REPORT OF
THE COMMISSIONERS
ON HARBOURS
OF REFUGE

II

MINUTES OF EVIDENCE

1859
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REPORT

OF

THE COMMISSIONERS

APPOINTED

TO COMPLETE THE INQUIRY IN THE TERMS RECOMMENDED IN THE REPORT OF THE SELECT COMMITTEE OF THE HOUSE OF COMMONS, IN 1858,

ON

HARBOURS OF REFUGE.

VOL. II.

MINUTES OF EVIDENCE.

Presented to both Houses of Parliament by Command of Her Majesty.

BIBLIOTECA
DEL C.O.A.M.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1859.

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MINUTES OF EVIDENCE

TAKEN BEFORE

THE ROYAL COMMISSION

ON

HARBOURS OF REFUGE.

WICK.

Thursday, 26th August 1858.

PRESENT :

Admiral HOPE (Chairman).

Mr. LINDSAY.	Captain VETCH.
Captain WASHINGTON.	Mr. COODE.

Mr. CALVER, Secretary.

Mr. JOHN MACKIE examined.

1. (*Chairman.*) What is your name? — John Mackie.

2. What is your profession?—I am editor of the *Northern Ensign* newspaper.

3. How long have you resided in this part of the country?—For 15 years, or nearly so.

4. Have you any statement to make to the Commissioners bearing on the subject of this inquiry, keeping in view the propriety of abstaining as much as possible from repeating the evidence which has been already laid before the Committee of the House of Commons on the subject in 1857 and 1858?—I am prepared to answer any questions that may be put to me on the subject, as I was under the impression that such would be done.

5. By whose authority did you come by that impression?—Of course I had no official information to that effect, but I believe it is customary in such cases that leading questions are put. However, with the leave of the Commission, I shall make a statement:—I am a native of Peterhead. I was harbour clerk of Fraserburgh from 1838 to 1844, when I came to Wick. I was for six years engaged on the *John o'Groat Journal*, and since 1850 I have been editor of the *Northern Ensign*. I am well acquainted with the trade of the north-east coast of Scotland, and have for many years paid much attention to the fishing and shipping interests. I produce a return of the shipping, foreign and coastwise, in the year 1857, for the ports of Wick and Peterhead. This shows 2,076 vessels, and 240,774 tons for Wick, and 97,177 tons for Peterhead. It has been prepared by me from a Parliamentary return by order of the House of Commons, No. 260. As further evidence of the traffic from Tarbet Ness to the Pentland Frith, I refer to Captain Washington's Summary Report of 1846, from which it appears that in that year the traffic amounted to 4,864 vessels, loaded, of 706,866 tons. I also produce a nominal return of the number of vessels at Wick on Friday last, and the ports to which they belong; the number of vessels being 81, and the tonnage 4,992. I also produce a return of the wrecks which have occurred here since January 1857, obtained by me from the receiver of wrecks appointed by the Board of Trade, so far as regards vessels, the entries as to boats being from my own personal knowledge. I have been unable to obtain any data from which to frame a return of wrecks previous to the date I have mentioned, unless it be a return contained in the Appendix to Captain Washington's Summary Report of 1846, which shows the number of vessels wrecked in Sinclair Bay, one half being engaged in the foreign trade. I have no return of the traffic through the Pentland Frith, nor do I know of any data for such a return, but I refer to Captain Washington's Report of 1846, wherein it is stated that, "according to the official "returns it appears that 4,178 vessels, carrying "cargo of 664,064 tons, passed through the Frith "in the year 1846; this number is exclusive of "vessels in ballast, passenger steamers, ships of war, "revenue cruisers, and all under 15 tons burden." I know that there has been a considerable increase in the Pentland Frith traffic since 1846. For instance, there was not then any steamer to and from Scrabster; there are now four every week. Further, we had no traffic with the Lewis in 1846, and it is now very considerable. Some idea of the vessels passing through the Pentland Firth may be formed from Captain Sulivan's statement before the Committee on Harbours in 1857 (page 57), that from 1,050 to 1,100 vessels found refuge in Scrabster Roads in 1856; and also from the fact that along the Caithness side of the Firth there are 15 pilot boats, with full crews of seven men each, engaged in piloting vessels through the Firth. Since 1846 the coasting trade of Wick has greatly increased. In that year we had only two steamers weekly for eight months in the year, whereas we have now six weekly during the whole year. From the best information I can obtain, I estimate that 10,000 passengers are landed and shipped every year at Wick, almost entirely by means of small boats. The shipping belonging to the port have increased from 39 vessels of 2,063 tons in 1850 to 56 vessels of 3,386 in 1857; while I find, by the Appendix to the Report of the Committee on Harbours of Refuge for 1858, that the tonnage of Peterhead has decreased from 77 ships with a tonnage of 12,616 in 1841 to 54 ships with a tonnage of 10,000 in 1858. The herring fishing at Wick is the greatest in the kingdom. It gathers fishermen from the whole northern counties, Argyle, Ross, Sutherland, Orkney, Shetland, Nairn, Moray, Banff, and Fife, and fish curers from various ports in Ireland,

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and from Liverpool, Rothesay, Leith, Dundee, and other places, and vessels from many home and foreign ports. I produce a return showing the number of persons employed in the fisheries at Wick, Lybster, Helmsdale, Peterhead, and Fraserburgh, showing a total of 18,712 on this coast, 4,597 at Peterhead, and 3,865 at Fraserburgh; also a return of the boats and their tonnage, and the quantity and value of fish exported, and the countries to which exported; also a return showing the progress of the Wick fishing in quinquennial periods since 1818, and a return of the herrings exported for the places above mentioned for the last five years. These returns have been collated by me from the Fishery Board's Reports, except in so far as regards the value of the fish exported, which I have calculated according to the prices published weekly in the various newspapers. Attached to the return of the boats and their tonnage, I have given a statement of the boats and men employed at the places named, in the present year; the return for Wick, Lybster, and Helmsdale having been obtained from the fishery officers, and those with regard to Peterhead and Fraserburgh from returns published in the newspapers of these districts. I have given great attention to the subject of harbours for many years, particularly since 1848, and am well acquainted with the creeks in this district, and have had very much intercourse with those who resort to this coast during the fishing season, and have had thus the most ample means of ascertaining their opinions on the subject of the accommodation necessary to enable them to prosecute their trade. Along the whole coast, from Helmsdale to Duncansby Head, there is no harbour of refuge, nor any place to which, with a gale from north-eastward to south, any vessel or boat can run for shelter. In consequence, the fishing and trade are carried at a very serious disadvantage. Steamers and other craft for Wick do not attempt to approach the coast when there is any appearance of a gale from the eastward. The boats are prevented from going to sea from the same cause, not because of any storm at sea, but from having no place of safety to run to in the event of any of those sudden gales which so often visit this coast. The best fishing nights of the season are frequently lost from this cause, and the fishermen are yearly becoming disheartened, the interruption growing yearly with the increase in the number and size of boats. Pulteneytown harbour is exceedingly limited in extent, and has no area to afford accommodation to any thing like the number of boats that prosecute the fishing in the neighbourhood. The other creeks and harbours on the coast, particularly Lybster, are in as bad a condition, and even worse. For want of a harbour the white fishing is not prosecuted to any extent, but there cannot be a doubt that were a sufficient harbour provided, as the Caithness coast has opposite to it the best fishing ground in the kingdom, the white fishing would be very extensively prosecuted. The only effective remedy to meet the necessities of the fishing, and afford shelter to the large number of vessels that pass this coast, is a breakwater across Wick Bay, that would provide sufficient shelter for the whole ships and boats, and would allow the fishing and trade to be carried on with safety. The herring fishing of Caithness is national; most of the persons, and vessels, and boats engaged in it are from a distance. It circulates an immense sum of money amongst the industrious classes in the manufacturing districts; all the materials required in its prosecution, wood, salt, iron, hemp, twine, tar, &c. are imported. It is the best nursery for the navy in the kingdom. When the Royal Naval Coast Volunteers were first enrolled, this district contributed one seventh of the whole force raised in Scotland, although the enrolling did not take place during the fishing season. The fishing on this coast has also proved itself a school of industry, and a large means of support for the Highland population. Ten years ago, not more than 50 boats were owned by Highland fishermen coming to this coast. There are now at least 300, and it is estimated that 1,500 individuals come every year to this coast fishings from the island of Lewis alone. There are good harbours and roadsteads on the Peterhead and Fraserburgh coasts, in proof of which I may state that 14,000 tons of shipping found refuge in Peterhead harbour alone last year, and a quantity not much less at Fraserburgh. Peterhead harbour has been recently very much improved, but that has not tended to increase the tonnage of wind-bound vessels. From a memorial issued by the harbour trustees in 1844, I find that from 1816 to 1824 there was an annual average of 244 vessels using Peterhead harbour windbound; from 1834 to 1844 the average was 237 annually; and although it is stated in that memorial that were certain improvements carried out, a large increase would take place, yet after these improvements have been effected, it appears from the Appendix to the Select Committee's Report, that from 1848 to 1858 the average has decreased to 200 vessels annually. I also find, from the evidence of Mr Stevenson, that the number of vessels observed passing Buchan Ness lighthouse during the day has decreased from 10,186 in 1850 to 5,274 in 1856. A new harbour was recently built at Fraserburgh, at a cost of upwards of 20,000*l.*, and there is first-rate accommodation for boats at both Peterhead and Fraserburgh. I have only to add, that the number of losses on this coast, and the serious inconvenience under which the fishing is prosecuted are yearly destroying the confidence of those engaged in it; and it is the opinion of those best qualified to judge, that unless something effective is immediately done, a calamity more sad than any that has yet occurred will sooner or later appal the country and drive the fishermen from our coast.

6. (*Mr. Lindsay.*) Can you give any reason for the decrease in the tonnage passing Buchan Ness?—I cannot; but one witness stated before the committee that it was probably the effect of railways; but such a cause can never affect the tonnage on this coast. I also observe that the Bell Rock tonnage decreased 3,000 tons in the same period, and that of Kinnaird Head 1,000; and while the tonnage of Noss Head decreased 1,000 in the same period, that of Pentland Skerries rose 500, and Dunnet Head 1,100.

7. You are not aware of any other course being taken by the vessels?—I am not.

8. (*Captain Washington.*) Is it not singular that these returns should show a decrease, while I observe, from the report of the Select Committee, that the traffic of the whole coast has considerably increased?—It is; I am satisfied that the traffic of the county of Caithness has increased 50 per cent. since 1844.

9. Then these returns must be wrong? How are they obtained?—They were handed in by Mr. Stevenson as part of his evidence.

10. (*Chairman.*) There is a portion of your evidence which relates to wind-bound vessels at Peterhead, will you restate it. (Witness here restated the figures with regard to the average number of wind-bound vessels entering Peterhead.)

11. These figures refer to wind-bound vessels?—Yes, they do.

12. Another portion of your evidence has reference to roadsteads?—I have counted 120 vessels at anchor at one time in Peterhead Bay.

13. What was the date?—I think in July 1843.

14. You saw 120 vessels in Peterhead roads?—Yes.

15. Now, what proportion of those vessels do you suppose were vessels that had taken refuge?—All took refuge—not refuge strictly speaking; the wind was moderate—but they were windbound and waiting a change to get south.

16. Then it appears by your statement that while the annual average of wind-bound vessels was 200, you yourself found in one particular day 120 vessels in the roadstead?—The 200 vessels are vessels windbound in the harbour, the others were in the roads.

17. (*Mr. Lindsay.*) You have said that a harbour of refuge is necessary for saving life. I suppose you mean the lives of those engaged in the fishing?—Yes; and I believe that a number of vessels that have been wrecked in Orkney would have been saved had there been a harbour of refuge at Wick.

18. In the list of wrecks which you have handed in, I observe at the top two vessels opposite to which you state, that had there been a harbour of refuge these wrecks would not have occurred?—I did not state so, it was officially reported by the receiver of wrecks.

19. Would the pier proposed according to Mr. Stevenson's plan have saved these vessels?—The wind was blowing in the direction that would have raised a heavy sea in the exact spot. In fact it is the universal opinion here, that Mr. Stevenson's harbour would do more injury than good. It would throw a heavy sea on the north side of the bay, and prevent the fishing from being prosecuted there, as well as cause many wrecks.

20. Would not the same follow under Captain Vetch's plan?—No; it is in deeper water and beyond the breakers. It comprehends a much larger area.

21. During a south-east gale, would small vessels, and especially fishing boats, be equally well sheltered inside Mr. Stevenson's harbour as that of Captain Vetch?—I don't believe they would.

22. Would such vessels enter Mr. Stevenson's harbour with as much facility as Captain Vetch's?—Certainly not; in the one case you have only 2½ fathoms, and in the other 6½. In fact, every one who knows the bay of Wick is aware that the heaviest seas are in that part where Mr. Stevenson proposes to build a harbour.

23. Would a harbour on a plan such as Mr. Stevenson's, but on a different line, be equally effectual?—No; there is not sufficient area or depth of water.

24. But I find that there is sufficient depth of water; inside you will see that there are 4½ fathoms at low water, spring tides?—Yes, inside, but only 2½ at the entrance.

25. No fishing boat would ground with such a depth of water?—They might not ground, but they would founder.

26. Do you mean to say that a fishing boat would run a greater risk of foundering at Mr. Stevenson's than Captain Vetch's harbour entrance?—I have seen them founder at the very place. I saw *thirty boats founder* in one day in Wick Bay.

27. Founder, I presume, from want of protection: but if protection were supplied would they then founder?—Certainly not.

28. What depth of water does a loaded boat draw?—From five to six feet perhaps.

29. Well, then, will not two and a half fathoms be quite enough to admit a boat in safety drawing five or six feet of water?—You are imagining smooth water; I am imagining a storm. I am satisfied there would be more loss were Mr. Stevenson's harbour erected. The sea in the bay would be increased by its erection.

30. Why would not a boat drawing six feet of water be as safe in Mr. Stevenson's harbour as in Captain Vetch's?—First, there is no area sufficient for the accommodation of the boats; secondly, a heavy sea would break over it; thirdly, the commotion in the bay would be greatly increased; and fourthly, I am sure that nothing short of the entire enclosure of the bay will meet the requirements of the place. The area of the present harbour is larger than Mr. Stevenson's, and consequently if Mr. Stevenson's harbour will not accommodate the 600 boats that fish from Pulteney Town alone, how can it afford protection to the 1,700 boats engaged in fishing on the whole coast?

31. Do you mean to say that with the present harbours, and that proposed by Mr. Stevenson, there would not be sufficient accommodation for the whole of the boats?—I do mean to say so; and there is the additional consideration that Mr. Stevenson's harbour would be in danger of silting up.

32. Would Captain Vetch's plan be open to the same objection?—No; the river would not affect it.

33. Would not the sea break over Captain Vetch's breakwater?—No, there is deep water there.

34. Then do I understand the sum and substance of your evidence to be, that for the safety of the fishing boats a harbour on Captain Vetch's plan would be necessary?—That is part of my evidence; but I also state that it is necessary on account of the coasting and foreign trade. A large proportion of the wrecks in Orkney would have been avoided had there been a harbour of refuge in Wick Bay.

35. You allude to vessels passing from the east to the west?—Yes.

36. Are there no harbours in Orkney?—There are, but they are at times very difficult of access.

37. And would a harbour at Wick be preferable?—It certainly would, because there would be no strong tides to contend with. With reference to the wrecks in Orkney, they are generally those of foreign vessels overtaken by easterly gales, and finding they have no chance of safety by running for this coast, they run for Orkney as a last resort, and are lost.

38. Do vessels bound from Hull to the Baltic come near this coast?—No.

39. Then, unless for vessels passing through the Pentland Firth, Wick is not on the great highway to the Baltic?—No; but there is still a large foreign trade going through the Firth, to and from America and the west.

40. Are the pilots, you speak of as being on the Pentland Firth, licenced?—I do not know.

41. Are they all employed in piloting?—They are.

42. And in any other occupation?—Yes, but their livelihood chiefly depends on piloting.

43. Do any vessels call for orders at Wick?—Yes; a great many.

44. Do they call here for orders from their owners in the south?—They do.

45. And this is considered a convenient port of call?—It is.

46. What is the course of post from London?—Thirty-six hours.

47. How soon would a reply reach?—In eighty hours; but you must remember that we have far speedier means of communication by the steamers' mails. I have had a telegraphic despatch in little more than eight hours; besides, orders are generally waiting the vessels before they come. I have known orders sent to Stromness, to which there is now daily communication.

48. (*Captain Washington.*) Have you any notion of the number of vessels that call at Stromness for orders during the course of a year?—I have not.

49. Were there a harbour of refuge at Wick, would many call for orders?—I have no doubt of it.

50. The line of telegraph is now open to Inverness, which is fifteen hours from Wick; do you think there is any probability of its being extended to Wick?—I have no doubt of it; perhaps across the firth, either from Lossiemouth or Fraserburgh. Two years ago I had a communication on the subject with the chairman of one of the leading telegraph companies, and the proposal was very favourably entertained.

51. Have you any doubt, then, that the telegraph would be extended to Wick were there a harbour of refuge made?—None.

52. And in that case Wick would be as well situated as any port in the kingdom?—It would.

53. Would it be possible to obtain a record of the loss of life at Wick for the last 25 years?—Perhaps it might; but I am not aware of any record having been kept.

54. In your opinion, which of the three plans of the proposed line of construction would be the preferable?—The largest, of course.

55. If that were constructed, do you think there

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would be sufficient refuge for vessels and boats?—There is no doubt of it.

56. Then it is your belief that if this harbour of refuge were carried out, every accommodation would be afforded?—There would be sufficient for many years, perhaps for ever.

57. And that would greatly tend to save life?—It certainly would.

58. And for the safety of the property?—Yes.

59. And also for the general accommodation and advantage?—Yes.

60. (*Captain Vetch.*) Look at the chart where you see the words "log buoy;" have you ever seen breakers there?—Very frequently heavy breakers.

61. Would vessels have got into harbour while such seas were rolling?—They would not.

62. Are you aware that when bored there were found sixteen feet of sand there?—I am not, of my own knowledge.

63. Would boats enter Mr. Stevenson's harbour with safety while these rollers prevail?—They would not.

64. There has been a good deal said concerning the outline of a harbour proposed by me; are you aware of the fact that Captain Sulivan, without any communication with me, proposed one which is nearly identical with mine?—I find that Captain Sulivan stated so in his evidence before the Committee last year.

65. (*Mr. Coode.*) You have stated your belief that Mr. Stevenson's harbour would silt up, while Captain Vetch's would not?—My conclusions are drawn from what was stated before the Committee last year.

66. Are you aware whether the deposit comes from the river or from the sea?—I am much inclined to believe that it comes partly from the river.

67. Have you ever seen a return of wrecks at Peterhead similar to that given in to-day?—I have not.

68. Are you aware of the chief causes of the wrecks at Peterhead?—I observe from the "North Sea Pilot," published last year by the Admiralty, that most of the wrecks near Peterhead occurred during fogs and calms.

69. (*Chairman.*) In a former part of your evidence you have mentioned that there are 15 pilot boats on the Caithness side of the Pentland Firth. Are you able to name any of the most experienced of those pilots who could afford some information to the Commissioners as to the amount of shipping passing through the firth?—Perhaps Donald Gunn, William Steven, Staxigoe, and William Bruce, Broadhaven. (*The Chairman ordered these pilots to be summoned.*)

70. Are you acquainted with any fishermen of experience who could give the Commissioners any information as to the probable effect of a gale from the south-east on the entrance to the breakwater marked B and C in the plan?—I think John Sutherland and James Bruce might do it.

71. (*Captain Washington.*) What number of vessels have you seen in Sinclair's Bay?—I do not remember. (*The Witness here handed in an additional return as to the rate of labour in Wick.*)

Captain William Campbell examined.

Capt. Wm. Campbell.

72. (*Chairman.*) What is your name?—William Campbell

73. What is your occupation?—I am master of the *Duke of Richmond* steamer.

74. Have you any information to afford relative to the subject of this inquiry?—I have. I know Wick Bay, the Caithness coast, and the Pentland Firth. I have been coming to this coast since 1831 in charge of steamers, and have been weekly in Wick Bay, landing goods and passengers often in great danger and risk; and with regard to Mr. Stevenson's plan, I cannot see how it would enable a vessel to ride in the bay in safety. I have often rode there with a heavy sea under the stern, and in great danger. I am sure that in a gale of wind no boat could enter there with safety, there being only from 2½ to 3 fathoms water. I am satisfied that the outside pier is the only plan that will afford shelter, as the sea will not break at it. There is a fair sea and no breakers, and there is no tide within the heads. I have been in Wick Bay many a time with great risk; and with regard to a wind-bound port, it is much wanted on this coast. There is no shelter, except at Cromarty or the Orkneys, which latter cannot be taken with a south-east gale, except with very great risk, and Cromarty is very difficult to take in such a gale. I was going down on the 13th March 1857 from Ackergill Bay, where I discharged part of the cargo, when the wind blew strong from south-south-east, and there was a strong flood tide. I kept under the land as long as I could with safety, and in the slack of the tide managed to leave for Orkney, close round Duncansby Head, the sea breaking over the head. I never was in such danger. Longhope and Widewall are very good harbours, but the question is how to get there with a south-east wind and a flood tide. In a short winter day, with the wind from the south, and the tide strong, it frequently happens that night comes on before reaching the firth, and then it becomes doubly dangerous, especially when we have no place of refuge on this coast. If there were a good harbour in Wick Bay, there would be no such danger.

75. You see on the plan the breakwater, which is shaded with an opening, marked B C. Suppose such a breakwater made, what is your opinion of the effect of the sea at its opening?—It would afford great shelter for the bay.

76. You mistake me. I do not speak of shelter for the bay; but I want to know what is your opinion as regards an opening in the centre, and one at each end, what style of sea would there be in the opening?—There might be a heavy sea outside, but it would expend itself there, and there would be no drawback.

77. Would there be any cross sea, making it dangerous for boats to run in in heavy weather?—No cross sea, but a fair going sea.

78. Have you any opinion as to the effect of a current running across the mouth of the bay, say from South Head to Proudfoot Rock, on the sea which runs without the bay in heavy weather?—It would have no effect, either good or bad.

79. It was stated to me, not very long ago, that the effect of the tide running through the Pentland Firth from Holborn Head to Dunnet Head acted as a breakwater, and rendered Scrabster Roads a very much safer anchorage than if there had been no tide at all. What is your opinion as to that?—He is quite right in that respect; the tide carries the sea past the bay; it is the same in all places.

80. What is the average strength of the tide which runs across the Bay of Wick?—From 4½ to 5 knots an hour in stream tides.

81. Then will the tide produce a similar effect on the sea which runs into the Bay of Wick, which you say it does in Thurso Bay?—Yes.

82. At what part of the Bay of Wick does the sea begin to break in heavy weather?—It breaks usually where the buoy is placed.

83. Does the sea never break beyond the log buoy?—Oh yes, a long way beyond it.

84. Will you mark in the plan where it does?—(*Witness here marked as far out as the line of the Salmon Rock.*)—But I have never been in the bay with a sea breaking heavily, and it may break further out.

85. (*Mr. Lindsay.*) How long have you been in command of the *Duke of Richmond?*—Since 1838, except four years, when I had the *Queen.*

86. Where does the *Duke of Richmond* trade to and from?—Between Granton, Aberdeen, Wick, and Scrabster.

87. How often do you visit Wick?—Twice a week, winter and summer.

88. Would a south-east wind not be a fair wind for the Pentland Firth?—With a strong wind and a flood tide a very heavy sea is raised rapidly; so much so, that no vessel can enter the firth with safety.

89. Suppose a ship caught with a south-east gale off this coast stood for the firth, and presuming that she were going at the time with an ebb tide, what would follow?—She would be quite safe in that case.

90. Would she find good shelter in Longhope?—Yes.

91. Are there any other harbours in Orkney?—Stromness and Widewall, but Widewall is not so good as Longhope.

92. Presuming the proposed breakwater were erected in Wick Bay, and you were caught with a south-east gale at sea, opposite to Wick, or between Wick and the Pentland Firth, where would you run?—I would not take the firth; I would run to Wick.

93. If it were daylight, would you not take the firth?—If I were going on my voyage I might.

94. But say you were disabled, and found it necessary to take a harbour of refuge?—Then I would take Wick, which I could always reach; whereas it is often very difficult to get to the harbours in the Orkneys.

95. You think that even with an ebb tide you could run with greater safety to Wick?—Yes.

96. Would the breaking sea not throw a considerable surf at the entrance of the harbour, marked B and C?—Yes, but not so heavy as to prevent entrance; it would be only on the surface, and there would be no difficulty in getting in.

97. Would the sea at the entrance be more cross than now?—No, it would not; there would be a fair sea.

98. You said, in answer to a question by the Chairman, that boats could not live within the limits of Mr. Stevenson's pier. Why?—Because there are only 3 to 3½ fathoms, and there would be a heavy drawback inside, so that the boats would be driven against the pier ends.

99. Would a boat be liable to be drifted among the breakers at the log buoy?—Yes, if not very quickly hauled round.

100. Would it alter the condition if the end of the breakwater, instead of turning round to the westward, were carried out more to the northward, beginning at east?—There would be the same danger, and perhaps more sea.

101. If there were a pier from the other side, would it have the same effect?—I do not think so.

102. Suppose a small area of water enclosed, would that be sufficient for the protection of the lives and property connected with the fishing?—It might do for boats, but not for vessels.

103. (*Captain Washington.*) Do you think that a sailing vessel, entering Mr. Stevenson's harbour in a south-east gale, could get in safely?—No.

104. Suppose the other breakwater were erected, could she do so?—I have no doubt of it. There would be sufficient room for her to veer cable.

105. The bay is very liable to heavy gales and seas?—Very liable to sudden gales and heavy seas, and it is not safe for a sailing vessel in a south-east gale to try the firth at flood tide.

106. Then the natural harbours of the Orkneys are of no use; they might as well not exist?—Quite so; we cannot get to them.

107. Where do you think the opening of the breakwater should be?—In the centre.

108. Would you prefer a central entrance, or two entrances, one at each end?—I would prefer one in the centre.

109. Have you ever run for any other harbour in easterly gales?—Yes; Aberdeen for instance.

110. Do you know the width of the entrance?—No.

111. Have you any difficulty in taking it?—Yes, there is great risk at times, arising from the fresh out of the river.

112. Is there any such at Wick?—Very little indeed, compared with Aberdeen. I have passed Aberdeen, and been unable to take it in bad weather.

113. Have you ever been in Peterhead or Fraserburgh?—Not for 12 years.

114. Did you not make use of the expression, that to take the Pentland Firth in a gale of wind and a flood tide would be like going into the jaws of a lion's mouth?—I think it would.

115. (*Captain Vetch.*) In the course of your experience, have you ever been on a lee shore with an upright rock?—Frequently.

116. Does the sea break?—I have seen it break as high as 200 feet.

117. Have you felt any bad effects from the recoil?—No.

118. Suppose the piers of the breakwater in this bay were upright, would the effect be the same?—Yes, the recoil would be the same; I have no doubt of it.

119. Would you be kind enough to show in the chart where the tide runs in front of the bay?—From Proudfoot Rock to the old kiln on the south.

120. Then inside of that line you would not be much affected by the current?—It would be comparatively still water.

121. (*Mr. Coode.*) You prefer a central opening to one in the side. Why?—Because there is better access in the centre.

122. Suppose the wind from south-south-east?—I would still prefer the centre opening.

123. (*Chairman.*) Here is a plan prepared by Mr. Rendel showing a breakwater from south side to Proudfoot.—A very good plan.

124. Comparing it with the others you have seen, which do you prefer?—I prefer Mr. Rendel's.

125. Why?—Because it shows where the sunken rock of Proudfoot lies. It is a dangerous rock. There would be less sea in entering it.

126. Do you consider Rendel's entrance preferable to Captain Vetch's?—I do. The sea would not enter into the bay so much; it would strike on the north shore, and leave the rest of the bay smooth.

127. With reference to vessels of 200 tons and upwards, would you consider Mr. Rendel's entrance preferable?—Their merits would be very much the same.

128. What are the prevailing winds off the bay of Wick in heavy weather?—North-east to south-east.

129. From what quarter have you the heaviest weather?—South-east.

130. How does the heavy weather begin?—It is very uncertain and changeable.

131. Do the heavy south-east gales begin from the south, veering to east, or the reverse?—They generally begin at south-east, veering to west after rain. At times they begin to the north of south-east, and veer round.

132. With reference to open boats, what entrance would you prefer?—Equally the same.

133. (*Captain Washington.*) What is the tonnage of vessels frequenting this coast?—From 1,600 tons to 50 or 60.

134. Are there many vessels of 1,000 tons frequenting this coast?—During the last three months I have seen some as high as 1,200.

135. Have they increased in size lately?—They have.

136. (*Mr. Lindsay.*) Where do vessels of 1,000 and 1,200 tons go from?—From Sunderland, Hull, Shields, Leith, to America and elsewhere, to West Indies and Australia.

137. When it would be unsafe to go through the Pentland Firth, could they not go round the Orkneys?—There is great danger that way.

138. Why so?—Because there are strong tides and heavy seas there, and on account of the low land.

WICK.

Capt. Wm. Campbell.

26 August 1858.

Capt. Vetch.

139. (*Captain Vetch.*) Would not a beacon at Proudfoot answer your difficulty about showing where it is?—Not at night.

140. Would not Mr. Rendel's piers be more apt to be carried away?—Yes, by being nearer the stream.

141. Would there not be some benefit obtained by having the breakwater in smooth water, and at a distance from the run of the tide?—Yes.

142. (*Mr. Coode.*) What change of a south-east gale is the worst?—That which changes to north.

Mr. J. G. T. Sinclair, of Ulbster, examined.

Mr. J. G. T. Sinclair.

143. (*Chairman.*) Have you any evidence to give bearing on the subject of this inquiry?—The evidence which I have to offer is this:—That whereas Mr. Stevenson stated, in his evidence before the House of Commons Harbours Committee, that from the lighthouse returns the vessels passing Buchan Ness were 7,763 as against 3,113 passing the Pentland Skerries, showing a proportion of 5 to 2 against Wick; I can show, on the same authority, that the tonnage which paid for Buchan Ness was 1,112,636 tons as against 713,609 paying for Noss Head, reducing the proportion to 3 to 2. I have further to state, that from evidence which I have collected at Leith I have reason to believe that the Baltic trade which has been reckoned in favour of Buchan Ness should be deducted, because vessels which sail from Leith and ports south of it to the Baltic do not sight Buchanness more than once in six voyages. By another calculation, from the same returns, I have been enabled to estimate that the Baltic traffic so accounted to Buchan Ness is 120,000 tons; consequently the true statistics of Buchan Ness stand as 992,636 against 713,609 already given. The next point is, that vessels are calculated by trips, while boats which are at sea for 36 nights are only accounted for once. Another point is, that the foreign and colonial owned passing vessels may be estimated at a tonnage of half a million on the basis of a trade circular from Elsinore, which shows that, exclusive of British vessels, which are already reckoned, 15,108 vessels of all nations passed Elsinore in 1851, exclusive of vessels passing the firth bound for Christiana and other ports. This return does not distinguish the ports from which the vessels came, excepting the American vessels, which numbered 134, all of which passed through the firth; and assuming each of those vessels to average the same number of tons as the 67 which are enumerated in the list, namely 404 tons, the total of the American tonnage going and returning would be 108,272 tons. Averaging the remaining 14,684 vessels paying sound dues at only 100 tons, or less than one third the average of American vessels, we have, say 2,972,800 tons, exclusive of British and American shipping, passing Elsinore; and supposing only one fifth of that traffic to go to America and Australia, which together make two fifths of the globe, we have 594,560 to add to the Wick or Pentland Firth traffic, which added to the American-owned vessels and 713,609 tons which pay dues for Noss, we have a total of 1,362,305 tons justly in favour of Wick against 1,112,606 reckoned by the lighthouse returns in favour of Peterhead.

144. (*Mr. Lindsay.*) Are you aware where vessels from London, Hull, and Sunderland generally sight the land or take their departure from for the Baltic or Archangel?—In the evidence which I collected at Leith from masters and owners I found that not one sixth ever sight Buchan Ness. They leave St. Abb's Head from Leith, and in no case do they ever sight Buchan Ness unless driven by a storm out of their course; and it was considered to be a hardship to pay for Buchan Ness, and has often been complained of.

145. Do not the vessels which pass through the Pentland Firth pass Buchan Ness?—They do.

146. How did you arrive at these returns?—By my own compiling from the Report of the Lighthouse Commissioners of 1852 and 1853, from which time the lights have not been kept separately. I deducted from the Buchan Ness total traffic that of the local ports on the east coast of Scotland going through the Caledonian Canal and Pentland Firth. The residue I considered to be Baltic traffic; and I may add to my statement that I have ascertained from the Caledonian Canal Commissioners returns, that 1,307 vessels, of 101,000, exclusive of local traffic, passed through the canal. Of these a large number would have passed through the Pentland Firth had there been a harbour of refuge in Wick Bay.

147. (*Chairman.*) Do you feel yourself competent to offer an opinion as to the merits of the different plans of breakwaters before the Commissioners?—In the presence of so many gentlemen who are so well acquainted with such matters I would rather not express an opinion.

Commander John Tudor, R.N., examined.

Commander J. Tudor, R.N.

148. (*To the Chairman.*) I am a commander in Her Majesty's navy. I was sent to Wick by the British Fishery Society in the beginning of March 1854, and had three plans of a harbour by Mr. Rendel with me to place before the Chamber of Commerce and others interested. One was a plan for a small harbour extending from the Salmon Rock, another was on a slightly increased scale, and the third was for a large harbour enclosing the entire bay from the south to the north heads. After being here for nine days, during which I witnessed an easterly gale, I became satisfied that the smaller harbours would be of little or no use to the shipping interests. I found that the rollers in the bay commenced beyond the six-fathom line, and acquired force as they proceeded shorewards, and I could not therefore recommend a harbour in three-fathoms water entrance. On the 14th March 1854 I wrote to the secretary a letter, of which I now hand in a copy, and ere I returned to London I communicated to the chairman of the Chamber of Commerce my intention to warn the directors of the danger of erecting the smaller harbour. I have seen the harbours now during four winters, and am more strongly of opinion that any harbour to be efficient must be outside the line of rollers thus pointed out by me on the map. If it is so it will not only protect the boats, but be a refuge for shipping generally. Wick is the key of the Pentland Firth; vessels leaving it for the firth may clear Cape Wrath in one tide. There are sometimes heavy rollers in the bay even when the wind is blowing out and it is calm outside. I recollect an instance which I pointed out to one of the members of the Refuge Harbours Committee, Lord John Hay, March 1857, when a merchant brig was reaching to the northward with royals set, and the bay was one mass of rollers, so that it would have been impossible for a boat to live within the six-fathom line.

149. From what quarter is the heaviest weather?—From south-east.

150. How do south-east gales commence?—I generally find that with the wind from the west it veers round with a rising barometer; then there is a succession of strong easterly gales, lasting for several days; and with a falling barometer we have strong east-south-east and south-east gales.

151. Do they come from the eastward?—They generally spring up from the eastward. When we get heavy rains it generally veers round to the west.

152. What opening do you prefer in the proposed breakwater ?—Decidedly the central opening.

153. If Mr. Rendel's plan were adopted, would you prefer the opening shown by him to a central opening ?—I should not ; it is well known that with a strong gale from the south silting suspension may be washed in. With a strong gale and an entrance of 500 feet in the centre, very little can be washed in, and that is counteracted by the influence of the stream. In the case of a central opening, no silt can be carried into the harbour, as it will either pass in a south-east gale to the north of Proudfoot, or in a north-east gale it will be carried south, and I consider the back water would be sufficient to counterbalance any attempt of the silt to deposit itself.

154. What is your opinion of the opening as regards fishing boats ?—For all purposes I prefer the central.

155. What do you think of the effects of the outside sea upon the opening ?—Supposing it to be placed on the line of current, it would not enable a vessel to recover her steering way in passing in so easily as if the line of current were a ship's length or two outside the breakwater. In the latter case she would recover her steerage way after passing the line of current.

156. Where is the line of current ?—It reaches from Proudfoot across to the old kiln.

157. Would the position of Mr. Rendel's breakwater be sufficiently inside the line of current ?—To a great extent it would ; it would depend greatly upon the direction and strength of the wind.

158. I see a jetty in Mr. Rendel's plan ; what is your opinion of it ?—I like to see a slight curve, because it takes down the strength of sea by the under-running current below.

159. And you would recommend the jetty ?—With a slight alteration.

160. Is it good or bad ?—If it is to be a straight breakwater it will be of no use, as no vessel could enter in southerly gales with a following sea along the line of breakwater.

161. Do you consider Mr. Rendel's plan would provide sufficient shelter to make it a harbour of refuge in the highest meaning of the term, as well as for local traffic, in which I include the whole of the fishing boats ?—I should regard it as providing ample shelter for the 1,700 boats fishing on this coast, but not for all the trade I have seen here were it to be doubled.

162. What is the largest size of vessel you expect to take refuge in Wick Bay ?—With a harbour of refuge, it would admit the *Diamond*, one of our frigates. The vessels named to-day of from 1,200 to 1,600 tons could find shelter. The boats are laid up during winter, which is the time when refuge for vessels is most needed, and I am certain that, with such a harbour, we should not only compete with other ports, but raise a hardy race of seamen prosecuting the white fishing during every lawful day of the year.

163. What number of vessels are likely to resort to such a harbour of refuge at any one time ?—I have been told that as many as 300 or 400 vessels have been seen to go through the Pentland Firth in one tide, and taking into consideration the frequency of south-east gales, and the danger of going through the Firth during the flood tide, I have no doubt the greater part of such vessels would take refuge in Wick.

164. During what period of the year is the fishing prosecuted ?—It generally commences on the 14th of July, but this year it was a good deal later. It lasts from 7 to 8 weeks, according to the success.

165. Do you think these boats would interfere with wind-bound vessels using the harbour ?—I am satisfied that it would be on a sufficiently large scale to meet all the requirements of both, as well as the local traffic.

166. (*Mr. Lindsay.*) How long have you been harbour master ?—Since March 1854, except 18 to 20 months when I was engaged in the Crimean war.

167. What description of vessels were those 300 to 400 which passed through the Firth in one day ?—Coasting and foreign.

168. What number of boats belong to the bay ?—1,100 ; and on the whole coast from Helmsdale northwards, upwards of 1,700.

169. What loss of life has taken place since 1854 ?—When I was absent some losses took place in the bay, but only one life, so far as I can remember, so long as I have been here ; but on the 9th September last I lost a man out of the life-boat, in rendering assistance to a Hanoverian galliot ; this is the second to my knowledge. That loss was occasioned through negligence during the dipping of the sail. In January two boats belonging to the steamer laden with goods were lost, and six men were drowned.

170. Would a harbour of refuge have prevented that calamity ?—Most certainly.

171. You object to Mr. Stevenson's pier. Why ?—Because it runs along the line of breakers, and is in only 3 fathoms water, while the rollers commence in 6 fathoms, so that a vessel or boat would have to run through a long line of rollers before getting in.

172. Do you think the plan proposed by Captain Vetch is necessary for the protection of the fishing boats and the lives of the fishermen ?—I do.

173. Why ?—Boats frequently return laden with fish to the extent of from 60 to 80 crans, and I do not think it safe for a deeply laden boat to enter the bay unless it were perfectly free from rollers.

174. (*Captain Washington.*) Were not 100 lives lost on this coast in 1848 ?—In this immediate vicinity 37 men were drowned, and many boats were wrecked, and on the other coast a great loss also took place.

175. Would a breakwater have saved those lives ?—Every soul and every boat.

176. Are fishermen deterred from going to sea ?—Very often.

177. Do you think a breakwater would encourage them to go ?—I am sure it would, it is a hard case when there is the slightest chance of getting fish to find them hanging back, when there is no bad weather outside, simply for want of a low water harbour to which they can run.

178. Have you a barometer ?—A very splendid one, erected by the British Fishery Society.

179. A light also ?—Yes ; lighted all night, the whole year round.

180. Does Proudfoot Rock want a beacon ?—I think it does; but it is beyond my jurisdiction.

181. Whose duty is it to provide it ?—The Lighthouse Commissioners.

182. As a sailor will you venture to take refuge in a south-east gale in Mr. Stevenson's harbour ?—No. There are those who can prove that before the present piers were erected there was a depth of from 9 to 10 feet water at low-water spring tides at the end of the south quay. I have seen it dry, and there are not now more than two feet water under the same circumstances, and I am satisfied that Mr. Stevenson's harbour would silt up in the same manner. We have shifting sands which would greatly affect Mr. Stevenson's harbour.

183. Does the silt come from the river or the sea ?—From the river principally.

184. Might the present harbour be deepened were a large harbour erected, and can it be underpinned ?—It cannot, as the walls are built on large loose boulder stones.

185. How many pilots have you ?—Ten.

186. Are they all licensed ?—Yes, by the Society ; in the event of an application, an examination would take place, myself acting as chairman, and assisted by the men of nautical experience at the port.

187. Do you consider the breakwater should be inside the south head ?—To a small extent.

188. And on the north side ?—Within Proudfoot.

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Capt. Washington.

189. Would it be more easily taken thus?—It would.

190. What are the advantages of it being inside?—It would prevent the sea running along the breakwater.

191. Is there sand in suspension off Wick Bay?—There may be sand in the tide way.

192. Would it be safer to have an entrance on each side sheltered by the heads, or one entrance in the centre?—The objection to one of the side entrances would be the recoil of the sea; with one entrance there would be no difficulty in taking it, and there would be less chance of silt coming in.

193. Is the trade of Wick chiefly dependent on the fishing?—Chiefly, but not entirely. This is an agricultural county. We import a great quantity of timber for other purposes than that of the fishing. The trade is dependent both on fishing and farming.

194. (*Captain Vetch*). Supposing an entrance according to Mr. Rendel's plan, would it not hamper the fishing boats and destroy much valuable curing ground on the north side?—It certainly would.

195. Would it be possible for boats to lie along the north shore were Mr. Rendel's plan adopted?—The central entrance would give the largest area and line of shore.

196. Would it not be safer for vessels and boats to get clear of the tideway before entering the harbour?—It would.

197. Would the sea break or recoil against an upright wall?—It would recoil when there is a sufficient depth of water.

198. When the boats have been prevented from going to sea has there been fish on the coast?—Frequently; for instance, I have known boats venturing out and returning with 60 or 70 crans.

199. What do you consider to be the amount of the loss through this cause?—Last year we lost, perhaps, about 50 or 60,000*l.*

200. What is the largest quantity you have known to be caught in a single night?—25,000 crans, or 25,000*l.* value.

201. If there were a refuge harbour, would the boats go to sea when they are now prevented?—Often.

202. (*Mr. Coode.*) You speak of rollers off the bay with the wind off the land, do you mean rollers or a ground swell?—These were breaking rollers or bar seas, not ground swell. A ground swell does not break, a roller does.

203. How do you account for it?—The only way I can account for it is that there may have been a gale on the outside, but we have a roll inside at times without any outside roll.

204. Does not the tidal water affect the bay with silt?—Not at all, or very slightly.

205. What effect have the freshes of the river upon the water in the bay?—I have seen along with the fresh the water discoloured to the full extent of the bay.

206. You have said that you prefer a curved to a straight breakwater, give your reasons?—I consider that the sea going along a straight line gains force, and a curved line disarms the sea.

207. What would be the weight of a boat with the fish and nets?—The calculation is 340 lbs. to the cran.

208. How many crans will a boat carry in extreme cases?—From 70 to 80 crans.

209. Then 80 crans would be about 12 tons; what do you consider a proper weight for a boat of 15 tons to carry?—I would consider her overladen with 80 crans, if she had to go through rollers or broken water, except in fine weather.

210. And you say that rollers break in 6 fathom in the bay of Wick?—Yes.

211. How many nights does the want of a harbour prevent the boats from going to sea?—Last year about 10 nights, and that may be called an average.

212. What plan would you propose for the present harbour?—I applied to the society for rebuilding the walls, but that could not be done unless there was a harbour outside.

213. Would not two openings give more motion in the bay than one?—I do think so.

214. What is the cause of silt in the bay?—Merely matter in the tideway driven in by gales.

215. What is the cause of the deposit of silt?—Merely the stillness of the water.

216. I again ask you would not two openings give more circulation in the bay than one, and prevent the deposit of silt?—Yes; but the other objections outweigh that consideration.

217. (*Chairman.*) Outside the line at which rollers commence is there generally a fair sea?—Not a rolling sea.

218. How much of a boat's gunwale is above the water when she is heavily laden?—About 9 or 10 inches.

219. Is that sufficient for her safety?—Certainly not in our bay with the rollers, or when there is any break in the sea.

220. What is sufficient for safety in the bay with the rollers?—I do not consider that there is any safety at present in the bay for a heavily laden boat.

221. Therefore in heavy weather boats must be light?—Yes; rather than attempt the harbour mouth they frequently run to the bays and creeks adjoining.

222. What is the fair load for a fishing boat at so many crans per ton?—A fishing boat of 15 ton would have a fair load with 50 or 60 crans on board; 4 tons is a fair estimate.

223. (*Mr. Lindsay.*) Is it not a matter of suprise to you that only one life was lost during two years, considering the number of boats, the great many lives at stake, and the great depth to which they load their boats?—No; because the fishermen do not risk going out.

224. Where were the 37 lives lost in 1848?—Within the bay of Wick.

225. Would a breakwater have saved them?—Every one of them.

Mr. Patrick May, Shipmaster, examined.

Mr. Patrick May.

226. (*Chairman.*) When did you first go to sea?—1835.

227. At what age?—Thirteen.

228. Have you read the evidence as respects Wick taken before the Harbours of Refuge Committee?—Yes.

229. Will you state for the information of the Committee what you wish to offer on the subject?—In my opinion there is great necessity for a harbour of refuge here. I generally agree with all that Captain Campbell and Captain Tudor have said.

230. Is there any additional statement which you would like to make?—I came by Elsinore in October last, along with 186 sail, two-thirds of which were bound to the north of Scotland, and about 30 to the United States. I often heard in America the great danger of the Pentland Firth, and of the want of a harbour in its neighbourhood, save the Orkneys, which are very difficult of access during stong south-east gales, so much so that so long as we can wear canvass I should never think of running for them with a flood tide in a south-east gale, but would keep off shore.

231. What description of vessel have you been at sea in?—From a fishing boat of 4 tons to 2,500 tons sailing vessel. I have fished in Ireland, and was master of a coasting smack before going to America.

232. How long?—Two years.

233. After you went to America what sized vessel did you command?—I never commanded one in America, I was bound for it.

234. What was the size and description of the vessel?—A brig of 140 tons register.

235. What vessel had you next?—The one I now command, which is a schooner, 85 tons new measurement.

236. How long have you been on board of her?—Two years.

237. Where have you been trading?—Wherever I can get a freight, Newcastle, Hull, Caledonian Canal, Bristol Channel, and the Irish ports.

238. What is the direction of the wind right through the Pentland Firth?—On this side from south-south-east to east-south-east.

239. In a heavy south-east gale and a strong flood tide, how far from the firth does the tide extend an unfavourable influence for a ship?—Three miles off from the Pentland Skerries.

240. In heavy weather, with the wind from south-south-east and the flood tide, where would you heave your vessel to, if you had several hours to wait?—I would go no nearer to the firth than Wick, but a little to the south of it, if the gale were heavy.

241. Why would you heave to or hang off at so great a distance?—Because it would be of the greatest importance for me to keep so far off in case of wanting room to leeward by change of weather.

242. With an ebb tide, is it always safe to pass through the firth?—Not with a strong gale and deeply laden vessel. In such a case there is often the greatest risk.

243. Have you heard of any accidents to vessels in the firth?—None have happened to myself. I saw one brigantine, bound from the Baltic to Dublin, in it, when the gale was so heavy that her topmast went over the bows, and her foreyard in the slings.

244. Were you in any danger?—Not then.

245. But my question referred to serious accidents by which vessels and crews suffered?— Being a stranger here, I cannot name cases, but the losses off the Pentland Firth have been long spoken of.

246. (*Mr. Lindsay.*) What experience as a master mariner have you had on this coast?—I have been backwards and forwards upon it for 9 years.

247. Where have you been trading to during that time?—To the Baltic, the Irish Channel, and other places I have named.

248. What ports have you traded to during the last year?—Rostock, Hull, Drogheda, Newcastle, Portsoy, Wick. I was overtaken on the 1st of May by a heavy gale off the Firth of Forth, when the *Ann Fleming* was wrecked at Duncansby Head with a strong south-east gale which shifted to north-east. We were two days under double-reefed canvass, and were afraid to come to anchor at Wick or Sinclair Bay, lest the wind should change.

249. Let us suppose that you were on your passage from the Baltic to Hull, and suppose, when in the longitude of Greenwich, and the 58th degree of latitude, you were caught by a strong south or south-east gale and got disabled and thought it necessary to run for a harbour of refuge, and suppose there were such a harbour at Peterhead or Fraserburgh, and another at Wick, which of these places would you run to?—To Peterhead, of course.

250. Say you were bound the other way and obliged to run for a harbour of refuge, where would you run?—To the same place.

251. But if you were bound for Ireland or America, where would you put in?—Wick, of course; as I would naturally run to the point nearest my port of destination.

252. You stated that in going through the firth, even with an ebb tide, it would not be safe at times?—It would not, with a small vessel, heavily laden, and a heavy sea.

253. Would you not have Cromarty under you lee?—Yes, with a south-east gale.

254. If you missed Wick, running for it with a south-east gale, could you fetch Cromarty from Wick?—No.

255. Whether, are the headlands of Wick or those of Fraserburgh and Peterhead seen at a greater distance?—The Paps of Caithness are seen much farther off at sea. The land about Wick and Peterhead is equally low.

256. Going back to the first point, would you see the land of Peterhead at an equal distance as the land at Wick?—I think not. I came from the Humber last winter, bound for home, and passed Peterhead without seeing it; nor did I sight any land till between Tarbet Ness and Cove Sea Skerries. The weather was thick.

257. If you had been the same distance from Wick that you were from Peterhead, would you have seen it?—I think not.

258. Suppose you leave Shields for the Baltic, from what point would you take your last departure from the land?—From the nearest headland at the harbour's mouth.

259. Would it be desirable under certain circumstances to sight the high land in the direction of Peterhead, in taking your final departure from the land?—If I did so, I should do the work of a schoolboy.

260. Supposing you were sailing from Archangel or the Baltic to Newcastle, for what land would you make?—I would steer right for Newcastle.

261. Would you hesitate to go through the firth with a flood tide?—I should not like to attempt it.

262. Do you think there is any risk with an ebb tide?—To a stranger there is, with a heavy sea and a deep vessel.

263. Can you say from you own personal knowledge that the passage is dangerous?—I am sure it is.

264. Is there any more danger in going through the firth with an ebb tide in moderate weather, than in any ordinary navigation?—I do not think there is; but, in rough weather, I was never more afraid in my life than in going through the firth.

Mr. James Dunnet examined.

265. (*Chairman.*) What is your name?—James Dunnet.

266. What is your occupation?—Shipmaster.

267. At what age did you go to sea?—Since I left my parents; and at the age of sixteen. I was not indentured, but served a regular apprenticeship of five years. I have been at the fishing and engaged as a mariner for twenty years. I first went to Inverness, and at the close of my apprenticeship remained with my former employer till he sold off; and since then I have been employed in the coasting trade to Ireland, the Baltic, and various home ports. I have been a master mariner 12 years, having charge of vessels from 70 to 100 tons register. I have often had occasion to go through the firth in very coarse weather, and have many times been in danger in it. I cannot say I ever suffered disaster, but many of my companions have been drowned in it, losing their vessels and themselves.

268. Will you state any accidents that have occurred to your own knowledge in the firth?—The *Lady Camilla* of Thurso, Captain Crear, foundered in the chops of the firth, and no trace of her was ever seen, save some small pieces of wreck and the dog. She was laden with guano, and was a fine new schooner of 80 to 84 tons.

269. Any more accidents?—The sloop *Pomona* foundered there; and another vessel, that I remember, lost two of her hands by their being washed overboard in a heavy gale from the south east, in attempting to take the firth to get shelter. Both of

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these vessels I have named as being lost, attempted to take the firth during a south-east storm and flood tide.

270. Did these losses arise from stress of weather or from an error of judgment?—They came under the land, thinking to get to the windward of the tide, and being unable to get through they were overtaken and foundered.

271. (*Mr. Lindsay.*) Where were you employed in the fishing trade?—In Pulteney Harbour.

272. How long ago?—21 years.

273. Were there any losses of life during that time?—There may have been many lost, but I was only a boy and do not recollect.

274. Do you remember any boats being lost?—I do not remember.

275. Say you were outward bound for the Baltic, and there was a harbour at Wick and Peterhead, and you were caught with a south-east gale in Greenwich longitude and 58 latitude, where would you run for?—I would prefer the nearest harbour, if it were a safe one.

276. If you were coming from the Baltic?—The cases would be the same; I prefer the weathermost harbour.

277. As a sailor, would you prefer a refuge harbour on a salient point to windward or one situated in a bay?—In the event of running for a harbour, if the wind is blowing to the land it is no matter where we go.

278. If both were to leeward, which would you prefer?—There is no difference, in my estimation.

279. Suppose in running for Wick harbour you missed it, what then?—If you could not catch a harbour in a bay you would have as bad a chance on a point in thick weather.

280. If you miss Wick harbour would you be able to weather the land and get to the firth?—We might.

281. Say you ran for Peterhead or Fraserburgh and missed them, would you have a better chance than at Wick?—In a south-east gale I would get shelter in the Moray Firth.

282. Suppose an easterly gale?—I would then try to get to Cromarty.

283. Have you no fear of running for a bay when a gale comes on?—Not when I know there is good refuge for me.

284. In the event of your missing Wick in a south-east gale, would there be any chance of your saving your vessel? Would you not also have a bad chance of saving yourselves?—I would not be afraid to try to get to sea during the day, and we have Noss Head under our lee during the night, affording some protection.

285. Would you have more danger in running for Cromarty than Wick?—There is more danger.

286. Is there more danger in running for Cromarty from Peterhead, than running for the Pentland Firth from Wick?—In the first case I would have a long lee shore.

287. Would you rather run for the firth than attempt to make Cromarty?—Cromarty is safer; but we might sooner take a fair wind and a drubbing, so as to make a passage.

288. What then comes of all your evidence as to the dangers of the firth?—It is certain destruction if attempted at certain times.

289. Any more losses?—Yes, the *Sea Sprite* was lost in a south-east gale, with all on board. I saw a ship on her beam ends in the firth lose two of her hands under like circumstances.

290. Was this by the sea breaking on board?—Not in this case.

291. Would it be as likely to take place in the open sea as in the Pentland Firth?—By no means.

292. I want to know the extent of the losses, during your experience, to life and property in the firth during a south-east gale and a flood tide?—Those I have mentioned to you were of that description, and many others I do not now remember. It it very likely that many losses have occurred in the firth without a single individual being left to tell the sad tale. This was the case with the *Sea Sprite* of which there was not a vestige found, although there is no doubt she foundered there. A brig, belonging to Blythe, sailed from the Baltic with grain from Dublin, and was never heard of. I am sure that 10 or 12 such cases have occurred in my knowledge.

293. (*Chairman.*) It is stated in evidence before the Committee of the House of Commons that vessels are afraid to run down to the Moray Firth with a gale on shore, because when they near Cromarty the wind comes off the land, and, getting between two winds, they are not able to reach it. Have you had any experience on that point?—I had twelve years' practice of it, and can verify the statement if the wind is south-west, and I have got many a good drubbing going through it. But if the wind is direct from the sea it will not catch you, but will carry you direct to Cromarty. It is a leading wind.

294. My question referred to cases in which the wind blows from north-east to south-east into the land.—Such a wind is a leading wind all the way to Cromarty, and blows fair home to Cromarty Harbour. If we are at the south side of the firth the wind is shy, but if it blows from north-east to south-east it will take us to Cromarty.

295. Therefore, with a wind from north-east to south-east it is always safe to run to Cromarty as respects carrying the wind close home to the harbour mouth?—Yes.

296. Is there any difficulty in running for Cromarty in heavy easterly gales, or in gales from north-east to south-east, or anything in respect of the weather, character of the land, tides, or currents which makes Cromarty unsafe?—None of any importance.

297. The weather in the bight of the bay is not thicker than at sea?—Not unless with wind and rain.

298. Would it then be more hazy than at sea?—I don't think it would be much.

299. Generally speaking, at what distance can you make the land in thick weather?—5 or 6 miles off.

300. Then the chief disadvantage of Cromarty is the ground you lose by running so far to leeward?—A vessel bound from Inverness to the south would take Wick sooner than Cromarty. If she leaves Inverness she would sooner get to Wick than Cromarty, because, if the wind comes from the north-east, she has a clear coast, but with a north-east wind she would not be able to have a clear coast at Cromarty. If a vessel is bound up the Moray Firth, with wind at south-west, if she catches the Caithness land, she gets a true set of the currents, but on the other side the current perpetually sets down when the wind is down the Firth, and the sea is so strong that a loaded ship cannot work to windward with any advantage.

301. (*Mr. Lindsay.*) You say that in leaving Inverness with a strong south-west wind you would rather run for Wick than Peterhead or Fraserburgh?—That is my opinion if there were a suitable harbour.

302. But suppose there were a suitable harbour at Fraserburgh, would you, if you could reach that harbour, prefer Wick?—If there were a harbour of refuge constructed where I think it ought to be, I would prefer Wick to either Peterhead or Fraserburgh.

303. If they were equally suitable?—If there were the same advantages at both places then I would think that the shorter the distance the better.

304. Then you prefer these to Wick?—Of course, as they would be further in my way.

DONALD GUNN examined.

WICK.

Donald Gunn.

26 August 1858.

305. (*Chairman.*) What is your name?—Donald Gunn.

306. Your occupation?—A pilot and fisherman at Staxigoe, two miles from Wick.

307. Have you been a pilot all your life?—I have.

308. Are you well acquainted with the Pentland Firth?—I have good reason, as I have been a pilot there for 50 years.

309. How many vessels on an average pass annually?—I have no idea, as I never kept any account.

310. How many a week?—Perhaps two or three a week.

311. In a month?—Half a dozen, or eight or nine, perhaps a dozen.

312. What is the general size?—From 100 to 1,200 tons, sometimes 1,500.

313. Are the larger proportion in the coasting trade?—Yes.

314. Have you any idea of the proportion?—No.

315. During a south-east gale with a flood tide what would you do with a vessel of 1,000 tons?—If she were weighty I would take different ways to shun it; I do not think it dangerous.

316. Suppose a 500-ton vessel, what would you do with her?—Take her through, of course.

317. During a south-east gale and flood tide?—Of course. I would go in off Duncansby, cut over, and get into the eddies and pass the flood tide.

318. In the case of a vessel of say 50 tons and upwards, has it ever occurred to you to be obliged to heave to, to wait the tide on account of the heavy sea?—Not a doubt of it.

319. Well, in vessels of 500 tons, would you hold the flood tide of any account?—Not a grain.

320. How low in point of tonnage would you regard a vessel as included in the remark you had made as holding the tide of no account? Could it be safe for a well-found vessel of 300 tons?—Yes. And as fit for a vessel of 1,000 tons, and handier too. A vessel of 150 tons could manage to get through the Pentland Firth so long as a boat could board her.

321. Suppose a south-east gale with a flood tide, would you consider it consistent with your duty, suppose you are pressed by the captain to run through?—No. I would heave to till the tide began to slack.

322. Does that include vessels up to 150 tons?—Yes, the sea takes off when the tide slacks.

323. And a vessel of 250 tons?—I would do the same with her.

324. If 300 tons?—All the same.

325. If 1,000 tons?—All the same.—If I thought the tide too strong, I would heave to and hang off. I would just please myself, and do what I thought was the best.

326. (*Mr. Lindsay.*) You say you would do the same with all sizes of vessels?—Quite the same.

327. Would there be any risk in heaving to in the circumstances you speak of?—Not a grain.

328. Would it be a right thing to heave to?—If the tide was against us it would, and it would be all the same with a vessel of 500, 300, 200, 150, or 100 tons.

329. During your 50 years' experience of the firth you have seen a great number of vessels taking the firth?—Yes.

330. What loss of life and property have you seen?—I have never seen very much.

331. Have you seen many instances of lives being lost?—Yes, when there were no pilot to get on board.

332. Do you think there is a greater loss in taking the Pentland Firth than in taking ordinary channels?—Yes; there is no place of refuge, and you must run the firth.

333. Do you think the danger greater than the risks of ordinary navigation?—It is a dangerous passage for those not acquainted with it, but to those who know it there is no danger.

334. In your long experience on the coast are you aware of any large loss of life among the fishermen?—Yes.

335. Do you recollect any particular occasion besides 1848?—I don't remember any in particular. I have seen many losses about the harbour and mouth of the bay, but none so great as in 1848.

336. Do you remember the spots where these losses took place?—In different parts, but generally close by the harbour among the breakers.

337. Suppose there had been a pier made, would these lives have been saved?—Yes.

338. (*Captain Washington.*) At what rate does the spring tide run in the Pentland Firth?—About 9 knots.

339. Are the ships pretty fast sailers?—They have just enough ado to run over the spring tides.

340. When this tide is running how do you generally manage a vessel?—I would run her into the eddies.

341. Would you try to cross and go down to the Orkneys?—Yes; if I got hold of the eddy.

342. Any difficulty in getting to it?—No doubt a little, but it can be done.

343. I am afraid, Donald, you are thinking we are doubting your knowledge of piloting, but we are not?—I don't care whether you do or not. I rather took a thocht of that.

344. I want to know if you generally advise vessels to pass through the firth. Remember you are a pilot of 50 years' standing, and it may go out to the world that you recommended vessels to go through the firth under dangerous circumstances?—I have done it.

345. Is it your general practice?—Not to a great extent.

346. How many vessels have you seen go through the firth in one day?—I have seen as many as 150 in 24 hours.

347. Had they all pilots? They had not all Donald Gunns on board?—They had not all pilots.

348. Did they know what to do? Would they with a nine-knot flood dare to go through the firth?—They might.

349. What would happen if they did? Would they get their decks swept?—No.

350. Then there is no particular danger in the firth?—Ah!

351. Have you ever been across the North Sea or English Channel?—No.

352. Did you ever hear of such a dangerous race as the Pentland Firth?—I don't know.

353. How many of the 150 vessels you refer to had pilots?—I can't say.

354. Where were they bound?—They were going to America.

355. Was the weather fine?—Yes.

356. Where do they pick up the pilots?—At Noss Head, Sinclair's Bay, and Duncansby Head.

357. Do many vessels anchor in Sinclair's Bay?—A good many, but I cannot state the number.

358. Do you think those vessels would come into Wick if they had the shelter?—Yes.

359. Have you heard of Wick Bay being made a harbour of refuge?—Yes.

360. Suppose it were made, would many vessels go in?—Yes; it is not so convenient to go to the Orkneys with a wind from north-west round to south.

361. In the case of a breakwater being built here, would it be much used?—Oh, yes.

362. (*Mr. Lindsay.*) In the case of a south-east gale do you think they would run for Wick in preference to the Orkneys?—In coarse weather.

363. Is it your opinion that during a strong south-

WICK.

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Mr. Lindsay.

east gale, with a good harbour, a vessel caught by dirty weather would prefer Wick to going to Longhope?—In coarse weather they would be unable to get a pilot, and would therefore prefer Wick.

364. If it were so strong that a vessel could not get a pilot to take her into Wick, would it be as safe as to go through the Pentland Firth?—There would be no danger in getting into Wick.

365. Is there not much more room in the entrance to the firth?—Yes, of course.

366. If it were clear weather, and if you were caught with a strong south-east gale, would you prefer the firth or Wick?—If the wind were east-north-east I would enter Wick, as I could not get round Duncansby Head. But there is no place of safety at present.

367. (*Captain Washington.*) Then it is your opinion, as a 50 years' pilot, that were a breakwater built at Wick it would be good for ships and boats?—I do think so, and for the preservation of men's lives.

368. If it were brought out as proposed in this plan, would you have one or two entrances?—One is plenty.

369. Where?—In the centre, a little to the northward.

370. Why?—Because it would give more shelter from south-east winds.

371. Which of those two plans would you prefer?—Rendel's, and that to the line of Proudfoot, or a small bit within it.

WILLIAM BRUCE, Pilot and Fisherman, Broadhaven, examined.

William Bruce.

372. (*Chairman.*) How long have you been a pilot?—Since I was 16 years of age. I have been going in and out nearly ever since.

373. For how many years?—37.

374. Can you give us any idea of the proportion which the coasting trade of the Pentland Firth bears to the foreign?—These several years back the foreign trade has not been so brisk as formerly: the coasting trade is the greater part.

375. Were you ever in the Pentland Firth with a vessel with a south-east gale and flood tide?—No common sailing vessel can cut the tide. She must be run from one eddy to another, or dodge in the south side of Duncansby Head before attempting to go through against the height of the spring tides.

376. Would a pilot, thoroughly well acquainted with the firth, by availing himself of the eddies, have any hesitation in heavy weather in attempting to run a vessel through?—None.

377. And that at all times of the tide?—If the wind were sufficient to allow her to enter the inner channel, but not the strength of the channel.

378. If you had a commanding wind while in the eddy tide you would have no difficulty in running?—No.

379. Now are there any particular states of winds in which there is more certainty of a commanding breeze than others?—Yes; a wind from south-south-west to east-north-east and north-east suits going to the westward, and we can keep the eddies also; but if the wind were from the north-west we cannot keep the eddies so well.

380. Is there much difficulty in heavy weather and flood tides with the wind from the eastward in vessels being boarded by pilots?—Yes, very often. It is only in moderate weather that a pilot can be got. Particularly in south-east breezes they cannot get out to the ships.

381. Under such circumstances would you consider it unsafe for the captain, unless he were very well acquainted with the firth, to run through with his vessel?—Yes, unless perfectly well acquainted.

382. To what size of vessels does this refer; because, in point of safety, a vessel of 1,500 to 2,000 tons is differently circumstanced from a smaller one?—A vessel of from 300 to 80 tons is suitable for running. A ship of 300 tons is handy if she has not a large draught of water. One of 80 or 90 tons is also handy. You can go with small coasters where you cannot with larger vessels.

383. This applies to a vessel with a pilot?—Yes.

384. But supposing she has no pilot, would you be disposed to say that in the case of a well-found vessel of 200 tons the captain would act prudently in attempting to run his vessel through with a flood tide?—Not many would attempt it; he might try, but he would likely be driven back, and he would then dodge and wait till the tide turns.

385. In your experience has it occurred to you to notice many vessels run into the firth in heavy weather unacquainted with the locality, and then failing in their object to haul off and heave to?—I have seen many lost in consequence. I have repeatedly known vessels founder between the Pentland Skerries and Duncansby Head. I have seen them do so in daylight. I have known of four foundering between these heads.

386. You are therefore of opinion that a harbour of refuge at Wick would be of great advantage to the passing trade?—It would, no doubt. It would save a great many wrecks in Sinclair's Bay and north of it; but as there is no refuge at present, with a flood tide many vessels are driven ashore.

387. (*Mr. Lindsay.*) Do you think there would be more danger in running for the Pentland Firth than for Wick Harbour?—There would be no danger in running for Wick Bay, and it is very rarely you can run for the firth without danger.

388. Suppose you could get no pilot on board?—I would enter Wick without a pilot.

389. Have you known many vessels to founder, having no pilot on board, between Duncansby Head and the Pentland Skerries?—Perhaps 10 or 12 lost or foundered with all hands in attempting to take the firth with a south-east gale and a flood tide. Four or five of them have occurred to my knowledge not many years back.

390. How many vessels go through the firth annually?—It is greatly diminished since I remember.

391. Foreign and coasting vessels; what is the cause?—I cannot say, unless the trade is diminished.

392. The trade of the country during the last 37 years has very greatly increased, has it not?—It may be so; but foreign ships have diminished on this coast. I remember to have seen 70 or 80 vessels at one time for America and the West Indies, and now not so many will go the whole spring.

393. Do they take a different route?—Many go to the north of the Orkneys; they don't venture there early in spring, to avoid being knocked about and put back.

394. Are you aware of any large losses among the fishermen?—Yes, in 1848.

395. Any other?—There was one not long since, when two of the steamer's boats were lost in the bay with six men.

396. Did the boats swamp?—Yes.

397. Suppose there had been a harbour of refuge in Wick, would that calamity had been prevented?—Not one of these men would have been lost.

398. Did you ever know of any of the boats swamping at sea?—I have heard of one.

399. With regard to 1848, I believe the bulk of the lives were lost in Wick Bay?—Yes; one boat in attempting to take Staxigoe foundered with all on board.

400. Do you recollect the limits of where the 100 lives were lost on that occasion?—Principally between the Ord of Caithness and Duncansby Head, and I believe some on the opposite side.

401. (*Captain Washington.*) Is the land at Wick easy to make?—Yes; it has excellent landmarks, such as Noss Head, where there is an excellent light.

402. Is it serviceable?—Nothing like it. It is a landmark by day and a light by night.

403. There are also very high hills which are easily recognised at sea?—Yes, the Paps of Caithness.

404. They are the most remarkable hills along the north-east coast of Scotland?—They are.

405. Before Noss Head lighthouse was erected were there many wrecks in Sinclair's Bay?—Yes.

406. Have they diminished since?—Very much.

407. Supposing a refuge harbour were made at Wick would vessels come to it?—Certainly, they would prefer a harbour to an open bay such as Sinclair's Bay.

408. Would you prefer a central to a side entrance?—I would like an opening in the centre.

409. Do you think that many vessels would enter Wick if a breakwater were erected?—They would, particularly the North American vessels. I have been eight days between Tarbet Ness and Duncansby Head tossed about in a vessel.

410. At such a time would you have been glad to come to Wick?—Certainly.

411. (*Mr. Coode.*) Can you give any idea of the loss of life between Duncansby Head and the firth?—I remember 4 schooners with from 3 to 5 hands in each. One brig ran ashore at Keiss, and lost one or two hands. She belonged to Montrose.

412. You have some knowledge, you say, of 10 to 12 vessels?—Yes; and they would have an average of not less than 4 hands each.

413. How many vessels have you seen at one time in Sinclair's Bay?—10 to 20 sail. It is no rare sight to see vessels in Sinclair's Bay almost every day with wind from north to south-west.

414. (*Chairman.*) How long is it since you were tossed about for 8 days?—20 years ago.

415. Were you unable to weather Tarbet and get to Cromarty?—We twice ran for Tarbet with heavy snow showers, when the wind veered to south-west and put us back in the direction of the Orkneys. The vessel was bound for Liverpool.

416. During these eight days how was the wind?—From north-north-east, north east by east, veering round by showers of snow.

417. The following question and answer appear in the Harbour of Refuge Committee's Report of this year: "Does it consist with your knowledge that a "ship running for Cromarty, with a north-easterly "gale, frequently meets with a wind at the upper "part of the firth blowing downwards that prevents "her getting into Cromarty at all?—It is a very rare "occurrence to go into Cromarty with a fair wind. "I have done so on some occasions; but when we "get to Brough Head the wind comes down almost "usually out of Cromarty." What is your opinion about that?—There are so many high lands about Cromarty; there is no point from which a contrary wind does not blow after entering the Sutor Head.

418. Do you consider the wind from north-east to south-east blows fair into Cromarty Firth?—About east-north-east right up.

419. And how far does the wind blow so as to rely upon it?—If the wind is east or east by south, Cromarty can be entered perfectly well; but if there is any northing in it, you always meet the wind coming in.

420. Does this apply to south-east and south-south-east?—No; it is always a true wind.

421. Supposing a breakwater is placed according to Mr. Rendel's plan, where would you, as a pilot, put the entrance?—In the centre, with a small bit of an overlap.

422. In regard to fishing boats, is the centre the most suitable for them?—I think so. Rollers always break bodily into the bay. I would not fear any cross sea from the backwater from the heads. The opening would make a clear channel for itself.

WILLIAM STEVEN, Pilot, Staxigoe, examined.

423. (*Chairman.*) What is your name?—William Steven.

424. Your occupation?—Pilot and fisherman for 54 years.

425. Have you been here during the examination of the last witness?—Yes.

426. And you have heard his evidence?—Yes.

427. Can you give any information as to the proportion of foreign and coasting trade passing through the Pentland Firth?—I cannot say. The foreign traffic has fallen off, but the coasting trade has risen, and is in the majority now.

428. To what do you attribute the falling off?—I don't know.

429. Has it ever occurred to you to witness vessels in heavy weather attempting to enter the firth, and, finding themselves unable to cut the tide, stand off?—Very few; if night were coming down they might do it. If daylight, they would endeavour to stem the tide.

JOHN SUTHERLAND, Fisherman, Wick, examined.

430. (*Chairman.*) How long have you been a fisherman?—Since I was about 9 or 10 years of age.

431. Have you ever been placed in great danger by being caught with a south-east gale?—Yes; the running sea on the bar is the principal danger. Always in deep water there is safety. In shoal water there is always great danger.

432. Have you ever had to throw your cargo overboard?—Several times.

433. Were you ever obliged to cut from your nets?—No. We have shaken fish out of them to lighten the boat.

434. Were you ever obliged to run and take shelter anywhere else than Wick, in consequence of the state of the weather?—No; but I have known plenty having to do so.

435. (*Mr. Lindsay.*) Were you fishing in 1848?—Yes.

436. Were you at sea on the 17th August of that year, during the storm?—Yes, we ran for Pulteneytown harbour, where we got in by one o'clock.

437. You remember the loss?—Quite well.

438. Where was the loss?—Principally at the quay head, or a little without it.

439. Among the breakers?—Yes.

440. If there had been a breakwater in the bay would these losses have been prevented?—There is do doubt of that.

441. Is there any other harbour in the neighbourhood?—No safe one.

442. You know Broadhaven?—There is no great safety in it. It is already lumbered with boats.

443. What number of boats would it contain?—From 100 to 150.

444. With safety?—Few boats can be there in safety.

445. Do they prefer Wick?—Yes. I have known the Broadhaven boats run to Wick for safety.

446. How much of the gunwale of the boat is above the water when she is laden with herrings?—About 10 inches to a foot.

447. If the weather were rough?—There would be great danger.

448. (*Mr. Coode.*) You know the bar?—Yes.

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J. Sutherland.

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Mr. Coode.

449. In what particular spot is it?—It shifts according to the gales. It is sometimes farther out than at others.

450. Would 100 to 150 boats get shelter in Broadhaven?—No.

451. What number would lie there in safety?—I cannot say. It is no very safe place.

452. If you run into Broadhaven could you beach your boat and draw her up?—Only a few boats could do that.

453. Could boats ride safely there during a heavy easterly gale?—No.

JAMES BRUCE, Fisherman, Pulteney-town, examined.

James Bruce.

454. You are a fisherman?—I have been so all my life, since the age of 9 or 10.

455. Have you ever been in danger of life in prosecuting the fishing in heavy weather?—Very often.

456. Have you ever thrown your cargo of fish overboard?—Sometimes at sea.

457. Why?—In stress of weather, to lighten the boat.

458. Have you ever cut away your nets?—None, except a few old ones, when we had plenty of herrings.

459. Would you prefer an opening in the centre, or at the side, in a breakwater across the bay?—In the centre; it would be smoother water, and it would give a vessel more room to reach out.

460. Where does the line of current run?—From Old Kilns to Proudfoot Rock. I prefer the breakwater outbye, as the sea does not break so heavy there.

461. Have you any opinion as to whether the tide has any effect on the sea which runs into the bay?—Not much; it runs pretty fair across, from one point to the other.

462. Are you quite sure you noticed no change in the sea when there is more or less tide running across the bay?—Very little difference.

463. (*Mr. Lindsay.*) How old are you?—67 years.

464. Have you been a fisherman 55 or 56 years?—Yes.

465. Do you remember the great loss of life in 1848?—I do. There was never any here like it.

466. The gale in 1848?—There were not so many lives lost, but there were more than 100 boats.

467. Where?—About the bay.

468. (*Captain Vetch.*) What is the strength of the stream of tide across the mouth of the bay?—In spring tides about 3 knots close in shore.

469. What is the velocity of the strongest?—I don't know, but at times it runs very fast.

Friday, 27th August 1858.

PRESENT:

Admiral HOPE (Chairman).

Mr. LINDSAY. | Mr. COODE.
Captain VETCH. | Mr. SEWELL, Secretary.

Mr. PATRICK MAY re-examined.

Mr. Patrick May.

27 August 1858.

470. (*Chairman.*) Do you think that it would be a public benefit to have a harbour of refuge as near to the Pentland Firth as possible; and would you in that event prefer Wick to Peterhead as a site?—I would.

471. Is the Pentland Firth in your opinion more dangerous than the Moray Firth, the Firth of Forth, or any other part of the coast?—It is far more dangerous; there is no comparison at all. I should consider it the worst part from Cape Wrath to Flamborough Head.

472. Suppose a vessel on this side of Caithness were overtaken by a gale from the south east, would she be in great danger?—Not unless she were close in shore.

473. If she were a little distance off, say four miles?—She could run for Cromarty; but if it blew strong from the south and she were close in shore, she would be in danger; and if Wick were available she could bear away for it.

474. Would a vessel be in as great danger at Peterhead as at Wick, with a gale blowing on the shore? If not, state why.—Peterhead projects more into the sea than Wick, and is not affected by the dangers of the Pentland Firth. In that case, suppose no harbour were at Peterhead and a vessel before being too close in saw the land, she would bear away for the Moray Firth.

475. Do you think Cromarty is as easily taken by vessels unable to get to Peterhead, or, in other words, is Cromarty as serviceable as a place of shelter to Peterhead as to Wick, or more so?—I should say it is, with the wind on the shore, it is as serviceable to Peterhead as to Wick.

476. (*Mr. Lindsay.*) Why would you prefer Wick to Peterhead as a site for a harbour of refuge?—For no other reason than the dangers attending the Pentland Firth in south-east gales in strong flood tides.

477. Would not Peterhead be more in the track of vessels than Wick?—I should say not. Ships returning from the Baltic to Ireland, America, or any part of the Irish Channel, would not go in the direction of Peterhead to go through the Pentland Firth; and after passing Peterhead, although the weather might be fine, then a vessel in her course from Peterhead to the south might be caught by a heavy gale of south-east wind.

478. Is Peterhead not more in the track of vessels from the east coast and channel ports of England to the Baltic?—In that case a vessel has nothing to do with either Peterhead or Wick.

479. Is not Peterhead more in the track?—It is nearer by about 90 miles.

480. Then, if you are forced to take a harbour of refuge, surely you would prefer Peterhead to Wick, as it would be 90 miles nearer to you?—Yes.

481. Well, is not the proportion of vessels trading between the Baltic and the east coast and English Channel far greater than the vessels trading between the Baltic and Ireland and America?—I am not able to give an opinion, as I do not know the proportion of vessels. I am rather inclined to think there are more vessels going through the firth than to England and Scotland together, I mean the coast trade as well as the Baltic, all these go through the firth.

482. But I am asking you with regard to vessels coming from the Baltic, Archangel, &c., are these not more?—I do not know.

483. Are there other harbours you could take between the Firth of Forth and the Pentland Firth?—Cromarty is one.

484. Can you take Cromarty at all times in safety? —Yes.

485. Have you never found a difficulty with variable winds in getting into the bight of a bay?—I have.

486. Have you run for Cromarty during easterly gales?—Not blowing heavy.

487. Have you found the wind variable in running for Cromarty?—I have found the wind very variable, but the entrance is easy. It is only in light weather I have seen it variable. I think in a heavy gale there would be no danger of contrary winds.

488. Why do you consider the Pentland Firth more dangerous than the Moray Firth, the Firth of Forth, or any other part?—In consequence of the very strong tide in it. It is considered by seamen that the Pentland Firth is the worst part of the sea in the whole kingdom.

489. What is the width of the firth at the narrowest part?—I should say that from Stroma and the Men of May the channel is not above 2 to 2½ miles wide.

490. Is it deep water?—Deep, but very dangerous with a calm; as the tide shoots nearly from one point to another, and in some cases overlaps.

491. Do you consider it as dangerous with calms as with gales?—Nearly as much so. I have the same objection to go through with a light gale as an easterly gale.

492. But you would not hesitate with an ebb tide? —No.

493. (*Chairman.*) Where did you say was the narrowest part?—From the Men of May to Stroma.

494. Are you sufficiently well acquainted with the firth to take a vessel into slack water with a flood tide for the purpose of getting through?—I sometimes do it. I am not a pilot. I never took a pilot through the firth. I would consider it a disgrace for us coasters to take a pilot; but the pilots are best acquainted with the tides.

495. As a general rule, from your knowledge of the generality of coasting vessels, do you think they venture in blowing weather to take advantage of the slack water?—I never saw a vessel get into slack water, I would rather take the channel. Suppose I lost a spar in the slack, what would become of me? I would run the risk of losing the vessel and cargo, I would not do so in a heavy gale.

496. Has it ever occured to you to see a vessel doing it with a pilot on board?—I have never seen it.

497. It has been stated in evidence that Longhope, Widewall, St. Margaret's Hope, and Deer Ness are difficult of access, is that your opinion?—I consider that they are all difficult of access, excepting to such men as are acquainted with the Orkneys. Few strangers would run to the Orkneys in bad tides to look for a harbour. I would not wish to do so.

498. State your reasons for not wishing to do so, taking into view the charts we go by at sea?—To run for the Orkneys by such charts, there are so many islands, and rocks, and sounds that a stranger is apt to mistake the one for the other, and get embayed, when he would not be able to bring up.

499. Have you any other reasons?—That is my chief reason.

500. As a general rule do the coast vessels use larger charts?—They do. They are a little smaller in size than greater-priced charts.

501. Do they use charts of the same scale as the Admiralty charts?—Perhaps about half the size.

502. Is Longhope a safe anchorage in blowing weather?—It is. I consider it safe.

503. Is the holding good?—I consider it is.

504. I was told the other day that gusts of wind are so violent in Longhope that vessels are often forced from their anchorage, and driven to sea?—I never saw any case of the kind, or knew of it; but from my knowledge of the harbour I would not venture to contradict it.

505. What do you say about Widewall Harbour in that respect? on the lee side of the bay do vessels ever drive from their anchorage there, and go on shore?—I never knew of it; but I don't consider Widewall a good harbour. It is a long time since I was in it, and to my knowledge then, the water was very shoal, at least the part where I was in.

506. And in order to get a good shelter you must go into shoal water?—Yes.

507. (*Mr. Lindsay.*) You said you would consider it a disgrace to take a pilot going through the Pentland Firth. Is this the case at all times?—Yes.

508. If it is the case, then the difficulties and dangers of the passage can't be so great as you state them?—I will tell you my reason. Out of 103 vessels belonging to my port not a single master takes a pilot, even when entering the bar of Liverpool; therefore I should take it as a disgrace were I to do it going through the firth.

509. Do you consider there is greater danger and difficulty in entering the firth than Liverpool, to which place you have been accustomed to trade?—All my fear in entering the firth is the sea in a gale, or the tide in a calm; but in entering the bar of Liverpool by night or by day we must know all the banks and marks, otherwise we loose our vessel.

510. The harbours of refuge in the Orkneys are difficult of access?—Yes, to any one not acquainted.

511. Do not a large number of vessels take refuge in them at times?—At Longhope principally.

512. In your experience has there been a large loss of life and property in consequence of this?—I have often heard from other masters of great losses of many vessels and crews; but I do not know of my own knowledge.

Mr. James Dunnet re-examined.

513. (*Chairman.*) Do you think it would be a public benefit to have a harbour of refuge as near the Pentland Firth as possible, and do you in that event prefer Wick to Peterhead as a site?—I would.

514. Is the Pentland Firth in your opinion more dangerous than the Firth of Forth, the Moray Firth, or any other part of the coast?—It is.

515. Suppose a vessel on this side of Clythness overtaken by a gale from south-south-east, would she be in great danger?—I have been caught myself several times, but managed to get to Cromarty.

516. Would a vessel be in as great danger near Peterhead as at Wick, with a gale blowing on the shore?—I do not think there is the same danger in a south-east wind. The distance from Buchan Ness to Rattray Head is short, and you have a clear firth to Cromarty, nor there have you to wait for a pilot or for flood or ebb tides.

517. Do you think Cromarty is as easily taken by vessels unable to get to Peterhead, or, in other words, is Cromarty as serviceable as a place of refuge to Peterhead as to Wick, or more so?—More so to Peterhead than to Wick. A vessel off Peterhead with a south-east wind has the Moray Firth clear. A vessel getting through the firth, and caught with a south-easterly gale must go back again, as she could not be kept to windward, and must go back day or night if caught with a lee-going tide.

518. Would you venture to take a vessel into slack water to avoid the flood tide in the Pentland Firth in heavy weather?—I would not like to make free with it, because the rebound of the sea off shore must cause extra motion in the water, and a vessel under low canvass, coming under these high lands, is apt to get becalmed and find the wind variable, and not blowing in its regular course as in the open sea.

519. Do you consider that the prevalent opinion

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among men in charge of coasting vessels?—I cannot say. I know that every master whom I know will work towards the head, but not in heavy weather, and will prefer keeping off till the tide ebbs.

520. (*Mr. Lindsay.*) Do you take a pilot going through the firth?—No. In fine weather I act as pilot myself, and in rough weather I cannot get one.

521. In what trade are you employed?—Round the British isles to Hull and elsewhere.

522. Are you often through the Pentland Firth?—Many times a year. Sometimes twice a week. I was twice last week.

523. Do many shipmasters as a rule take pilots?—No; none of the coasters do.

Mr. WILLIAM BRUCE re-examined.

Mr. William Bruce.

524. (*Chairman.*) You know what tide and half tide is?—Yes.

525. Is there such a tide in the Pentland Firth?—Yes; but not in the centre.

526. From Dunnet Head to Freswick Bay does the flood and the ebb run for an equal number of hours?—No; the top of the spring runs for 3 hours south-south-west to south-west, but that is the eddy tide; and 9 hours of ebb tide runs about north-east to Dunnet Head.

527. How far from the land does the eddy tide extend?—Not half a mile at first; but in course of 3 hours it extends for 3 or 4 miles off half way between Duncansbay Head and Freswick.

528. From Dunnet Head to St. John's Point do the flood and ebb run an equal number of hours?—Close inshore.

529. There is no difference?—When the ebb commences to run to the west at any point it forms an eddy, and the tide runs the contrary way. This applies to flood and ebb.

530. From St. John's Point to Duncansby Head is there any difference in the ebb and the flood?—The difference is nearly the same except under the headlands.

531. When taking the side from Hoxa Head to Iron Ness are there any eddies which enable you to work with advantage in getting through the firth?—A variety of eddies and several cross tides to encounter.

532. Can you avail yourself of the tide to get through?—Yes.

533. (*Mr. Lindsay.*) In your experience, is there more danger in going through the Pentland Firth during calm weather or light winds than during south-east gales?—Yes, there is.

534. It appears that the wind which masters of vessels most dread is south-east gales and a flood tide?—It is.

535. How long does the flood tide last?—Six hours; in the eddies only 3 hours.

536. Do you know how many vessels have taken refuge in Longhope and the other harbours of the Orkneys?—The largest number I have seen at Longhope at one time is from 200 to 300.

537. Were they lying in perfect safety?—No; Because I have frequently seen them driven out of Longhope on to the island of Flotta.

538. Ships of all sizes?—50 to 1,000 tons, and even 1,200 to 1,400.

539. Have you known of any vessels being wrecked in Longhope?—Yes; with north-west winds I have seen them drag their anchors, and driven on shore. In no other quarters will they drive ashore there.

540. Have you ever known a vessel wrecked in a south-easterly gale in taking Longhope?—No; but I have seen it in calms.

541. What other harbours are there in the Orkneys?—Panhope is a small harbour not much resorted to, and is perfectly safe with the wind off the land. I never saw more than three or four vessels in it

542. Any other harbours?—Widewall Bay. But it gives no safety. It gives good anchorage for small vessels in 7½ fathoms water.

543. Any others?—Stromness, which holds the largest-sized vessels that frequent the coast; but it is difficult of entrance except to those who have been there before. I have seen 30 to 40 Greenland vessels in it at one time.

544. Any other harbours?—There is a variety of places where vessels wait the tides, but none of them are available as harbours of refuge.

545. Have you anything to add to your evidence of yesterday?—I have one statement to make: I omitted to make reference to the great number of pilots that have been drowned off this coast since I came here. There have been no less than 14 boats, with an average of at least five men.

546. Where did they belong?—Stroma, Freswick, Sinclair's Bay, Staxigoe, and one to the River of Wick. All these boats were occupied in piloting and fishing.

547. Where were they lost?—Between Noss Head and Dunnet Head.

548. Would a harbour of refuge have saved them?—It might not; but if it had not been that the ships had no harbours of refuge to run to, and consequently drew the pilots off, they would not have been drowned.

549. How many ships have been lost?—A good many. I hand in a return of a few. There are more, but these are some of them from 1834 to 1844, between the Ord of Caithness and Duncansby Head, during south-east and east gales.

550. In your opinion, would the whole or a part of these wrecks have been prevented had there been a harbour of refuge in the immediate neighbourhood on the coast?—Part at least, I am sure, but I cannot say how many.

551. (*Chairman.*) Suppose a vessel out of her reckoning by bad weather, and making for Mill Head, would Deer Ness Harbour be of any use to her?—Deer Ness is quite out of our district and track.

552. What about Kirkwall?—It is a very good harbour, but there are a great many shoals and tides on both sides of the entrance.

553. (*Mr. Coode.*) Do you know Gills Bay?—I do.

554. Is the holding good?—Very; but vessels never lie more than a tide in it, if they can help it at all.

555. What kind of bottom has it?—Sandy.

556. What is the strength of the tide outside?—7½ to 8 knots an hour. I never saw more than 3 to 5 vessels in it.

557. (*Chairman.*) Is Gills Bay safe in dirty weather?—Well, there is good anchorage in it; but few vessels enter it.

558. (*Mr. Coode.*) You know Brough, east of Dunnet Head?—It is of no use except in calm weather.

559. What harbours are used on the south side of the Firth?—None but Gills Bay.

560. Is Thurso Bay a good roadstead?—Capital; it is a great refuge.

Captain Tudor deposited with the Commissioners a large plan of Wick Bay by Mr. Rendel, the property of the British Fishery Society, with the view of the Commissioners obtaining tracings therefrom.

561. (*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?—(No answer.)

Sittings at Wick closed.

FRASERBURGH.

Monday, 30th August 1858.

PRESENT:

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.	Captain VETCH.
Mr. LINDSAY.	Mr. COODE.
Captain WASHINGTON.	Mr. SEWELL, Secretary.

Mr. LEWIS CHALMERS examined.

564. (*Chairman.*) State for the information of the Commissioners anything that you have got to say on the subject of this inquiry. — I may mention at the outset that I am chairman of the Harbour Commissioners of Fraserburgh, and Commissioner for Lord Saltoun, the Superior of the Burgh; and as such, by your permission, I shall give a short account of the statistics of Fraserburgh harbour. Fraserburgh was originally called Faithlie, a Burgh of Barony, conform to a charter from Queen Mary, dated 2nd November 1546; but afterwards by another charter from King James VI., dated 4th April 1601, it was erected into a free port, free Burgh of Barony, and free regality, to be called in all time thereafter,— "The Burgh and Regality of Fraserburgh." It is situated close by the rocky headland called Kinnaird's Head. The Commissioners of the harbour of Fraserburgh act under powers granted by Act of Parliament, 2nd and 3rd Vict., cap. 65, and the Fraserburgh Harbour Amendment Act, 20 and 21 Vict., 1857. The Commissioners have done much since the first-mentioned Act was passed for the improvement of the harbour. As early as 1745 a stone pier was erected in the bay. In 1808 the north pier was built; and if we look to the Government Report on Harbours of Refuge, page 329, we shall find that the middle pier was built in 1830, at a cost of 5,654*l.*; and that there had been laid out in excavations during the last six years, as by that report, which was published in 1849, 2,103*l.* 4*s.* 7½*d.*, making a total of 25,702*l.* 4*s.* 7½*d.* At November 1857 there had been expended, chiefly in the construction of a new north harbour, including the last-mentioned sum, 50,099*l.* 11*s.* 9*d.* I produce a table, showing the imports and exports comparing the year 1837 with the year 1857; and I now lodge a copy of that table with the secretary. A very important traffic has sprung up of late years with the Orkneys and Caithness in cattle. In 1856 I have known about 1,500 head of cattle brought from the Orkneys to this district. The revenue of the harbour last year was 1,999*l.* 2*s.* 0½*d.* In the year 1797 the revenue was only 45*l.* The tonnage of vessels belonging to the port is, I think, mentioned in the table now lodged. The number of wind-bound vessels which entered the harbour during the last ten years was 1,453, representing an aggregate tonnage of 80,302 tons. This is taken from the harbour books. The number of vessels passing Kinnaird's Head in 1846, close to Fraserburgh, according to Captain Washington's "Report on the loss of life and damage to fishing "boats on the east coast of Scotland, in the gale of "19th August 1848," was no less than 7,700 laden vessels, supposed to carry a million of tons. I have no means of knowing the number at a later date. The number of vessels that have entered Fraserburgh harbour during the last ten years was 4,702, representing an aggregate tonnage of 160,895. This also is taken from the harbour books, and will be certified by the clerk and collector if required. There are five seal and whale fishing vessels belonging to Fraserburgh, representing an aggregate tonnage of 1,219 tons. The value of the cargo in 1856 was 12,613*l.* 17*s.* 6*d.* The herring trade is carried on to a considerable extent at Fraserburgh. In 1856, as appears from the fishery board's report, there were cured 44,215 barrels; caught but not cured 3,076 barrels; the number of cod 30,927 cwt., and 512 barrels cured in pickle, besides a considerable quantity of red herrings, whereby employment was given, it is supposed, to about 4,064 persons. As a herring fishing station, Fraserburgh is now second only to Wick. Last year the number of boats fishing in that district was:—at Fraserburgh 248, Pitullie 33, Rosehearty 41, and Pennan 9, making a total of 331. It has been stated that Peterhead is second to Wick, but we find that the number of boats fishing last year was 233, and at Boddam 26, making in all 258. In the present state of the harbour, and until the outer breakwater is prolonged, these boats can only make it in a gale with safety at two hours flood. A great many wrecks occur at Fraserburgh and in the neighbourhood. There was no loss of life, however, at Fraserburgh in the gale on the 19th August 1848, when 31 lives were lost, and property to the extent of 3,820*l.* at Peterhead. On that occasion the gale was from the south-east. The prevailing gales on this coast are from the south or south-east. The direction of the wind is taken every night at Kinnaird Head lighthouse, and I obtained my information on this point from that source. These books show that out of the 365 days in the year 1857, on 165 the winds were southerly, while only on 53 days were they from the north, while in the gale column 41 gales were from the south, and only 23 from the north. The number of wrecks which have occurred at Fraserburgh since 1848 was 26, and the supposed value, including cargo, 21,156*l.* This is taken from the lighthouse record. Mr. Stevenson, in his evidence given before the Select Committee of the House of Commons on Harbours of Refuge, says, that between Girdle Ness and Kinnaird's Head thirty-five wrecks had occurred in ten years in all that line of coast; so that Fraserburgh would appear to have had its due proportion, twenty-six of those wrecks having happened in its immediate neighbourhood. The position of Fraserburg would appear to me to be particularly favourable for a great national harbour of refuge. In support of this, if allowed, I would quote from government documents a few passages. First, from Captain Washington: "Report on the loss of "life and damage to fishing boats on the east coast "of Scotland, in the gale of 19th August 1848," at page 13 we find the following: "Fraserburgh is in "an admirable position close to the promontory of "Kinnaird's Head, the turning point of the shore, and "directly in the track of all the trade from the southward to the Moray Firth and the Caledonian Canal. "It is the head quarters of a fishing district, 22 miles "in extent, employing 428 boats, and 923 men and "boys." Turning to page 47 of same report we find the following observations:— "The situation of "Fraserburgh harbour is generally known, throughout "all the maritime towns in Great Britain, to be the "most north-east point in Scotland, and situated at "the mouth of the Moray Firth, consequently a place "much resorted to, and well suited for the accommodation of wind-bound vessels, fishing boats, and "others. It is 12 miles north of the latitude of "Peterhead, and about 8 miles to the westward of "its parallel of longitude; it lies in a bay which is "formed by Kinnaird's Head on the west and Cairnbulg Head on the east; the distance between these "heads in a straight line is about 2 miles, and the "depth of the bay inland within said line is somewhat better than a mile; its exposure is nearly

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" north-east. The shore from the interior part of " Cairnbulg Head to within half a mile of the town " is flat and sandy, and there is generally good " anchoring ground throughout the whole of the " bay." " A refuge harbour at Fraserburgh seems to " be absolutely necessary, being a station where " vessels bound either north or south about night " find shelter in storms." I would also quote, from Appendix C to the second Report of the Commissioners appointed to inquire into Tidal Harbours," Mr. Robert Stevenson's opinion of Fraserburgh, page 325, and Mr. Walker's opinion, page 327. Perhaps it is needless, having noted the pages, to read them over. The date of Captain Washington's report is 28th July 1849. I shall just quote Mr. Robert Stevenson's remark. The report is dated 1847. The date of Mr. Stevenson's report is 1818. He says: "From information received accidentally " by the reporter regarding the origin and progress " of the harbour of Fraserburgh, it appears that this " town is of very considerable antiquity, but till a " comparatively modern date its harbour was merely " an open bay, like that of most of the early harbours " of Scotland, having no piers for the shelter or " berthage of decked vessels. At that time it was " consequently resorted to only by fishing boats and " small craft, which could be easily drawn upon the " sea-beach out of the reach of the waves. From the " naturally convenient position of the bay of Fraser- " burgh for the shipping of the North Sea, the " Moray and Cromarty Firths, and also the coasting " trade of the north of Scotland, Fraserburgh, even " prior to the erection of piers, was at certain " times considered a place of refuge for small " craft in the stormy and tempestuous weather with " which the shipping of the coast is but too often " visited." And a little farther on, he says: "It " has also been considered so excellent a situation " for wind-bound vessels that about twelve or fifteen " years ago, a very general desire was expressed by " the shipping and mercantile interests of the numer- " ous ports of the Moray Firth and Firth of Forth, " and also on the English coast as far as Newcastle " and Sunderland, for the enlargement and improve- " ment of the harbour." Again at page 328, the same gentleman writes as follows:—"By the slightest " inspection of a map or chart of the German Ocean " or North Sea, it will be observed that vessels " overtaken by a gale of wind from the north, east, " or south-east have only the Firth of Forth and " Moray and Cromarty Firths to resort to in a storm, " all other ports and inlets of the sea upon the " British side being respectively shut up and ren- " dered inaccessible with these winds. It may " further be observed, that the land between Bu- " chan Ness and Peterhead to the south and Kin- " naird's Head or Fraserburgh towards the north " forms a prominent shore between the great estuary " of the Firths of Forth and Moray, and becomes a " turning point in the navigation of this port, and is " also the land most generally made by ships south- " ward-bound from the Baltic and higher latitudes." Further on he states:—"When a vessel has got to " the northward of Fraserburgh and meets with an " adverse wind, it is of importance to her safety to " get into that harbour, instead of again passing these " foul grounds in bearing away for the Firth of " Forth, *as Peterhead cannot be entered when Fraser- " burgh would be perfectly accessible.*" If allowed, I would also quote from Chambers' "Repository of Instructive and Amusing Tracts," where the following occurs:—"In 1736 an Act was passed authorising " the formation of a Board for the erection of four " lighthouses on the Scottish coast, Kinnaird Head, " Mull of Kintyre, the Orkneys, and the Isle of " Harris. The Board, however, was not appointed " till 1786. They entered on their duties with " spirit, and in December 1787 the Kinnaird Head " light was first shown." The limited works shown on the plan, which was laid before the Committee on Harbours of Refuge, as will be pointed out by Mr. Abernethy, are not meant to exhibit the works which will be required for a great naval station or maritime harbour of refuge; but the simple extension of the outer breakwater in water not too deep for its construction, but deep enough for any sized vessel (being an average of six or seven fathoms water at any rate), would provide a refuge harbour, such as it seems is so much desired on the north-east coast. In regard to the facilities for the erection of the harbour, I may mention that there is a first-rate quarry about 450 yards from the present breakwater connected with it by railway, which quarry is inexhaustible, and from which stones of any dimensions may be produced. This quarry the Commissioners are allowed, by the kind permission of the proprietor Lord Saltoun, to work gratis. The new north harbour is now well on to completion, although it will cost a very large sum of money to deepen, extend, and clean it. It affords a water area of 11½ acres, and additional quay room when the retaining wall along the shore is built of 3,020 feet; but it will never be a good harbour till the outer breakwater be continued to the outer Bush. I shall conclude by stating that in olden times there used to be, where the baths now stand, a battery, which was removed to make room for their erection.

565. Mr. Chalmers, you hesitated once or twice in the course of your statement as to whether you should read more at length, or not; I wish to ask you, before you sit down, if you are quite satisfied that you have put us in possession of all the information you wished?—Perfectly satisfied, because what I have not read I have referred to as at such and such a page of such and such a government document.

566. As I understand, Mr. Chalmers, you had arranged with Captain Washington, who came here previous to our arrival, that you were to put questions to the witnesses; is it so?—It is the wish of the parties themselves.

567. It is not in exact consonance with the mode of procedure which we have adopted hitherto, but our desire being to elicit the truth and all the information we can, we will follow that which you, from your local knowledge, are of opinion will be the most efficient way of obtaining it. Who is your first witness?—Mr. Abernethy, but I do not wish to examine him. I shall examine only the seamen and pilots, whose evidence will, I think, be best brought out by this mode of procedure.

568. (*Sir Frederic Smith.*) You stated that there were a certain number of wrecks within a certain period; can you, Mr. Chalmers, give the Commissioners any information as to the cause of the wrecks at those several periods?—I have a document at hand which will do so. That is, a list of the wrecks that have occurred at Fraserburgh during the last ten years, which I extracted from the record kept at Kinnaird Head lighthouse. In that list the date of the wreck is placed in one column, the name of the vessel in another, to whom belonging in a third, the name of the master in a fourth, the number of tons in a fifth, the value of cargo in a sixth, when wrecked in a seventh, and the cause of a wreck in an eighth, when the cause of wreck is known.

569. And the points to which they were destined and where they came from?—It does not show where they were bound to; but I will examine a witness by-and-by who will speak to that. The documents will be put in in evidence by Mr. Reid, the keeper of the lighthouse and of the register itself.

570. (*Mr. Coode.*) You stated, Mr. Chalmers, that Buchan Ness was the land generally made by vessels from the Baltic bo und south; is that so?—I stated Kinnaird's Head.

571. What course did these vessels take?—In a south-east gale they make Kinnaird's Head rather than Buchan Ness, whether they were bound north or south, in order to keep the Moray Firth open.

572. Can you state the proportion of vessels bound south for the Thames that make Buchan Ness?—All

vessels bound south desire to keep the Moray Firth open in a south-east gale, and all those vessels bound north and west of Fraserburgh invariably make Kinnaird's Head and Mormond Hill, and not Buchan Ness.

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Mr. ABERNETHY examined.

Mr. Abernethy.

573. (*Chairman.*) What is your name?—James Abernethy.

574. What is your occupation?—I am a civil engineer

575. State the information which you wish to offer relative to the subject of the present inquiry, observing that it will be desirable, so far as may be in your power, not to repeat that which is already before the Commission in an official shape, in the published evidence taken before the Committees of the House of Commons in the years 1857 and 1858?—That being the case, my evidence on this occasion must necessarily be very short. I need not again repeat the opinion which I gave before the Committee of the House of Commons, that I do not consider it necessary to treat Fraserburgh as an important point for a harbour of refuge for an extensive district of coast, because I am of opinion that, with the exception of Wick as an important fishing station, no harbour on the east coast of Scotland ought to be so treated. Therefore, I have confined the suggestions which I have offered to the Commissioners of Fraserburgh for the improvement of the harbour, by treating it entirely as a local harbour—a harbour of refuge for a limited extent of coast.

576. (*Mr. Lindsay.*) Then you are going to give your evidence holding the opinion you do that a great national harbour of refuge is not necessary on the north-east coast of Scotland?—I think it is not necessary. I think there is no one point that you can select on the north east coast of Scotland that would serve the purposes of a great harbour of refuge.

577. Then is it because you think there is no site on the north-east coast of Scotland well adapted for a great national harbour of refuge that you give that opinion?—No; I think there are sites on which you might construct a great harbour of refuge, but that harbour of refuge, if constructed, would be available only to a very limited number of shipping as compared with the shipping of the whole coast. That such an extensive work would therefore not answer the purposes of a national or general harbour of refuge; and if the Commissioners think fit I will briefly give them my reasons for holding this opinion. In doing so it may be necessary for me to advert to the claims of Peterhead. I would have much preferred to have made any statement regarding that port in the presence of the authorities at Peterhead, and more especially as I do not think the engineer to the Commissioners for that place is present; but if the Commissioners see fit I will now give my general reasons for the opinion I hold.

(*Chairman.*) Certainly, proceed with your statement.—The Commissioners will probably have before them the wreck charts for 1852, 1853, 1854, 1855, 1856. In dealing with the subject, I would divide the portion of the coast to be dealt with as between Fifeness and Buchness, and between Buchan Ness and the Moray and Cromarty Firths. As regards the first of these sections of the coast, because the easterly gales are exceedingly sudden in their occurrence, and that coasting vessels especially hug the shore in seeking their ports, I think it is manifest that in an easterly gale, there is but very little chance of vessels under ordinary circumstances, bound northward, weathering Buchan Ness point. I have myself, during my experience for ten years as an engineer at Aberdeen, often seen vessels fail to weather the Buchan Ness in easterly gales. As regards this first section of coast, a harbour of refuge at Peterhead would not be available. And if vessels, bound perhaps foreign, have sufficient offing off that coast to weather Buchan Ness Point, I think it is manifest that they would attempt to run into the Moray or Cromarty Firths, as they do at present. Between the Buchan Ness Point and the mouth of the Moray Firth, during on-shore northerly gales there, the same thing takes place. Vessels are caught between the various headlands between Buchan Ness Point and Kinnaird's Head, between Kinnaird's Head and Banff, and between Banff and Lossiemouth; and you will observe that at Lossiemouth there are a very considerable number of wrecks immediately to the westward. None of these vessels caught on this coast by an on-shore gale could by any chance reach a harbour of refuge at Buchan Ness. They would all be caught between these various headlands, and must go on shore if there is no port under their lee. At Lossiemouth there is a reef of rocks which extends immediately westward, called the Skars; and vessels in north-easterly gales generally go ashore there if they miss Lossiemouth. I think, therefore, that if a harbour of refuge were carried out at Peterhead to-morrow, it would be available for only perhaps one or two solitary vessels that managed in easterly gales to struggle round the Buchan Ness Point, and that it is more advisable, for the safety of the shipping generally, to improve and enlarge the existing harbours within the bights of the bays, and adapt these as much as possible for refuge purposes, than to construct a great harbour of refuge which could not be accessible to the great majority of the shipping in gales on this coast. Entertaining these views, in advising the Commissioners of Fraserburgh harbour, I pointed out to them that it ought to be treated, like all the others, as a mere local harbour of refuge for a given district of coast. But supposing that the question of a general harbour of refuge was entertained, setting aside my own views altogether, I say that the port of Fraserburgh offers much greater facilities in every point of view for the construction of such a work than Peterhead, and that with a much smaller sum of money a greater extent of anchorage can be secured. I find, from the evidence given by Mr. Stevenson before the Committee of the House of Commons, that for a sum of 300,000*l.* he proposed to provide 200 acres of deep water. I expressed my doubts before that Committee, as to the possibility of affording any such extent of sheltered anchorage for such a sum of money; and on examining the plan now appended to the report of the Committee of the House of Commons, I find that there are only 96 acres of what you might call deep water anchorage, that is, of three-fathom depth and upwards, instead of 200 acres; and I believe it will be proved to the Commissioners, that a considerable portion of that is foul ground. Therefore, setting aside my own opinions altogether, as to the advisability of having one harbour of refuge on this coast, I have caused a plan to be prepared of an extended harbour at Fraserburgh, by prolonging the pier 1,500 feet, as I originally proposed, to the extent of 1,500 yards; and I find by doing so, that a much larger area of water space, with clean ground for anchorage, is secured than can possibly be obtained at Peterhead. For by extending the pier this distance, there will be included within the two-fathom line and upwards, 195 acres of anchorage, within the three-fathom line 151 acres, in round numbers, and within the four fathom line 97 acres—a much greater extent than can be provided at Peterhead by the construction of the breakwaters shown in the plan appended to the Committee's report. And I believe it will be proved that the anchorage here is composed of blue clay, with a slight stratum of sand above it, entirely free from rocks. I will put this map in evidence. Perhaps it is unnecessary to point out to the Commissioners, that during

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the east and south-east gales the harbour of Fraserburgh is sheltered by Cairnbulg Point. Therefore it is only open to the north-east seas, and provided it were sheltered from them it could be entered by vessels at all times and under any circumstances.

578. (*Sir Frederic Smith.*) Have you made an estimate of the extension of the pier at Fraserburgh?—I have not, but I have no doubt that that extension could be executed for a much smaller sum than a similar length of pier at Peterhead, inasmuch as the situation is much less exposed, and the site altogether more favourable.

579. (*Chairman.*) Then you are of opinion that the best system for the protection of the passing trade along the north-east coast of Scotland, is an improvement of the several harbours along the coast, in preference to the construction of any one single large harbour of refuge?—I am; all the present harbours on this coast are high-water harbours. Great number of wrecks occur at the period of low water, when vessels cannot enter them; and if by extending the existing works you could provide deep water at that period, I am of opinion that few wrecks would occur.

580. From what quarter is the heaviest weather on this part of the coast?—At Fraserburgh, the north-east sea is the heaviest sea; at Aberdeen, from east and south-east.

581. From what quarter does the wind blow hardest?—We find the eastern and south-eastern gales the hardest.

582. From what quarter do the south-east gales generally commence, and by what weather are they generally preceded?—The weather is generally murky and cloudy; and the gale, commencing from the south-east, generally travels round to the east, and gets round to the north-east. I have noticed that at Aberdeen the easterly gale is more southerly than at Fraserburgh. A vessel caught off Aberdeen in an easterly gale would find, when she gets round to Fraserburgh, that it is northerly. I have noticed at Aberdeen very fine weather, and after a lapse of four or five hours a strong gale blowing; so sudden are easterly gales in their occurrence.

583. How long, as a general rule, do these gales last?—I have known them last from two to three days, but as a general rule a shorter period of time.

584. Would you say then, that the gale commences one day, blows hard the next, and breaks the third?—The gale lasting three days would probably increase in strength the second day, and gradually die away. But at times it blows hard almost at the commencement of the gale and continues so. Vessels after leaving Aberdeen, and but a short distance out of the bay, have been caught in these gales and wrecked.

585. When the wind gets round to the north-east, do they generally break?—They generally die away.

586. How do the heavy north-easterly gales commence on this coast?—Not having resided at Fraserburgh, I am not prepared to speak decidedly on that point.

587. But on the coast from the Firth of Forth to the Pentland Firth generally? If you can give me any information on the subject, tell me what you know from your own knowledge?—In many cases they are extremely sudden, commencing within a few hours to blow a strong gale. As a general rule all the gales from the east are sudden in their occurrence on this coast. I might give one instance which is exceedingly well known in Aberdeen. A whaling vessel called the *Oscar* left the port, went out into the bay, and in a few hours was in pieces on the rocks.

588. (*Sir Frederic Smith.*) Mr. Abernethy, in giving an adverse opinion to the formation of any one great harbour of refuge, you seem to base that opinion upon the effect of north-easterly gales; but I shall be glad to know what your opinion would be of a harbour of refuge at Peterhead or at Fraserburgh, with regard to vessels bound southward in a south-easterly gale and being south of Peterhead. Would a harbour of refuge then not be valuable either at Peterhead or Fraserburg?—In a south-easterly gale of course the vessel would not as a general rule proceed to the south. For instance, if in the Cromarty Firth, she would remain there.

589. Would not that be 100 miles out of her way?—If caught by south-easterly winds south of Buchan Ness, the probability is vessels would run back, as they do now, to the Cromarty Firth.

590. Is not that an evil?—If they had a fair wind they would go round by Kinnaird's Head, in a south-easterly gale; running into Peterhead would be attended with extreme risk, even if a harbour of refuge were constructed there. All vessels would prefer running before the wind in a south-east gale to passing into Peterhead, because the sea would run so high and irregularly between the heads of the proposed piers that there would be great danger in taking it even with a much wider opening.

591. That is, with reference to Peterhead, but I am talking of Peterhead and Fraserburgh; would you say that in these circumstances no harbour of refuge would be necessary or desirable?—In a south-east wind a vessel could enter Fraserburgh harbour.

592. But you recommend going into Moray Firth, where they might be caught in an easterly wind?—Under existing circumstances, but if a harbour of refuge was provided at Fraserburgh, vessels in south-easterly gales would enter that harbour, and so obviate the necessity of proceeding to the Cromarty Firth.

593. (*Mr. Lindsay.*) I think you said, Mr. Abernethy, that you proposed to carry out your original plan from 1,500 feet to 1,500 yards?—Yes.

594. What was your estimate for the 1,500 feet?—I think 80,000*l.* with contingencies.

595. You said that you had not had sufficient time to calculate an estimate of the pier extended for 1,500 yards?—That is the case, because it was only this morning that I turned my attention to this extension.

596. Well but, if 1,500 feet in comparatively shallow water cost 80,000*l.*, three times that length of pier in much deeper water would cost a great deal more than three times that sum?—It would. I am calculating, of course, only roughly, but I would not put down the estimate for that extension under 400,000*l.*

597. You would not put it down under 400,000*l.*?—I would not; and I think the estimate of 300,000*l.* for the breakwaters at Peterhead very low.

598. Would you state to the Commissioners how you would construct so great a length of pier as 1,500 yards?—I may at this point state that probably I shall on a future occasion have to bring before the Commissioners my views on the subject of the construction of breakwaters. I am at present preparing detailed plans and drawings for this purpose. They are not in a state now to be produced, but I may state that I do not propose to follow the mode of construction that has hitherto been adopted. The class of material, as a general rule, is much too small. Stone of a great size, in any quantity, is difficult to be procured. I shall be quite prepared on a future occasion to give my views on this subject at length.

599. But could you not give the Commissioners at present an outline of your views as to the mode of constructing such a pier as this, say that the Commissioners had agreed to recommend such a pier?—If time is granted, I shall furnish the Commissioners with detailed drawings, showing the mode by which I propose to construct the pier. At present I am not prepared to do so.

600. Do you propose to construct the whole of such a pier as this of stone?—Generally of stone.

601. Do you mean that the outer end of the pier would be wood?—No; of stone.

602. On what part of the pier would you put your wood?—In the case of this pier I shall not apply

wood except as staging and as a protection to some extent to the work during its progress.

603. What other materials besides stone would you use in the construction of the pier?—I may state that I am just now making experiments, the results of which I shall be very happy to bring before the Commissioners. They relate to the building of large masses of rubble masonry in a peculiar way. The machinery for lifting these masses is the question that I have still under consideration.

604. When would it be convenient to furnish the Commissioners with your views on that point?—Probably the Commissioners will have to visit the Bristol Channel, where I will endeavour to furnish them with all the information they require.

605. If this great pier is carried out, to what winds would the bay be open?—It would be sheltered then from all points. Cairnbulg Point bearing true east from the present pier head, the north-east seas would be the only seas to which the harbour is exposed, and the area within the breakwater would be sheltered from that wind.

606. But I understood you to say that the north-east winds brought the heaviest seas. If, then, a breakwater were exposed to the heaviest seas, would not the area or any portion of it be exposed to those heavy seas?—No; it would not. No portion of the anchorage ground would be exposed to the north-east seas.

607. You offered your opinion on some nautical points; I think it advisable not to trouble you with these. They are rather for seafaring men?—I gave them, having been for twenty years a harbour engineer.

608. Are you agreeable that I should ask perhaps one question or so upon this?—Perhaps it would be as well to ask some nautical man. I gave the reasons for my opinion that one harbour of refuge would not benefit this coast generally.

609. I would just ask you one question on that point. Did I understand you to say that if a great national harbour of refuge were to be formed, you would prefer Fraserburgh as the site to Peterhead?—I do.

610. Then did I understand that you prefer Fraserburgh to Peterhead because ships from the north bound to Aberdeen and the southern ports hug the shore?—I begin at Fife Ness travelling northward, and speak of vessels bound to the north from Aberdeen and various ports, such as Dundee and Montrose, and meeting with easterly gales.

611. But do vessels bound north hug the shore during easterly gales here?—Yes. Seeking the ports they do, the moment they round the Buchan Ness they can run into Cromarty.

612. Do vessels during easterly gales keep as much to windward as possible until they get opposite their port?—As a general rule they do; but we generally find as regards vessels bound from the south to Aberdeen that if a severe easterly gale comes on, very few get round the Buchan Ness, for want of sufficient offing.

613. If they could not weather Buchan Ness in an easterly gale of wind so as to reach Peterhead, for what reason do you suppose they could reach Fraserburgh?—I do not understand the question put to me, but think that if a vessel in a south-easterly gale could round the Buchan Ness Point she could reach Fraserburgh or the Cromarty Firth, as a harbour of refuge.

614. But if a vessel bound for the north from Aberdeen could weather Buchan Ness Point, could she not get into Peterhead?—She could not get into Peterhead in a south-easterly gale from the violent confluence of the tides; and from the fact that the mouth of the projected harbour of refuge is open to the south-east seas, there would be manifest risk to any vessel entering the harbour in such circumstances.

615. She would get in, but you say there would be great risk on account of the construction of the proposed harbour?—Yes; whereas in Fraserburgh there is not the same risk, because Cairnbulg Point shelters it from the action of the south-east seas.

616. (*Captain Vetch.*) Mr. Abernethy has two designs, I think, for a harbour at Fraserburgh, one pier consisting of 1,500 feet, and another pier consisting of 1,500 yards. I understood that the latter one was to be abandoned, and the shorter one preferred. I want to know if that is the case or not?—I have merely produced that plan to contrast it with the projected harbour of refuge at Peterhead, and to show that for a smaller outlay an additional length of pier and greater extent of anchorage could be provided—not that I recommend that plan to the Commissioners.

617. I want to know whether in a south-easterly gale a vessel being opposite either to Peterhead or Fraserburgh would find the one or other most easily entered?—Of course, Buchan Ness Point being the most easterly headland of Scotland, in a south-easterly gale there would be a very heavy sea between the heads of the projected harbour of refuge at Peterhead, but Fraserburgh being protected by Cairnbulg Point the entrance of the projected harbour would be comparatively smooth, and there would be no risk in entering it and passing the pier-head.

618. Then, in missing the entrance to either harbour, you think the vessel would be more safe at Fraserburgh?—Yes, because there would be much less sea.

619. (*Mr. Coode.*) In your evidence before the Committee of the Harbours of Refuge in April 1858, you said the south-easterly was the prevailing gale on this coast. In the table which you handed in I see that the south-east gales were 41, while the south-west were 68.—What I meant to state was, that the south-east gales were the prevailing on-shore wind, and the south-west the off-shore wind.

620. Does this table refer to winds for any one year, or is it an average for any number of years?—This table, I may mention, was handed to me by Mr. Chalmers to put in, and I think I stated it was his table and not my own.

621. Do you know whether it is for one or two years?—I do not.

622. You stated in answer to the Chairman that south-east gales blow hardest on this coast. What gales raise the heaviest seas in the North Sea?—If you take the coast from Buchan Ness, the north-east sea, of course, has the longest stretch. At Aberdeen it is from east to south-east, because Aberdeen is protected from the north-east by the Buchan Ness Point.

623. In this particular part of the North Sea, which wind makes the heaviest sea?—The north-easterly.

624. By referring to the large chart of Fraserburgh, can you state the number of acres sheltered from the easterly and north-easterly gales?—I have not calculated because Cairnbulg Point effectually shelters Fraserburgh.

625. Well, taking the gale east by north have you the number of acres shut in from that?—No.

626. What is the nature of the material with which you purpose to construct this new harbour?—I have already stated generally that the foundation of the work is to be made of large concrete blocks of rubble.

627. I mean the character of the rock which you propose to use?—I should use the whinstone and limestone of the country.

628. What is the kind of limestone? To what formation does it belong?—It is a black limestone, exceedingly coarse and cannot be burned; the rest is whinstone. Granite is in the immediate neighbourhood also.

629. Can you get blocks of a large size of the whinstone, or should you propose to use granite?—You can get large irregular masses of whinstone, but as a general rule you cannot procure large blocks for dressing, except from the Firth of Forth, where large masses can be procured.

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630. You speak of the confluence of the tides at Peterhead, does that refer to the tide within the horns of the bay?—Immediately off the headland.

631. Do you happen to know the greatest strength of tide off Fraserburgh?—I do not.

632. (*Chairman.*) Do you know that plan of Wick Bay?—Yes, I have seen it before.

633. You see the central opening marked BC?—I do.

634. With reference to the opinion given in your evidence as to the effect of the sea upon the projecting pier heads, give me your opinion of an entrance of that description, as to whether there will be an unfair sea?—That, of course, will depend on the way the land trends north and south of that entrance.

635. Give me your opinion as to the effect in a locality similar to that shown by the plan?—Without a better knowledge of the locality and the rate of the tides, and the action of the sea, I should perhaps be wrong in giving an opinion.

636. I am not talking of Peterhead at all. I am talking as to whether there would be an uniform sea at such an opening as you see in the chart, if an opening of that description has come within your experience as an engineer?—Without a further knowledge of the position of Wick (for I have never been at Wick), I might give an opinion that would be wrong.

637. Have you been much in the society of seafaring men?—A great deal.

638. Have you ever been at sea?—Oh yes, frequently.

639. For what period, would you say?—For the last twenty years, I have been round the greatest portion of the coast, from one point to another.

640. Have you heard questions such as those which arise out of our present inquiry frequently discussed amongst seafaring men?—I have.

641. From the nature of your profession, have these questions been of any interest to you?—They have necessarily been so, inasmuch as, considering my position, these questions necessarily formed an element in guiding me in my conclusions; and I have been in the habit of consulting nautical men previously to making harbour designs. I may mention that my profession is entirely that of a harbour engineer.

642. For how many years have you been an engineer?—I have been twenty years an engineer of harbour works. I commenced my first important work, the large dock at Aberdeen, in 1842. Previous to that I had been engaged as assistant engineer and resident engineer on harbour works.

643. Would you state how long you were an assistant?—Four or five years.

644. And therefore, though not a nautical man by profession, you are disposed to attach some weight to your opinion on nautical subjects?—I speak with all deference to the opinions of nautical men, but I have been obliged as a matter of course to consider nautical points during my professional career, constantly.

Mr. JOHN DALRYMPLE examined.

Mr. J. Dalrymple.

645. (*Chairman.*) What is your name?—John Dalrymple.

646. What is your occupation?—A retired master mariner.

647. (*Bailie Chalmers.*) You are a native of Fraserburgh?—Yes.

648. And you now reside there?—Yes.

649. How long have you been at the sea?—Thirty years.

650. Chiefly in the foreign trade?—Yes.

651. Do you know the Bays of Wick, Peterhead, and Fraserburgh?—I do. I have been at Wick, and I know from seafaring men the nature of the coast.

652. Have you studied the subject of harbours of refuge?—Yes.

653. And you prepared some remarks which you wish to read to the Commissioners?—I have noted some particulars which I consider peculiar to the Bay of Fraserburgh, and which, with the permission of the Commissioners, I would read to them.

Permission having been granted, witness read as follows:—

"To the Honourable the Commissioners on Harbours of Refuge.—John Dalrymple, residing in "Fraserburgh, of which place I am a native, and "now retired from seafaring life of thirty years experience, upwards of twenty of which I was in the "command of vessels trading to different parts of the "world. The following points I consider from personal experience peculiar to the Bay at Fraserburgh: First, with the heavy south-west gales "which prevail in winter, vessels coming from the "south and bound to the north and west, bring with "them to Kinnaird's Head a leading wind. But "there their passage is stopped, for as they attempt to "go further to the north and west, the wind heads "them. It therefore follows that vessels from the "Moray and Pentland Firths, bound south, also "bring a leading wind with them to this place; but "here, as in the other case, they get no further; so "that in winter it is a very common occurrence to "see off this bay large fleets of vessels, bound both "to the north and to the south, struggling for days "to keep hold of the land; and it frequently happens "that in our present limited harbour may be seen "vessels lying windbound alongside of one another, "and bound to opposite points. Such a circumstance "does not, I think, occur at any other place on this "coast. Second, that here no new harbour has to be "commenced, but that an extension of the present "breakwater will afford refuge to vessels from all "winds, and at all times of tide; and it is only a "matter of the extent of the extension of said breakwater to give any amount of shelter to vessels of "the largest class. Third, another peculiar feature "in the direction of the winter storms on this coast "is, that (so far as my observation goes) I have never "known a heavy westerly storm blowing into the "bay. It appears to me that the heavy easterly "gales in the north sea and south coast become a "north-east storm here; that if our present breakwater were carried out into deep water, vessels "with such a gale could at all times of tide, day or "night, run out and get shelter in smooth water "under it. From south-east gales the bay is sufficiently protected by Cairnbulg point, and the reef "of rocks running out from that point. Lastly, "Fraserburgh has a smooth and gradually sloping "sandy beach of some miles in extent. I need not "enlarge on the fact that vessels in stormy weather "will make bolder and run with more confidence for "shelter under such circumstances than they would "do when nothing but a rocky iron-bound coast presets itself. I may also add that here the tides run "less rapid, and more direct, and the sea more regular "and less dangerous, than on the coast without this."

654. (*Chairman.*) At what time of the year is the worst weather?—Perhaps in December. In the winter months generally.

655. From what point of the compass have you the hardest gales?—North-east.

656. How do the north-east gales begin?—South-east and south, veering from the south-east and round, but it does not come to blow till it reaches to the north-east here. Our north-east gales are east gales to the south of us.

657. How do these north-east gales terminate?—They die away generally.

658. The wind still blowing from the north-east?—Yes.

659. In a north-east gale is Cromarty Firth easy of access?—That depends upon the position of the vessel requiring to reach it.

660. Supposing a vessel to be off the entrance to Cromarty Firth with a north-east gale, would it be easy of access?—With good winds on shore.

661. Then approaching Cromarty with a scant wind, are you ever liable to the wind leading you off the high land, and making access difficult?—With south-west gales, the wind invariably blows off the high land from the west. In that quarter the wind is right out of Cromarty.

662. But with the wind from the north-east and south-east, however hard it blows, it blows fair home into the entrance of the firth?—Yes.

663. In what trade have you generally commanded vessels?—I could scarcely particularise. I have been in all parts of the world.

664. How long were you master of a vessel?—Twenty years.

665. Have you traded to the Baltic?—In the early part of my time I was at the Baltic.

666. Have you been at Archangel?—Never.

667. Have you traded to America, going north about?—No; I have been in Norway.

668. Are you of opinion that harbours of refuge are wanted on this coast?—Very much.

669. What land do you generally first make when coming from the Baltic, bound to Leith?—In the autumn we generally made Kinnaird's Head and Mormond Hill, in the immediate vicinity of this, and one of the best landmarks we could have.

670. Do you consider Mormond Hill the best mark to make in dirty weather?—No master of a vessel can mistake it.

671. When you traded to the Baltic, from what port did you sail?—Particularly from Liverpool.

672. Did you come north about?—Yes.

673. Are you acquainted with the Pentland Firth?—Yes.

674. How often have you gone through it?—Seven or eight times.

675. Have you ever been in it in bad weather?—In a favourable breeze and in a strong gale.

676. Which way?—Going west.

677. Do you know the harbours of Longhope, Widewall, and St. Margaret's Hope?—No; I have only been at Stromness.

678. (*Sir Frederic Smith.*) How long is it since you left the sea?—Six years.

679. (*Mr. Lindsay.*) In the statement which you read, you stated that during south-west gales you had seen large fleets of vessels off Kinnaird's Head?—Yes.

680. Were these vessels bound both north and south?—Yes.

681. Are the south-west winds safe?—Yes, but blow very hard. Vessels run great risk of being disabled, and of being driven into the North Sea. Vessels in a south-west point hug the land; and it is as much as they can do. They have often a very severe task to keep the land.

682. Are not these vessels found in great numbers in south-west gales off Peterhead?—I think not. If they are bound for the Pentland Firth, they are so much farther on their voyage at Fraserburgh. They can pass Peterhead with a fair wind, but here they are stopped.

683. Then is it because that during south-west gales more are under shelter off Fraserburgh than off Peterhead?—I would conceive they would proceed on their voyage as far as they could come past Peterhead with a fair wind, but stop here.

684. But vessels bound from the south to the Baltic and Archangel would not be found in Fraserburgh Bay?—No.

685. Then you refer only to homeward-bound vessels?—Vessels from the ports bound to the south are found here.

686. From your experience as a shipmaster, say one great national harbour was to be made on the north-east coast of Scotland, whether would you prefer it at Wick, Peterhead, or Fraserburgh?—At this place.

687. Why?—Because of the number of vessels that congregate here.

688. But you say in south-west winds?—Yes.

689. But I need not say that during south-west gales vessels would not take a harbour of refuge?—Yes, and very glad to get it, because it blows very hard.

690. You would then prefer Fraserburgh to the other two points?—Most undoubtedly.

691. Any other reason for doing so?—Because it has a sandy beach, on which we would seek shelter sooner than on a rocky-bound coast; and also the tides run more equal here.

692. (*Mr. Coode.*) Suppose vessels bound from the Baltic to the Humber, what land do they generally make?—Flamborough Head, I should suppose.

693. (*Captain Washington.*) But with vessels returning from Baltic?—Not further north than Kinnaird's Head, unless disabled.

694. Were you ever driven to the Orkneys?—No, unless disabled.

695. Do you remember of eight vessels being wrecked within ten years in the Orkneys, returning from the Baltic?—No.

696. Were they not bound to the Pentland Firth?—I don't know.

697. (*Mr. Coode.*) Tell us the direction of the ebb and flood streams, from Cairnbulg Point to Kinnaird's Head, do they run fair across?—I think they do.

698. Do you know the rate?—Five to six miles off Kinnaird's Head; only this is merely an opinion.

699. (*Captain Washington.*) Is the beacon on Cairnbulg Head sufficiently conspicuous?—It might have been further out and higher. It is, however, only six weeks since it was fixed.

700. Have any wrecks taken place upon the rocks there?—Frequently.

701. (*Chairman.*) Have you seen that chart before?—No; I am not aware.

702. Are the charts that you have been in the habit of using on the same scale as that?—No.

703. With a chart of that description, would you, as an experienced seaman, have any difficulty in running for the anchorage of Longhope, never having been there before?—I should think not in clear weather.

704. If with thick, dirty weather, and you were very desirous to get into the anchorage, would you then have much hesitation in running for it?—I certainly should hesitate, unless circumstances obliged me to seek a place of refuge, from having a leaky vessel, or being disabled, or anything of that sort. I would not voluntarily run down in thick weather.

705. In running through the Pentland Firth, have you ever taken a pilot?—I have had a pilot, and I have gone without one.

706. When you have gone without a pilot, was it because the weather was such that you could not get one on board, or by preference?—I did not look for one. I think I could do the thing quite as well myself without a pilot.

707. In running for the Pentland Firth, with a strong south-easterly gale, would you have any apprehensions about the flood tide which meets you there?—I should wait till the slack tide before I attempted, with a gale of wind, to run through with a loaded vessel.

708. But still, knowing the time of high water, you would have no difficulty in heaving your vessel to for a sufficient time, and then running through on the ebb?—No.

709. You have stated in your evidence that you have only been through the Pentland Firth five or six times?—Yes.

710. Does that arise from the circumstance of your only having occasion to make that voyage five or six times, or that you preferred going north-about round the Orkneys?—Solely from the latter circumstance.

711. Should you say, from your acquaintance—

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which must be pretty extensive amongst your brother seamen, that the opinions you entertain relative to the Pentland Firth and Long Hope, are such as generally prevail amongst them?—I think they must do so; it is not from conversation amongst them that I judge so, but because I think that these views which I have expressed are the opinions which, I imagine, generally prevail.

712. You are not prepared to say so from your own knowledge?—No.

713. (*Mr. Lindsay.*) I understood you to say that you did not take a pilot in some cases when going through the Pentland Firth?—No.

714. Then, I understood you to say that should you have found it necessary you would have had no hesitation in running for Long Hope in clear weather?—None.

715. And further, that you would have great hesitation in running for Long Hope in thick weather?—Yes.

716. Would you not have great hesitation in running for almost any harbour in thick weather?—I should make a comparison between one state of thickness and another. I should run for many a place in preference to Long Hope in thicker weather than I would do to day. I would not run for any harbour in a dense fog, but I would hesitate to run for Long Hope with a moderate haziness.

717. Now, you have looked at Long Hope, this is the question on which I would ask your opinion as a nautical man of great experience; say that you were off the Caithness coast, and that you were caught with a southerly gale in thick weather, whether would you prefer running through the Pentland Firth for Long Hope, or running for a harbour of refuge at Wick, as laid down in the plan?—I think I should prefer running for Long Hope. I have much greater scope in running for it than I have in running for Wick.

718. Well, suppose these piers were carried out much further than they are, so as to afford even greater shelter than now appears, would you still prefer running for Long Hope in thick weather to running for that harbour?—I should still prefer running for Long Hope, and my reason would be that in running for Wick Bay, which, I suppose, is not above a mile and a half across, I have to run, as it were, into a needle's eye. In the other case I have several miles to veer and haul upon, even in thick weather.

719. (*Captain Washington.*) In the same thick weather should you run for a harbour at Fraserburgh?—Yes.

720. Is the entrance of the proposed harbour at Fraserburgh a mile and a half wide?—I don't know how far they propose to carry the breakwater out, but I should, as I have said before, prefer running a risk for a port at Fraserburgh, when I would not do so at Wick. I should consider that the lives of my crew, taking the very worst view of the thing, were safer in running for Fraserburgh than in running down upon a coast like Wick. I should be very nervous in doing so.

721. (*Captain Washington.*) Mr. Abernethy, perhaps, can state to us the width of the proposed opening between Cairnbulg Biggs and the ends of the pier?

(*Mr. Abernethy.*) A mile and a quarter.

722. Have you ever been at Wick?—I have.

723. Have you ever sailed into the harbour of Wick?—Never.

724. Have you ever sailed into Long Hope?—Never.

725. Then I understand you to say, that to run for Wick Bay, which is a mile and a half wide, would be like running for the eye of a needle, while to run for Fraserburgh Harbour, which is only a mile and a half wide, would be better?—Being a projecting point I would run the same risk of losing the vessel; but supposing I missed the harbour I would have a chance of saving the vessel at Fraserburgh, by making one or two tacks; whereas at Wick, if I am down there and find I have no hope of entrance, there is no hope for me. At Fraserburgh I would be very likely to save the vessel at least.

726. How are you supposing the wind?—I am supposing a favourable wind into both places.

727. Do you mean south-east or north-east?—You must take the wind differently. I am supposing your question to refer to my running down on a lee shore, and looking for a harbour. Of course the wind seems to be different here for a lee shore. In an easterly wind here I should fear the land; but if I were in an easterly wind in Wick, I am ruined.

728. Have you been a good many years cruising in the North Sea?—No, but merely sailing to the Baltic. I judge from my observations in regard to scenes that took place on the coast of England, and judging from what it is in winter there must be very tremendous gales there which we never have.

729. Why do you think so?—From the casualties which take place at Sunderland and Shields, and which are generally easterly gales.

730. You have run through the Pentland Firth in an easterly gale?—Yes.

731. With or against the tide?—With the tide.

732. Would you venture to run against the tide in an eastern gale?—I should not make chances of doing so.

733. What size of vessels did you command?—At that time I had a small vessel of 150 tons.

734. At what rate does the flood tide run after the springs in the Pentland Firth?—I should think eight or nine miles. From seven to eight, and perhaps sometimes nine.

735. And sometimes ten?—Well, it may.

736. We know this by actual measurement. In a damaged vessel would you venture to cross the Pentland Firth in a flood tide, and to run to Long Hope?—No, I should think not.

737. Would any sailor in his senses attempt to do so?—He would not make choice of doing so.

738. Would he dare to do so?—He could no more dare than fly. There are vessels built now-a-days that perhaps you could do anything in.

Very well, when you go to sea again, perhaps you would try the experiment.

739. (*Mr. Lindsay.*) You stated that you would, in a vessel of 150 tons, not consider it advisable to run for the Pentland Firth with a south-east gale in a flood tide?—No.

740. What would you do?—I would get on to the land after the eddy.

741. That is, in fact, to dodge until the tide turned?—Yes.

742. Then would you consider that you were running a great risk, during a south-east gale, in getting under the land to dodge, until the tide turned?—That is, if a heavy south-east gale came on, I should consider there was considerable risk.

743. (*Bailie Chalmers.*) Would you not make more bold to reach a harbour with an entrance of a mile and a half and a sandy beach than a harbour with an entrance of 500 feet and a rocky coast?—Most decidedly.

744. (*Mr. Lindsay.*) Say that you were caught with a south-east or easterly gale off this coast, and that you were at an equal distance from Peterhead and Fraserburgh, presuming it to be thick weather, whether would you take Fraserburgh, with the harbour constructed as proposed by Mr. Abernethy, or run for Long Hope and the Pentland Firth?—I should not hesitate for a moment to run into Fraserburgh with the harbour as has been represented to me as being proposed by Mr. Abernethy.

745. Then would you run for it in preference to running for the Pentland Firth and Long Hope?—Most assuredly.

746. (*Bailie Chalmers.*) Do you consider that Fraserburgh would be a good look-out in time of war?—

think that was a feature which was introduced into the Harbours of Refuge Report; and I think the Commissioners will see that if you are placed on Kinnaird's Head you have a longer extent of sea horizon from that point than from any other point on this coast.

747. Do you often see the Caithness coast from Kinnaird's Head?—Yes.

Mr. JOHN STEPHEN examined.

748. (*Chairman.*) What is your name?—John Stephen.

749. What is your occupation?—That of a master mariner.

750. (*Bailie Chalmers.*) How long have you been at sea?—Twenty-eight years.

751. You have commanded vessels in the coasting as well as in the foreign trade?—Yes.

752. For how long have you commanded vessels?—Nineteen years.

753. What vessel do you command at present?—The *Melinka*.

754. What trade is she engaged in?—The seal and whale trade.

755. How long have you been in the *Melinka?*—About seven years.

756. You know the harbours and bays of Wick, Peterhead, and Fraserburgh?—Yes.

757. Have you been in Wick?—Yes.

758. Do you remember the quay there being knocked down during the storm some time ago?—Yes.

759. (*Captain Washington.*) What storm was this?—I forget the year when it happened. The pier wall broke down.

760. Tell us when it occurred, as near as you can?—I think it must have been about seventeen years ago.

761. That is, two years after you got the command of a vessel?—Yes, about that.

762. (*Bailie Chalmers.*) If a harbour of refuge is to be erected on the north-east coast of Scotland, at which of the three places would you say it should be erected?—I should say it ought to be erected in Fraserburgh Bay.

763. Can you tell me why?—Because, providing that I were in the North Sea, and caught with a gale of wind from the south-east, which is the most prevalent wind on the coast south-west or south-east. I should never think of running down upon any dead land when I had a headland of this kind to run under. I don't mean to run under, but to keep off, knowing that I can come to a harbour, if there was a harbour erected in this bay, because it is a clean bay, and I have the lighthouse here. If I were to run down upon a dead land at any other place, and were to miss, I know that it is certain destruction.

764. Do you find here almost every winter, a great many ships of considerable tonnage congregated about the bay?—Yes.

765. Are many of them driven from the coast of England?—I have known a great many from off the coast of England, as well as from off the coast of Holland, and off the mouth of the Sleeve.

766. Do you find that they congregate here, bound both north and south, with a south-east gale?—Yes, the south-east gales, south-south-east, and south gales prevail most.

767. Do you find them congregate here going both ways?—Yes.

768. And two went down?—Yes, ships of 400 tons upwards, are often off here, and would have entered the harbour if they had got water.

769. Many of them in a disabled state?—Yes.

770. How long have you been going about here, between this and Cromarty?—I have known vessels knocked about here for two or three weeks.

771. And some of that traffic from the coast of Norway?—Yes.

772. Do you consider easterly gales the most dangerous on this coast?—Yes.

773. Do you consider that during easterly gales Fraserburgh harbour would be safe as compared with others?—I think it would be much safer.

774. Would you give me your reason for stating that?—The shallowness of the water before it reached where the extended harbour would be would moderate the sea.

775. An easterly gale is of quite rare occurrence, is it not?—Yes.

776. Do you find vessels bound to Peterhead, driven round to Fraserburgh during a south-east gale?—Occasionally in winter we have such vessels.

777. Why?—The reason we have heard was, that the sea was too heavy at Peterhead, and they could not approach it for that reason.

778. Would the position of matters be altered by the erection of such a breakwater as you see in the report of the Committee, at Peterhead?—To a small extent, but a very small extent, from the dangerous state of the sea.

779. I mean, the plan of the breakwater proposed by Mr. Stevenson, which you have seen in the report of the Committee?—I do not think the position of matters would be altered in that case.

780. Suppose a vessel were once in the harbour in the prevailing gales you have mentioned, could she leave it?—No; by no means. The best ship that belongs to the navy could not. The sea is extraordinarily heavy, and the water is tremendously deep.

781. Would a vessel bound from the coast of England northward or west, think of running down to the land and leave the Moray Firth, which is open in these gales?—No seaman would do that.

782. Would vessels from the Baltic bound to the Moray Firth, and the west, come to the Caledonian Canal by Kinnaird's Head?—They would.

783. Is an inducement now held out on the Continent to masters and owners to go to the Moray Firth and the west coast by the Caledonian Canal, since it has been improved, and steam introduced on the canal?—Yes, the insurance is cheaper. I have always found, from what I have had to do with merchant ships of late, that since the improvement in the Caledonian Canal, it has been the request of the merchants of the Continent to go through the Caledonian Canal to the west coast.

784. Would ships in a disabled state from the North Sea reach with safety the harbour of Fraserburgh in almost any gale, if the breakwater were carried out?—They could do so as long as they can live in the sea, because they come in upon a sandy bay. Every mariner knows that if he can come in upon a sandy bay he has more chance of saving his life than on an open rocky coast.

785. Would there be a necessity for a harbour of refuge at Wick for the fishing boats?—I am at a loss to find any argument for a great harbour at Wick.

786. I spoke of a smaller harbour?—I have been a good deal at Wick, and I have always seen a great necessity for improvement at that harbour.

787. Have you seen the plan of the proposed harbour at Wick?—Yes.

788. With a gale from the south-east, would you like to run down upon that harbour?—I would rather run to the Pentland Firth.

789. Do you say the same about Peterhead?—I should say the same thing. There is no alternative but certain destruction if you miss the harbour mouth.

790. What is the principal anchorage ground at Peterhead?—It is about seven-fathom water.

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791. In what direction?—It is just in the mouth of the harbour, where the place is most exposed.

792. Do you know any other good anchorage ground on that enclosure?—The best ground is there. There is no other anchorage ground, the other places being rocky.

793. (*Being shown chart No.* 2181, *the Chairman put the following question to the witness:*—) Are the charts which you are in the habit of using on the same scale as that chart, I mean as large?—The chart which we use for the Orkney and Shetland Islands is on a much larger scale than this.

794. By "larger scale than this" do you mean that the whole chart is larger, or that the proportion of the degrees of latitude is greater?—I mean the scale.

795. You see Long Hope on that chart?—Yes.

796. Do you know Long Hope?—Yes, I have been in it often.

797. Supposing that you had never been in Long Hope, and were in possession of a chart of that description, would you, as a seaman, have any hesitation in running your vessel for it?—None whatever, if it were clear weather.

798. Are you acquainted with the Pentland Firth?—Yes, I have been often there.

799. How often?—Ten times, at least.

800. Have you ever run through the Pentland Firth in heavy weather?—Yes.

801. How was the wind?—I have been there with heavy gales from the northward.

802. Have you ever run through with a southerly gale?—I have run through with very heavy winds from the southward.

803. Do you recollect if, on approaching the Pentland Firth, you had to dodge your vessel for the purpose of waiting for the tide?—Yes, I have had to tack in, not to be down too quickly upon Duncansby Head and the mouth of the Pentland Firth.

804. And with the knowledge you possess of the Pentland Firth, do you consider that there is any risk whatever in running through it when a southerly gale blows, provided you do so with due attention to the tides?—None, if the weather is clear, and if you can keep your ship to windward till the tide turns.

805. You say that you know Long Hope well; what style of anchorage is it, good or bad?—It is very good anchorage; very good holding ground.

806. Did you ever know vessels driven to sea from Long Hope by strong gusts of wind from the westward?—Never; I have been there in gales from the westward as hard as ever it was known to blow, with two anchors down, and 100 fathoms on each chain.

807. Do you know Widewall?—I have been in Widewall and St. Margaret's Hope.

808. What kind of anchorage is Widewall with a strong westerly wind?—It was in St. Margaret's Hope that I was; I never was in Widewall—I don't know anything about it.

809. What kind of anchorage is it in St. Margaret's Hope in blowing weather from the westward?—It is very good if you go in, but it is a very small place.

810. Is it easy of access?—I don't know it well; I have been at different places thereabout. It is said to be rocky.

811. What is the heaviest wind on this part of the coast?—The easterly gales are the worst we have.

812. By easterly gales you mean from north-east to south-east?—From north-east to east; the most prevalent winds are from the south-east.

813. By this coast do you include the coast from the Forth to the Pentland Firth?—Yes.

814. Have you traded to the Baltic?—Yes.

815. How many voyages have you made to the Baltic?—I don't recollect exactly—perhaps 12 or 13, or more.

816. Have you often come home in the fall of the year?—Mostly every year. Perhaps ten winters I have had to come from the Baltic, and to go from this side as late as the 20th October.

817. Should you say that there is any prevailing wind at that time of the year in the North Sea?—The winds prevail most from the south-west and south-east.

818. And what generally is your land-fall?—It depends on where we are bound to from the Baltic.

819. Where have you traded from to the Baltic?—From all places on the east coast of England, and the Continent too—at least, I have been from Antwerp to the Baltic, from Guernsey, Jersey, London, Hull, the Firth of Forth, and other places.

820. If bound for the Firth of Forth, where would be your landfall?—If the wind was for the Firth of Forth I should make for it, if I could.

821. With reference to your former answer relative to the prevailing winds, are they such as generally enable you to make the land as far south as the Firth of Forth?—I have had to heave to through a heavy gale while bound to the Firth of Forth till it had cleared. It was very often foggy in some of those gales.

822. (*Mr. Lindsay.*) You would prefer a harbour of refuge at Fraserburgh to Wick?—Yes.

823. Is your reason why you prefer the harbour of refuge at Fraserburgh to Wick on account of its being in a more prominent position?—Yes; the most trade is in the southern part of the North Sea and down; in the northern part there is no trade. Besides, all the ships are brought here. No man, supposing the harbour of refuge was at Wick, would ever think of running down on the coast of Wick. That would be a most preposterous idea, as long as he has a headland here to run under, and the Moray Firth open with Cromarty at the top of it, and the Pentland Firth on the north side of it. He would never think of running down upon a dead land like Wick, although a harbour of refuge was erected there, because if he were missing that harbour mouth, with snow in the dead of winter, there is nothing but certain destruction for him.

824. Then you object to harbours of refuge on dead lands?—Unless there is sufficient room for an entrance.

825. Then, as a general rule, you would prefer a harbour of refuge upon a promontory, or close to a headland, to a harbour of refuge which was in a bay?—Yes, if it could be approached in all weathers and with safety, so that you can save your life if you run down upon it.

826. I believe there was another reason why you preferred Fraserburgh, and that was, there would be more chance of saving life, on account of there being a sandy beach at Fraserburgh?—Yes, a sandy, clean, and open beach.

827. Is it all a clean bay?—Yes, it is a clean bay.

828. Are there no rocks which intervene?—There are no rocks at all. On the only rocky shore there is four fathoms at low water, about east or east-south-east from our breakwater, which would protect our breakwater from more than what people think about. The face of the sea is broken upon that before it comes to the harbour.

829. I have a plan of Fraserburgh harbour, No. 1439; look at that plan, and see if there are any rocks along the sandy beach?—There are no rocks. It is a clean bay until you come to the vicinity of Cairnbulg Briggs, from the Buss, or Burnett's Buss.

830. But in an easterly gale of wind, would there not be a danger of your ship running right on to those rocks, instead of running on to the sandy beach, where you say that there would be a greater chance of saving life?—If the breakwater was extended, there would be smooth water with the easterly gales at the place where the beach is lined with rocks.

831. Are there no rocks along the beach to the eastward of Kinnaird's Head?—Yes, to the southward of the Busses.

832. Are there no rocks along the beach to the eastward?—None, till you come to the vicinity of Cairnbulg Head.

833. Then, between Cairnbulg Head and the

place to which you have referred, is the beach entirely clean and clear?—It is.

834. Such a beach that a ship might run for it with a chance of saving life?—Yes; we have had many instances here of such cases.

835. (*Sir Frederic Smith.*) Are you of opinion that a harbour of refuge for this coast is at all necessary anywhere?—I am quite of that opinion. I have had experience of it, having been off here many days, and could get neither north nor south, after having put out into the North Sea.

836. (*Captain Vetch.*) Suppose you were sailing from Fraserburgh to go through the Pentland Firth, and then on reaching Sinclair Bay you found the wind was against you, and you could not fetch to Duncansby Head, what would you do?—If the wind is from the north, of course I must beat through the Pentland Firth.

837. But if the wind were so far from the east that you were in danger of getting on the shore?—Then I would go to Cromarty.

838. From Sinclair Bay?—Yes.

839. Would you not rather take a port under your lee, or one being near at hand?—In the winter it is very seldom that we can see to the very north, which is always the thicker. I find that in the trade I am employed in, if I take a port I lose a passage; I cannot get out again.

840. (*Mr. Lindsay.*) Then even in thick weather you would prefer with such winds as these to take the Pentland Firth and Long Hope rather than to run for Wick Bay, even if there was a harbour there?—By all means; because I have more room, and if I miss even Long Hope I have an open sea before me.

JOHN REID examined.

841. (*Chairman.*) What is your name?—John Reid.

842. What is your occupation?—I am keeper of the lighthouse at Kinnaird Head.

843. (*Bailie Chalmers.*) How long have you been at Kinnaird Head lighthouse?—Sixteen years; and I was two years, in 1816 and 1817, learning the profession.

844. You have been in the employment of the Commissioners of the Northern Lights since 1817?—Yes.

845. You are contractor for repairs at the Kinnaird Head lighthouse?—Yes.

846. And for any other lighthouses?—Yes; for Samborough in Shetland. I am also inspector at Buchan Ness, Cape Wrath, Dunnet Head, and Burrow Head lighthouses.

847. Do you keep at this lighthouse a register of the wrecks that occurred in the vicinity?—Yes.

848. Is that a correct copy of the register?—Yes; and I now enter it as evidence.

849. While at these places you had frequent opportunities of knowing the force of the waves on curving shores and perpendicular rocks?—Frequently.

850. And the effects of currents and tidal waves?—Yes; I have made it a study.

851. Can you tell me the force of the current between Kinnaird Head and Cairnbulg?—I cannot.

852. Have you any idea what it is?—I have an extract that I prepared about it some time ago, but it is not here.

853. Have you found that the strong reach of the tide that occurs at Great Ness to and round the headland, formed in storms a barrier, and cut-off the undulation of the waves, and reduced the surface inside to ripple only by the wind?—Yes.

854. Is the cause of that the tidal current passing through the breakwater?—Yes.

855. I have asked these questions because I wish to compare this place with Fraserburgh. Have you seen something of the same sort affect Fraserburgh?—I have noticed it from the lighthouse frequently, and I have always seen that the current coming down the Moray Firth took the point, as it were, at an end, and was driven over to the south side of the bay. And again, the tide after sweeping the bay turns out and almost forces the wave and sends it down, making thereby a smoother part for a considerable portion of the sea before the harbour mouth.

856. Have you been requested by any one to make these observations for a certain number of years?—Mr. Robert Stevenson requested me many times to make my observations on the waves at different places where I was, in order to give him satisfaction about it; and I did so also for my own satisfaction, and from time to time was much satisfied to see the effects of the waves, reporting occasionally to Mr. Stevenson.

857. Do you know Peterhead?—Well.

858. You have been at the Buchan Ness lighthouse?—I was once superintendent there.

859. You have been there as long as you have been at Kinnaird's Head?—Yes, longer.

860. Can you tell us if the sea is as heavy in Fraserburgh Bay as it is in Peterhead Bay?—It is much heavier in Peterhead Bay.

861. Did ever you see so heavy a sea in Fraserburgh Bay as you have seen in Peterhead Bay?—No.

862. Could a vessel with the wind blowing strong from the south-east or north-east take the harbour of Peterhead with any safety?—Not if there was a heavy sea. No man could attempt to take the harbour in any of these winds with a gale. I have often seen them put into the bay at Peterhead, and turn out again.

863. From what direction was the wind blowing then?—From the south-east or east, and even with easterly winds. I have seen them making a reach out there, but they could not take the harbour.

864. Can this occur at Fraserburgh?—No; because here we have the shelter of the point of Cairnbulg Head, causing the water to be smooth, the sea at the mouth of Peterhead throws them across to the back of the next pier.

865. What do you consider the best quarter to blow from to get into Fraserburgh harbour?—The north-west wind.

866. Even off the land?—Yes, because the water is smooth, even during a heavy gale.

867. Suppose the present north pier head to be extended outwards, would that be remedied?—That would just be the safety round the pier, and then down anchor.

868. You have often seen a number of vessels wind-bound here?—Yes.

869. And bound different ways?—Yes.

870. Have you seen the abstract of the register of winds published by the Committee in the Appendix to their Report?—Yes, it is a correct abstract or very nearly so. The wrecks from the south quarter are 41, and from the north quarter 23, but I have made it out to be 22. This applies to 1857.

871. Are you prepared to say how the gales were from 1853 to 1856 inclusive?—The gales were double from the south what they were from the north quarter.

872. Do you find also in west-south-west gales that vessels cannot get either south or west?—That is too often the case.

873. Of course you would say that this is only the result of your observation during the day?—That is all, and in clear weather.

874. Taking an average of four years, how many ships have you seen?—I have seen 4,400 in the daytime passing and repassing.

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875. You have taken this from your register?—Yes.

876. What do you put down those passing at night for?—I suppose there would be just as many at night and in foggy weather as during the day, that makes 8,800 vessels at Kinnaird's Head, on an average of four years, yearly.

877. Have you observed how they pass, west and north?—Yes, there are about 460. As many go west as go north.

878. You know Peterhead Bay?—Very well.

879. From your experience as an inspector of works, do you consider it to be very difficult to erect a pier at Peterhead to stand?—I would think so; it is very deep water, and they would require a very, very strong pier to stand there.

880. Do you know anything about Wick?—Wick has much need of a harbour to protect the boats, but I should feel rather suspicious as to its being filled up with sand.

881. Are you so well acquainted with the place as to say so?—Yes, I have been frequently in it, when I was at Dunnet Head.

882. (*Chairman.*) Of the vessels which have passed your lighthouse, can you give me any notion of the proportion which vessels apparently belonging to the coasting trade bear to those which belong to the foreign trade?—I could not do that, because we cannot know what they are. Only we keep a note of whether they are sloops, brigs, steamers, or barques.

883. Are there any considerable number of large ships?—No; there are not so many of them as of the other coasting vessels. Generally schooners, brigs, and sloops are the most prevailing.

884. Can you give me any idea of the proportion of the large vessels to that of the smaller vessels that you have named?—In general, the proportion would perhaps be that of six large vessels to 120 or 200 schooners in a month.

885. (*Mr. Lindsay.*) You say that on an average of four years 4,400 vessels pass Kinnaird Head every year during daytime?—Yes.

886. And you presume an equal number pass at night?—I would suppose so, taking foggy weather also into account.

887. Well then, that being the case, in the course of ten years there will have passed somewhere close upon 100,000 vessels?—Yes, there would be that.

888. You have given a return of the number of wrecks at Fraserburgh and the immediate neighbourhood, which return shows a loss of 26 vessels; are these all the vessels which have been lost during the last ten years?—Yes, that is all which have been lost, to my knowledge.

889. Then there is only a loss of 26 vessels out of 100,000 vessels that passed Kinnaird Head?—Yes.

890. Now look to this return, and let me know how many vessels in your opinion would have been saved if there had been a harbour of refuge at Fraserburgh?—There would have been twelve, as far as I can see.

891. That return was made up by you?—Yes.

892. From the information which you received at the time?—Yes.

893. Would a harbour of refuge at Fraserburgh be of any value in westerly or south-west gales?—Oh yes, very much; because there is many a vessel endeavouring to keep out of Moray Firth, that would take into harbour here rather than be driven about.

894. Well, but could Fraserburgh Bay be made of any more value during westerly and south-westerly gales, by the construction of such a harbour as that which is proposed by Mr. Abernethy, than it is now?—It would be so.

895. But do not the south-westerly gales blow off the land?—Yes.

896. Then, when the wind is off the land, what benefit would such a pier as this proposed by Mr. Abernethy be to vessels with the wind blowing off the land?—It would prevent them from being blown into the sea.

897. Then you think a breakwater ought to be erected at Fraserburgh to prevent vessels from being blown to sea. That is your opinion of the use of a breakwater?—Yes, to keep the vessels in safety.

898. Were not eighteen of these twenty-six vessels lost when the wind was south-west and westerly?—There were.

899. Were not four more of these vessels lost during easterly winds, from the loss of their bowsprit, the loss of their sails, and other causes besides the gales?—Yes.

900. Then, in fact, it would appear by this return, and by the analysis of the winds and the causes of loss, that out of 100,000 vessels which have passed Kinnaird Head during the course of these ten years, there are only three which would have been saved had there been a harbour of refuge at Fraserburgh; is it so?—That is not my opinion.

901. Is your opinion still, after the answers you have given me, that there would have been more than three saved, and that there would have been twelve saved?—I am still of opinion that there would have been twelve saved, if there had been a harbour which they could have taken.

902. (*Captain Washington.*) How many vessels of those which have been wrecked have been lost off Cairnbulg Briggs?—Eight out of twenty-six.

903. Is there no buoy or beacon, or anything else, to mark the extent of the Cairnbulg Briggs?—There was none until about two months ago.

904. I believe the design for the north breakwater was drawn by you, was it not?—I gave a sketch of it.

905. I think I saw you ten years ago, and you then brought that design under my notice; I am very glad to see that that design has been carried out; I hope it will be carried still further. It has made a very good harbour; about six or seven acres?—It is more than eleven acres.

906. (*Bailie Chalmers.*) Might not a harbour of refuge at Fraserburgh have prevented part of those wrecks that you see on the wreck-chart as having occurred at Lossiemouth and up the Firth?—Yes.

907. So that Fraserburgh ought to be credited for more than the wrecks that simply occur in the immediate vicinity?—Yes.

908. Would not a harbour of refuge at Fraserburgh have saved many of the vessels bound south from the north, in a south gale, wrecked at Peterhead, and between Rattrayhead and Peterhead?—Yes, they might have got in here.

909. In south-west gales, have you not known of ships having been blown off the land here and never heard of again?—Yes, I have heard of them.

910. Then would you not say that a harbour of refuge would be useful even in those gales?—Yes.

911. (*Mr. Lindsay.*) But could vessels fetch into Fraserburgh during a strong south-western gale?—Yes, if they come into smooth water.

912. Does not a south-westerly wind blow right out to sea?—Yes.

913. Then how could a vessel be saved by a harbour of refuge at Fraserburgh?—By beating into the harbour.

914. But can a ship beat against such a south-westerly gale as that to which I have alluded?—When the water is smooth off the land.

915. The question was put to you, would not a harbour of refuge during a south-westerly gale have saved ships from being blown to the north? you said yes. Well, then, I ask you how could a vessel beat into Fraserburgh Bay in such a gale as would blow her to the northward?—If she were coming from the southward, and came round there in a south-west gale, she would be able to make Fraserburgh, rather than be knocking about.

916. But could she get into Fraserburgh Bay during a south-west wind by any other means than beating?—No.

917. She would be obliged to make a tack before she could get in?—Yes, that is a clear matter.

918. (*Bailie Chalmers.*) Can a vessel, to your knowledge, get in here with a south-west wind?—I have seen them come in just by taking one tack. I have seen it done frequently, and even in a gale.

(*Mr. Lindsay.*)—I would rather give Fraserburgh the benefit of that last answer than occupy more of the time of the Commissioners.

WILLIAM STEPHEN examined.

919. (*Chairman.*) What is your name?—William Stephen.

920. What is your occupation?—Fisherman and seaman.

921. (*Bailie Chalmers.*) You are seventy-one years of age?—And above.

922. You are a native of Fraserburgh?—Yes.

923. You have been engaged in seafaring pursuits the greater part of your life?—Yes.

924. How long were you a pilot in Fraserburgh?—About ten years.

925. You are well acquainted with the harbours of Wick, Peterhead, and Fraserburgh?—Yes.

926. From what quarter do the gales prevail most upon this coast?—They occur mostly from south-east and south-west.

927. Are these also the prevailing winds?—The prevailing winds occur generally in the fall of the year when vessels are coming from the Baltic.

928. With a gale from the south-east or south, would you consider that a harbour of refuge at Peterhead would be of much use on this coast?—No.

929. Why?—When I am bound from the coast of England, or from the Firth of Forth, with blowing weather from the south-east, heavy gales, the sea running very high, and an iron-bound coast, I am afraid to go to look for it, but keep the sea till I am certain I am round the Buchan Ness. Then the coast varies two points, which makes me more free. Until I have the Moray Firth quite open, my mind cannot be easy.

930. In a south-east or south gale, do you consider Fraserburgh quite accessible with a good harbour?—I do.

931. In a south-westerly gale could you easily make Fraserburgh?—Yes, if I have clear weather and can carry canvass.

932. Have you done it?—Yes.

933. Suppose a gale from the north-east, would you consider Fraserburgh a good refuge?—Yes.

934. And sufficiently protected?—Yes.

935. What sort of anchorage ground have you got in this bay?—We have good anchorage. We have sand above, when a vessel comes to the right end, and we have blue clay below.

936. How do you know?—When we heaved the anchor up, we got the blue clay sticking on the peak of the anchor.

937. Is there any rocky ground whatever in Fraserburgh Bay?—There is rocky ground on both sides of the anchorage, but when you come up to the bay it is all clear. There are no rocks to be met with until you come to Cairnbulg Briggs.

938. How far may Cairnbulg Point be from the breakwater?—It is considered to be about two miles.

939. If the breakwater were carried out a quarter of a mile, would that form a good refuge?—Yes.

940. Would that afford ground to accommodate even Her Majesty's ships of war?—They have been much oftener in "shoaler" water than that.

941. Do you know anything about Wick?—Yes.

942. Have you been there?—Yes; I have fished two seasons there at the herring fishing.

943. Will you give me your opinion about the capabilities of Wick as a harbour of refuge? Do you consider it a good place for a harbour of refuge?—There might be a harbour of refuge made, but I don't think any man would attempt it in bad weather.

944. Why?—From Clythness to Duncansby Head there is nothing but iron-bound rock. The general winds are from the south-east, and we have also foggy weather on that coast. A stranger might try to run into such a harbour, but any man acquainted with the coast would never do so. He has got the Pentland Firth to go to, if the wind is blowing from the south-east, and if the tides are not suited to take it he must keep the ship off, in order to keep the Moray Firth open. If he would not take the Pentland Firth with bad tides in thick weather, he must reach to the southward, and keep the shore open, that he may have a chance of Cromarty.

945. Have you taken Cromarty with vessels of 17 feet water?—Yes, as a pilot.

946. You were not a pilot at Wick, were you?—No, but I was a pilot at Fraserburgh; and when in that situation I went to Cromarty with vessels drawing that draught of water.

947. Have you seen fleets of vessels wind-bound in this bay, bound both north and south?—Yes.

948. Have you seen it frequently?—I have seen eighty-four vessels harboured here at one time.

949. If the harbour was larger, would you have seen more of them?—Yes; I have seen eighteen smacks riding in the bay at the same time.

950. Can you tell me were these vessels bound for the west?—They were generally bound south at that time.

951. But you have seen them wind-bound here, both north and south?—Yes, from west to south-east-by-south.

952. Do you remember the great storm from the south-east on this coast some years ago when the accident at Peterhead happened?—Yes, I was caught in the gale.

953. Where were you?—I was fishing from this quarter.

954. Were many of those who attempted to make Peterhead after the gale came on saved?—I think there were about 30 boats lost.

955. Were they all the while trying to make for Peterhead?—I believe they all intended to make for it during that gale, but they were all lost.

956. Do you know if any attempted to make Fraserburgh?—Yes, there were a few of the Peterhead boats carried round Rattray, and all got safe into Fraserburgh, and the Fraserburgh boats which attempted the port were all quite safe.

957. During westerly gales, is it common to see Buckie boats here for refuge?—Yes.

958. Do you remember a few years ago that a number of English vessels were driven on this coast?—Yes.

959. Did they make Fraserburgh?—All that could did.

960. Do you remember where the gale was from?—South, south-east, and south.

961. Would Cromarty be easily made in westerly gales?—Yes, when you can carry canvass.

962. What wind drives the Baltic vessels to this coast?—From south-east to south-west.

963. Suppose that there were a harbour of refuge at Peterhead, in this case could these vessels take advantage of it?—I don't think there would be any wisdom in that.

964. Would you do it?—No.

965. As a pilot, would you take down a ship to Peterhead in those gales?—No.

966. Have you seen Mr. Stevenson's plan?—No. No man in his judgment would run for Peterhead Bay in a gale from the south-east, when the west was free to him.

967. Why?—Because if I miss the harbour mouth I run a great risk of losing my ship.

968. Can you say that any man in his senses would

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run to Peterhead in such a sea ?—No ; he has nothing but hard rocks on both sides.

969. Do you consider, from the depth of the water, that there would be a considerable swell on at the entrance ?—I always found that there was a most heavy sea there. Our minds are always unquiet till we get round the heads.

970. Do you know the anchorage ground at Peterhead Bay ?—Generally they bring vessels to close up. It is generally opposite a certain street.

971. What is the name of the street ?—I do not recollect.

972. You cannot see the plan at all ?—No ; my sight is nearly gone.

973. You cannot tell me, then, that the principal anchorage is exactly opposite the opening of the harbour ?—I understand that from the south point, where it comes up, there is much shallow water. Along the breakwater there is a great deal of shallow water. The most deep water is nigh the harbour mouth.

974. Do you know that the principal anchorage is near the harbour mouth ?—Yes.

975. Do you remember a small battery being where the baths now stand ?—Yes.

976. It was removed when the baths were erected ?—Yes.

977. The baths of Fraserburgh, I mean ?—Yes.

978. Is there anything else you might want to say ?—I suppose I recollect as long as any old man in Fraserburgh. I was at work here before the foundation of any of these quays was built. Then we had only a very small place, and some ten or twelve small vessels. Our harbour revenue at that time was only 60*l.* ; and I think, in less than half a century, we have advanced in numbers above any small place that I know "'twixt John o'Groat's and the pier of Leith."

979. (*Chairman.*) You stated in the former part of your evidence that you had been a pilot for ten years, did you not ?—Yes, in Fraserburgh.

980. When you were pilot at Fraserburgh, whereabouts did you generally pick up the vessels ?—From about the Castle, round the bay, and round Cairnbulg, when we saw the signals for the places where we were detained.

981. What size of vessel have you generally been piloting ?—In that place we could not take large vessels. They were vessels of perhaps 40, 50, 60, or 100 tons we took in them.

982. (*Sir Frederic Smith.*) You say that you are 71 years of age ?—Yes, I exceed that.

983. How long have you left the sea ?—Well, I have been about 60 years at sea.

954. And you are at sea still ?—I still persist a little at it.

985. You are still a pilot, are you ?—No, I was about 30 years or more upon the register after I had given up the piloting.

986. You say, sail along the coast round here till you have got the Moray Firth open ; how do you know when you have got the Moray Firth open ?—We must keep our reckoning.

987. Then if you know by your reckoning when you get the Moray Firth open, surely you must know by your reckoning when you have got Peterhead open ?—Yes, but I am not certain in making for a round promontory.

988. Are you not wrong in your reckoning sometimes ?—Oh yes.

989. Well, it must be rather awkward then to find by your reckoning that you had reason to believe you had got the Moray Firth open when it is not ?—Then we take soundings.

990. But these soundings would enable you to know that you were at Peterhead ?—Yes.

991. Under all circumstances you have no doubt whatever that Fraserburgh would be the best place for a harbour of refuge as compared with Peterhead ?—If my canvass is good, the ship in a workable way, I could take it as long as I could live in the sea.

992. (*Mr. Lindsay.*) What is the course from Buchan Ness to Cairnbulg Point ?—North-north-east to Rattray, and then north by west.

993. Well, that would be a fair wind during south-east gales ?—Yes.

994. If that is a fair wind during south-east gales, would the Moray Firth not be as much open to you as far as a fair wind is concerned, off Peterhead, as it would be if you were off Cairnbulg Point ?—The sea is so bad there that it would almost catch our ships. We must drive round and get smooth water, and the further we get round, we get sheltered by the point, and get fine smooth water, whereas we could not live off Buchan Ness.

995. But, so far as a fair wind is concerned, would not the Moray Firth be as open to you at Peterhead as at Cairnbulg Point ?—The wind might be good to take us forward to the Moray Firth ; but there we round the point, and get shelter.

996. However, it would be as much open to you, as far as the wind is concerned ?—Yes.

697. Well, you have the soundings as far off from the land to the eastward of Peterhead as to the eastward of Cairnbulg point ?—Yes.

998. Then you can depend as much upon the soundings at the one place as at the other ?—We can, but we must be certain we are round.

999. You said that you have made Fraserburgh in a south-westerly gale, and also in a gale from the west ; where were you coming from then ?—I would be coming from the south. I can come from the south and south-west.

1000. Then you have made Fraserburgh, you say, in a south-west gale coming from the south ?—Yes.

1001. Before you get into the best anchorage bay at Fraserburgh, could you bring up by making a tack or two ?—Yes.

1002. That is to say, you must beat to windward to some extent ?—Yes.

1003. You say you have also made the bay of Fraserburgh with a gale from the westward ?—Yes, as long as I can carry canvass, and the ship will work.

1004. How many tacks would you require to make with a gale from the westward from Cairnbulg Point to the best anchorage in Fraserburgh Bay ?—The great point is, whether we have the flood tide, or an ebb tide with us. When we have the tide on the flood it keeps us back ; we need far more tacks. When we have the ebb tide, we do it quickly.

1005. Then with an ebb tide and a good smart ship well found, how many tacks do you think you would require to make from Cairnbulg Point during a westerly gale ?—Three tacks will do it fast enough.

1006. That is, with the tide in your favour ?—Yes.

1007. But with the tide against you, how many tacks do you think you would need ?—We might be tacking for six hours.

1008. Now you have had great experience, do you think a ship is in any danger when she can beat to windward and make way to windward ?—Yes, I have known ships blown northward from Fraserburgh Bay. When they returned from Norway Fraserburgh was the first point which they made.

1009. Then, do I understand that a ship, in your opinion, is in great danger at sea when she is in a position, or so well found, as to be able to beat to windward ?—For instance, if a master sees he has little chance of gaining any ground, he would run to a shelter, to shelter him from the long course of the stormy night coming on.

1010. Then he makes for a harbour of refuge in such gales as these, more to ease his own mind than for any imminent danger to the ship ?—To preserve the ship and property as well.

1011. You said that if a pier or a breakwater were carried out for about a quarter of a mile as originally proposed it would afford good accommodation for Her Majesty's ships of war ?—That is, not to say that we should take the largest, but these are

amongst them. There would be plenty of water to take them in.

1012. If a pier were extended for a quarter of a mile what area of water, in acres of four fathoms depth, would that pier afford?—I cannot answer the question.

1013. (*Captain Washington.*) In coming from the Baltic, is the land about Fraserburgh a good landfall?—It is generally considered so.

1014. What makes it?—It reaches on the point here, and here is the Moray Firth open.

1015. Is there anything in the appearance of the ground?—There is Mormond Hill.

1016. How far off would that be seen?—We can see it 20 miles off.

1017. Then it is a very good landfall?—Yes, we know by the shape of it.

1018. (*Captain Vetch.*) You know the bay of Wick very well?—I fished there two herring seasons, and I have been there with my vessel different times.

1019. You are aware that in the fishing season 1,000 or 1,500 boats are there?—I know there are far more now than when I was there.

1020. And that there are sometimes 40 vessels besides, all at the same time in the bay?—I believe so.

1021. I wanted simply to ask you whether you did not think some protection was desirable for these boats and ships, particularly as the place is well situated in other respects?—I believe there is great necessity for something being done for the preservation of such a number of boats, but there is no trade to support.

1022. Are you aware of any other place near Wick which would serve to protect, so well as the bay of Wick, the boats and vessels?—There is no place but Sinclair Bay sheltered a little from south-south-east and westerly gales.

1023. But from your knowledge of that part of the coast and the large number of boats that are fishing there and vessels attending them, you would think that some work of safety was desirable to be made there?—There is great necessity for safety. They have got a new breakwater there, and when it was built it was thought that it would be a great accommodation, but the last time that I was there I found that the sand had run into it nearly as much as the old harbour.

1024. Then you think it wants something still to make it all right?—That is quite plain.

1025. (*Captain Washington.*) Are you aware that great loss of life took place at Wick ten years ago?—I am aware of that.

1026. A loss of some 37 fishermen?—Yes.

1027. Is the life of a fisherman as valuable as that of any other sailor?—I consider it just the same.

1028. Then, don't you think that a very large harbour of refuge for ships generally, and for the fishermen and small coasting vessels there, is very desirable?—It would be very desirable indeed.

1029. Do you think it is worth while to give them some protection?—Yes.

1030. (*Mr. Lindsay.*) Considering the number of boats that fish at Wick, and the number of lives which are placed in jeopardy, do you know of your own knowledge, that the proportion of life is greater from those boats at Wick than it is from the boats fishing at any other place along the north-east coast?—There is not such a liability elsewhere.

1031. That is to say, you are not aware that the proportion is greater there from those boats sailing from Wick than the boats from any other port?—There must be some risk, because there is a great body of people there.

1032. Quite so; but the loss of life is not greater in proportion to the number of people employed, is it?—When the wind comes dead on, accidents occur at Wick, as well as at other places, but here we have Kinnaird's Head, and we may enter the harbour with a risk.

1033. Then you think the fishermen going out of Fraserburgh risk their lives as much even as the fishermen at Wick?—When the wind is south-east there is a greater risk.

1034. (*Captain Washington.*) In all your recollection as a fisherman, did you ever hear anything like the calamity that occurred at Wick on the 19th August 1848?—It was most severe, certainly.

1035. Did you ever hear anything like it, before or since?—Well, I was liable to the same the same night; but there has been nothing like it. I heard, however, an old story about a storm at Dunbar that was worse, some 200 or 300 boats being lost.

1036. Does anybody else know anything about that old story about Dunbar?—I have read about it.

1037. (*Mr. Lindsay.*) Do you know about the number of lives lost over the fishing portion of the north-east coast during that fearful gale of 1848?—I did see it in print, but I don't remember the number.

1038. Was it somewhere about 100, do you recollect?—I don't recollect, but it was very heavy on the coast of Caithness.

(The Secretary here read the official list, which stated that 124 boats were wrecked, value 7,011*l.*, and 100 men drowned.)

1039. (*Captain Washington.*) Did you ever hear of a calamity like that, I ask you still?—Never.

1040. (*Chairman.*) I think I have gathered from your evidence, that you consider the bay of Fraserburgh more favourably circumstanced for the fishermen than the bay of Wick; do you understand the question?—Yes; that is my view concerning it.

1041. How many fishing boats are at Fraserburgh just now?—I could not say.

1042. Make a guess?—I cannot exactly say the number; about 230, I believe.

1043. Can you give me any idea of the number of fishing boats at Wick?—There are places round the coast, about eighteen miles, included in Wick; I could not specify the number of boats, on account of its being so long since I fished there.

1044. I find that there are 1,200 boats at Wick, and some 330 at Fraserburgh: can you explain to me why there are 1,200 at Wick and only 330 here, since you have told me that this is a more favourable locality for the fishing boats?—Perhaps they can't find merchants to lead them to this quarter. When I went to Wick I could not get a merchant there.

1045. Is Wick nearer to the good fishing ground than Fraserburgh?—I cannot say; it is just owing to what way the shoals go. Sometimes the shoals come from the east, sometimes from the north; sometimes they may set in by the coast of Wick and not come here, and sometimes they set in here and don't go there.

1046. I distinctly understand that you attribute the greater number of fishing boats which resort to Wick to the greater assistance and encouragement they receive from the merchants?—Yes.

1047. (*Sir Frederic Smith.*) I presume that the merchants generally select those places that give them the greater profit?—It has been thought that they do so.

1048. Well then, how can you account for the merchants selecting Wick for their trade rather than Fraserburgh?—It has been longer in standing favour.

1049. But don't merchants change their ground for profit?—I have seen them do so.

1050. Is it not likely that they would do so?—Merchants from many quarters go to Wick. They see it to their advantage to go farther than Fraserburgh.

1051. Have you any knowledge of the proportion of fish caught per boat here and caught at Wick in the season?—We have often beat them, and they have often beat us.

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1052. That seems to be a very strong reason for the merchants changing their ground. It must appear to you singular that with a superior harbour here for fishing there should be the smaller number of boats with an equally likely chance of getting fish. There must be some reason that you have not given us to account for this?—Well, I could not say the reason; but there is one thing, they generally have to pay as much for their fish there as here.

1053. What are the chief markets for the fish caught at Wick or here?—They go to many different markets.

1054. What is the general market?—The Baltic, Stettin, and other places.

1055. Well then, according to your own view, it is easier for the Baltic vessels to find this harbour than Wick harbour; and the fish being equal in quantity at both places, they should give this the preference?—Merchants making Wick their home don't like to leave it.

Mr. William Burnett examined.

Mr. Wm. Burnett.

1056. (*Chairman.*) What is your name?—William Burnett.

1057. What is your occupation?—Seaman.

1058. (*Bailie Chalmers.*) How long have you been at sea?—Twenty-one years.

1059. And how long a master?—Eight years.

1060. In what trade have you been engaged?—Both foreign and coasting.

1061. In what trade are you now engaged?—In seal and whale fishing.

1062. What is the size of your vessel?—349 tons.

1063. You know the bays of Wick, Peterhead, and Fraserburgh?—Particularly the last two.

1064. The bay of Wick you don't know quite so well?—No.

1065. If a harbour of refuge is to be erected at one of these points, where would you prefer it?—At Fraserburgh.

1066. How do the winds on this coast prevail?—From south-west and south-east.

1067. Would a man of prudence attempt to run down to Peterhead even if the harbour of refuge be erected there in these circumstances?—Never, if he could clear Rattray Head or the Buchan Ness.

1068. You have seen this plan of Mr. Stevenson's?—Yes.

1069. Suppose that plan were carried out, do you think it would afford shelter for vessels in gales from the south?—Not from the south-east.

1070. How is the sea near Peterhead Bay?—The sea is always very heavy from the south-east.

1071. And the tides?—The tides run pretty strong.

1072. Are they so heavy and so strong that vessels trying to make that harbour would be sent round to Fraserburgh?—I think so.

1073. Do you know the anchorage ground at Peterhead?—Yes; it is in a line with Maiden Street.

1074. Is it the principal anchorage in the bay of Peterhead?—Yes.

1075. Is the opening to the south-east?—Yes.

1076. Is there any other good anchorage in the bay?—Not that I am aware of.

1077. Do you very often see fleets of vessels lying here wind-bound, going both north and south?—Yes.

1078. Can you explain how that occurs?—When the wind is from the south-west.

1079. Are vessels coming from the north-west stopped at Peterhead?—Yes.

1080. As they attempt to go west of that, they are met by a wind?—Yes.

1081. This is the leading wind for vessels through Moray Firth?—Yes.

1082. And they in their turn are stopped by the wind that brought the vessels up from the south?—Yes.

1083. Do you know any other point on the north-east coast, where such a thing can happen?—No.

1084. Do you consider that a harbour of refuge ought to be erected on this coast at the place which can be made with the greatest safety in the most prevailing gales?—Yes.

1085. And these gales are?—South-east and south-west.

1086. Do you consider that, if a harbour according to this plan, or any harbour, were erected at Peterhead, it would be of any use to a mariner in these gales?—Not if he wish to save himself and property.

1087. Supposing that one pier was carried out, say one third of a mile across the bay, would that afford a good refuge?—Yes.

1088. In any gale?—Yes.

1089. With regard to Wick, do you consider that there would be great use for accommodation for the craft there?—Yes, for the boats and small ships.

1090. You don't consider that a large harbour of refuge at Wick would be of any use for the regular trade of the country?—I don't think it would.

1091. You have been at the Baltic trade?—Yes; and ships bound to the west coast make for Mormond Hill or Kinnaird Head.

1092. And in gales from the south-east, how do these vessels do?—They attempt to keep the Moray Firth open.

1093. And in that case they would make for Kinnaird Head in preference to Buchan Ness, would they not?—Yes.

1094. Is Mormond Hill a good landmark?—Yes, very good.

1095. Have you occasionally seen English colliers and other vessels driven down from the coast of England to Fraserburgh?—Yes, from London, Newcastle, &c., some of them loaded and some light.

1096. You are aware that a great many wrecks occur in the neighbourhood of this bay?—Yes.

1097. And away up about Lossiemouth and down about Peterhead?—Yes.

1098. Would a harbour of refuge here have been the means of saving many of those who have been wrecked here and at Lossiemouth and Peterhead?—That is owing to the position of the wind.

1099. But it would have saved some of them?—Yes.

1100. Do you know how it is that 1,200 boats, fish at Wick and only 300 here?—Because there are more curers there.

1101. Is it only lately that we have been able to accommodate a larger number of curers than we did?—It is only within a few years.

1102. And they have not had sufficient trial of the new harbour to change from Wick to Fraserburgh?—Yes.

1103. (*Chairman.*) How long had you been a mate prior to being master?—Eight years.

1104. Prior to that were you apprenticed?—Yes.

1105. You heard the evidence given by the former witness, and you must have seen at once the drift of my later questions to him with respect to the fishery?—I cannot say much about the fishery.

1106. Are you of the same opinion with him that the harbour of Fraserburgh is in itself a more favourable harbour and better locality for the fishermen than the harbour of Wick?—There is more accommodation in it just now than there was formerly.

1107. Do you think that the fishermen can make the harbour in bad weather here more easily and with more safety than at Wick?—That is owing to the way the winds are.

1108. But supposing the wind to be in the most dangerous direction at either place?—I should say there is not much difference.

1109. You see and understand that plan of Wick Bay, do you?—Yes.

1110. Do you see the breakwater marked with the opening in the centre?—Yes.

1111. Now, supposing that breakwater to be made, would you consider it a superior harbour for the fishermen to the harbour at Fraserburgh as it now exists?—No.

1112. So that even supposing that breakwater was placed where you see it, you would still consider Fraserburgh a better harbour for the fishermen?—Yes, in bad weather.

1113. Will you state to me your reasons for doing so?—There is a deal of sand to run to here, for one thing, which can save a vessel and property, whereas it is all rock about Wick. If they pass the entrance they pass all.

1114. Nothing else?—No.

1115. As the advantages of the harbour at Fraserburgh are in your opinion superior to those at Wick, and as you will probably soon have railways to Fraserburgh, and therefore your access to the markets will be very much better and cheaper than that which there is at Wick, do you anticipate a great increase of the fishing trade here?—Yes, but we want a better harbour.

1116. Not if you had a better harbour, but with the harbour as it is at present, do you anticipate a great increase in the fishing trade?—Oh yes.

1117. And *à fortiori*, if the harbour was made better you would expect a still greater increase?—Yes.

1118. Do you consider that at Wick the fishermen are nearer to the good fishing ground than they are at Fraserburgh?—I could not say.

1119. That you have no experience of?—No.

1120. (*Sir Frederic Smith.*) Are there any instances of fishermen having missed the harbour and run for the sands?—Yes.

1121. Many?—I have seen a few.

1122. Lately?—I could not say how long it is—some years ago.

1123. Then, although you have the sands here, they have not been of much avail to you?—They have been made use of frequently.

1124. And saved life in consequence?—Yes.

1125. You say you have navigated to the Baltic?—Yes.

1126. Have you ever had occasion to go into Cromarty in coming from the Baltic?—I never was driven there.

1127. You have always made safe voyages and got into your port here?—I always got in when I came.

1128. But you have never been driven out of your course?—Oh yes, many a time. I make my way sometimes into Moray Firth.

1129. Do you think if you had a harbour of refuge at Fraserburgh you would come here instead?—Yes.

1130. In fact, nothing but the want of a harbour would take you there?—Yes.

1131. You have no water capable of taking in a vessel of 300 tons at low water?—No.

1132. What is the largest vessel that can come in at low water with safety?—No ship of any size could come in at low water. It is a dry harbour.

1133. (*Mr. Lindsay.*) I think you said that no man of prudence would run for the harbour of Peterhead in a south-east gale if the breakwater was carried out as laid down there so as to make it a harbour of refuge?—Yes.

1134. If the breakwater was carried out as proposed at Fraserburgh, would you have any hesitation in running for it in an easterly gale?—No, none.

1135. Can you tell the Commissioners from your experience why any man of prudence would not run for Peterhead during a south-east gale?—Because you have only got one chance; that is, the entrance, and if the ship does not steer well, down they are. There is no alternative for ship nor man; whereas here, if we miss the entrance at Fraserburgh we have got the sand. If we don't get inside the breakwater we can take the Moray Firth.

1136. Then when you spoke of Peterhead you referred to a ship not steering properly, or any accident having happened to her, just at the time she was about to enter the purposed harbour?—I say I would never run unless the ship was disabled.

1137. Then the sum and substance of your answer is, that even if there were a harbour of refuge at Peterhead, you would never run for it during a south-east gale?—Yes.

1138. I have not clearly understood from you the reasons why you would not run for it, would you repeat them?—Because the entrance is narrow, and if you miss the entrance you have got nothing to run to.

1139. You would also have a narrow entrance to Fraserburgh if these piers were carried out?—We have something to run to here.

1140. You have the sands to run to?—Yes.

1141. And therefore on that account you consider a harbour of refuge more desirable at Fraserburgh than at Peterhead; is that your reason?—Yes.

1142. Is that your only reason?—We can save our lives here, which we cannot do at Peterhead, on account of the sand at the head of the bay at Fraserburgh.

1143. Have you any other reason?—It would be a more easily-taken harbour in a south-east gale.

1144. You mean that you could take Fraserburgh in a south-east gale, when you could not take Peterhead?—Yes.

1145. (*Captain Vetch.*) I think we heard that there are 330 fishing boats at Fraserburgh, are you aware of that fact?—Yes.

1146. Do you know how many of these fish here, and how many of them go to Wick to fish there?—I am not aware that any go in the meantime.

1147. Are you aware that the herrings generally select known haunts, and that they are found there in great quantities, and not found anywhere else? Do you know that at Peel, in the Isle of Man, they appear in large numbers, and that fishing boats come from the island, from Scotland, from England, and from Ireland, to fish in that island at a particular time?—I have heard so, but I cannot speak upon it.

1148. But you do not expect that you can change the haunts of the herring; if the boats resort to the fishery they must go to the haunts of the fish?—I cannot speak anything about the fishing.

1149. Well, then, you can speak as to the protection required for the herring fishery boats?—Oh yes.

1150. Where would you place the protection? Near the haunts, or far from them?—Near them.

1151. Very well, then, I suppose that is a very good reason why the protection to the boats should be given at Wick and not at Fraserburgh. I think Fraserburgh has a very good harbour for many purposes, but it would hardly suit for the protection of the fishing boats. Is not that, too, your conclusion? But Fraserburgh would do for the fishing boats as well as for any other?—Perfectly, if you could get the first to come here.

1152. (*Mr. Coode.*) You said there was a very heavy sea off Peterhead in a south-east gale, do you consider that it is heavier at Peterhead in a south-east gale than at Fraserburgh in a north-east gale?—Yes.

1153. Why so?—Because the tides run stronger.

1154. I do not say in the bay, but off Peterhead and off Fraserburgh?—Yes.

1155. Do you know the difference in the rate of tide?—No, I cannot state it.

1156. Do you think it runs much stronger off Peterhead?—Yes, but I don't know the exact time.

1157. (*Bailie Chalmers.*) Do you happen to know that the entrance to the proposed harbour to be erected at Fraserburgh would be more than a mile wide.—Yes.

1158. And that the entrance to the proposed harbour at Peterhead is only four hundred feet?—Yes.

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Bailie Chalmers.

1159. Would not that be another inducement for you to run to Fraserburgh in preference to Peterhead ?—Yes.

1160. As well as what you have said about the rocky nature of the coast at Peterhead ?—Yes.

1161. (*Sir Frederic Smith.*) If the opening be a mile in width, does not that expose your harbour much more than an opening of only four hundred feet ?—If we get to the mouth of the breakwater, we are in smoother water.

Mr. Alexander Stephen examined.

Mr. Alex. Stephen.

1162. (*Chairman.*) What is your name ?—Alexander Stephen.

1163. What is your occupation ?—Mariner.

1164. (*Bailie Chalmers.*) How long have you been at sea ?—Twenty years.

1165. How long have you been a master ?—Twelve years.

1166. Have you been employed in the foreign and coasting trades ?—Yes.

1167. Are you at present engaged in the seal and whale fishery ?—Yes.

1168. You command the *Alexander Harvey* ?—Yes.

1169. Do you know the bays of Wick, Peterhead, and Fraserburgh ?—Well; but I am more intimate with the two latter bays.

1170. But you know something of Wick Bay ?—I have been once in it.

1171. Which of those places would you prefer as the site for a great national harbour of refuge, if such is to be ?—I would prefer Fraserburgh.

1172. Would you give me any reasons for preferring Fraserburgh ; about the winds, for instance ?—It is naturally protected from south-east and south-south-east winds.

1173. Are these the winds which prevail, to your knowledge, upon this coast?—Yes, and south-west winds.

1174. What is your experience about the sea near Buchan Ness ?—In going from the coast of England, which I have often done, I find the sea as I approach the Ness to run very heavily, and my vessel almost foundering till I can get to the north of Peterhead, where I find the sea less dangerous and more favourable for the ship to pass through.

1175. Do you know of any place on the north-east coast, where the tide runs so strong as between the Skerry Rock and the north and south heads of Peterhead, with the exception of the Pentland Firth ?—No.

1176. Have you seen Mr. Stevenson's plan of the proposed harbour at Peterhead ?—Yes.

1177. Can you point out upon the plan, the principal anchorage ground in Peterhead Bay at present ?—Yes.

1178. Where is it ?—I can point it out on the plan from the information I got when I had first the charge of a vessel, the first time I was in the bay, by some of the pilots, I was informed by some of the pilots that the figure 8 is in the line of the best anchorage in the bay.

1179. Do you know what street it is opposite ?—I think it is Merchant Street, but I am not sure.

1180. But you have been there ?—Yes, and I know that the best anchorage lies where I have indicated.

1181. Do you know if there is any anchorage as good as within this enclosure ?—I don't know that there is any so good.

1182. Do you believe that there is any as good ?—There might be for small vessels, but there is none except this for larger vessels.

1183. Then this anchorage ground is left open to the sea, especially in the prevailing gales ?—Yes.

1184. What land do vessels from the Baltic, bound north and west, make ?—I should prefer Kinnaird's Head and the Hill of Mormond.

1185. And even when bound south in a south-east gale, which land would you make ?—I should prefer making Mormond Hill too, if possible, and keep the firth open.

1186. You would do that rather than take the chance of running down two miles in a south-west direction to seek for shelter ?—Yes.

1187. What sort of coast is it all along there ?—There are some sandy bays, but generally speaking it is a rocky coast.

1188. Would you make Peterhead Bay with any confidence in a south-west gale ?—No.

1189. Why ?—Because I have so often experienced in running down on that bay, even a mile and a half off, that the sea runs so high as to put me in danger of our private property being lost.

1190. Is the face of the sea considerably modified by the water being shallower a considerable distance outside ?—Yes, from certain winds.

1191. But even in an east or a north-east gale ?—In that case the force of the sea is broken by the water being shallower.

1192. Suppose a breakwater was carried out according to the plan which you have seen, do you suppose that the harbour of Fraserburgh could be made in any gale ?—Oh yes, I have no hesitation in saying so.

1193. And obtain safe anchorage inside ?—Certainly, to the best of my judgment.

1194. Have you seen frequently vessels wind-bound out in the bay both north and south ?—Yes.

1195. Is this a thing that occurs in any other point of the coast?—I have not experienced it ; I do not think it is.

1196. Would you consider this one cause for preferring Fraserburgh Bay to Peterhead Bay and Wick Bay as a harbour of refuge on a great scale ?—Yes, for sheltering vessels that are often wind-bound here, bound north and south.

Bailie Chalmers then said :—This is a paper I got sent to me by Mr. Calver, filled up. I now beg to lodge it in the hands of the Secretary, and I expected to have been able to examine Commander Croker, but his absence in London has prevented my doing so.

(*Chairman.*) Is he resident in London ?—Yes.

(*Bailie Chalmers.*) I have here Commander Croker's precognition, as well as those of Captain Aldridge and Captain Rohb.

(*Chairman.*) Is it your wish to put these papers in evidence ?—It is.

(*Chairman.*) The Commissioners have decided that these papers cannot be received in evidence.

(*Bailie Chalmers.*) I request that the evidence of these gentlemen may be taken in London, in order to complete my case.

(*Chairman.*) Your request will be duly considered by the Commissioners.

Mr. Abernethy recalled.

Mr. Abernethy.

1197. (*Bailie Chalmers.*) Laying aside your own views, Mr. Abernethy, as to small grants to various harbours, if the Government determine on the erection of a great national harbour, do you consider Fraserburgh the best site on the north-east coast for that harbour ?—I do, for the interests of the shipping generally. At the same time I must say, that I am strongly impressed with the necessity of a harbour of refuge for the vessels connected with the fishing trade being provided at Wick.

1198. (*Mr. Lindsay.*) There is a portion of your evidence so important, that as we have to examine

witnesses at Peterhead before it can be printed, I wish just to see that I have taken it down correctly. Did I understand you to say, that the pier, as proposed by you, extending 1,500 yards and costing somewhere about 400,000*l.*, would enclose an area of 195 acres within the two-fathom line ?—I think that is on the plan.

1199. That is to say, two fathoms and under ?—Yes.

1200. And further, within the three-fathom line down to two fathoms, 150 acres ?—Yes.

1201. And further, you would have, four fathoms down to three fathoms, ninety-seven acres ?—Yes.

1202. Do you mean that you would have 195 acres of depth between two fathoms and three fathoms ?—Two fathoms upwards.

1203. That is to say, your whole area within two fathoms would be 195 acres ?—Quite so.

1204. And your whole area within three fathoms would be 151 acres ?—Quite so.

1205. And your whole area within four fathoms would be 95 acres ?—Quite so.

1206. Then, I think I understood you also to express a doubt of a harbour at Peterhead, such as is proposed, being constructed for the sum which Mr. Stevenson has stated ?—Yes ; I think the estimate is low.

1207. Do you think, from your past experience, it would cost considerably more than 330,000*l.* ?—I do.

1208. Have you formed any idea of how much more it would cost ?—I have not. I gave an estimate of 400,000*l.* as a probable estimate, without having time to go into details ; but in proportion as regards this pier I have put a much larger price upon it than on the pier at Peterhead. I think, seeing the situation, a harbour at Peterhead would be much more difficult to make, and much more expensive, than a harbour here.

1209. Do I understand you to say that there would not be a greater area than 97 acres at Peterhead ?—There would be within the three-fathoms line 95 acres ; within the two-fathoms line there would be 116 acres.

1210. Did I understand you to express an opinion that the holding ground at Fraserburgh is better than what it is at Peterhead ?—From all the information I have received, and inquiries I have made, the holding ground, is clean ground, and better ground at Fraserburgh than at Peterhead.

1211. (*Mr. Coode.*) By the replies which you gave to Mr. Lindsay, I believe the areas had reference to the portion enclosed within the north-east line ?—Yes.

FRASERBURGH.

Mr. Abernethy.

30 August 1858.

1212. Will you tell us nearly in what proportion that area would be reduced if a line were drawn from the outer end of the breakwater, east by north ?—This might reduce the depth of the water anchorage within the four-fathom line about one-fourth.

1213. Do you not think that a line drawn east by north would reduce that in a greater proportion than one-fourth ?—Yes ; but as the Cairnbulg Point and the rocks beyond this point trend so far to the eastward, I don't think the harbour would be exposed in that direction. In fact, I believe that, with an east wind in the direction you mention, at present there is smooth water in the bay.

1214. Do you not think that a line drawn east by north from the outer head of the breakwater would reduce the sheltered area to a greater extent than one-fourth ?—Within the three-fathom line ; and within the two-fathom line, considerably more than one-fourth.

1215. You have no memorandum of the relative numbers of acres, have you ?—I have not. I don't think so, for this reason : that, with the wind in that direction, I find at present that the water is smoother in the bay at that point. You will observe that, although a beacon is shown on Cairnbulg Point, the reef extends beyond that, and at present the beacon is within 400 feet of the rocks.

1216. (*Chairman.*) Will you put in a plan on a reduced scale, when corrected ?—I will.

1217. I understand you to say that you are not prepared to go into the question of construction whatever till a later period ?—Yes ; I am at present preparing detailed plans for the purpose of laying them before the Commission at a future period, on the question of construction.

(*Bailie Chalmers.*) I request leave to examine Mr. Abernethy on a future day in regard to the construction of the harbour.

1217*a*. (*Chairman to Bailie Chalmers.*) Before you sit down, allow me to ask you what is your profession ?—An advocate.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry ?

No answer.

Sittings at Fraserburgh closed.

PETERHEAD.

Tuesday, 31st August 1858.

PRESENT :

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain VETCH.
Mr. COODE.
Mr. SEWELL, Secretary.

Mr. ALEXANDER ANDERSON examined.

1218. (*Chairman.*) What is your name ?—Alexander Anderson.

1219. What is your occupation ?—I am Preses of the Harbour Trustees, and Provost of Peterhead.

1220. State for the information of the Commissioners any information which you may wish to offer relative to the subject of the present inquiry, observing that it will be desirable, so far as may be in your power, not to repeat that which has already been given before the Select Committee of the House of Commons on Harbours of Refuge, in the years 1857 and 1858.—If permitted, I shall read the following statement :—

PETERHEAD.

Mr. A. Anderson.

31 August 1858.

With the view of facilitating the inquiry which the Royal Commissioners are about to make at Peterhead, to enable them to report on the best site for a harbour of refuge on the east coast of Scotland, and thereby lessening the labours of the Commissioners, Provost Anderson begs,

PETERHEAD.

Mr. A. Anderson.

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with their permission, to make a short statement of some of the leading points on which he thinks that good grounds exist for the selection of Peterhead for such a harbour.

It will not, he hopes, be considered out of place to state how important the harbours of Peterhead have been viewed by the country for a long series of years. So early as 1661, in the first Parliament of King Charles the Second, an Act was passed "for a Contribution for repairing the "Harbours of Peterhead." In 1705, an Act of the Scottish Privy Council was obtained "for a Voluntary Contribution "within all the Parish Churches of the three Lothians and "bewest the Forth" for building and repairing these harbours; and in 1729, and again in 1739, the Convention of Royal Burghs authorized a voluntary contribution throughout all the royal burghs in Scotland for the same purpose. In 1807, and again in 1827, Acts of Parliament were obtained for their farther improvement; and since 1797 upwards of 105,000*l.* have been expended on these improvements. The harbours are managed by a rotatory Board of Trustees, a certain number of which are elected annually. The revenue can be applied only to the maintenance of the harbours, the payment of the interest of the debt, and the liquidation of the principal. No individual or body of persons have any pecuniary interest in them whatever. Within the last ten years extensive improvements have taken place, which have been duly appreciated by the public, upwards of 50,000*l.* having been expended within that period on those improvements. By the present Act of Parliament the trustees are authorized to borrow 60,000*l.*; they have under that authority borrowed 57,517*l.* 19*s.* on the security of the annual revenue, which for the year ending at March last amounted to 4,391*l.* 19*s.* 7*d.*

Between 1806 and the present time many eminent engineers and others, by reports and other ways, have borne the strongest testimony in their favour. These reports will be found in the memorials and other documents which will be tendered to the Commissioners.

Before entering upon the few details he is about to submit, he may be farther allowed to state that he is himself practically acquainted with nautical affairs. He went to sea at an early age, and was eight years in the navy, and 24 in command of a ship in the merchant service, and he has himself had experience of the necessity for a refuge harbour upon the east coast of Scotland.

He would, in the first place, respectfully refer the Commissioners to the following documents, which have not been printed in either of the reports on harbours of refuge which were made by the Select Committee of the House of Commons in 1857 and 1858; he does so because they contain much valuable information respecting the fitness of Peterhead for a refuge harbour; evidence of the loss of many valuable lives, and much property, which, had there been a refuge harbour at Peterhead, would have been prevented; and a strong expression of preference which a vast number of shipmasters and mariners trading along the coast referred to have given in favour of Peterhead.

The documents now alluded to, and which he requests to be allowed to hand to the Commissioners, are the following:

Copy of memorial by the trustees of the harbours of Peterhead to the House of Commons, 1858.

Copy of petition by shipmasters and mariners at many of the ports in Scotland, 1858.

Copy of a petition by shipmasters and mariners at many ports in England, in 1858.

Copy of a report by Messrs. Stevenson, civil engineers, Edinburgh, in 1858.

Copy of a report by Mr. James Leslie, civil engineer, Edinburgh, 1858.

Return of wrecks which have occurred in the vicinity of Peterhead at different intervals since 1816, there being no means of procuring a continuous return.

Besides these, there are other returns which he will take leave to lay before the Commissioners, and which he will afterwards notice.

The geographical position of the harbours of Peterhead, as will have been shown, has for many years secured for them much public attention, and the spacious south bay has long been looked to by many mariners as the most fitting place on the east coast of Scotland for affording them necessary protection, should means be taken for that purpose.

It will be shown in evidence to the Commissioners by witnesses of respectability, intelligence, and practical nautical knowledge now present,—

That the south bay is the most generally frequented anchorage on the east coast between the Pentland Firth and the Firth of Forth:

That it has good holding ground:

That the Buchan Ness light on its south boundary; and the adjoining high land, so mark its position that it is easily got hold of; and these objects, forming, as they do, landmarks for vessels passing in either direction, naturally draw them thither, so that shelter and refuge are often sought for in it, and would always be obtained were breakwaters erected for the necessary protection from certain winds:

That all vessels from Archangel to the east coast of Britain endeavour to make the land of Buchanness, and most of them do so:

That vessels from the Baltic to the east coast of Scotland, more especially as the season advances, seek first for the Buchan Ness:

That many vessels from the Baltic bound to the west coast or to America also endeavour to make the Buchan Ness land; and that all vessels bound south or north of Peterhead, from whatever quarter, invariably endeavour to make it:

That in its present unprotected state large fleets of ships bound northward or westward obtain shelter in the south bay in the spring, summer, and autumn months:

That the average of such vessels is not less than 600 of 80 to 90 tons average; many of them are of too large tonnage to be enabled to enter the harbours:

That so many as 96 ships have taken shelter in the south bay at one time:

That large numbers of vessels also take refuge in the present harbours of Peterhead, so many as 86 having been there at one time: on one occasion 78 ships bound northward and westward were in the harbours together; and that during the last five years the number which took refuge in the harbours was 1,149, and the tonnage 69,703: a return to this effect will also be presented to the Commissioners:

That adding these to the tonnage entered at the Custom House for purposes of trade, and those decked vessels which, though entering the harbours for purposes of trade, are not included in the Custom House Returns because of the nature of their employment, such as the carrying of fish coastwise, lime, &c., the total number, taking the average of the last three years, was 1,323 sail of ships of 106,964 tons annually: an amended Return to that which was laid before the Select Committee will also be presented to the Commissioners:

That the trade of the Moray Firth especially is greatly dependant on the harbours and bays of Peterhead for the refuge afforded to it there, when its vessels are overtaken by gales or contrary winds:

That many vessels from Archangel, the Baltic, and North America, call at Peterhead for orders, the average number being not less than 150:

That were the south bay protected, many vessels would take shelter there that cannot do so at present:

That the number of vessels lost and stranded, as enumerated in the return referred to, was 134, and that since 1847 the number has been 64, causing the loss of 87 lives, as nearly as can be ascertained, exclusive of the loss of life which has taken place in the herring and white fisheries, the amount of which has not been ascertained with certainty, although the fact is of itself sufficiently notorious. From a return which will be submitted to the Commissioners it will be shown that since 1847 the number of lives so lost amount to 15. Reference is not now made to the great loss which occurred in 1848 farther than to state, that upon that occasion 59 boats were driven on shore; 35 of these were totally lost, in most cases with all their nets and other materials; the damage was estimated at upwards of 3,000*l.*, and, melancholy to add, no fewer than 19 fishermen perished in that storm:

That Peterhead is a station for the herring fishery second in importance in Scotland, the number of boats engaged annually being from 230 to 400; and within a range of 14 miles south and north, the white fishing is largely carried on, more particularly in the winter months:

That were a harbour of refuge erected at Peterhead, it would possess all the advantages which the trade of the North Sea passing or nearing the east coast of Scotland could require.

Provost Anderson, in conclusion, would beg to inform the Commissioners that he is prepared with a list of the witnesses to whom he has referred, and who will be prepared to answer any questions which the Commission may think proper to put to them in evidence of the points which he has taken the liberty of submitting to their consideration, or any others having reference to the important national object which has been committed to them.

1221. (*Mr. Lindsay.*) You stated that 105,000*l.* had been expended since 1797. In what way has that sum been expended?—In the deepening and enlarging of the harbours.

1222. The tidal harbours?—The tidal harbours.

1223. Was there any part of that sum expended so as to make more safe the anchorage in the bay?—None.

1224. By the powers granted to you in your Act you can borrow 60,000*l.*, of which I understood you to say you had already expended 57,000*l.* ?—Yes.

1225. How has this sum been expended ?—In cutting a communication between the two harbours, in deepening the North harbour, &c.

1226. The money has been expended solely upon the tidal harbours and the docks ?—Yes.

1227. I think you stated in your evidence that you had been for four years in the command of a ship ?—twenty-four.

1228. During that time you traded to where ?—The West Indies.

1229. Where from ?—London.

1230. Have you had any experience in the navigation of the North Sea ?—Not a great deal. In my earlier days I was cruising in a ship of war. During that time we were through every part of the Orkneys, Shetlands, and the Pentland Frith, and all about. The first voyage I made in the merchant service was to America, and in coming home I came through the Pentland Frith, with a gale of wind to the west. Since then I have merely had opportunities as a passenger for observing these places.

1231. You have had some experience in the Orkney Islands in your younger days ?—Yes ; but the period is so far back that I would not venture to give an opinion regarding them. I may merely state the fact that I found no difficulty in coming through the Pentland Frith ; there was a good deal of sea, but nothing to hurt a good ship.

1232. Are you acquainted with the natural harbours of Longhope, Kirkwall, and Stromness ?—It is so long ago since I have been there that it would be with difficulty I could remember the formation of them.

1233. Don't you feel satisfied in offering an opinion on the several harbours ?—I feel competent to say that Longhope and Kirkwall are safe in all winds.

1234. One other question. You say that during that fearful gale in 1848, 59 fishing boats belonging to Peterhead were wrecked, and that 15 fishermen lost their lives. Did all these belong to Peterhead ?—Not all ; some frequenting it, and others fishing at it.

1235. Did I understand you to say that, independent of the loss of life in 1848, there were 15 fishermen who lost their lives at different periods ?—Yes.

1236. Do you know sufficient of the details to answer my questions ?—One boat capsized off the heads and one or two other boats were lost in a similar way.

1237. But would a harbour of refuge at Peterhead have saved those lives ?—I should think not, under the circumstances.

Mr. David Stevenson examined.

1238. (*Chairman.*) What is your name ?—David Stevenson.

1239. What is your profession ?—A civil engineer.

1240–1. State, for the information of the Commissioners, what you wish to offer relative to the subject of the present inquiry, observing that it will be desirable, so far as may be in your power, not to repeat that which has been already before the Commissioners in a published shape in the reports of the Select Committee on Harbours of Refuge, in the years 1857 and 1858.—I do not know any additional evidence that I have to lay before the Commissioners. I think all that I have to say in the shape of evidence has been laid before the Committee ; but I am desirous of offering explanation on a few points. The first is with reference to the tables of traffic which I was asked by the Select Committee to lodge ; and since these tables were made public I have been told that in some quarters they are considered to be inaccurate, I am therefore desirous of explaining as fully as possible to the Commissioners the manner in which these tables were made up ; and I think I shall be able to satisfy the Commissioners that they are correct in so far as they go, not as presenting *absolutely*, but at least *relatively*, the amount of traffic at different parts of the coast. In page 4 of the Report of the Committee on Harbours of Refuge for 1858 I have given a table. That table contains the average numbers of vessels seen to pass certain lighthouses during the day, and extending over a period of seven years. I shall now state the manner in which these observations were made. At each of the lighthouses the light keepers, in their printed instructions, were ordered to note the number of vessels seen to pass each lighthouse during the day, noting the kind of vessels, whether three-masted, two-masted, one-masted, or steamers, and also the direction in which they were seen to be sailing ; and this was as much a part of the lightkeeper's duty as lighting the lamps, or any other service connected with the station. These observations were all entered in a book containing printed forms ruled for every day, and regular returns made up from that book were transmitted to the office in Edinburgh. From these forms the tables which I have produced were made up. The observations were made not by any one set of persons at each lighthouse station, but, as the light keepers are shifted from station to station, it very often happens that the observations at some of the places were made by many different people. For example, during the period over which the observations extend, I find that there were two principal light keepers and eight assistants at the Bell Rock ; at Buchan Ness there were two principal light keepers and two assistants ; at Pentland Skerries, two principal light keepers and five assistants ; and so on, varying according to the changes made. So that these observations really come from independent people, acting under definite and stringent instructions, and with all the care with which it was possible to make observations of such a nature. I think, indeed, that the table bears upon the face of it its accuracy, from its wonderful consistency from year to year at the different stations. I was also asked by the Select Committee, not only as to the numbers of these vessels, but also as to their tonnage, in order to furnish them with a comparative view of the tonnage of the vessels passing Buchan Ness and through the Pentland Frith. The return which I gave to answer that requirement is found in page 210 of the Appendix, which gives the amount of light dues at Buchan Ness and Dunnethead lighthouses from 1846 to 1853 inclusive. These returns, obtained from entirely different sources, shew the same general result, and appear to me to be absolutely conclusive as to the statement which I made, that the traffic on the Buchan Ness coast is very considerably greater than that through the Pentland Frith. I have here, in addition to these tables, a note of the different kinds of vessels which were seen to pass each station during the seven years in question. That is the only explanation with reference to these tables which I have to offer.

1242. Have you anything further to state on the subject ?—I may also mention that the plan I have produced is simply a preliminary plan, made on the understanding that 200 acres was what was necessary ; and showing how these 200 acres could be enclosed in the Bay of Peterhead. But it does not indicate the full resources of the locality, should it be desirable to enclose a larger space, and expend a greater sum of money.

1243. With reference to your last observation, could you point out to us the most eligible mode of constructing a large national harbour of refuge at Peterhead ; I mean, viewing your chart, where would you run the breakwaters ?—The present design might be extended by shifting the piers as laid down [*pointing to the chart*] further seaward ; that is, the area might be extended by removing the piers in a direction somewhat parallel to their present lines

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of direction further seaward; and by this means the whole of the south bay of Peterhead would be enclosed, and somewhere about 70 acres additional harbour room obtained.

1244. Putting considerations of expense out of view, as an engineering question, would there be any difficulty in including Invernetty Bay, following the course of the Skerry rocks?—There is, I believe, no engineering difficulty; but it would be an enormous work, involving a very large amount of time and of expense. It would enclose from 1,200 to 1,500 acres of anchorage ground, I suppose.

1245. (*Sir Frederic Smith.*) Why do you draw any comparison between the number of vessels that pass Buchan Ness and Dunnethead? What is the object of that comparison?—The object of that comparison was in answer to a question from the Committee as to the comparative amount of traffic on the Aberdeen coast and the Pentland Firth.

1246. Have you any estimate of the cost of enclosing the 200 acres?—335,000*l.*

1247. For 300 acres?—None.

1248. Any approximate sum?—It might cost 100,000*l.* more. Probably it might be more.

1249. What are the soundings here?—6 to 7 fathoms low water at the south part of the bay, and 7 to 8 at the north part.

1250. Would there be any great difficulty for a vessel to take your harbour in a south-east gale of wind?—Certainly not; I cannot see any difficulty.

1251. This is so far a nautical question; but would you be prepared to say whether there is any state of the wind in which a vessel could not take the harbour of refuge proposed?—I cannot see any difficulty whatever with south-easterly winds.

1252. Was it at all under your consideration whether it would not be better, instead of having a central opening, to have a breakwater detached from both sides of the bay, with an entrance at either end?—I did carefully consider that; and my reason for suggesting one entrance is that it gives a greater amount of shelter. It does not open up the bay so much, and keeps the entrance more from the rocky shores both to the north and south. If again a single entrance were adopted, but placed close to the north side, it would be dangerous for vessels in rounding too closely the projecting rocks, round which the north-east seas break with great violence. If on the other hand the entrance were placed close to the south end, it would be a very dangerous harbour, as vessels would be brought too close to the Salter point. In my opinion there is too little space between the points for the adoption of a double entrance in this situation, however desirable it might be. Before you could allow a sufficiently commodious entrance with a sufficient berthage from the rocky shore at either extremity, you would shorten the breakwater so much that its utility as a shelter would be destroyed.

1253. Look at the plan of the proposed harbour, and give me your opinion whether a breakwater made with a curved line, shown in pencil, would not give more anchorage ground at somewhat less cost than what you propose?—The plan which you have shown me represents a pier going from Salter Rock to meet the proposed north pier. It would give a greater area; but I have found, so far as my experience goes, that the piers of a harbour, in order to have a smooth water entrance, should recede as much as possible from the entrance. In accordance with this view I threw the landward extremity of the south pier within the bay. In short, the entrance to a harbour should never, if possible, be a gap, as it were, in a straight line formed by the piers on either side, but should rather be projected forwards, the piers receding from the entrance on either side towards the shore. This gives relief to the sea, prevents recoil, and stilts the entrance. This is one reason why I said, in answer to the Chairman, that if the harbour were extended, the extended piers should, as far as possible, be made parallel to the lines shown on the plan. These views represent generally the principle by which I was guided in laying out the harbour shown on the plan.

1254. Do you not think that the curved form which I have given to the south breakwater would in some degree produce the effect you desire, of breaking the force of the wave?—No, I am afraid it would not, because I see in the sketch shown me that there is a large portion of the pier—1,500 feet or more—at the mouth of the harbour which is very nearly straight; and I should be afraid that the very nearly straight portion would throw the seas during the south-east winds too much into the entrance to the harbour. I should prefer very much a direction somewhat parallel to that shown on the plan.

1255. Are the two harbours on the same level?—The north harbour is of considerably greater depth than the south harbour. The basin in the north harbour has a depth of four feet at low water; the south basin is dry at low water.

1256. In your evidence before the House of Commons you spoke very favourably of Wick as a fishing harbour?—Yes, I did.

1257. Do you still adhere to your statement in favour of Wick made at that time?—Yes; I have seen no reason to alter my opinion.

1258. Do you think that Wick is the best harbour on this coast for fishing?—I am not exactly sure my evidence was to that effect. It is a very bad harbour just now.

1259. But as to the locality?—As it is, there is no single harbour where there is the same amount of boats collected during the herring fishing.

1260. But are you of opinion that it would be a national object to improve Wick harbour, looking at it as a nursery of seamen and a place of trade, deserving protection?—There cannot be a doubt that the improvement of Wick harbour would be of very great importance to the fishings there, and to that district. And if improved upon a sufficiently large scale, my opinion is, that it would also to some extent be useful as a harbour of refuge.

1261. Do you imagine that if Peterhead harbour were improved it would tend to increase the herring fishing at this port?—I should think it would.

1262. (*Mr. Lindsay.*) I understand that the south-east winds are the heaviest and most dangerous on this part of the coast?—No; I should say the north-east gales sent in heavier sea than the south-east at Peterhead; that is, the sea in the north bay with a north-east wind is much heavier than the sea in any state of the wind in the south bay. The south bay is considerably sheltered by the Buchan Ness and Skerry rocks, and the run of the tide outside of it, which may in part account for this; but my own impression is, that the north-east wind raises a higher sea off these coasts than a south-east wind.

1263. The south bay of Peterhead is somewhat protected in the north-east gales?—To a very considerable extent; and that is one of its great qualifications for the construction of works.

1264. But the south bay is in nowise protected in south-east gales. Is that so?—Yes; it is quite open to the south-east gales; but the sea in it, as stated before, is not so heavy as might be expected.

1265. Now, instead of those piers you propose, as shown on the plan (*pointing to the chart*), if a breakwater was formed, say on the eight-fathom line, leaving a passage for ships to the north, and another to the south, would ships anchored within the bay be then protected against south-east and east gales?—Yes, they would.

1266. They would be protected from both south-east and east gales?—Yes, they would; but in order to have that amount of protection, it would be necessary, as already stated, to carry a breakwater too close to the rocks, both at the north and south-east side, which is a decided objection to the double opening.

1267. You think then that you would not be able to give a breakwater along the eight-fathom line, or thereabouts, which would sufficiently protect ships

during south-east and east gales, and at the same time give a sufficiently wide passage for ships to enter with safety ?—I should much prefer, in this particular case, to accomplish it by having one entrance in some such position as that shown on the plan.

1268. Suppose further, the breakwater were along this eight-fathom line, do you think—for you can only answer the question roughly—do you think such a breakwater would cost more money than those piers laid down upon the plan ?—No, I am not sure it would.

1269. What greater extent of anchorage would it give ?—It would enclose about 40 acres more space.

1270. Not more ?—Not if placed near the eight-fathom line. If placed where I see it, it would cost little more.

1271. The Chairman asked you a question in regard to a very great undertaking ; that is to say, carrying out a breakwater from the Skerry rocks on the one side, and somewhere between the south head and the proposed line of the north pier on the other, so as to form a great harbour of refuge somewhere within these limits ; you said if it were so carried out it would give an area of 1,500 acres. Do I understand you to mean an area of 1,500 acres at low water of one fathom and upwards ?—No, at low-water line. But the bay, especially the south bay, is pretty steep, and there is not a material difference in the area at low water and the one-fathom line.

1272. What description of shore is it generally ? Is there any place within the south bay where a ship could be beached ?—Not at present with safety, I think.

1273. There is one point I want to ask you about which has sorely puzzled me. In the evidence before the Committee of the House of Commons, I observe that Mr. E. R. Calver, when under examination (page 119, question 1996, Report for 1857), was asked the question—"Do you know Peterhead ?" To which he answers "I do." He is then asked, "Do you recommend anything being done at Peterhead ?" He answers, "Not at all." "Confining your attention entirely to public purposes, it does not present any facility for an external harbour of refuge ?" He replies, "Except one of a very limited character, which, of course, could only be partially available. There is a bay to the northward of the present harbour, but I think it is very contracted in space ; the water is deep, and there would be a considerable outlay required." Now, considering that Mr. Calver has been long employed in the survey of harbours, these answers must have weight with me ; but on turning to a book called "The North Sea Pilot," which is printed for the Hydrographic Office at the Admiralty, and would seem to be a book which is published for the guidance of mariners frequenting the North Sea, I find, at page 110, referring to Peterhead Bay, the following statement :—"This bay has "been often pointed out as a site for a harbour of "refuge. Its advantageous position, under the shelter "of the easternmost headlands of the coast of Scot- "land, the long list of wrecks that have taken place "in its immediate neighbourhood, and the number of "windward vessels seeking shelter, the vicinity of "granite rocks, and other reasons adduced by eminent "engineers who have reported upon it, recommend it "for adoption as a national undertaking." The writer of this book and Mr. Calver are both official or semi-official, and as both express opinions diametrically opposite to each other, and as I am bound to value the opinions of both ; if you can do anything by way of explaining this great difference of opinion, do so ?—I may observe that this question attracted my attention the first time I read the evidence, and I immediately concluded that there must be some mistake in the report of Mr. Calver's evidence before the Committee. At the same time I was struck with it, and had prepared for my own information this small sketch here, showing the relative areas of the bays of Wick and Peterhead, drawn from the Admiralty survey, which I found to confirm my own convictions on the subject that Peterhead Bay is of very considerable dimensions. One circumstance may have probably misled Mr. Calver, and that is, a report of mine in 1847, where a harbour of refuge in Peterhead on a small scale, for a limited number of vessels, is proposed, but that plan does not in any shape embrace the resources of Peterhead Bay as a harbour of refuge. It is just possible that there may have been some mistake at the moment with reference to that plan.

1274. (*Chairman.*) Do you give in this plan ?—Yes, if you desire it. It was not prepared for being produced, but merely for my own information ; but I believe it represents the matter pretty accurately.

1275. (*Mr. Lindsay*). From your knowledge of the coast, do you agree with what is stated in the paragraph I have read to you from "The North Sea Pilot ?"—Most certainly I do.

1276. Considering your high position as an engineer, would you answer me one question, and I wish you calmly to consider it. Do you think the south bay of Peterhead, all points considered—the preservation of life and property on the coast, the expense of construction, and the area of anchorage—is the best point on the north-east coast of Scotland to construct a harbour of refuge ?—I shall answer this with certain explanations. With reference to the combined consideration of the general trade on the coast, the amount of traffic, and the facilities afforded for making a harbour, I have no hesitation in saying that the harbour of refuge at Peterhead for shipping would be more useful generally than on any other part of the east coast of Scotland.

1277. Are you well acquainted with Fraserburgh ? —Yes : I have been there often.

1278. Have you looked at it as an engineer, I mean with the eye of an engineer ?—Yes, I have.

1279. What is your opinion of a harbour of refuge at Fraserburgh. I speak of a national harbour ?—I have no hesitation in saying that Peterhead is a far better place for a national harbour.

1280. Do you mean better as a place affording greater facilities for ships to enter during the gales which are most frequent on this coast, or as affording greater facility for the construction of a harbour of refuge ?—In both points of view, Peterhead is not so open as Fraserburgh, and is in a great measure sheltered from our most severe wind, the north-east, to which the bay of Fraserburgh is completely open. It is also a far more useful part of the coast, being more in the track of shipping, and having a far better loose. It is also to the south of a very dangerous sea opposite Rattray Head.

1281. Do you know the Bay of Fraserburgh sufficiently to say whether, for the same expenditure, you could obtain a larger area of good anchorage ground at Peterhead than at Fraserburgh ?—I know Fraserburgh very well, but I could not answer that question off hand ; I could not, without some actual data, give an opinion which I could venture to lay before the Commissioners ; but I can say generally that works in the Bay of Fraserburgh, if carried to any great extent, must be greatly exposed to the north-east sea, from which those in Peterhead Bay are, for the reasons already mentioned, much sheltered. There is also a very great want of material for the construction of such works at Fraserburgh ; at least, what I mean is, that it does not exist to the extent at all compared with Peterhead ; and these are very important elements connected with engineering constructions.

1282. You know Fraserburgh ?—Yes.

1283. Are you not aware that within 200 yards of the town there are large whinstone quarries ?—There are quarries, but they don't produce for sea work anything compared to what the quarries at Peterhead do.

1284. Would you obtain equally good stone at as low a cost at Fraserburgh as you would do at Peterhead ?—I don't think that the same quality of stone can be got at Fraserburgh at all. Peterhead granite has been largely exported and extensively used.

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1285. As an engineer, have you inquired into the relative qualities of the holding ground at Fraserburgh and Peterhead ?—No, I have not.

1286. (*Capt. Washington.*) As you have called attention to the table of the number of vessels observed passing lighthouses, in page 4 of the report of the Select Committee on Harbours of Refuge for 1858. I should wish to refer you to it for a minute If I understand aright, it is only a return of vessels that have passed during daylight ?—It is.

1287. Therefore all passing during the night and in foggy weather are not included ?—No ; and therefore I have stated that the results are not *absolute*, but *comparative*.

1288. Then I would call your attention to the column in your table for the year 1852, in which year 2,700 vessels passed the Pentland Skerries, whereas there were 3,788 at Dunnethead. This is a discrepancy of 1,000 odds between two lighthouses about 20 miles apart. Perhaps you could throw a little light upon that point ?—It is impossible for me to explain the variation in that very year which you have pointed out, excepting that it is in point of fact true that the Dunnethead return should perhaps be higher than the other returns given, inasmuch as it is within the Pentland Firth, to which narrow passage the vessels converge ; and vessels passing near it can be more easily seen, but I cannot give any definite or decided explanation to you upon what you point out.

1289. Should you not be rather disposed to think that the preponderance would be in favour of Pentland Skerries, inasmuch as vessels bound to the east coast would probably sight the Skerries and not Dunnethead ?—Well, one would suppose, from that circumstance, that the preponderance would be in favour of the Pentland Skerries ; but what I have stated leads rather to the supposition that it may be in the other direction. It is a point on which it seems to me no explanation can be given.

1290. Of course you are aware that I have not the slightest doubt that the table was prepared by you in the belief that it was thoroughly correct, but it carries condemnation on its face. As a good deal of stress has been laid upon it, I think it better to bring out the valueless nature of that table?—In reply to that I have only to say that it was made with all care, and that I still believe it to be correct ; and it does appear in my view, on the whole, to be consistent, inasmuch as the whole of these observations prove a gradual falling off of the amount of traffic from the Bell Rock northwards, and particularly in the upper part of the Moray Firth, and that for a series of seven years.

1291. Well, let us carry it one step further—1854. In it again occurs a difference of 1,000 vessels between Pentland Skerries and Dunnethead ?—Yes, and it is in the opposite direction this time.

1292. Exactly so. I purposely cited it to show that I don't want to draw any unfair deduction from it, and only wish to show that too great stress must not be laid upon it.—In that particular case, I admit, the consistency is not so fully borne out. I cannot pretend to explain how, but it does not materially affect the general averages and results.

1293. I have only further to say in reference to it, that I only wish to be understood as referring to these inaccuracies of the table to show that it may be valuable to a certain extent, in which you will probably agree with me. Do you think that as these returns have only reference to the vessels passing during daylight, that those passing during night or in fog, being out of sight, would probably be double ?—Safely double, and probably 2½ times.

1294. At present you are aware that these returns are very much less than those we get from other sources of the general traffic along the coast?—I am not aware what has been laid before the Commissioners. The only estimate I have seen is one by Mr. Sinclair, published in the newspapers, which is not based on observations at all.

1295. But to return to the harbour proposed at Peterhead. You have placed an admirable plan before us ; may I ask if it is from your own survey ?—Not altogether ; it is partly enlarged from the Admiralty survey.

1296. Well, then, take in your hand the Admiralty survey, No. 1430, of Peterhead, in which observe that the whole of the shore out to low water, marked, is rocky, which you have stated is hard. Nests of rocks occur within two cables' lengths of the low-water mark around the whole margin of the bay ?—Yes, I see.

1297. Have you any reason to doubt the Admiralty chart ?—None in the least. No rocks are shown on it beyond the one-fathom line, nor do I think there are any.

1298. Can you tell the width of the entrance ?—400 feet.

1299. In deciding upon this, did you consult any pilots or nautical men ?—No ; I went upon my own knowledge of such matters ; but the plan has long been before the harbour trustees, many of whom are nautical men, and with whom I have had many meetings on the subject. But the entrance, its width, and exact directions of the piers, I do not hold to be determined in the same exact manner as I should do if making out the working drawings for the actual execution of the work.

1300. I think you have been employed on a good many harbours ?—Yes.

1301. Could you mention some of these ?—Sunderland, Hartlepool, Seaham, the Tyne, &c., and almost every harbour on this coast, and many in Ireland.

1302. Several of these are pier harbours ?—Yes.

1303. These harbours are taken by vessels ?—Yes.

1304. What is the breadth of the pier harbour at Sunderland ?—350 feet.

1305. There is a very large traffic in and out of Sunderland ?—I am not aware of its extent.

1306. May it not be about 25,000 vessels a year ?—I could not say exactly, but it is very great.

1307. It is that number. No very great difficulty has arisen in taking that entrance in a gale of wind ?—Occasionally they are wrecked in taking it, because the piers there are nearly parallel, and that for a considerable distance within the entrance ; and that causes a very unsteady sea within the entrance, and from the limited depth of water on the bar vessels are apt to lose steerage, and are sometimes lost in making the harbour of Sunderland.

1308. Do you think it is the width of the entrance that causes the wrecks ?—No, but mainly the shallow water and defective form of entrance.

1309. What would be the breadth of pier harbours at Fraserburgh, or any other ports along the coast in the event of their being constructed there ?—400 to 500 feet is quite sufficient.

1310. (*Capt. Vetch*). Will you tell me what is the amount of the low-water area, and at one fathom and upwards ?—I could not.

1311. Of three fathoms and upwards ?—195 acres.

1312. Four and upwards ?—I have not these measurements by me, but it is not materially less.

1313. What is the greatest depth of water you have under the line of piers ?—Eight fathoms.

1314. What is the rise and fall of the tide ?—11 feet spring tides and 6 neaps.

1315. Could you form an opinion as to the number of vessels from 200 to 500 tons that would find anchorage inside ?—I never calculated.

1316. Which is the wind that brings in the heaviest seas upon the site of the harbour ?—The north-east, from which the works are greatly sheltered.

1317. Is there any strong run of tide across the mouth of the bay ?—There is round the north head but not in the bay.

1318. Do you know its rate ?—Not exactly; in particular circumstances, it may run nearly 5 knots just at the north head and close in shore.

1319. Suppose the tide was running, and the strength of the stream beyond the bay under a heavy sea on from the eastward, would a vessel be able to

take that entrance easily ?—Yes, I think so. The strong tide which I mention does not apply to the entrance to the bay at all, but to the north head. The tide opposite the bay is not so strong.

1320. How much, outside of the proposed harbour, would the stream of the tide run ?—The strength of the tide is at the outside, in the line from the north head to the outside of the Skerries. There is only a modified current that comes into the bay.

1321. This would in some degree cross the harbour's mouth ?—Yes, but it is very gentle.

1322. In heavy weather, under these circumstances, would there not be some difficulty in getting in ?—There is no doubt that in heavy weather vessels would encounter heavy seas, but I cannot see any difficulty in vessels during south-east gales making the harbour. This is more a nautical question, which nautical witnesses may speak upon.

1323. With respect to the bottom, you say there are 95 acres of 3 fathoms and upwards of good anchorage ground. Are these 95 acres of clear ground for anchorage ?—The best anchorage for large vessels is towards the north ; but there is a large amount within the area covered by the harbour where vessels might take their anchorage.

1324. Would there be any danger of vessels driving from their anchorage in heavy sea ?—Possibly they might if anchored too far in; but there is plenty of room for good anchorage in the bay.

1325. I think you already mentioned that there was no beaching ground on the harbour ?—No ; I think there is not any ground where vessels can safely beach at present, in the unprotected state of the bay.

1326. (*Mr. Coode.*) In making your estimate of the cost of this harbour, what kind of construction—what form of section—would you adopt ; how would you arrange your materials ?—It would be composed of rubble brought up to somewhere about 12 feet below the low water, with a superstructure raised to the height of about eight feet above high water.

1327. What proportion of that section would be raised by cranes, and what thrown in ?—All below 12 feet low water would be thrown in, and all above that set.

1328. Do you propose to use mortar or cement ?—Neither, above nor below.

1329. I think you gave evidence as to the height above high water ?—Eight feet.

1330. Have you revised your estimate ?—Yes.

1331. State the nature of the material ?—It is of granite rock, to be found in the neighbourhood from two localities. The one is Stirling Hill, about two miles from the town ; the other is Black Hill, about the same distance. The material is equally suitable in either case, but perhaps Stirling Hill granite is the best.

1332. What is the size of the blocks you propose to employ there ?—For the under-water works we take the blocks as we find them.

1333. With what height of face do you contemplate working the quarry ?—A face of 50 to 100 feet could be very easily obtained.

1334. Would you have any difficulty in getting faces from 50 to 100 feet ?—Not the least.

1335. As to the nature of the holding ground, was your information obtained from pilots and others ?—Yes.

1336. You made no personal observations yourself ?—No; but I have several times been at anchor in the bay.

1337. Have you made any observations on the strength of the tides ?—No ; they are given on the Admiralty chart.

1338. Have you any idea of the strength of the tide from the south head to Salter's Point ?—It is slack water nearly between the south head and Salter's Head. The main stream outside, from the north head to the Skerries, is, I think, three or four knots.

1339. You said that the north-east wind was the worst in the German Ocean, and that the north-east gales raised the heaviest seas ?—Yes.

1340. Is there a pretty general concurrence of opinion in this ?—Yes.

1341. Could you give us the soundings in Invernetty Bay ?—They are shown on the small plan.

1342. What would be the height of the top of your proposed work above the level of high water at spring tides ?—Eight feet.

1343. Do you propose to have any parapet upon it ?—No.

1344. You spoke of the material at Fraserburgh. Have you an intimate knowledge of the quarries there ?—I know them very well. I don't consider it very well adapted for the construction of a harbour, except for the underwater rubble. It will be next to impossible to get large well-shaped stones there in any quantity.

1345. This is not a complete plan, but subject to investigation ?—No doubt of it.

1346. (*Capt. Washington.*) As attention has again been called to the table at page 4 of the Report for 1858, I again desire your attention to it. Between Kinnaird's Head and Buchan Ness is a distance of twenty-two miles ; then it would be fair to suppose that any great change which would pass at the one lighthouse would also be shown at the other ?—No, not at all. I conceive that many vessels pass Buchan Ness and are not seen at Kinnaird's Head, Buchan Ness being upon a point of the coast, and Kinnaird's Head off this course.

1347. I mean the comparative number passing the one would likely be the comparative number passing the other ?—No.

1348. We shall deal with facts. Will you run your eye along the line of Kinnaird Head, and you will see that a fair average is maintained during the whole seven years. Now, will you refer to the column marked Buchan Ness, and you will see that while 10,186 vessels passed in 1850, only 5,225 vessels passed in 1855. Can you explain that extraordinary discrepancy ?—A gentleman has suggested that it may be accounted for by the Russian war in 1855–56, when the Baltic ports were closed. I shall inquire into this, and explain it to-morrow. It is obviously due to a variation in some part of the traffic which is not common to both stations.

1349. Would a vessel sailing from Peterhead, going north, be reckoned as passing Buchan Ness lighthouse ?—No.

1350. She would not pay shore dues, but would she not be reckoned ?—No.

I have only further to say, that it tends to show the reliance which may be placed on this table.

1351. (*Chairman.*) Would the secretary read at page 21, paragraph 22 of the Report of the Select Committee on Harbours of Refuge for 1858, beginning "In conclusion," and ending at "in severe storms." With reference to one expression in the paragraph of the Committee's Report now read to you, which indicates the probability of the continued extension of our passing trade, do you consider that the second bay—Invernetty Bay—will afford any facility for constructing a national harbour of refuge at Peterhead ; that the protection for the passing trade at present required may be obtained by a work constructed in the south bay in such a manner that hereafter, if required, Invernetty may be included ?—I am afraid that could hardly be done without to some extent constructing a work which would be afterwards superseded. But although I know the place very intimately, I am not prepared to advise the Commissioners at this moment.

1352. You have never considered it in all points of view ?—Not very closely ; and there is no subject on which I should be more cautious to offer an opinion without due consideration than the construction of sea works, where exposure, currents, and many other things have to be taken into account.

1353. Would you have any objections to consider it, and to send in the result to the Commissioners

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at a later period?—I shall certainly be most ready to do so.

1354. What time would you take to consider it?—A week or two.

1355. (*Sir Frederic Smith.*) Would it be inconvenient for you to give the Commissioners a rough section of your proposed breakwater?—I shall do so.

1356. Do you attach any importance to the dressing of stones for the harbour; that is, the fair outside dressing?—None whatever to the outside dressing.

1357. (*Mr. Lindsay.*) I have one question to put to you by way of explanation. Did you suppose, by the way I put the question, I asked you who was the author of the paragraph I read from "The North Sea Pilot"?—Yes, I so understood it.

I think it right to say a word by way of explanation. I myself was not aware that Mr. Calver was the author of the paragraph when I read it. I supposed he had nothing to do with it. I wished merely, as the opinion offered in that book was so very different from that offered by a very competent and impartial authority in the evidence before the Select Committee, to draw your attention to the two paragraphs, and obtain from you an explanation of them, not supposing that Mr. Calver had anything to do with the paragraph in "The North Sea Pilot."

(*Capt. Washington.*) I am responsible for this publication, and, in the absence of Mr. Calver from indisposition, I think it right to exonerate him from any apparent contradiction. The paragraph in question, with the exception of the last two words, is entirely a quotation from the Report of the Tidal Harbours Commission, which was written by myself. You hold that report in your hand. Mr. Calver says, "to recommend it (Peterhead Bay) for adoption as a national undertaking." For "adoption" "consideration" should have been written, and most probably was the idea in the mind of the writer. I think you will admit that by this alteration the statement does not sound so strongly. I believe it was Mr. Calver's wish to say everything he could for a refuge harbour on the east coast of Scotland, and that it has been the aim of his life for the last twenty years to get refuge harbours on the coast of Great Britain.

Wednesday, 1st September 1858.

PRESENT:

Admiral Hope, Chairman.

Sir Frederic Smith.
Mr. Lindsay.
Captain Washington.
Captain Vetch.
Mr. Coode.

Mr. Sewell, Secretary.

Mr. D. Stevenson.

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Mr. David Stevenson.

1358. I was asked yesterday to put upon this plan the two-fathoms and three-fathoms line, and also to insert the soundings in Invernetty Bay. This plan which has been lodged contains that information; and having no means of doing it here, I understood the Commissioners to say that they would be satisfied with this, and that it was not necessary to transfer it to the large plan. I may state, that the rocks to which the Royal Commissioners alluded do not extend beyond the one-fathom line. The only other point that I have to mention with reference to the evidence of yesterday is with regard to the currents. There appears to be some slight mistake as to what was said regarding the directions of the tidal currents. The statement made was, that the strength of the flood tide runs in a line between what is called the north head and the second head on the map to the south Skerry. I mentioned that at one point the tide under certain circumstances ran with a velocity which I thought might be about five knots an hour; that is between the south head and the north head. Off the bay of Peterhead the velocity is about three knots an hour, and the tides in the bay are eddy tides, so that the main stream tide runs without the bay of Peterhead. I am not sure that that was quite understood in the evidence yesterday, and before the nautical witnesses came I wished just to explain what was intended.

1359. (*Chairman.*) Have you any other statement that you wish to make?—There are a few statements which I should wish to offer with reference to the statistics at a future period of the sederunt, when I shall be prepared to do so, if the Commissioners can give me a few minutes.

(*Chairman.*) Very well.

Capt. P. Burnett.

Captain Peter Burnett examined.

1360. (*Mr. Boyd.*) You were a shipmaster in Liverpool?—Yes.

1361. The last ship you commanded belonged to Malabar?—Yes.

1362. You left that ship a few months ago?—Yes.

1363. How long have you had command of a ship?—Since 1839.

1364. Have you had much experience along this coast?—I never traded regularly along the coast, but I have made many voyages on the coast at different periods.

1365. You were a good many years in the Greenland trade?—I commanded ships in the Greenland trade from this port from 1845 to 1852.

1366. You have, I presume, thought about and considered the question of the desirableness of a harbour of refuge upon the east coast of Scotland, and the most eligible site for such a harbour?—I have.

1367. Would you state to the Commissioners the opinion which you have formed, and the grounds on which that opinion has been formed?—I will. In giving my opinion regarding harbours of refuge, I think there is a fact which all seamen would agree with me in when speaking with regard to all harbours of refuge, with the exception of those in some peculiar situations to which I will afterwards refer, namely, that nine tenths of the vessels entering these harbours of refuge do so, not from stress of weather, or with the wind blowing in currents on the land, but as wind-bound ships taking shelter in unsettled states of the weather when the wind is against them. Granting these views to be correct, I would then glance at this chart of the coast, from the Firth of Forth to the Pentland Firth and I see that the eastern promontory of Scotland is where the greatest number of vessels passes, or would have to pass, in the coasting trade, and where, from certain peculiarities in the direction of the wind, the greatest number of vessels meets, coming from both south and north. It is a well-known fact, I believe, to every coasting seaman trading to the Moray Firth,

that in coming along the land and approaching Peterhead from either direction, they will have the wind from west-south-west south of Buchan Ness, west off Peterhead, and west-north-west as soon as they have opened out round Rattray Head. I have myself frequently seen vessels bound both south and north, as many as 60 and 70, at anchor in Peterhead Bay during strong westerly gales, which vessels could get neither south nor north, in consequence of the wind blowing the line in the manner I speak of. That, taken along with the fact that all ships for the coast of England, as far south as Flamborough Head, passing to the northward, either through the Pentland Firth, or steering bound to Archangel, if they steer for the Shetland Isles, do it almost passing or in sight of or near Peterhead, very few ships shaping a direct course for the North Cape. It is my opinion that there is no other point of the coast where so many vessels will be found to have congregated together at one time ; and, as I remarked before taking the meaning of the harbour of refuge, not merely in its limited sense for vessels taking shelter, by having it just under their lee at that very point where they may be caught in a gale from the land, and obliged to run for it, I think it is a very small number of ships that can be able to take advantage of the harbour of refuge under these circumstances ; that the purpose will be better served from the fact that these vessels taking shelter in an unsettled state of the weather or foul winds, would diminish the risk of loss of property and life along the adjacent coast in case of a gale coming on. Holding these views to be correct, I would then point out some inducements that would lead to shipmasters. I, as a seaman, consider that others would be actuated by the same reasons, one of which, and I suppose the greatest, would be to prefer a harbour where the facilities granted would be of easy access, and easy to get out of it when the fair wind should happen. I will carry that plan of the harbour on to this map here, and place it in the position of Peterhead. With those present harbours the entrance through to the north and the contemplated harbour of refuge with the entrance to the south-east, I maintain that there is no other position on the coast, from the Firth of Forth to Duncansby Head, where you could have the same chances of getting to sea with the winds from so many points to the compass as you could out of Peterhead Bay as it at present exists. I also hold that when the winds as such and of such a strength that you could not get out of those harbours in consequence of the sea that would be running in, I, as a shipmaster, would consider it imprudent to attempt to get out, even if I could, because I think that the danger would be very great in proceeding along the coast, particularly to the southward. To the north of Peterhead there is no one place where a harbour of refuge could be built where ships taking advantage of it bound to the southward would be able to get out when it came a fair wind between north-north-west, and east-north-east, which winds invariably shift constantly round from south-west to north-west-west and east-north-east. Again, south of Peterhead, if a harbour of refuge was constructed anywhere between the Firth of Forth and Buchan Ness, with the winds any way from south-south-east to east, or even east-north-east, which, providing a vessel cleared Rattray Head bound up the Moray Firth or Pentland Firth, would be a fair wind for them, I hold that vessels having taken shelter in any harbour so placed would not be able to avail themselves of these winds, they would not get out ; if they do get out of the harbour they will be close on the lee shore. I think the line of coast there of itself bears sufficient evidence on both sides to corroborate what I state. It is not so with Peterhead ; a ship bound for the southward will be able to get out of that harbour, so long as the wind is not to the southward of east, unless blowing a very heavy gale of wind, when, as I said before, it would be imprudent under any circumstances to come out and risk the coast. With the wind at any point of the compass, from east round to south-south-west, she could come out of that entrance ; and between south-south-west and east a vessel could get, on the other hand, out of the north entrance as it at present stands, such vessels whose draught of water would not be too great for the depth of the cut through. These are my principal reasons for maintaining that a harbour of refuge would be of greater benefit, taking it in the most extensive view, here than at any other part of the coast. I might remark, that farther south, on the coast of England, which I said has some peculiar situations, a harbour of refuge would be perhaps better on the bight than on the promontory. I see, between Flamborough Head and North Sunderland or thereabout, there is a class of coal ports, where I suppose a greater amount of traffic is carried on by far than at any other port of Great Britain on the same extent of coast. These ports being in the bight, naturally lead the ships down to them into the bight. Very often at low water, sometimes during the night, and sometimes even during the day, a gale springs up, and they afterwards find that they cannot or dare not attempt those ports that they now run down for. I think that therefore any harbour of refuge on that part of the coast would be of the greatest service in the bight in reference to coal ports.

1368. (*Chairman.*) What coal ports are you speaking about?—I am speaking of the coal ports about Whitby, &c.

We always feel the greatest disinclination to interfere with any witness when he is giving his evidence, because we are perfectly aware when any gentleman comes here to speak before us, and prepared to give his evidence, it discomposes him, but in this case it would be better if you would confine your remarks to the particular locality at present under our notice.

(*The witness continued.*) With regard to the probability of taking such a harbour as that in a gale of wind, I have been residing here at different periods for a number of years, and have seen some very heavy gales of wind blowing here, and have seen also a good many disasters, and much loss of life and property ; at the same time I am of opinion that in the bay of Peterhead there is much less sea strikes in than there is either north or south of it, from the fact that the strong band of tide running across the bay runs the sea down before it enters it. I myself came from London in December 1849, during very heavy gales from the eastward ; and when I was off Aberdeen during the gale, I saw two Aberdeen steamers, one bound north and the other south, both having to call at Aberdeen to land goods and passengers, but neither of which dared attempt the harbour, and one was obliged to pass south, and the other north. That evening, just before dark, my ship took Peterhead harbour as it is with perfect safety, when there was such a sea running at Aberdeen, rendering it impossible for these steamers to enter the harbour ; and I think there is a gentleman present who was aboard one of the steamers, and was landed at Portsoy instead of Aberdeen. I think that of itself is good evidence that there is not so much sea runs into Peterhead Bay as many parties allege ; and it is to be accounted for in the way that I spoke of, namely, that the tide runs the sea down before it enters the bay. My opinion is as a seaman, and my experience, that that harbour, as it is proposed to be made, is adapted for a harbour of refuge, and I would have no hesitation in running for that entrance, so long as my ship would run under a close fore-topsail ; and the larger the ship the better, because she would steer better. There is no tide runs across that entrance ; the band of tide runs direct from the south head to the Skerry Rocks, and there is rather a back tide from Salter Head to the south head from the flood, but it is very irregular, and does not run the same during all the periods of the flood, and it is so weak that it is not of the slightest consequence, and would be of no danger to a ship under any circum-

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stances, because we always find that the direction of the tide running there is with gales of wind running the tide has about half the velocity that it has with westward when a gale on the eastward, so that I think in a gale of wind from the eastward there would be no back tide at all there. I may remark, that during the year 1848, when the loss of those herring boats occurred, I was perhaps the only man who in Peterhead saw the whole of it. I was upon the rocks at the harbour mouth from the time the first boat came on shore till daylight, and would have been able to give perhaps the best information of any one here on that question. Unfortunately I had to sail before the investigation took place, and the consequence was that I was not present. I have not the slightest hesitation in saying that had there been any such harbour of refuge as that which is proposed, not one boat of those 59 would have been lost, except the two which foundered outside, of which we had no account. However, the accident occurred; but had that harbour existed, with a leading light there, all that I say is that not one boat would have been lost. I could explain to you, perhaps, that the reason that there were so many boats lost at the harbour's mouth was, that, steering in sight of Buchan Ness light, with a wind from the eastward, they bore down upon the harbours. When they found themselves close to the rocks, west to the harbour pier, they could see no harbour lights to guide them; they had to suddenly change their course, and found the sail on the wrong side of the land, which was the consequence of at least 30 boats being wrecked that otherwise would not have been. I believe there are many here in Peterhead, fishermen, who could bear me out in what I say, that I witnessed the whole of it, and saved many of their lives.

1369. (*Mr. Boyd.*) In speaking of the harbour of Peterhead, in its present state, do you mean as it is on the plan?—I mean the old harbours as they stand.

1370. Do you speak of them as being sufficient for the refuge harbour? the harbour as it is, or merely that it is the most suitable site for the necessary harbour of refuge?—Merely that it is the most suitable site for the necessary harbour.

1371. You have made, I understand, a sketch of the line of coast or a chart?—I have.

1372. Do ships going to or coming from Archangel pass through the Pentland Firth from the east coast?—Never.

1373. Is Peterhead where vessels from Archangel and the Baltic endeavour to make the land?—Yes; the Archangel vessels have invariably orders to call at Peterhead for orders.

1374. Do you know that many vessels call at Peterhead for orders?—Yes; I hold in my hand papers which will testify to that effect.

1375. Have you made some inquiry as to the number of letters to be called for?—I have. I found 43 letters. I hold in my hand the *Shipping Gazette* of yesterday, wherein it is stated that 8 vessels cleared out at Archangel to call at Peterhead for orders; and I hold in my hand another paper, showing 21 vessels ordered to call at Peterhead from Archangel.

1376. In short, it is a general place of call to vessels from Archangel?—It is. I can remember the time when no vessels called at Peterhead for Archangel, but of late years the order is now given that they shall call there for orders; there are also a great number of vessels from the Baltic. I think perhaps during 8 or 9 months of the year, the prevailing winds in the North Sea are between west and south or south-south-west. These winds generally prevail during the time that the Baltic is open, and also the south-south-east. The first land that vessels from the Baltic make is about Peterhead, or even to the north of Peterhead, for the purpose of getting into smooth water. That is the reason why a great many of the Baltic ships homeward bound pass Peterhead. No outward-bound vessels do so.

1377. Are you acquainted with the soundings off the coast compared with those off the coast of Caithness?—No, I cannot say I am.

1378. I think you have explained to us the tides in the harbour; what is the rate of the tide between the south head tide and the north head?—There is little or no tide. What tide there is, is a back tide. Vessels riding there in the position of those piers at present will very frequently during the flood tide be met with a stream to the north-east, but it does not continue so during the whole flood of the tide.

1379. Are you acquainted with the South Bay of Peterhead as holding ground?—Yes. I have seen many vessels riding in Peterhead Bay. I occupied a house for several years founded on the rocks at the south harbour mouth, where I had a view of the whole harbour and all the ships that came into it during summer and winter, and I may state that I never saw a ship driving into Peterhead Bay. I have seen 60 or 70 vessels lying there, and I never saw two vessels foul of each other; and I think it will be very difficult for any one in Peterhead to say that there has ever been any fouling in Peterhead Bay, although ships lay out double anchors. I have ridden in it myself at various times, and always found it good holding ground.

1380. (*Chairman.*) How many years have you been at sea?—Since 1831.

1381. How many years as master?—19 years.

1382. Generally of what sized vessels?—From 150 tons up to 1,200 tons.

1383. And of the larger description of vessels, say from 500 to 1,200, how many years?—Since 1853.

1384. How many years were you a mate?—About two years. I had also the command of a transport during the Chinese war. I was about 18 months there. My last ship was in the transport service in the Persian war.

1385. Do you wish to put this chart, with the tracks laid down on it, in evidence?—Yes.

1386. Will you be good enough to lay these tracks down on a smaller chart, or to make a chart for us on a small scale, with the tracts in question?—I will.

1387. I want to ask you, with reference to an opening of that description: has it ever occurred to you, during your experience as a seaman, to run a large ship into a harbour of that kind?—No, I have not. The largest ship I have ever run into Peterhead harbour is a ship of 450 tons. The entrance is 100 feet wide.

1388. I understood from your evidence that it is a great advantage, as respects the sea, which you would expect at the entrance of a harbour of that kind, that it should be out of the run of the tide?—Unquestionably.

1389. And your reason, I presume is, that the sea in the opening would be a fair sea; that is, without tide?—It would; and also that it requires no calculation in steering for it, but just simply steer for it, where, if there is any tide running across it, every stranger would be astray.

1390. (*Sir Frederic Smith.*) Although you never entered a harbour with so narrow an entrance, would you be at all apprehensive in taking vessels of large tonnage with a strong south-east wind into a harbour with such an opening?—Not the slightest. I would have more hesitation in running into it with a very small vessel under a heavy gale of wind than a very large one, from the fact the large ship would steer much better.

1391. Do you know the width of the proposed entrance?—I have heard it stated 400 feet.

1392. Would you be under any apprehension in taking that entrance with a small vessel?—No, I would not; but I merely made the remark to say that as a harbour of refuge for large ships the danger is less to a large vessel than a small, because the large ship will always steer more under command than the small one.

1393. Would a vessel be able to get out of Peterhead harbour with a strong gale blowing to the east of the proposed entrance?—A powerful ship would

be able, but I do not think a small would; but I do not think it would be prudent for a vessel to go out with a gale blowing hard.

1394. What are the winds that would lock a vessel in that harbour?—A vessel could scarcely be locked into it with any wind, unless it was blowing a very heavy gale; because, if you could not get out of the one end you could get out of the other.

1395. But, supposing the vessel of so large a tonnage that it could not get out of the canal, what would you do?—In that case, the wind would be between east-south-east and south-east, not more; because, if you look at the entrance and the magnetic lines there, you will find that with the wind at south, she could lay out at that tack, and clear the south head.

1396. Have you looked at that proposed plan with any degree of attention, or is it new to you?—It is quite new to me. I only saw it some three or four days ago, and that for a short time, till I saw it yesterday in this room.

1397. You have reflected on that plan; can you suggest any alteration in it that would improve it?—Irrespective of cost, I should decidedly say that it is too small.

1398. What number of vessels would be able to take refuge in that harbour?—I do not think more than ten. I think ten would. I do not think that ten could perhaps be placed in a position to execution as men-of-war; but I mean to say that ten could lie very well in that harbour.

1399. What increase of size would you suggest?—A harbour of national benefit should be made from the Skerry rocks; that is to say, it should be such a thing as would be sufficient for a fleet to rendezvous in, and also at the same time to give accommodation to the increasing trade in the merchant marine; but at the same time, a pier run parallel to that from the south side of Salter Head, and another still out upon the south head, would give more than double the present area, as near as I could judge.

1400. Are you of opinion that no vessel could get out, with a strong wind from north-east to east, from the harbour?—Decidedly not, with the wind between north-north-east and east-north-east. The same thing applies to the other side; because, with the wind any way almost, between east and south-east, it is a dead lee sea.

1401. Are you of opinion that if the funds were unlimited, both for Peterhead and Fraserburgh, you would give the preference to a harbour made here, over a harbour made at Fraserburgh?—I would. I may state my reasons for doing so: first, that I think a harbour of refuge is not simply a harbour for ships to run to in a gale of wind that may happen to be near the neighbourhood, but one holding out inducements for vessels to take shelter in it in foul winds; these, by keeping these ships off the coast, I think there would be more lives saved, and less property lost that way, than if the harbour was placed at any point where protection cannot be given for ships driving in a gale of wind.

1402. Then you think a harbour for storms is not so essential as a harbour for vessels with a foul wind?—I think not; I have always found that nine-tenths of the ships in harbours of refuge take shelter in unsettled states of the weather and foul winds.

1403. What would be the opinion of shipowners if their masters ran into this harbour merely to wait for fair winds? Do you think they would approve generally of that course?—I do not think that owners would be profited by harbours of refuge for ships to take shelter in; at the same time I think that the underwriters ought to have as good a claim on the public as the owners have, but the lives of the seamen have still a greater claim.

1404. (*Mr. Lindsay.*) Do you know the holding ground at Fraserburgh?—I do not; I have never been in the anchorage.

1405. You know the anchorage ground well in Peterhead Bay?—I do.

1406. Without the three-fathom line is it good holding ground?—It is. Perhaps it may be satisfactory to the Commissioners to know that at one time I spent nearly a week in Peterhead Bay, looking for anchors with a long tin tube and glass in the foot of it, and went over more than the space within those piers; and without that line of two fathoms, as near as I can judge, there was no such thing as a patch of rocks. Within the one-fathom line there are several places in the bay where a ship could beach. Without that line there are no rocks.

1407. Then, with your knowledge of the bay, are you decidedly of opinion that there are no rocks without the one-fathom line?—Without the one or one-and-a-half fathom line. There are no rocks except at the south head, where the two-fathom line is very near the rocks.

1408. I think you said just now that there were parts of the bay where vessels could beach with safety; what part of the bay is that?—I remember, as far back as 1825, a little vessel in a gale from south-east, and a very heavy sea running into the bay, so much so, that she was afraid of entering the harbour. She ran up to the present breakwater, and reached the beach quite safe. Then again, in January 1849, during one of the heaviest gales of wind and one of the heaviest seas that ever rolled in upon this coast, there were two schooners disabled came into the bay in an almost unmanageable state, notwithstanding which, they were beached a little to the westward of the baths. Manby's apparatus was got, and a stout warp got on board, and the captain nearly reached the shore, when the warp broke. It was very evident that nothing could be done to get the men out. I, being present, managed with a speaking trumpet and signs for them to go down into the forecastle, and remain until low water, which they did, and afterwards came on shore on the dry beach. That was during the heaviest gale of wind that I have ever seen on this coast, and the heaviest sea; which shows that there are points on that bay where ships can be beached.

1409. Are those points sandy points, without any rocks intervening?—The first that I pointed out is sand and small pebbles.

1410. But no rocks intervene between the sand and deep water?—None.

1411. What length of the beach consists of sand?—I should say about 500 or 600 feet, I cannot speak positively upon that. The other point that I pointed out has a rocky bottom, but the rock is not high—quite flat.

1412. I do not suppose that you understand by that that ships could beach with safety on that particular part?—The ship could beach to save the crew on that part, because if you will look at the chart there is a point of rocks runs out westward from the baths, which protects that part of the sea.

1413. You said there were eight vessels, in the *Gazette* received to-day, cleared out at Archangel for Peterhead for orders. Would you look to the *Gazette* and see how many vessels have cleared out from Archangel altogether on that particular day?—Forty-five; 8 of which have cleared for Peterhead, and 37 for other ports. A number of them, I see, are foreign vessels, some to the west coast of England and St. George's Channel, which, of course, would have received their orders here. I have not examined what proportion the ships cleared out for Peterhead bear to those bound to the east coast of England and Scotland.

1414. Would you look to see what proportion they bear to those bound for the east coast of England and Scotland?—Eight for Peterhead, and 14 for the other ports. I may remark upon that point, that it does not always show the number of vessels that will call at Peterhead for orders, because every shipmaster does not clear out his ship. He knows his destination pretty nearly, and very often loads for a port; at the same time he will proceed to call at Peterhead for orders, but he clears out for the port he is going to.

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Mr. Lindsay.

1415. You expressed an opinion that shipowners were not benefited by harbours of refuge ?—I think that shipowners will be benefited to a certain extent by harbours of refuge. I should say that many men would be in the harbour of refuge when they should have been making the passage, but at the same time I do not think that that would counterbalance the great loss of property and life that accrue in consequence of there not being a good harbour of refuge. I would not give that opinion positively ; it is merely an impression, and might be an erroneous one.

1416. And whether do you think the owner of a ship is more benefited by that ship being anchored in the Downs during strong westerly gales of wind, or attempting to beat to windward ?—More benefited decidedly by lying in the Downs. I have experienced the same thing myself.

1417. That is to say, you think the loss of time to the owner is of less consideration than the wear and tear of the ship, in attempting to beat down the Channel in a strong south-west wind ?—My answer to that question is more the view that many of the owners would take on the question, not exactly my own decided opinion on the matter. I have known ships in the Downs for two months or ten weeks, where they would be a great loss to the owner.

1418. Then you would think that a master of a ship would be very incompetent for his duty, if he lay in a harbour of refuge when there was a chance of making his passage, tear and wear and the safety of the ship always considered ?—I would.

1419. (*Captain Washington.*) I think you stated you had been 20 years at sea ?—I have been 27 years at sea.

1420. Of that time about 18 years in command of a ship ?—Yes, about that.

1421. I think you said that, looking at the proposed width of the entrance of the contemplated refuge harbour in Peterhead South Bay, you think that width of 400 feet is ample to enable you to take it in a gale of wind ?—I think so.

1422. And I think you said the larger the ship the better, as being more under command ?—Yes.

1423. And you, as a seaman, would not hesitate to run down upon that harbour and take it in an easterly gale ?—Not the least.

1424. You had occasion to survey in the bay in searching for anchors ; how long ago was that ?—At least 20 years ago.

1425. How was it that there were anchors in the bay then ?—We lost an anchor not far from the harbour mouth, a warping-out anchor, and it was while searching for it that we saw the bottom so distinctly. The kedge anchor was not buoyed, and it was lost in consequence, just at the entrance of the present harbour mouth.

1426. Then it was not a number of anchors strewed over the bay ?—The search commenced with that anchor, but we got such a beautiful view of the bottom that curiosity led us to examine the whole of the bay. Sometimes in that bay the water is very clear, and you can see the bottom very distinctly.

1427. Did it occupy you a long time to search for this anchor ?—No ; we got the anchor very conveniently.

1428. But then you extended your search ?—We did.

1429. How many days did that occupy you ?—I think we were nearly a week altogether.

1430. Examining the bottom of Peterhead Bay with a glass ?—Yes.

1431. You have a distinct recollection of that ?—I have.

1432. Who was with you at the time ?—I cannot remember. I could tell you, however, who was with me one or two days, a gentleman residing in Peterhead, Mr. Robert Hutchinson, of Cairngall. It was that gentleman who constructed the instrument, and he was with us at least the first day.

1433. When you speak of having examined the whole extent of the South Bay, can you state that you examined it sufficiently accurately to say there were no rocks within the one or two fathom line ?—I can say that I never saw any ; and during all the time I anchored in that bay I can assert that I never found any rocks in it.

1434. Have you often anchored in the bay ?—Frequently.

1435. Which is the best anchorage ?—The best anchorage is a little broken up now, in consequence of being so much used. It is nearly opposite Merchant Street, and there are about six or seven fathoms.

1436. You say that it is broken up by vessels anchoring there ?—Yes, and I think in course of time all anchorages in the same way will be broken up.

1437. How many vessels have you seen in the south bay at one time ?—60 or 70.

1438. But 60 or 70 could not all anchor in that anchorage ?—I do not mean to imply that ; but what I state will be perfectly borne out, that where they will find the way clear they will anchor there.

1439. Pray understand me. I do not wish to doubt in the least what you say, I only wish to get further evidence of the clearness of the bay, because if 80 vessels have been anchored over Peterhead South Bay, they must have been anchored over a large extent, and it is fair to presume that they did not come upon rocky ground ?—There is a larger extent than these piers, because ships will not confine themselves to the pier in an exposed bay.

1440. And 80 ships you say, extended over a greater space than would be enclosed within these piers ?—Oh yes, certainly.

1441. In what winds did that happen ?—A long series of westerly winds, about west-north west, down the Moray Firth to west-south west, along the southward.

1442. Then, if the common demands of the coasting trade at present require more than that space, do you think it would be sufficient to build what is called a refuge harbour of any greater extent ?—I should decidedly say, from my experience, that I have seen, even in the present harbour, a little of that ; where a great expense had to be incurred, which might have been very much lessened, had it been done more extensively when you could go about it ; and I think the same thing will apply to this harbour.

1443. Then you are of opinion, that if a harbour of refuge is to be made there, it should be very much larger in extent ?—I think so ; that is, looking at it in a national point of view, because we find the trade increasing very much, and we must look to it increasing still more.

1444. The trade is increasing, is it ?—Yes.

1445. And you contemplate that it will increase ?—I do.

1446. And therefore it is fair to suppose that a much larger number of ships will come to seek harbour in that bay ?—I think so.

1447. I think you said it was a favourble port of departure for the Baltic ?—No ; not for the Baltic. I said, that ships from the Baltic make it as a landfall, in consequence of the prevailing south-west winds during the whole months the Baltic is open.

1448. And could a vessel, leaving the Baltic with a south-west wind, make a lee so as to fetch Buchan Ness ?—She could not do quite that, but as soon as she left the Naze of Norway, she would keep her reach across the North Sea to the westward till she fetched the land.

1449. I think you said she could make the west across the North sea ?—She could cross with the wind south-west.

1450. Look again ; what will the ship's course be across the water with a south-west wind ?—It would be about west-north-west, and she would make that course good within half a point in an ordinary sailing vessel, at least with winds like what we are getting now.

But I do not mean to say that the wind is blowing steady at south-west; it will take a range of about four points, and the prevailing winds are from south to about west-south-west. It would be rather difficult for me to say that the winds were constantly at one point.

1451. We will take the wind at any point you like to say, but only state it as one?—Well, I say, when the wind is south-west, that ships after they get round the Naze of Norway, will keep their reach under, till they reach somewhere about Peterhead, till they get hold of the weather shore, that is the way I would do myself, and that is the way that the Baltic vessels do also. Vessels along the shore would take more tide than they would do out of the North Sea.

1452. You are speaking, I think, of moderate weather?—Yes.

1453. Well, suppose the south-west breeze increased to a fresh gale, what land would she make then?—I fancy that if she were to keep right on, with a fresh gale of wind, she would, making two or three points of lee way, have quite enough to do to fetch any part of the Moray Firth. I should attempt to tack the ship.

1454. You would, if you could, make Buchan Ness?—I would; that is to say, with a fair wind, and if it was practicable.

1455. And therefore, a great many vessels do pass in sight of Buchan Ness?—If they will fetch at any port on the coast of Scotland, they will reach it and fetch it.

1456. You have laid down some tracks on this chart of the North Sea?—I have.

1457. Are they laid down from memory or from a log book?—Simply from headland to headland, as I would measure off my course if I were shaping my course off the chart.

1458. Independently of winds?—That is supposing fair winds, and an approximation to true magnetic course to which I referred.

1459. I think you have drawn the track from Flamborough Head ships, bound to Archangel, at north-east $\frac{3}{4}$ north?—I thought it was there; I had no other chart to show me.

1460. That is with a fair wind?—It is.

1461. And suppose a ship coming home for Archangel bound to Hull, would she take about the same course?—I think she would rather prefer, in consequence of the chance of west winds, making the land on the coast as soon as she could.

1462. Let us take a vessel bound across to Archangel, as you have laid it down, at what distance from Buchan Ness would she pass?—I did not measure that.

1463. I will measure it for you. It is 95 miles; do you suppose that is about right?—Yes.

1464. Well, take the next course, from the mark of the ships leaving the coal ports bound to Archangel, with a fair wind about north east, do you know the distance they will pass from Buchanness?—I did not measure it.

1465. I will measure it for you. It is 45 miles. Would ships, bound to the Baltic, from the same ports steer more to the eastward?—They would steer direct for the Naze, and therefore would not come near Buchan Ness.

1466. Is there much trade from America to the Baltic?—Not from our colonies, but from the United States there is a great deal of trade, particularly with Russia.

1467. How does that trade pass?—It passes by the Pentland Firth or between the Orkneys and the Shetlands if the weather is very boisterous. In blowy weather, with the wind from the eastward, they generally endeavour to steer about the Faroe islands. In moderate weather, they will generally pass the Moray and Pentland Firths.

1468. And I suppose, make the Skerries off Duncansby Head?—Yes.

1469. Do you think you could obtain log books by which to lay down the actual course of any ships to Archangel at your leisure?—I think it would be a very difficult thing, because the ships going to Archangel don't care very much for the log books; they do keep logs, but the logs are very little cared for after the passage is over. I am sorry to say they are generally torn up for waste paper.

1470. They might be very useful?—I hope when Peterhead is a harbour of refuge, that the captains of ships sailing from or taking refuge in this port, will consider it their duty to keep accurate log books. I think it would be well if instructions were given to all the custom houses in the country to demand a look of the books of every ship that arrives, and take notes from them, for the benefit of science.

We all agree with you.

1471. (*Mr. Boyd.*) You have said that the largest fleet of ships which you have seen riding at anchor in the Bay of Peterhead extended beyond the line of the proposed piers; if the piers had been built would not a much less space than that sufficed to have kept these ships?—Undoubtedly. Ships could moor in tiers within that, just the same as they do in the Mediterranean.

1472. You have just now spoken of the courses laid down upon the chart, do you refer to the course of vessels from the coast of Great Britain or to the coast of Great Britain?—That is from the coast of Great Britain; but I do not mean to say that it is the course adopted, because I think that many vessels endeavour to take their departure from every headland they can get. They have no chronometers, and they are entirely out of reckoning. I merely laid those courses down as showing the distance, with ships steering in a direct line, that the shortest route would be from the different ports.

1473. I wish to know, taking the line from any of those ports on the east coast of Great Britain to Archangel, whether vessels pass the Buchan Ness nearer than they pass the coast of Caithness?—Very much nearer. The nearest point on the coast of Caithness would be 141 miles. From the same point to the Buchan Ness is only 100 miles; but that is not the nearest point. It is 90 miles.

1474. Would you look at the list of the Archangel vessels, and see whether the number 45 which you gave does not include 5 vessels arrived, and whether the proportion named for Peterhead was 8 to 40 in place of 8 to 45?—Yes, it was so.

1475. (*Chairman.*) With reference to the tracks upon the chart handed in, I was under the impression that they were tracks of voyages made by yourself; is that so?—It is not so.

1476. Could you place on a chart for me any tracks of voyages made by yourself across the North Sea?—I am afraid I could not, because in all the vessels I commanded the log books were left on board the ship, and I do not know what has become of them.

1477. I understand you to say in making a voyage across the North Sea, with the wind say from south-south-west to south-west, it would be your endeavour to get across to the weather shore in order to make your passage?—Yes.

1478. Now, as to keeping the sea in bad weather, what is the feeling amongst men who command ships such as you have commanded? Would it not rather be a point of honour to keep the sea, and not to take a harbour of refuge?—In very large vessels it is very seldom that they do take a harbour of refuge. We always endeavour to make our passage.

1479. For what class of vessels then would you say that these harbours of refuge which are proposed along the coast would be most useful?—Vessels from 350 or 400 tons downwards.

1480. Would such vessels be chiefly employed in the coasting trade?—No; I think not. The smaller class of vessels would be employed in the coasting trade.

1481. Then you would include American vessels, Archangel vessels, Baltic vessels, and vessels from St. George's Channel, coming round this way?—Yes.

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Chairman.

1482. Do you know the Pentland Firth ?—I do.

1483. What is the feeling amongst men who command ships such as you command about the difficulties of the Pentland Firth in running through it ?—None whatever.

1484. Look at the Orkney Islands on that chart (*being shown Admiralty Chart No.* 2181) would you, putting on one side the local difficulties of the Pentland Firth, as respects tides, have any hesitation in running for a harbour like that of Long Hope, shown on that chart, never having been there before ?—Not the slightest.

The witness then said,—You will perhaps permit me to make a remark before I leave. Although I am a resident and native of Peterhead, still I have not the slightest local interest there. The probability is that I will leave it in a few days, perhaps never to return again; therefore the evidence I have given will be taken as purely with a wish to be of service to the shipping interest, and to promote, so far as my judgment will lead, to that which will be the best for the protection of property and the lives of seamen.

(*Chairman.*) We have the power, as you are aware, of swearing witnesses, but do not do so, in the full confidence that every man who comes before us to give us evidence, whether he belongs to Peterhead, or whatever his feelings may be about Peterhead, or otherwise, will tell us the truth, the whole truth, and nothing but the truth; and therefore, whether you have any interest in Peterhead or not, to my mind, has nothing to do with the matter.

Capt. D. Gray.

Captain DAVID GRAY examined.

1485. (*Chairman.*) What is your name ?—David Gray.

1486. What is your occupation ?—A shipmaster.

1487. (*Mr. Boyd.*) How long have you been a shipmaster ?—Ten years.

1488. You have heard the evidence given by Captain Burnett ?—I have.

1489. Do you concur in it generally ?—I do.

1490. In what class of vessels have you been a shipmaster ?—Vessels from 300 to 700 tons.

1491. How long were you at sea before that ?—I served four years as an apprentice and two as a mate.

1492. Are you acquainted with the anchorages in the south bay of Peterhead ?—Yes, I am.

1493. Did you ride out one or two heavy gales of wind there with the wind from south-south-east ?—I have ridden out a heavy gale with the wind from east-south-east.

1494. What was the size of vessel and the draught of water ?—Three hundred tons, and fourteen feet.

1495. Was the sea very heavy ?—Yes, we were showing our fore-foot out of the water sometimes.

1496. Did your anchors hold during that gale ?—Oh, yes : never started an inch.

1497. Have you seen other vessels in different gales of wind in the bay ?—I have.

1498. What ships ?—I could not mention their names; they were vessels of considerable tonnage. Since I remember, I have seen the *Union*, 250 tons.

1499. Did she ride steadily ?—Yes.

1500. And did not drive at all ?—No.

1501. (*Chairman.*) Have you considered the question of a harbour of refuge at all ?—I have.

1502. And I understand you view it in the same light as the former witness—more as a harbour for vessels to run to, being windbound, or expecting heavy weather, than absolutely running for it in distress from stress of weather ?—I agree with what the former witness said on that point.

1503. Tell me, where have your voyages principally been to ?—I have been going all my life to the Greenland whale fishery.

1504. Do you feel competent to offer an opinion as to the navigation across the North Sea from intercourse with men in your own class of life, or from actual experience ?—I would rather not give an opinion on that point.

1505. Have you ever been through the Pentland Firth ?—I have.

1506. How many times ?—Once.

1507. (*Being shown Admiralty Chart No.* 2181,) Do you know what character the Pentland Firth bears as respects tides and other difficulties ?—I do.

1508. Have you any difficulty in passing through the Pentland Firth ?—Not if there is plenty of wind.

1509. But knowing the difficulties to be encountered in running through the Pentland Firth, you would provide for all contingencies by heaving to or otherwise ?—I should let it be till daylight if I had to run through the Pentland Firth. I should contrive to be ready to go through in the morning.

1510. You see the harbour of Long Hope on that chart ?—I do.

1511. If I put a chart of that kind into your hand, and told you to run for a harbour like Long Hope, such as you see it there, would you have any difficulty in doing so, if you had never been there before ?—Not the slightest.

1512. Are you acquainted with the Orkney harbours as respects vessels navigating in the coasting trade ?—I am not.

1513. Should you, if taken in bad weather, have any feeling as to not taking a harbour of refuge unless you are absolutely forced to do so ?—I would never take a harbour of refuge if I could avoid it. In fair weather I would take a harbour of refuge at once, but in foggy weather I would keep the sea as long as I could.

1514. My question related more to the point of honour in keeping the sea and making the passage, instead of running for a harbour of refuge.—I would never take a refuge if I could keep the sea.

1515. As a point of credit as a seaman ?—That is my feeling.

1516. (*Capt. Washington.*) Do south-west gales prevail much on this coast ?—Generally all the winter.

1517. Have ships ever been blown away from the coast off into the North Sea ?—Often.

1518. At such a time would it not be a great advantage to have a harbour of refuge where they could take shelter ?—It would be an immense advantage.

1519. In looking at the plan on the wall, and at the width of entrance bteween the proposed piers of 400 feet, would you have any hesitation in taking it ?—Not the slightest.

1520. I mean in a south-east gale, and the weather sufficiently clear to make out the entrance ?—No, I would take the entrance in the heaviest gale of wind I ever saw on the coast.

1521. You do not think the width of 400 feet too limited ?—Not a bit; plenty of room.

1522. Have ever you been in any of the pier harbours on the coast of England or Scotland ?—Never.

1523. I think you said that the holding ground within the south bay is extremely good ?—There is no better in the world.

1524. You have ridden out an east-south-east gale there without any breakwater ?—I have.

1525. Do you know what the bottom is ?—Blue clay; and it is exceedingly clean throughout the greater part without the two-fathom line.

1526. Where did you anchor ?—We were up till we had Uphill Lane open, and the sea was breaking about.

1527. In what depth of water were you riding ?—We brought up about seven fathoms.

1528. You payed out a whole cable ?—Yes.

1529. Only one anchor down?—We had broken both our anchors before we got them up, they were so hard in the ground.

1530. That says a great deal for the holding ground, does it not?—I rather think so.

1531. Did you hold on to the third anchor?—We got a new anchor from the shore, and after that we got several warps bent on, one being on the larboard bow, and then on to the shore; and got almost all Peterhead down upon those rocks, and hauled the ship out of the bay.

1532. I think you said in the Davis' Straits trade?—In the Greenland trade. I have been in Davis' Straits, but I have been engaged in the Greenland whale fishing.

1533. What is your course generally to your fishing ground?—We steer north-north-east from Rattray Head for Sambrough Head, then a little westerly; and we generally steer a little westerly after we set out from the Pentland Firth, and from the Roost.

1534. Then you have only been once through the Pentland Firth?—Only once, and that was in coming home from Davis' Straits, in the month of November.

1535. (*Chairman.*) Taking into consideration your duty to your owner as to the wear and tear of your vessel on the one hand, and the feeling which you would have as a seaman on the other, I now ask you whether you think that a harbour of refuge would be of great service?—I do think so.

1536. (*Capt. Washington.*) Captain Burnett stated that it was a great advantage to have a north outlet, which we all know and concur in; but we do not know the depth of water in the canal?—In the north side of the bridge it is, I should say, sometimes 17 feet water in high spring tides, and in the south harbour it is not more than 19. I think that is near about the mark.

1537. Would it not be of very great advantage to deepen either the channel or wall of the south harbour?—That is just what we want to complete our harbours.

1538. Would that be attended with great expense?—I am not sufficiently acquainted with the subject to say.

1539. Don't you think that it would require a great deal of money to do so?—It would.

1540. Has great benefit arisen from the communication between the north and south harbours?—Owing to there being so little water in the south harbour, there has not such a great benefit arisen from the canal as was expected.

1541. Why was not the whole of the work carried out?—It is not convenient.

1542. (*Mr. Lindsay.*)—What is the reason of its not being convenient?—We want the funds.

1543. (*Chairman.*) Are you able to place on a track chart a considerable number of your tracks, I mean outward bound, from Peterhead to 50 miles north of the Shetland Isles?—I can give you a number of them.

1544. Will you lodge with Mr. Boyd, for the use of the Commissioners, a track chart showing the tracks I have named?—I shall.

Captain Joseph Scott examined.

1545. (*Chairman.*) What is your name?—Joseph Scott.

1546. What is your occupation?—Master mariner.

1547. (*Mr. Boyd.*) You have been in the room during the examination of Captains Burnett and Gray?—I have.

1548. Do you generally concur in what you have heard them state with respect to the eligibility of this place, and the preference to be given to it, as a site for a national harbour of refuge?—I do, in a general point of view.

1549. How long have you been at sea?—38 years.

1550. How long have you been a shipmaster?—27 years.

1551. Can you give us a general account of the class of vessels you have commanded, and the trades in which you have been engaged?—From 100 tons to 270 tons, and the coasting and foreign trades for 10 years; the foreign trade exclusively for 11 years, and six years in the Greenland whale fishery trade.

1552. You are in the Greenland whale fishery trade at the present moment?—Yes.

1553. What is the general course of vessels from Peterhead to Greenland? Do they pass through the Pentland Firth or not?—No, they pass to the eastward of the Orkney Isles.

1554. Universally?—Yes, as far as I know they do.

1555. Do you concur with what has been said by Captain Gray as well as Captain Burnett?—Yes.

1556. What is your opinion as to the most eligible site on the east coast of Scotland for a national harbour of refuge?—My opinion is that Peterhead is the most eligible site. I wish to make a few remarks to the Commissioners, which I have committed to paper with a twofold object; namely, not to waste their time in wandering from the point, and to assist my own memory, as I am not much in the habit of speaking in public, and I wish to confine myself merely to nautical points on this subject.

(*The witness then read the following statement:*—)

"I think Peterhead is the most suitable site for a harbour of refuge on the north-east of Scotland, its situation being about halfway between the Firth of Forth and Cromarty, and between those two places (which are about 180 miles apart) there is not a harbour at present that a vessel could run for with a strong gale from south-east, and have the least prospect of saving either life or property.

"Peterhead being the north-east point of the mainland of Scotland, vessels bound south and north make for it; and many vessels from the Baltic make Peterhead, although bound to a port south of it. In the fall of the year, when strong southerly winds prevail, vessels keep their reach across the North Sea, and have no fear of making the land about Peterhead, for they have Mormond Hill a little to the north, and Stirling Hill a little to the south, with Mill Hill and its town right at the head of the bay, all which are striking or conspicuous landmarks; and with Buchan Ness light at the south interim of the bay, which can be seen in clear weather from a vessel's rigging a distance of 25 to 30 miles.

"And in foggy weather the sounding of Peterhead will indicate a vessel's approach to the land, as the depth of water decreases gradually from off the shore.

"The South Bay of Peterhead has good anchorage, and were a harbour of refuge constructed there, vessels taking shelter in it from stormy weather, bound either south or north, would have no difficulty in leaving it again when the weather moderated, as it is a salient point. In its present state it affords shelter to many vessels bound south and north: I myself have counted 100 vessels riding in the bay at one time; some of my nautical friends say they have seen more.

"Vessels bound to Fraserburgh, and all ports in the Murray Firth, take shelter in Peterhead Bay, with strong winds from north-east to north-north-west. These are some of its recommendations as a proper site for a harbour of refuge, in a nautical point of view, according to the best of my judgment."

1557. (*Mr. Boyd.*) You were at Fraserburgh on Monday, I understand?—Yes.

1558. Did you hear there some expression of opinion by shipmasters belonging to Fraserburgh with reference to the anchorage at Peterhead Bay?—Yes.

1559. Have you seen these shipmasters taking refuge in Peterhead bay or harbour?—I have.

1560. Did you hear the shipmasters state that

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Peterhead is not a place where refuge could be obtained, or something to that effect; or that there was any refuge to be got in the South Bay?—I think the sum and substance of their evidence was that the anchorage was very limited, and that very few vessels took refuge there.

1561. At the time that one of these ships, the *Melinka*, took refuge in the South Bay, was there a considerable number of vessels in the south bay?—I was not here at that time.

1562. (*Chairman.*) Where have your voyages in the foreign trade principally been made to?—To almost all parts of the world, China and Australia excepted.

1563. How many times have you crossed the North Sea to the Baltic?—I am not prepared to say the number.

1564. Have you crossed half a dozen times?—More.

1565. Have you crossed a dozen times?—I think, more.

1566. How many times have you been through the Pentland Firth?—About 12 or 15 times, more or less.

1567. Have you any difficulties in running through the Pentland Firth, choosing yourself the time for doing so?—No, not if I can choose my own time for doing so.

(*Admiralty Chart No.* 2181 *was shown to the witness.*)

1568. You see the harbour of Long Hope on that chart?—Yes.

1569. Suppose I give you a chart with a harbour of that description, into which you have never been, would you have any difficulty in running for it?—I should say none whatever. I see nothing lying off the mainland or the islands. If I keep off what I see, I think my vessel will be safe.

1570. Would you be able to place upon a chart for us the tracks of any of your voyages outward from Peterhead, or homeward to Peterhead?—I think I can.

1571. About how many?—I think I could give you about ten.

1572. Will you do so, and lodge them with Mr. Boyd for the Commissioners?—I will, with pleasure.

1573. (*Mr. Lindsay.*) In approaching the land from the eastward, do you consider that the soundings decrease more gradually off Peterhead than off any other part of the north-east coast of Scotland?—I think they decrease more gradually here than they do at any part of the coast to the northward of Peterhead.

1574. Will you get soundings at a greater distance from the land off Peterhead than you will at any part northward of it?—You will get soundings all the way across the North Sea.

1575. Yes, but I speak of soundings of 50 or 60 fathoms?—I think we will have about 60 fathoms of water off Peterhead when we are from 25 to 30 miles off.

1576. What soundings would you have at the same distance, say from Wick?—I think we would have about 45 or 50.

1577. You say you have been through the Pentland Firth some 12 or 15 times?—I have.

1578. Would you consider there was any danger in running through the Pentland Firth for the harbour of Long Hope during a south-east gale and with a flood tide?—That depends entirely upon what kind of a vessel I had and the severity of the gale.

1579. Well, say the gale was so strong that you as a prudent master considered it advisable to run for a place of safety, would you then consider it safe to take the Pentland Firth in such a gale during a flood tide?—Such a gale would not commence all at once; and if such a gale were coming on, I could shorten sail and keep my vessel off until I had an ebb tide, and then I would have no fear in running for it with the heaviest gale from the south-east.

1580. (*Capt. Washington.*) How often have you been in Long Hope?—Three or four times.

1581. On what occasions did you go there?—We were windbound to the westward.

1582. Was it blowing hard from the westward?—Yes.

1583. How was the wind?—From west to north-west.

1584. What time of the year?—In the winter time.

1585. Where were you bound to?—To Liverpool.

1586. Is it a common practice to take shelter in Long Hope in westerly winds?—A great many vessels do.

1587. Were you ever caught at the entrance of the Pentland Firth in a south-easterly gale?—I never was with a very severe gale. I have run through the Pentland Firth from the westward with a heavy gale and an ebb tide. I remember one night I ran through it during the night. I got hold of the Island of Stroma, and kept my vessel there, I think, for four hours, and it was so dark that I could not see the Pentland Skerry line. I remember very well making a log to see what rate she was going at, and I found she was going eight knots; and we hung, I think, for about four hours abreast of Stroma. Then when the tide began to ease I was through in no time, and into Peterhead next forenoon tide.

1588. Do you think it is quite certain the ship was going eight knots?—I do.

1589. Were the spring tides running?—Yes.

1590. Then the spring ebbs run as much as eight knots?—I think they do fully nine.

1591. Do I understand you were hanging under Stroma?—Yes, in sight of Stroma.

1592. Were you hove to?—I had all the sail set that I could carry.

1593. What was the sail?—I think the topsail; there was a reef in it, and it was not very large. I do not remember if the mainsail was set or not. The vessel was a schooner.

1594. Was it a very heavy sea?—There was a good deal of sea.

1595. Did it ever wash your decks?—No; my vessel was in good trim and not very deep.

1596. What was her tonnage?—93 tons.

1597. Did you carry a whole topsail?—There was a single reef in it.

1598. How was the wind?—From the west.

1599. South-west or north-west?—Perhaps west-north-west. I could not say the exact point, but it was a fair wind.

1600. How close were you to Stroma, do you think, at that time?—I think I must have been sometimes within half a mile of it.

1601. Then, in fact, Stroma was acting as a natural breakwater against the ebb tide for you?—Yes, I got out of the face of the eddy at first. It brings a rush of the tide both east and west, and then I had to steer out into the current lest I should run into Stroma.

1602. In fact, you got under Stroma, and dodged the tide?—No, I ran up to Stroma, under the lee of it, but if I had kept the same course I would have run right on to it. Then I steered my vessel to the middle of the stream, and she kept there for about four hours, and never altered the position. The tide was come to the westward, and she hung in the stream till the tide slacked.

1603. Then the wind and the tide were opposed to each other?—Yes.

1604. But there was no such great sea as to sweep your decks?—No.

1605. How often do you say you have gone through the Pentland Firth?—I think I have gone through 15 times.

1606. And you never had such a bad sea as to sweep your decks?—No; I never had. I have gone through between Stroma and the main often.

1607. You said, I think, that from the land you got 60 fathoms, at what distance?—Off Peterhead, from 25 to 30 miles.

1608. And the depths gradually decrease as you approach Peterhead?—Yes, pretty gradually.

1609. Would you venture to approach Peterhead in a fog by your soundings?—Yes, I did it just now, coming in from Greenland.

1610. Very good; very useful knowledge. And you did steer straight for Buchan Ness as long as you saw the light?—I did not see anything at all from the time I left the Shetlands till I was within a mile and a half or two miles of the bay here. I reckoned myself to be right for the Buchan Ness, and I steered on west-north-west and sounded every now and again, and by my soundings I knew that I was close to the land.

1611. Very good and very seamanlike. Have you a chronometer on board?—Yes, but she was of no use, as I could not see the sun.

1612. I think you read some notes?—I did.

1613. Were those notes drawn up by yourself, or were they suggested to you?—They were drawn up by myself from my own experience.

Quite so; I had no doubt of it, but I wished to put it on record as a fact.

1614. (*Chairman.*) I understand from your evidence that you consider the land about Peterhead to be the most easy land on this part of the coast to make by means of soundings in thick weather?—I think it is easier to make than the land north of this.

1615. From Peterhead south to the Firth of Forth do you consider it the easiest land to make?—I think it is.

1616. Tell me why is the land about Kinnaird's Head, for instance, not so easy to make as the land about Buchan Ness by means of soundings?—I think the soundings for Kinnaird's Head will be much the same as for Peterhead; but then if I am a little to the northward I may reach a considerable way up the Moray Firth before my soundings will indicate my approach to the land.

1617. Taking the land about Duncansby Head and Noss Head what is the reason that the land about Peterhead is easier to make by soundings than there?—I think for a considerable distance in a south-easterly direction, that it is all a flat. I will get the same soundings for 20 miles off Noss Head in a south-east direction.

1618. And off Duncansby Head?—I think, taking Duncansby Head in a north-north-west direction, the depth of water decreases very rapidly.

1619. What sized vessels have you commanded chiefly?—I have been commanding a vessel of 270 tons for the last 15 or 16 years.

1620. You have described an occasion on which you hung your vessel off Stroma?—Yes.

1621. Tell me, from the knowledge which you possess of the masters of the coasting trade, whether many of them would be disposed to try the same thing?—I could not say, for I have not been in communication with many of them for several years past.

1622. Amongst the masters of vessels with whom you are acquainted, do you thing there are many who would be disposed to try the same thing?—I do.

1623. (*Mr. Lindsay.*) I see there is a bank here called the "Dutch Bank," on the chart, about 60 miles to the eastward of Buchan Ness?—Yes.

1624. I see there is 53 fathom water inside, and about the same depth of water outside, of that bank; but I see over the whole bank the soundings range from 25 to 35. Would that bank be of any assistance to you in running for Peterhead during thick, foggy weather?—I do not think it would; I do not think that the north end of that bank would be of much service. But the south end is of great service. I have taken advantage of the south and of it.

1625. That is to say, in ascertaining your position you have steered a course so as to hit this bank?—No; but I have crossed it, and thinking I was about that position have tried soundings.

1626. You are aware of such a bank as the Dutch Bank about 60 miles to the eastward?—I have found shallower water on the south end of it; but I have never found it 25 as marked there.

1627. What soundings have you found there?—The least that I have found on it is about 35 fathoms.

1628. Is it much shallower than the water contiguous to it?—It is a little shallower; I could not say how much, but having the bank on my chart I have often tried the soundings when I was there.

1629. (*Capt. Washington.*) In speaking of soundings, do you speak of soundings made by yourself or from the chart?—I speak of soundings made by myself.

1630. That's right. I think you said that this part was easy to make on account of being conspicuous; is it so?—Yes.

1631. How far is it between Mormond Hill and Peterhead?—About 8 or 9 miles. Perhaps a little more.

1632. My reason for asking is, that at Fraserburgh the other day the vicinity of Mormond Hill was made a great point in favour of Fraserburgh as a landfall?—They make it the same here.

1633. Then, in fact, you pass by it?—We generally see it before we see the low land between it and the shore.

1634. Do you see the plan of the proposed harbour; are you aware of the width of the entrance?—I have heard it stated at 400 feet.

1635. Supposing it to be 400 feet, would you have any hesitation in running for it in a south-east gale?—I think none whatever.

1636. You think the limited width would not prevent you taking it?—I think not. I was considering it since yesterday. I think as the entrance is about where the deepest water is, the sea has less chance to break there than it would at each end, although I am not an advocate for breakwaters of that description.

1637. What sort of breakwater would you wish, as far as a nautical man would have an opinion on that subject?—If it could be accomplished, I would like such a breakwater as the one at Plymouth, a detached breakwater.

1638. May I ask if you or any other nautical man in Peterhead were consulted about the design for these breakwaters?—I was not.

1639. Has it ever been the subject of conversation between the masters of ships here?—I do not know that.

1640. Has it with you? Was your opinion ever asked as to the position of the piers?—No, it was not. I only saw the plan yesterday for the first time. I have been considering it ever since, and I was thinking that it perhaps might be the best plan, but if it could be accomplished I think that an opening at each end is the best, because in the bays that I have generally frequented the best anchorage is generally in the middle of the bay, and if a detached breakwater crosses the middle of the bay, it shelters the best part of the anchorage, whereas the best part of the anchorage is exposed in that manner.

1641. In a refuge harbour that you would run for in a gale of wind, you do not care much about still water, do you? It is the sheltered roadstead that you should look for?—I certainly should look for a sheltered roadstead.

1642. Do you wish the water to be very still, or would a sheltered roadstead, such as you would find under the lee of a breakwater be sufficient for you?—Yes.

1643. Supposing the same width of entrance to be at the north and south end of the bay, would you have any fear in taking it?—I am not prepared to answer that question.

1644. There is a spring tide, is there not, off the South Head?—Yes, to the best of my knowledge it runs from 4 to 4½ miles per hour in the direction of the Skerry rocks, and there is a smooth generally between it and the land occurring at the mouth of the bay. The tidal wave forms a kind of breakwater, if I may so express it, and there is generally a calm or a smooth inside of that tidal wave. They are placed where I have observed a rapid tide running across the bay.

1645. And therefore you would recommend the

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piers to be placed just within the cushion of that tide?—Sufficiently within, so as a vessel could pass out of the stream and enter the harbour safely, because there would be a danger in steering, passing from a rapid stream into still water.

1646. Now, then, supposing the entrance were at the north end, would the stream that passes the South Head prevent your taking it?—I do not think so.

1647. Would there be anything in the tide off Salter Point?—There is very little tide between the South Head and Salter Point. I think about, perhaps, a knot.

1648. Then you think a south-west entrance could be taken as easily as that central entrance?—I do.

Captain DONALD MANSON examined.

Capt. D. Manson.

1649. (*Chairman.*) What is your name?—Donald Manson.

1650. What is your occupation?—Seafaring.

1651. (*Mr. Boyd.*) You are harbour-master and captain pilot at Peterhead?—Yes.

1652. How long have you been at sea?—54 years.

1653. You have had the command of a ship?—Several ships.

1654. How long have you been ship-master?—Upwards of 38 years.

1655. Were you the ice-master in the Arctic expedition—the *Isabel* and *Phœnix*?—I was.

1656. What class of vessels had you under your charge as ship-master?—From 300 to 350 tons.

1657. And what trades were you generally engaged in?—In the North American trade, the whaling trade, the Mediterranean trade, and the Baltic trade.

1658. Then you have had a great deal of experience upon this coast in the North Sea?—I have.

1659. Were you present when Captain Burnett was examined?—I was.

1660. Do you concur generally in the opinions which he gave?—I may state that I did not hear him distinctly, I was so far back.

1661. Have you considered the question of a harbour of refuge upon the east coast of Scotland; first, whether it was really called for, and next what was the best place for it?—Yes, of course, I have been passing my views with my neighbours; and if I am to understand the Commissioners distinctly, it is simply to give my opinion as to whether this is a proper site for a harbour of refuge or not, and whether a harbour of refuge is necessary in my opinion. In the first place it is necessary in my opinion; and Peterhead, so far as my judgment leads me, is distinctly the best place.

1662. You know the South Bay anchorage, I suppose?—I am not competent to pass an opinion upon it. I have very seldom come to anchor in the South Bay; and I have only been harbour-master here for two years.

1663. Is it any part of your duty to be acquainted with the anchorage of the South Bay?—If it is my duty I have never acted upon it yet.

1664. Is there an assistant harbour-master who has held that situation for upwards of 20 years?—Yes.

1665. You were present when a question was put to Captain Burnett, and an answer given by him with respect to the length of the heads at the South Bay where a vessel might be beached. Have you measured that?—Yes, since the question was put.

1666. And what is the length of it?—It is 540 feet.

1667. (*Sir Frederic Smith.*) You have been harbour-master here for two years?—Yes.

1668. Can you tell the Commissioners what were the depths of water in the two harbours?—I think about 12 feet at spring tides, and about 8, as near as I can judge, at neap.

1669. Are both harbours the same?—The rise and fall of both harbours are the same. At spring tides there cannot be less than 16 feet in the north harbour, and in the south harbour perhaps about 11 or 11½ feet.

1670. Would it be any great advantage to have the levels the same?—Very much indeed.

1671. What would be the practical advantage?—We could get a great number of ships in, drawing a great draught of water, that are afraid to enter our harbours just now, in consequence of not having it in their power to do so.

1672. Do you think that would be more useful to you than a harbour of refuge?—In my opinion, I should like a harbour of refuge first.

1673. But you would like to have the other also?—Perhaps in the course of time we would be enabled to do it.

1674. So as to make a canal passage for vessels of large draught of water?—Yes.

1675. (*Mr. Lindsay.*) As captain of the pilots, do you not consider it your duty to make yourself conversant with the anchorage in the South Bay;—I am so far conversant with it that I know where the ships generally endeavour to bring up; but I never have been sounding the bay myself.

1676. Then can you say of your own knowledge whether it is good holding ground or not?—Yes, I can say that it is good holding ground, but perhaps not over the whole bay.

1677. Did you ever see a ship drive from her anchors?—Never.

1678. Did you ever know a ship to drag her anchor in the bay?—Not, to the best of my recollection; particularly with the wind from the southward, I think they never do so. With the exception of one year, I think it was one of Her Majesty's ships that had been hung too short, and I believed she dragged her anchors off here, and came ashore at Peterhead That was the *Pleiades*.

1679. When was that?—It was a good number of years ago.

1680. You have had great experience, you say, as the master of a ship?—I did not say that I had great experience; I only said I should have had experience.

1681. You have been thirty-eight years master of a ship?—Yes, and I have been thirty-two years in one ship commanding.

1682. You know the North Sea?—Yes, I know it pretty well, that is, passing and repassing.

1683. Have you ever gone through the Pentland Frith?—Many a time.

1684. Have you ever gone through the Frith in a heavy gale from the south-east?—Yes, I may say I have gone through it in all weathers.

1685. In what sized ship?—A ship of above 300 tons.

1686. Have you ever attempted to go through the Pentland Firth during a strong south-east gale with a flood tide?—Yes, I did attempt it, but I do not think I would be very much inclined to try it again.

1687. Do you consider the danger was great?—The danger, perhaps, was not so very great, but we were likely to get a good deal of our things taken off our deck.

1688. You were afraid, then, on account of the high sea which prevails during a south-east gale and a flood tide, that you would have your deck swept?—Yes, we certainly had that risk at the time, but it was only momentary, just near Duncansby?

1689. Were you not in a position to heave to or dodge your ship till there was a change of tide?—Certainly we had that in our power; but perhaps I was rather too anxious to get home.

1690. Have you been often in Long Hope?—Often.

1691. How many times do you remember?—I could hardly state that very correctly, but I will be bound I have been perhaps fifteen times.

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1692. Do you consider it a good harbour of refuge during south-east gales?—I do not know that there could be a better harbour than Long Hope.

1693. Have you known, during your long experience, many ships lost in going through the Pentland Firth, or in attempting to enter the various harbours of refuge amongst the Orkney Isles?—I am not aware of any.

1694. You do not know of your own knowledge?—No, not of my own knowledge.

1695. (*Capt. Washington.*) I think you said you are captain of the pilots?— Yes, I get that designation.

1696. How many pilots are there here?—Sometimes 47.

1697. But it is not your duty to examine the pilots as to their qualifications?—No. I have never done it, at any rate.

1698. Who is that done by?—I believe the harbour trustees take a great interest in examining them.

1699. But you are not concerned in it?—Of course I am concerned in it to a certain extent; but I do not consider it my duty to examine them exclusive of the harbour trustees.

1700. You do not consider yourself responsible whether a pilot is a good pilot or a bad one?—Of course we must endeavour to get them good, if it is in our power. I must consider that I certainly have an interest so far as that goes.

1701. And you have 47 pilots. Are they simply harbour pilots, or do they go along the coast?—Simply for the harbour.

1702. And not to carry a ship through the Pentland Firth?—I do not mean to say that they remain constantly on the piloting, because there would not be sufficient to support such a number of pilots. They occupy themselves in other ways.

1703. Do Peterhead pilots ever take ships to the Pentland Firth?—Not that I am aware of; but I have no doubt there are some of them competent enough to do so.

1704. I think you were ice-master in the *Phœnix* Captain Singlefield?—Yes.

(*Capt. Washington.*) And a right good one you were too, I remember.

Alexander Souter examined.

A. Souter.

1705. (*Chairman.*) What is your name?—Alexander Souter.

1706. What is your occupation?—Pilot.

1707. (*Mr. Boyd.*) How long have you been at sea?—Forty-eight years.

1708. You have been a shipmaster?—Yes.

1709. For many years?—Eight years.

1710. In the coasting and foreign trades?—Yes.

1711. You were a good many years harbour-master and pilot-master at Peterhead?—Twenty-three years.

1712. And within the last two years Mr. Manson has taken your place?—Yes.

1713. You are still a pilot?—Yes.

1714. You are, I presume, well acquainted with the anchorage in the South Bay?—I am.

1715. What sort of anchorage is it?—Good.

1716. You are thoroughly acquainted with it all?—Yes, round and round.

1717. Have you been present during the examination of the witnesses Captains Burnett and Gray, and so on?—Yes.

1718. Have you heard what they have said about Peterhead?—Yes.

1719. Do you concur in what they have said?—I do.

1720. They have said nothing at all in which you would be inclined to disagree with them?—Nothing.

1721. (*Capt. Washington.*) Did you hear Captain Gray's or Captain Burnett's evidence respecting having seen the Buchan Ness light 30 miles off?—I have seen it 25 miles off myself, just going away from it.

1722. Is it a good, distinct, flashing light at that distance?—It is.

1723. And therefore a very good point to make for?—Capital.

Captain Alexander Hepburn, of Inverness, examined.

Capt. A. Hepburn.

1724. (*Chairman.*) What is your name?—Alexander Hepburn.

1725. What is your occupation?—Seafaring.

1726. (*Mr. Boyd.*) You are a shipowner in Inverness?—Yes.

1727. Have you been many years at sea?—About 40.

1728. How long have you been a shipmaster during that time?—About 26 years.

1729. What class of vessels did you command?—From 60 to 150 tons.

1730. In what trade were you chiefly engaged?—In the coasting trade and Baltic trade.

1731. Have you heard the witnesses who have been examined to-day?—Yes.

1732. Do you generally concur in what has been said by them about Peterhead?—I do.

1733. Have you often taken refuge in the South Bay of Peterhead yourself?—Frequently.

1734. Have you found it a place containing good anchorage ground?—Yes, I always found it safe.

1735. Have you been there when it was blowing hard?—Yes; with gales from the west.

1736. Have ever you known ships driving from their anchors in Peterhead South Bay?—No, except the *Pleiades*.

1737. Were you here at that time?—Yes.

1738. In what year was that?—I think it was 1811 or 1812.

1739. Do you know the cause of her drifting?—No.

1740. In the same gale, do you remember some large foreign vessels having been beached in the South Bay?—Yes, I do.

1741. Was it a very heavy gale at that time?—It was.

1742. Where was the wind from?—I think it was east-south-east.

1743. There was great loss in the North Sea?—Yes.

1744. Do you remember the time of the year?—I think it was in November.

1745. Were the crews of these vessels saved by their being beached?—They were.

1746. Was one of them up in the head of the South Bay?—There were two there.

1747. And the crews in both cases were saved?—Yes; they were quite exhausted, and the ships were waterlogged.

1748. I presume you are thoroughly acquainted with the trade of the Moray Firth?—I am.

1749. Is the refuge found in the South Bay of Peterhead held to be of great importance to that trade?—Very great.

1750. Is the trade of the Moray Firth very much dependant on that refuge?—With strong westerly gales the vessels are generally driven down the firth, and take shelter in Peterhead Bay.

1751. Suppose a harbour to be on the Caithness coast, and a vessel taken in a south-east gale, would you consider it safe for her to run down on that coast?—No, I would not.

1752. What would you do?—I would keep the south side, if possible; except, if the wind was westerly, I would try to get to Peterhead Bay.

1753. But supposing the wind was south-easterly?—I would try to get to Cromarty.

1754. You would not run down upon the Caithness coast?—By no means.

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1755. Why?—Because I would be on a lee shore, and there is no harbour.

1756. What is your opinion with respect to the necessity of a harbour of refuge on this coast; do you think it necessary?—I do.

1757. Have you considered the subject of the best place for such a harbour?—Yes, I have thought over it frequently.

1758. What is your opinion as to the locality?—My opinion is, that Peterhead is the best place on the east coast.

1759. In the course of your experience has it happened that you have been driven backwards for a very considerable period between the Gridleven and Somemouth?—I have been so sometimes for three weeks on a stretch, and I could not get hold of any place except Peterhead Bay.

1760. (*Chairman.*) On the occasion in question, where were you from, and where were you bound to?—From London, bound to Inverness.

1761. In what sized vessel?—About 110 tons.

1762. Where do you belong to?—Inverness.

1763. Supposing there were a harbour, say at Wick, would that alter your opinion about running down on the Caithness coast?—Yes, it would, with the south-east wind.

1764. Therefore, having in view the heavy south-east currents, would you, as an Inverness man, prefer Wick to Peterhead, for a harbour of refuge?—No, I would not.

1765. State your reasons why.—With the south-east wind it is a lee shore on the coast of Caithness, but I would prefer trying to get Cromarty.

1766. And with a south-east wind there is never any difficulty in getting into Cromarty in heavy weather?—No.

1767. With the wind from north-east, round to east-south-east, blowing hard, is there ever any difficulty in getting into Cromarty from the wind baffling you when you arrive off the port?—With a north-east wind it sometimes baffles between the Souters.

1768. From what point to what point would the wind blow fair home? With the wind south-east, does it blow fair home?—Not quite.

1769. Does an east-south-east wind blow fair home?—No.

1770. (*Sir Frederic Smith.*) You had only been two years at sea when that man-of-war got on shore here?—About that time.

1771. That is a long time ago; do you remember the circumstances perfectly?—Yes.

1772. How was the wind blowing then?—I think the wind was blowing south-south-east when we came on shore.

1773. Was it blowing a gale?—Not a heavy gale; a strong breeze.

1774. Would a good harbour of refuge, if made at Fraserburgh, be of much or little use to the traders of Moray Frith?—A good harbour would be very useful, but I think Peterhead could be made useful.

1775. If a good harbour were made at Fraserburgh it would be useful?—For windbound vessels.

1776. In what quarter?—The present quarter.

1777. Suppose you got both harbours, which would be the more suitable?—Peterhead, I think, would be the most suitable place.

1778. But in stress of wind, should you make the other in preference to this?—I should say, with a strong northerly wind or north-east wind, a vessel could not take Fraserburgh so well as this place; and in fact, going to or coming from any place or with any wind, Peterhead would be a better place for us than Fraserburgh.

1779. (*Mr. Lindsay.*) Is it your opinion that in a national point of view, all things considered, Peterhead is a more desirable place to have a harbour of refuge than Fraserburgh?—I cannot answer that question.

1780. You said you remembered two or three foreign ships being beached here?—Yes.

1781. The crews were saved?—Yes.

1782. Did these ships become total wrecks?—I do not remember if they broke up here, but I think that they either broke up or their cargoes were landed in the bay.

1783. Were they got off to be repaired?—I do not know; I did not remain long enough to know.

1784. You do not remember whether the ships were got off or not?—No, I do not.

1785. (*Capt. Washington.*) What year did that occur?—1811 or 1812.

1786. You must have been very young at that time.—I was between 11 and 12.

1787. I have no doubt it would make a great impression. Have you ever had occasion to go through the Pentland Firth?—Frequently.

1788. Trading from where?—From Liverpool, Ireland, and different places.

1789. Have you ever run through it blowing hard?—Yes.

1790. And found no difficulty?—No, I always managed to delay till a proper time of tide, if possible, and ran through it with a fair wind.

1791. Did it ever occur to you coming from Inverness with a south-west wind, when you came down from Duncansby Head, you found the wind blowing west-north-west?—Yes.

1792. In that case where did you go to?—I went to Long Hope.

1793. Did you ever stop in Sinclair Bay?—Never.

1794. It is not a good stopping place?—I do not know; I never used it myself.

1795. You crossed to Long Hope?—Yes.

1796. But you would not hesitate to cross the Pentland Firth, blowing hard from the west-north-west?—Not with a tide suitable to get hold of Long Hope.

1797. You would be obliged to wait for the tide?—Yes.

1798. In that case, supposing a harbour of refuge, as has been mentioned, at Wick, would that be of no advantage to you?—No, I would never attempt Wick.

1799. What would be your objection?—There would be no possibility of getting out with a fair wind, and the south-west or south wind raises a heavy sea upon the coast.

1800. You trade also, I think, from Inverness to London?—I did do so.

1801. Did you ever find with a south-west wind, that as you turned the point of the Moray Firth, the wind passed to west?—Yes.

1802. Then you would require a stopping place?—No, we keep on unless it blows very hard. We often get round into the firth with double sails, and we make it.

1803. You see the proposed plan of piers upon the wall; have you seen it before?—No, not till to-day.

1804. Do you know the width of entrance?—I have heard that is 400 feet.

1805. Would you hesitate to take it with a gale from the south-east?—No.

1806. Did you hear what a witness said about a north and south entrance instead of a central entrance?—I did.

1807. Do you agree with that?—I would not like to speak on that point.

1808. (*Capt. Vetch.*) You have traded a great deal between Inverness and London?—Yes.

1809. Did it ever happen to you in passing Fraserburgh that you saw in an adverse wind vessels waiting for a wind to go south?—Yes, frequently.

1810. How many have you seen at a time?—Forty sail.

1811. Then, returning to Inverness on your voyage from London, and reaching Kinnaird's Head with a foul wind, and going down Moray Firth, did you ever see vessels waiting there to go westward?—Yes, I have sometimes seen small vessels at anchor off Kinnaird's Head.

1812. How many have you seen at a time?—Probably eight or ten, not more.

1813. That frequently happens, does it not?—Not frequently.

Mr. JAMES LESLIE, C.E., examined.

1814. (*Chairman.*) What is your name?—James Leslie.

1815. What is your profession?—Civil engineer.

1816. (*Mr. Boyd.*) Were you applied to last year by the harbour trustees to report on the eligibility of the site of the bay of Peterhead for a harbour of refuge, having had submitted to you a plan which Mr. Stevenson had prepared?—I was.

1817. Have you the report which you made?—Yes, it is dated February 1858.

1818. (*Chairman*). Do you wish to put this in evidence?—If you please.

REPORT to the TRUSTEES of the Harbours of PETERHEAD, by JAMES LESLIE, C.E., as to the eligibility of the South Bay of Peterhead as a site for a Harbour of Refuge.

Agreeably to instructions from Mr. Boyd, Clerk to the Trustees, I visited Peterhead in the end of December last, accompanied by Mr. David Stevenson, C.E., and then carefully examined the harbour, the bay, and the adjoining coast. I also visited the neighbouring quarries, so as to be able to judge of the quality and cost of building materials.

It appears to me that the Bay of Peterhead, which is nearly a statute mile in width, and fully three quarters of a mile in depth, is particularly well adapted for the site of an asylum harbour, having great depth of water, good holding ground, and shelter from at least three-fifths of the compass.

I have examined and fully considered the plans of a harbour prepared by Messrs. Stevenson.

The larger one, enclosing the greater part of the bay, and having a low-water area of 190 acres, and an area of 116 acres below 12 feet at low water of spring tides, witha maximum depth of seven fathoms, would be very accessible at all states of the tide, and in all weathers, and it would afford accommodation and perfect shelter to a very large fleet of vessels, a considerable number of which might be of the greatest draught afloat.

This plan is decidedly the one which I should prefer, if funds can be provided for its construction. The expense, however, would be great, viz., according to Messrs. Stevenson's estimate, the data for which I have examined and think correct, 335,000*l.*, which could only be hoped to be raised by the work being made a national measure.

I am of opinion that the smaller plan shown, though possessing fewer advantages than the larger one, would still be highly beneficial, and would afford shelter in deep water to a considerable number of vessels, and would be able to accommodate all the trade of Peterhead, and the vessels trading to the neighbouring coasts. It has a low-water area of 86 acres, and an area of 44 acres, with a minimum depth of 12 feet, and a maximum depth of seven fathoms at low water of spring tides. It has a great extent of beach, viz., three quarters of a mile, enclosed within its piers, where quays, jetties, &c., may be erected at any time, as required, at a moderate expense, no great degree of strength being necessary, as they would be quite sheltered from the sea.

The piers of this plan are much longer in proportion to the area enclosed than those of the larger plan, but the south or west pier being in comparatively shallow water, and not being so much exposed as one facing the sea, could be constructed with less risk and at much less expense.

Messrs. Stevenson's estimate of this plan is 210,000*l.*, and I think that sum sufficient.

With regard to the general suitableness of the locality for a harbour of refuge, I am of opinion that the Bay of Peterhead, being situated on the most easterly point of Scotland, affords great and peculiar advantages.

The number of vessels passing is shown from returns to be very great, and the number of wrecks on the neighbouring coast is also large.

There is no harbour sheltered in easterly gales, and accessible in all weathers, nearer on the south than the upper part of the Firth of Forth, distant 110 miles, and on the north or west than the Cromarty Firth, distant 90 miles. To all vessels out at sea, and overtaken by a violent gale, it is a great object to find shelter within the shortest possible distance, and it is much better for them to find it on a projecting headland, which they can get easily away from again, than in a deep bay, which they may find a difficulty in getting out of, from the state of the wind, even after the weather has moderated.

It has been objected, and doubtless with some reason, that a headland ought not to be selected as the site of an asylum harbour, because vessels can in most of winds run from it—such as in the case of Peterhead in a north-easterly gale, to the Firth of Forth, and in a south-easterly gale to the Moray Firth, and within it, if necessary, to the more perfect shelter of Cromarty Firth, and that, consequently, a refuge harbour in such a situation is a mere convenience, not by any means a necessity. But many dangers beset vessels before they can reach either of those distant destinations, and many a vessel, if off Peterhead, might get into a harbour there during daylight or clear weather, which would require to make a long voyage during the night, or perhaps in thick weather, round the bold rocky coasts, either to the south or the north, and might not be able to stand the sea to be encountered in either direction—that on the north, on rounding Rattray Head, especially, being particularly heavy and dangerous.

It is notorious how reluctant shipmasters are to run far out of their course, if it can be avoided, and that rather than do so they will often run very great risks; and the same reasons that might be urged against forming a harbour of refuge on a headland, would apply with equal force to lighting or otherwise improving the navigation through any strait or channel, used for making a short cut, when vessels might be saved from all risk of running on rocks or shoals and similar dangers, by making a longer voyage, and keeping far enough out to sea. They might also be brought forward as objections to such a work as the Caledonian Canal, made for shortening a voyage, and saving sea risk; but such an idea is seldom mooted, and large sums have been, and are constantly being expended, most judiciously in my opinion, in lessening the dangers which vessels would be exposed to in taking the shortest possible course.

If a vessel be close to a lee shore in a gale, it is doubtless more a matter of necessity for that vessel to have a harbour of refuge close at hand, if in a deep bay than if off a headland, as she might run from the latter, while she might not be able to escape from the former; but as regards the most accessible bays or firths nearest to Peterhead, vessels if once there, can find shelter already by running far enough in.

In my opinion, a harbour of refuge at Peterhead would be of great advantage to all vessels sailing to the northward of the Firth of Forth, and to those sailing between any port of Great Britain and the Baltic, or any port in the north of Europe. That opinion does not affect the question as to the desirableness of having asylum harbours, if possible, elsewhere along the coast; but it seems to me that, taking into account the number of vessels passing, or likely to make the land at Peterhead, and its distance from any place of shelter, its claims to an asylum harbour are very strong and well founded.

I do not consider it necessary to go into the details of the plans of the harbour proposed, further than to say that, generally and essentially, I quite approve of them.

(Signed) JAMES LESLIE.

Edinburgh, 12th February 1858.

1819. (*Mr. Boyd.*) Do you still adhere to that report?—I do.

1820. (*Sir Frederic Smith.*) You say there is a great extent of beach at the bottom of the South Bay?—The extent of beach was great in proportion to the size of harbour in the smaller plan. I do not mean sandy beach. I just mean that the extent of shore was such that they might make building yards on it. Extent of coast, I mean.

1821. (*Capt. Washington.*) Do you concur in opinion with Mr. Stevenson that the entrance of 400 feet is sufficiently wide?—I think it is, but I would not say exactly; something between 400, 500, and 600 feet. I do not think Mr. Stevenson means to say that 400 feet is the precise width he would make.

1822. Would you prefer one entrance or two?—I think under the circumstances one entrance is better. I think it is too narrow a bay for two entrances. Some one of the witnesses formerly stated that it should have a detached breakwater like that of Plymouth Sound, but the length of breakwater there is much larger than the one proposed here.

1823. Do these piers cover the best anchorage?—I believe they do.

1824. If you had a larger sum of money to build farther out, would you have a greater amount of accommodation?—Yes. It was stated by some of the

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Capt. Washington.

witnesses the other day at Fraserburgh that the very best anchorage is exactly opposite the entrance.

1825. Do you know of your own knowledge?—I do not know from my own knowledge whether it is exactly so.

1826. (*Capt. Vetch.*) Did you look over the estimates?—Yes.

1827. And you were satisfied that they were sufficient?—I am satisfied that they are very liberal.

1828. In what period of years do you think it would be completed?—It depends on the rate at which the money is given for making it. You can begin at both ends or only one.

1829. Supposing the money was forthcoming?—I do not know. In ten years or less it could be done.

1830. There is a larger line and a smaller line; can you describe where the smaller line runs?—A plan will be given in showing that.

1831. Will you state what you found to be the condition of the shore of the proposed larger harbour? How much of it is rocky, and how much otherwise?—It is mostly rocky.

1832. Entirely rocky?—Almost entirely.

1833. How far does that extend into the interior from the high-water mark?—By the Admiralty chart there are no rocks within the one-fathom line.

1834. Will you tell us the nature of the structure which is proposed to be built for that sum of money? What the highest platform will be above high-water mark?—I think it is eight feet.

1835. Is it proposed that these piers should be furnished with a parapet?—No; that does not come within the estimate.

1836. What would be the effect of gales of wind upon such a pier? Would they run over the piers?—Oh certainly.

1837. Then in the case of any vessel in distress or wreck, difficulty or danger, outside the piers, in stormy weather, you would have no means of giving immediate assistance and aid from the piers to those vessels so found?—No persons could go upon those piers in a gale of wind, not at high water at any rate.

1838. (*Mr. Coode.*) Do I understand rightly that you adopted the same form of section at Mr. Stevenson's?—I did not make a plan at all.

1839. You took his section?—Yes.

1840. And upon that section you founded your estimate?—Precisely.

1841. Can you tell us at what rate per cubic yard you calculated the cost of the rough rubble on which the masonry is proposed to be founded?—Three shillings the cubic yard, including carriage.

1842. Do you remember the distance from the quarries to the commencement of the work?—It is a little more than two miles, I think, from the west end of the breakwater.

1843. Is the whole material proposed to be taken from one quarry or from more?—I think from one quarry, because there is plenty of it there.

1844. The name of that quarry?—It is the quarry close to Buchan Ness. It is a large hill of granite.

1845. Did you examine that quarry personally?—Yes, I did.

1846. Did you satisfy yourself that there would be no difficulty in obtaining blocks of sufficient size for the construction of such a work?—I am quite satisfied there could be plenty of it got there of all sizes.

1847. You spoke of the extent of coast, when you made reference to the *smaller* plan, as being adapted for the construction of wharves or building yards, that has reference more to the commercial extent than the refuge extent?—It is entirely as a commercial harbour.

1848. Not as a refuge harbour?—Partially a refuge harbour for the local trade.

1849. (*Mr. Boyd.*) You have said, with reference to the breakwater proposed to be built, which you say you understand to be 8 feet above high water, that the seas will run over it, and that access could not be had from the top to render assistance; do you know any breakwater that has been built at Plymouth where the same exception does not arise,—a breakwater requiring such buildings as would be protection for a harbour of refuge?—No, I do not. I know that you could not walk on the top of the parapets at Peterhead, hardly even the highest of them, in a gale of wind.

1850. (*Sir Frederic Smith.*) Have you been examining the quarries near Fraserburgh?—No; I saw a crane standing in a quarry near Fraserburgh, but I did not examine the quarry.

1851. Do you know anything of the capabilities of the neighbourhood as regards stones?—No, except what I heard Mr. Abernethy explain the other day. He said there was whinstone in small pieces, and limestone, and freestone, and that whinstone in large pieces could be got from the Firth of Forth.

1852. From what you have heard in evidence, and from what you know of your own knowledge, or have acquired from other sources, are you of opinion that the materials found here are more likely to form a good harbour of refuge than the stone to be got in the immediate neighbourhood of Fraserburgh?—I cannot speak as to the neighbourhood of Fraserburgh beyond what I have heard, but I know they would not talk of getting stones from the Firth of Forth if they had good stones there.

1853. You are of opinion that better material than that you quarry here could not be obtained for the purpose?—I do not think it could.

1854. Are you satisfied with the section proposed by Mr. Stevenson?—Quite, as a breakwater.

1855. There would be no external face-work in this section?—No, except at the pier head which is proposed, which will require a rough dressing.

1856. Does it require dressing?—The stones must be cut in such a way that they will lie together.

1857. But you require no outlay for the external surface, I presume?—No, the rougher the better.

1858. With regard to the pier head itself, what is the intention of Mr. Stevenson, as far as you know it?—The pier head itself must be brought up as regular masonry.

1859. Will there be any increase of the thickness of the general line?—No; it is the same breadth.

1860. In fact, to terminate abruptly, but smoothly?—Yes.

1861. There is no advantage in increasing the thickness and rounding the ends of the pier, that you are aware of?—No, I do not think there is in such a case as this.

1862. It only adds to the expense?—Yes.

1863. (*Mr. Lindsay.*) Is there any part of the south bay a sandy beach free of rocks?—I am not aware that there is, except what I heard in evidence to-day, that there was part of it sandy. I think, generally speaking, it is a rocky shore.

1864. You have not examined it yourself sufficiently to be able to answer that question?—Not so minutely as that; but I can say that generally speaking it is not a sandy or gravel beach.

1865. (*Capt. Vetch.*) I wish to follow up where we stopped last. You mentioned that you had not seen the use of any refuge breakwaters that were supplied with parapets; are you not aware that Dover has a breakwater of that description?—No, I have not been to Dover since the commencement of the breakwater.

1866. Or that Cherbourg has, and Holyhead is intended to have, and that the Newcastle piers, which are very extensive, are also to have parapets?—I do not know.

1867. Do not you think, considering the advantage that such piers would have in the saving of wrecks, that they should build such a protection by means of parapet, as would allow of passage along the piers?—The height the parapet would require to make it accessible in a gale of wind would be so enormous, that I do not think it would be advisable.

1868. Do not you think that a parapet rising fifteen feet above the platform would be a great means of saving vessels from the effects of stormy

gales?—I do not think fifteen feet would have much effect. If you call it 25 or 30 feet, it would have a different effect.

1869. Yes; but you do not think it would have much?—It would be an advantage if it were so high as that, but the cost would be very great.

1870. Have you formed any estimate of what would be the additional expense of such a parapet? No; I have not. I think if you had the money to make it, you had much better enlarge the harbour.

1871. Do you think it is better to have a large harbour without parapets, than a small one with parapets?—Yes; for the breakwater.

1872. (*Mr. Coode.*) With reference to the dressing of the outer portions of the work, do I understand you that there was no dressing upon the upper portion, but some upon the lower?—No; it was the outer face, I think, which Sir Frederic Smith referred to specially.

1873. Your answer had no reference to the copestone, simply to the face?—Yes.

1874. Do you propose, or did Mr. Stevenson propose, to make any difference whatever in the character of work at the termination of the piers?—The termination is to be brought up with diving-bell work.

1875. Is it in any respect different from the general run of breakwater?—The lower part is different.

1876. In what way is it different?—It is to be brought up from the foundation instead of being built upon the rubble stones.

1877. Do you remember the additional cost for the additional building?—Part of it was taken at 70*s.* a yard.

1878. What portion was that?—Under low water.

1879. Was the whole under low water taken at 70*s.* per yard?—The backing of that was taken at 50*s.*

1880. Then your answer is: face stones 70*s.* per cubic yard, and backing stones 50*s.* per cubic yard?—Yes.

1881. Was it proposed to use any mortar or cement in their ends?—No; I think not.

1882. (*Mr. Boyd.*) You have just now spoken of a smaller harbour, and produced a sketch; some time hereafter I may refer to this as showing both places?—That is to be put in evidence.

1883. That is the plan referred to?—Yes.

1884. I should like Mr. Leslie to state to the Commissioners his experience in harbour building?—I have been pretty extensively engaged at Leith, Dundee, Montrose, Arbroath, Kirkcaldy, Methel, Burghead, Inverness, Ayr, Dumbarton, and a great many other harbours along the coast and the Firth of Forth.

Mr. Alexander Stuart examined.

1885. (*Chairman.*) What is your name?—Alexander Stuart.

1886. What is your occupation?—Builder and harbour contractor.

1887. (*Mr Boyd.*) You have had some experience in harbour building, Mr. Stuart?—Yes.

1888. You built the harbour at Buckie?—Yes.

1889. You made the breakwater at Nairn?—Yes.

1890. You made extensive improvements in the harbour of Peterhead, building piers, &c.?—Yes.

1891. At Lossiemouth?—Yes; I did some work there, and at some other places.

1892. I put into your hand the other day a printed schedule, that I told you had been issued by the Commissioners with regard to the materials and prices for a refuge harbour; have you made up that schedule?—Yes.

1893. Will you produce it?—Yes.

1894. Was that schedule made up without any communication with Mr. Stevenson, and without your knowledge of his rate of prices?—I had not seen it.

1895. Has he since showed it to you?—I saw it yesterday.

1896. Was his rate higher or lower than yours?—I made up mine on the same data as he did, but after I had made up mine, I found I was 2½*d.* per yard lower than Mr. Stevenson.

1897. And that was the schedule on which Mr. Stevenson based his?—Yes.

1898. Do you see this plan?—Yes.

1899. You know the bays of Peterhead?—Quite well.

1900. As a harbour contractor, would you have any difficulty in executing that plan?—Not if I got plenty of cash.

1901. Do you think it could be built for Mr. Stevenson's estimate?—I will take in hand to do it for that money.

1902. (*Sir Frederic Smith.*) Are you aware of Mr. Stevenson's section?—Yes; I only examined it yesterday, I had never seen a proper section of the piers till yesterday.

1903. But you are aware of the soundings over which it is intended to form the piers?—Yes.

1904. How would you get to the formation of the northern pier? By what mode of traction for the materials?—I would adopt a similar plan to that of Mr. Rendel, at Holyhead. I think it is only that which would do in this bay.

1905. What sort of blocks of stone would you use?—I would use as large blocks as I could get, and mix with small blocks.

1906. How would you quarry these blocks?—We have never attempted the mining system, as at Holyhead. Our system of quarrying has been to put in large perpendicular bores, shake the rock a little by a shot, then fill the crevice with powder, and blow as much out as you possibly can.

1907. Can you describe the various layers of material proposed to be used in that section?—They would just be put in a promiscuous state, as they came from the quarry.

1908. Up to what level would they be?—They would be tipped over the top of the platform, as they come from the quarry to the level of low water spring tide. Then select the largest and best blocks, to put on the top of the section; then I would take the largest blocks, and place them on the top section.

1909. What would be the form of the section you would give to the pier?—I would allow the sea to be her own mason for three or four years, and allow her to make what breadth of base she thought proper.

1910. That is a very suitable arrangement, to allow the sea to be her own artificer; but as you are a contractor, in making your calculation I presume you had some idea of what the size would be?—That would be required to make the calculation, but the sea would form itself a regular beach or slope.

1911. In making a calculation which would enable you to take the contract at the sum specified by Mr. Stevenson, you must have formed an idea of the actual mass you would put into the water?—I had some notion of the number of cubic yards, but I have not exactly the measurement of the base. I did not take that particularly; and the only way that I think Mr. Stevenson's sum to be large enough is that I have merely calculated upon the measure which he has given, and seeing my own prices so much lower than his, I had no hesitation in saying that sum was large enough.

1912. Then, in point of fact, you would not allow the sea to be her own artificer; you would be the artificer on Mr. Stevenson's section?—It was only in making the calculation.

1913. It would be to a certain degree a speculation, without a certainty of profit?—We would require, in making a calculation, a sufficient sum to make it, as much as would include contingencies in the account.

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Mr. Alex. Stuart.

1 Sept. 1858.

Sir Frederick Smith.

1914. (*Mr. Lindsay.*) Do you think that a breakwater could be constructed just within the eight-fathom line, which would give a greater area of anchorage, with entrance north and south, for about the same sum of money as the piers?—The same amount per cubic yard would do the work, but the quantity would be so much greater, that the increased cost would be very considerable.

1915. Would the quantity in the breakwater then be very much greater than the quantity in the proposed piers?—I am certain the sea would have more tendency to spread it before you got up to high water and formed your upper works.

1916. Have you formed any idea of the extra cost it would be?—No. There would be another thing; the risk would be greater for carrying away staging and plant, and in working there would be so much more risk.

1917. You could not say whether it would cost twenty, sixty, or a hundred thousand pounds more? —It would require some calculation.

1918. You have not made any calculation?—I never have done so.

1919. (*Mr. Coode.*) In making your estimate, then, you took Mr. Stevenson's quantities and your own prices ?—Yes.

1920. What is the greatest depth of water below low water in which you have had any experience of building piers or breakwater works ? — Seven feet.

1921. That is the deepest?—Yes.

1922. For what length have you built such piers ? —Only about a distance of forty-five feet or fifty feet out in seven feet water at spring tide.

1923. That is all your experience in building under low water?—Yes.

1924. Can you tell us at what rate per ton or per cubic yard you estimated the square blocks which Mr. Stevenson proposes to use in the masonry of his work, taking the price at the quarry?—My schedule furnishes that.

Mr. Boyd then said, Mr. Stevenson requests leave to make an explanation with reference to the evidence which has now been laid as to the plans, and his estimates.

(*Chairman.*) Certainly.

1925. (*Mr. Stevenson.*) The plan, as explained yesterday, but probably not fully, consists of these breakwaters with an understructure of rubble, and a superstructure of systematic but rough and strong masonry. The pier heads themselves are to be brought up from the bottom, but with a gangway elevated on some of the staging piles, and are to be built with a diving-bell, and the whole is to be a simple breakwater without any parapet. The estimates which have been spoken to by Mr. Leslie and Mr. Stuart were made up from calculations of the amount of material in the work, which I furnished to these gentlemen, and Mr. Stuart's prices are his own. The measurements are mine. I can give the Commissioners all the information as to the cost which I have allowed for bringing up the pier itself, or any other part of the work, now; or, if they prefer it, I can furnish them with a detailed statement of the different prices which I have taken, which may probably save time. With reference to the question of the parapet, which has been raised, my own opinion is, that no parapet, however high, speaking within reasonable limits, which could be put upon that north pier, could ever make it a pier along which you could pass in safety in bad weather. Under the circumstances, it seems to me to be very questionable indeed how far it is expedient to spend money in putting a parapet in that situation, seeing that the object in view is simply to afford shelter. No doubt communication could at the same time be had along the pier, by building the parapet very high; but I do not see in what way, without an enormous expenditure of money, such communication could be had by means of a parapet. Therefore the piers are laid out without a parapet, and simply as sheltering piers, with an elevated gangway. I think that is all that I wish to say with reference to the subject of the estimates. I wish also to make some statements with reference to the traffic returns of which we spoke yesterday, if this is the proper time for doing so.

I think this is the time to make that explanation.

1926. In reply to a question which was put yesterday, with reference to the sudden and great diminution of traffic in the Buchan Ness returns, I stated at the time that I was not able to account for in any way, not having lookod into those returns in a critical way, comparing year after year, but simply having laid them before the Committee of the House of Commons as they were obtained by me, being the returns made, as I stated before, by what I conceived to be trustworthy and competent observers. But afterwards it was suggested to me that probably that great diminution in the trade might be accounted for from the fact that in the year 1855-56 the ports of Russia were shut, in consequence of the war. This is more a mercantile question than an engineering one, certainly; but at the same time I have little doubt that the diminution referred to is attributable to that particular cause; and if so, it seems to me to be an additional fact in support of the trustworthiness of the returns. I stated that, in my opinion, the returns, as a whole, bore out the fact that there was greater traffic at Buchan Ness than in the Pentland Firth; in fact, that they were, I believed, a true exponent of the relative amount of traffic at different parts of the coast; and this is a diagram (*showing diagram*) I have made up, which probably you will allow me to put in, and on which the lines for the different years are drawn; and I think it will be seen that with the exception of Buchan Ness, which I think has been satisfactorily explained, there is really no very material difference over the whole table. I may state, in conclusion, that it was in consequence of a desire having been expressed by the Committee of 1857, for such returns being prepared, that that return was made out, with the sanction of the Commissioners of Northern Lights, and was laid before the Committee of 1858.

1927. Is that all you wish to remark in further explanation of your former evidence?—That is all.

1928. (*Capt. Vetch.*) Could you furnish the Commissioners with the cost of the parapet wall upon such a structure as you propose for Peterhead? —Certainly; I will be happy to do so.

1929. From what depth do you bring up your perpendicular wall?—It varies from twelve feet to four or five feet, according to the exposure, exclusive of the pier heads.

1930. And you imagine that with an upright wall presented to the sea, and twelve feet perpendicularly below low water mark, and no parapet wall, that there would be no difficulty in walking along the platform?—I have not the least doubt of it. It will be elevated on the piles a sufficient height above the pier. The seas will pass under it.

1931. Have you ever visited Dover ?—Dover I have not seen since the works were commenced.

1932. You are aware that they proceed upon that plan there, and have every appearance of complete success ?—I am quite aware of this, that I know of no place, whether in low or deep water, where exposed to such a sea as we have here, there will not be a very great rise of sea, indeed ; certainly much greater than any parapet can protect.

1933. Do you not conceive that the upright wall and parapet would act very differently from a sloping wall, such as that generally found in this country ?— That is a very vexed question among engineers, and I am one of those who certainly hold very strongly the opinion that we have no evidence at all in proof of what you say ; because I happen to know several upright faces of rock exposed to the sea, which are nearly perpendicular, and on which the sea rises cer-

tainly in one case higher than I know it to do in any part of the coast. One of these is Barrahead in the Hebrides, another is North Unst in the Shetlands.

1934. Would you give in any sample nearer at hand?—I cannot give you any sample nearer at hand, because, excepting Dover, I know no artificial work which presents the same perpendicular face; and excepting those places I have mentioned, I do not know any nearly perpendicular face.

1935. Do you know Cherbourg?—I do; but I am not aware that Cherbourg is particularly protected from the sea coming over; but it may be.

1936. Then you think, from all your experience, that a parapet wall upon that pier would be useless?—I do, in bad weather, most unquestionably. What I mean to say is, that it would be useless, because, although in ordinary weather it might be convenient, yet in bad weather, when it is most required, I have no hesitation in saying that I believe whatever height of parapet you make, I mean within ordinary limits, during certain states of the weather, when it is most required, it will be unsafe to pass along that pier.

1937. And with all the application of modern practice you think it could not stand?—What I mean to say is, that it would be unsafe to pass along the pier. I state this from my experience of other places.

1938. Do you know, from your own knowledge, that there is any difficulty in passing along the pier at Dover or Cherbourg?—I do not know from my own knowledge; but still I do not know from my own knowledge the contrary; and in the other cases to which I have referred I certainly do know, from my own knowledge that the result is as I have stated it.

1939. In those cases which you know, are the sea walls perpendicular?—The sea faces are nearly perpendicular.

1940. In what depth?—I do not know how many fathoms, but I believe them to be nearly perpendicular. My opinion is, that unless it can be proved that the waves of the sea are purely waves of oscillation, and have no percussive force, they must rise against a plumb wall, and certainly I think no one will doubt that a wave of translation will rise, whether the wall be sloping or upright. In fact, we know that a wave of translation will actually rise higher on an upright wall than on a sloping wall. I have no doubt in the world that during heavy weather you will have against the pier waves of translation as well as oscillation, and I think no man can doubt that if we have waves of translation they will go over it.

1941. That is with a depth of three fathoms from the wall?—Yes.

1942. (*Sir Frederic Smith.*) I do not wish to prolong a discussion upon a point on which engineers differed as far back as the projection of the first harbour of refuge, but I will ask you one question. Whether you will not be much more exposed here than the Dover pier can by possibility be, from the great sweep of tide you have?—I could hardly be prepared to answer that from my own knowledge. I should certainly think we must, in certain circumstances, have heavier seas than they can have at Dover; still it is quite notorious that there are very bad seas there, but whether they may be inferior to the seas we shall have here I really could hardly give an opinion.

1943. Have you seen the pier at Alderney?—No.

1944. Perhaps you have never heard that stones, several tons in weight, are thrown right over the pier there?—I am quite aware of that. The most extraordinary instance of such action of the sea we have, are those in the Shetlands, where I know that stones of six tons weight have been raised to a place that is seventy feet above the level of the sea.

1945. (*Mr. Coode.*) Are you aware to what gales the works at Portland are exposed?—No.

1946. The worst gales at Portland, I believe, are south-east?—North-east.

1947. Do you think there may be as many north-east gales in this latitude as there are south-west gales?—Well, I should think not, I cannot say. I have not made observations sufficient to enable me to give an answer that is worth a great deal.

1948. What is your belief on that subject? Do you know that the frequency of gales from the north-east is greater than the gales from south-west?—On the contrary, I should say that so far as this coast is concerned they are pretty much alike.

1949. Do you know from what quarter the wind blows heaviest on this coast?—I believe the prevailing wind is west.

1950. I am speaking now of the number of gales that the works at Dover would be exposed to as compared with the works at Peterhead; do you believe that the works at Dover, exposed to the south-west, would be subject to as many gales in the winter as the works in Peterhead, exposed to the north-east?—That I cannot answer.

1951. Are you aware of the action of the sea upon a vertical wall when founded at a depth of as many as twenty feet below low water? Have you never seen such a case in your experience?—No; I just mentioned that the only case I am acquainted with is that of Dover, and that I have not seen, neither am I aware of the action of the waves there.

1952. You spoke of Barrahead, I think; have you any means of ascertaining whether the cliffs at Barrahead are strictly vertical?—I have had the cliffs at Barrahead and at North Unst, to which I also alluded, examined as closely as it was possible, and my belief is that for a great depth they are nearly vertical. One of them overhangs a little, and I have no doubt that for a great depth they are nearly or practically vertical.

1953. That overhanging which you speak of is above the water?—Yes, slightly overhanging.

1954. And you have no means of telling us exactly what is the rate of inclination of those rocks under low water?—It is quite deep close up to the rocks, but to what depth I cannot tell, of course.

1955. You cannot tell us, in fact, in what degree they may vary from the perpendicular under low water?—According to my information, and so far as I have been able to observe them, I believe they are to a considerable extent vertical, but how far I am not prepared to say; that is, that after they go down a considerable extent, they may assume another form.

1956. (*Mr. Lindsay.*) Do you consider that Wick as a harbour, has claims upon government for a grant of money?—I do.

1957. Upon what ground?—On the ground of the fishing, mainly.

1958. Do you think there are any other fishing stations along the coast which have equal claims upon the Government in proportion to the number of boats frequenting them, and the number of lives at risk?—I cannot answer as to the number of boats; but I have no hesitation in saying that there are other stations which have very strong claims indeed upon Government, and one of these is the Moray Firth; I state that, in consequence of a reputed loss of life in the Moray Firth; and last year, in that particular locality, there was a loss of forty-five lives. The number of boats I am sorry I cannot give, but I am engaged at present in making a survey for a refuge boat harbour to obviate the calamities that have occurred; and the Hon. Mr. Bruce, who is now present, has taken a great interest in it. He has taken charge of collecting all the statistics connected with that particular part of the coast, and if you desire it he could give you the explanations you require better than I can, for he knows the circumstances better, but I have no doubt whatever as to the very great necessity for a boat harbour on that coast.

1959. Are you prepared to give an answer as to the proportionate loss of life of fishermen frequenting Wick, with the fishermen frequenting the other ports along the north-east coast of Scotland, or do I understand that the Hon. Mr. Bruce is

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better prepared to give an answer to that question?—He has obtained or is in the course of preparing the returns which you desire with reference to the particular question to which I have adverted; namely, the erection of that harbour at some place between Port Gordon and Banff.

1960. Then, of your own knowledge you cannot state to the Commissioners the proportion?—Not further than that the loss of life last year was 45, and I know of my own knowledge that there have been boats lost very often on that particular coast.

1961. (*Capt. Vetch.*) I wish to ask you what are the other fishing harbours which you said are equally entitled to the assistance of Government as that of Wick?—I have all along placed Wick first as regards the herring fishery, but there is one question connected with the fisheries, which is a very important one, and that is the winter fishery—what is called the white fishing. Along that Banffshire coast, to which I have alluded, it is carried on to a very great extent.

1962. Admitting all that, you must have some harbours in your mind, I want to know what they are?—That is one, the harbour in that district of the coast of the Moray Firth, namely, somewhere between Port Gordon and Banff.

1963. You have no particular place in view, then?—No; I am at present engaged in making a survey of that coast, with the view of making a report on what seems to be the most eligible site for making a harbour there.

1964. But you do not actually know at this moment any place that is equally entitled as Wick to the assistance of Government?—I have stated my belief that that place, from the reason of the very great loss of life that has been there, is certainly. I do not say that I should put it first. I should put Wick first, as it has been long spoken about.

1965. What is that place?—It is on the coast between, as I have mentioned before, Banff and Port Gordon, and of which I am engaged in making a survey.

1966. What length of shore is that?—It is somewhere about 15 miles.

1967. Then you do not know at this moment any particular point or harbour thereabouts, which is equally entitled to the assistance of Government as Wick?—There are in that line of coast a certain number of harbours, Port Gordon, Buckie, Banff, Cullen, and several others. It is a very important fishing district, and my statement is that that fishing district, in consequence of the numerous losses, and the very heavy calamities, such as that of last year, when I forget how many boats were lost, but I know there were 45 lives lost, that district has in my mind a very strong claim for Government aid.

1968. Admitting all this, I ask if there is any harbour that you are aware of which is more entitled to the assistance of Government than that of Wick?—I have already stated that there is no harbour. We propose to make this harbour to serve for those harbours which I mentioned, and I may mention that I do not know any other harbour which, if made, could have prevented this extraordinary loss of boats, either to the north or east of it. What I mean to say is this: that that is a most exposed and dangerous district of coast, frequented by a very large number of boats engaged in both summer and winter fishing, and on which very serious accidents and calamities have occurred; and I do not know in what way these calamities could be prevented, except by building a harbour on that line of coast. And in answer to Captain Vetch,—Do I know any place where the money of Government ought to be laid out, or might be judiciously laid out,—I have no hesitation in saying that it is quite as much in want of a harbour as any place I know for fishing purposes.

1969. My question is, will you state the fishing harbours which you conceive equally entitled to the assistance of Government as Wick?—I have already said there is no such existing fishing harbour.

1970. (*Mr. Lindsay.*) Did I understand you to say that it is in contemplation to build a harbour along that particular line of coast so as to suit the various fishing stations in that district?—Yes.

1971. And do the parties intend to build such a harbour at their own cost, or do they intend to apply to the public treasury for a grant of money for the construction of that harbour?—I think you had better allow Mr. Bruce to answer that question.

1972. You cannot answer the question?—My understanding is, that there is to be an effort made—certainly an effort to some extent—to do it out of their own funds.

The Hon. Mr. Bruce examined.

The Hon. Mr. Bruce.

1974. What is your name?—Thomas Charles Bruce.

1975. Where is your residence?—Cullen House, Banffshire.

1976. State, for the information of the Commissioners, any evidence which you may wish to offer relative to the subject of their present inquiry which may more particularly bear on the question of construction, reserving for the statement to be sent into the Commissioners in writing at a later period, should you prefer to adopt that method, the additional information relative to the fisheries, which you wish to offer?—I think I must offer one word or two of explanation as to the reason for which I have tendered myself at all to give any evidence to-day. It is in consequence of some questions which were put to the last witness, and about which he professes himself to be insufficiently informed. I do not know that anything I can say will bear directly upon the subject of your present investigation. It will naturally bear upon the subject on which Mr. Stevenson was questioned, namely, upon the loss of life and the condition of the fisheries in other parts of the coast, particularly on the north coast of Banffshire; and I will not detain the Commissioners above a minute in explaining. Last year, as Mr. Stevenson stated, there was a great loss of life amongst the fishermen on the Banffshire coast, chiefly amongst those who reside within five or six miles of the village of Buckie. There were about 42 men drowned on one occasion, and I think there were about 10 a month or two previously. The subject, of course, excited a great deal of attention throughout the country, and a meeting was held of the county of Banff, at which a committee was appointed to inquire into the state of those fishermen and into the causes of this loss of life, and the means which might possibly be taken to prevent it. I was appointed convener of that committee, and in that capacity I had occasion to obtain several returns, both as to the loss of life on that part of the coast amongst the fishermen, and as to the number of boats that are employed, and other things about the condition of the fisheries. I am very sorry to say that I have not got those returns with me, and I cannot lay them before the Commissioners; in fact, I did not understand that an inquiry such as that would have been included amongst the subjects to be brought before the Commissioners, because, in the view, at all events of the committee of which I am a member, the subject was not one which we could bring under your notice and form the basis of an inquiry such as that in which you are engaged, and which we understand to refer principally to a national harbour of refuge for ships of all classes. But if the Commissioners would think that it would at all conduce to their information that I should forward to them such returns as I have described, which may give some further insight into the condition and the habits of

the fishing population in this part of Scotland, I should be very glad to do everything in my power to forward to them, at the earliest possible time, these returns. The steps that we have taken were alluded to by Mr. Stevenson ; and I may also state that we found, on inquiry, that the inhabitants of the fishing villages, of whom a very large proportion are in the habit of going to Wick during the summer, return to their own villages during the winter time, and that in consequence there are a considerable number of boats, I cannot state how many—there are several hundreds—which sail from the villages in what is called the white fishing, and stay during six or seven months of the year. As these are principally the winter months, these men, of course, are exposed to very considerable danger ; and I regret to say, that it appears that considerable loss of life takes place amongst them. I would not wish to state any number at present, because I have not a very good memory in these matters, and I have not got the returns with me, and I should not like to make a mistake ; but if the Commissioners think it a subject of sufficient interest, I shall be glad to send them these returns. I may add, that the committee of which I am a member have entered into communication with the Board of Fisheries here, and we have taken steps to obtain plans for such a harbour as would afford shelter for the boats on that particular part of the coast. We have not brought the subject before the Commissioners, because, as I have said, we consider it primarily a local, and not strictly a national subject. Our intention is, if we obtain the assistance of the Board of Fisheries, to obtain a plan for a harbour for the place which is considered most suited along that part of the coast, and then we shall endeavour to raise amongst those persons who are interested in the fisheries such a sum as shall meet at all events a considerable part of the expenses. If we cannot raise it all we shall then find it necessary to apply to Government ; but I wish it to be understood that I do not bring the matter forward with any such view—even with the view of bringing before the Commissioners any returns or details which I have procured with reference to this matter, but I shall be very glad to forward such returns to them if they can be of any interest.

(*Chairman.*) The Commissioners will be happy to receive the statements to which you allude.

(*Mr. Boyd.*) I beg to put in as evidence a letter to me of this date, by Captain Penny.

My dear Sir, Peterhead, 1st September 1858.

I regret exceedingly that my continued indisposition will entirely preclude me from the honour of meeting with the Royal Commission in the Town Hall to-day, to give evidence regarding a site for a harbour of refuge on the east coast of Scotland.

Although in these circumstances I am prevented from giving evidence personally, I have great pleasure in bearing testimony to the fact of Peterhead being pre-eminently adapted for such a purpose, from the natural advantages it possesses, and its position on the coast.

Viewing the subject entirely as a national question, after a nautical experience of upwards of thirty-six years, I have no hesitation in pronouncing my decided opinion in favour of Peterhead, conscientiously believing it to be the best locality on the coast for the construction of such a work.

I am, &c.

Andrew Boyd, Esq. (Signed) Wm. Penny.

(*Chairman.*) The Commissioners will be glad to receive from Captain Penny a more detailed statement relative to the subject of their inquiry, to be forwarded to them at his own convenience. Mr. Boyd, will you be good enough to acquaint Captain Penny with this ?

(*Mr. Boyd.*) I will.

Captain Young examined.

1977. (*Chairman.*) What is your name ?—William Young.

1978. What is your occupation ?—A shipmaster.

1979. (*Mr. Boyd.*) How long have you been in the capacity of shipmaster in this town ?—Upwards of 20 years.

1980. In what trade chiefly ?—Commanding in the Orkney, Shetland, Caithness, and Iceland trades.

1981. You have made many voyages to the Orkneys, I believe, in a single year ; can you tell us how many in one year ?—I have made more than 20 from Peterhead and Fraserburgh to the Orkneys in one year.

1982. Have you ever, in coming with a northerly wind, been prevented from getting into Fraserburgh ; Yes, at different times ; but when I was unable to get there, I got into Peterhead instead.

1983. During all the time you have mentioned, was there ever an occasion on which you intended to come into Peterhead and did not get in ?—Never but once.

1984. What was the cause of that ?—It was dark at night and we lost some of our sails, and the wind was north-north-east.

1985. In the many times that you have thus passed through the Pentland Firth had you ever a pilot ?—No, never.

1986. How many times within the last six weeks have you passed through the Pentland Firth ?—Four times.

1987. Have you never passed when it was bad weather and blowing hard ?—Yes, I have passed it in a gale of wind.

1988. Have you ever taken Long Hope, Widewall, and other places for shelter, when it was blowing hard ?—Many a time Long Hope.

1989. When was that ?—That was when I was going westward.

1990. Have you taken either of these places with the wind blowing hard from the southward and coming south ?—Yes, many a time.

1991. Have you been in Wick Bay when it was blowing hard from the southward ?—Yes.

1992. And what were you doing there ?—I would not stop a night in it if I could get out.

1993. Were you engaged in the carrying of cattle ?—Yes.

1994. Was it in order to get provender for these cattle that you ran into Wick ?—I have gone in different times, mostly to get meat for the cattle.

1995. But without having that purpose in view, would you have taken the Bay of Wick ?—If I could not get to the Moray Firth, I would have gone to the Orkneys rather.

1996. Do you know that vessels touch at Sumburgh Bay at times ?—Very often.

1997. Do they stop there generally for refuge ?—Oh, no, only to wait the tide.

1998. Have you known of vessels being wrecked in that bay ?—I have seen a report of 14 or 15 vessels being wrecked there. Two-thirds of them ran there instead of going into the firth. It was not bad weather.

1999. Do you know of other vessels being lost in a mistake, taking the bay for the firth in thick weather ?—Yes.

2000. Can vessels more readily get hold of Peterhead than they can of Wick ?—Yes.

2001. Is Peterhead more in the general track of shipping than Wick is ?—A great deal more.

2002. Did you pass through the Pentland Firth within a week or ten days with a cargo of horses ?—Last week.

2003. How many horses had you on board ?—80.

2004. Was it blowing hard ?—No ; a good strong breeze. We had a reef in our topsail, but we took it with a bad tide.

2005. Did you require to batten down your hatches ?—No ; the hatches were put off.

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Mr. Boyd.

2006. Have you ever been in the Baltic?—Yes, many a time.

2007. Do you know that vessels from the Baltic try, especially in the winter months, to make for Buchan Ness light?—Very often they do, if the wind is at all in their way.

2008. Are you speaking entirely from your own experience?—Yes; and from hearing other masters say the same.

2009. Vessels coming from Archangel mostly all make for Buchan Ness. I mean those which are coming to the south-east coast of Scotland?—Yes.

2010. Do they not pass through the Pentland Firth either going or coming?—No.

2011. Do you think does Peterhead possess any advantages beyond a place on the coast of Caithness or elsewhere on the east coast, for the site of a harbour of refuge?—For a general shipping place it has.

2012. What are the advantages that you think chiefly belong to it? Is it a place that vessels can get easily into or leave?—It is easier than any other place that I know.

2013. Supposing vessels are coming from the Pentland Firth, and it comes blowing from the northward, what would be their best place of refuge?—They might get up to the South Firth or get to Peterhead, or they could to Long Hope, if they were acquainted with it.

2014. Would they go to Wick?—No, because they would not get out again if the wind came fair.

2015. Do you consider generally the navigation of the Pentland Firth to be dangerous?—Dangerous with a bad tide, but it is not dangerous with a good tide and a breeze of wind. It is a very bad place going to it with a bad tide.

2016. Do you know that vessels are sometimes driven from the coast of England to our own coast?—Very often.

2017. Where do they seek refuge?—Somewhere about the Orkneys.

2018. Do they sometimes take refuge in the harbours here?—I have seen them in Peterhead.

2019. What would you think of the coast of Caithness as a place for the ships to run down to?—I would not run down upon it if I could keep off it.

2020. You would rather go to the Orkneys, perhaps?—Yes, or the Moray Firth.

2021. You have passed along that coast very often, and along the east coast of Scotland. Do you know any place that possesses the like advantages with Peterhead for a harbour of refuge?—I do not.

2022. (*Chairman.*) How long have you been master of a merchant ship?—Upwards of 20 years.

2023. Do you hold the Pentland Firth to be no real difficulty in the way of navigating round the coast?—No. It is a very good place, going to it with a right tide. It can do no harm if you go into it with a calm. Go where she likes, you cannot shove your vessel ashore. I have gone through it three or four days in calm weather. We clewed the sails up and let her go. In a gale of wind there is no fear if you go through it with a right tide. I have gone through it many a time against the tide, with a foul wind and a fair.

2024. You know the harbour of Long Hope, I think?—Yes, I have been many a time in it—fifty times.

2025. Have you ever known vessels drive from their anchors at Long Hope in strong westerly winds?—Yes, and drive ashore on an island named Flotta and different other places.

2026. To what do you attribute that?—To strong winds and bad anchorage, I suppose. They did not break their chains. They drove always. The anchor did not hold. There is good holding ground in the right place.

2027. Do you consider it easy of access?—Yes. It is better than it was since they got the lighthouse there.

2028. Supposing that you had never been at Long Hope before, would you have any difficuty in running for it, with the Admiralty chart in your hand?—No, I do not think I would. I know of many a one who has run to it who never knew it before, and I have seen people who have been at it at one time for the first time. I have seen 50 or 60 vessels lying there which never were there before, and plenty of ships have run for it whose masters were never there before.

2029. (*Mr. Lindsay.*) You say you have gone through the Pentland Firth many a time against the tide with a foul wind?—Yes, beating through.

2030. Against the tide?—Yes.

2031. And beat through the Pentland Firth?—Yes.

(*Capt. Washington.*) It is quite capable of explanation, but as it stands now it is nonsense.

2032. (*Sir Frederic Smith.*) At what rate was the tide running?—Four or five knots.

2033 (*Capt. Washington.*) How did you get through?—We got inside in the eddies.

2034. You do not mean to say you actually opposed the tide?—I have gone to the eastward when the tide was coming from the westward with a foul wind.

2035. That is, by working in the eddies?—Yes.

2036. You know Peterhead South Bay well?—Yes.

2037. You have anchored there?—Many a time. I belong to Peterhead.

2038. In what sized vessels?—Small vessels, from 50 to 100 tons.

2039. Have you anchored in different parts of the bay?—No.

2040. Have you generally kept to the general anchorage?—Yes.

Mr. Boyd then said:—I beg to state to the Commissioners that since we have sat to-day I have discovered that there are four foreign shipmasters, one of whom has just called from Archangel for orders. They are in the room, and if the Commissioners desire it will be examined. Their names are not in the list of witnesses, but perhaps it would be interesting to the Commissioners to hear some questions put to them. I will just put one or two questions to one of them, and the others can concur.

CAPTAIN JOPP was examined.

Capt. Jopp.

2041. (*Chairman.*) What is your name?—J. F. Jopp.

2042. What is your occupation?—Shipmaster.

2043. (*Mr. Boyd.*) You are master of a British vessel called the *Karl* of Stettin?—Yes.

2044. You have come from Stettin to Peterhead?—Yes.

2045. How long have you been at sea?—Twenty-one years.

2046. How long have you been in command of a ship?—Eleven years.

2047. You will often have traded to the east coast of Britain?—Yes.

2048. That is where your trade chiefly was?—Yes.

2049. Are there any particular places upon that coast where you call for orders, where you know that vessels from the Baltic and the east country call for orders?—Yes, the places are, Peterhead, Leith, and Grimsby.

2050. At which of these three places do vessels most frequently call?—At Peterhead first, when they can get to it.

2051. Would you explain the reason for preferring Peterhead to the other two places?—Yes, when ships come from the north, if they come from Archangel,

then Peterhead is the first place, and there is this Buchan Ness light, the surest place where they can make the land for. Secondly, when they have to go to Leith, there is the pilotage; and another thing is, when the wind is from the northward or north-eastward, they can make their passage to it from the continent, London, &c., but they cannot get their foot out again. There is just the same reason for Grimsby. With that wind they cannot get out of the Humber. They could make their passage from here before they can get out there.

2052. Then the vessels from the north of the continent of Europe, as a rule, endeavour to make the land in Buchan Ness?—Yes.

2053. (*Chairman.*) Where have you traded to chiefly?—I have traded to England and the West Indies, but chiefly to England and France.

2054. Have you ever gone through the Pentland Firth?—No; I have gone through between the Orkney and Shetland Islands, but never through the Pentland Firth.

Shew the witness the Admiralty Chart.

This having been done,—

Point out to him, Mr. Secretary, the anchorage of Long Hope.

This also having been done,—

2055. Do you see that anchorage on the chart?—Yes.

2056. Look at it well, and tell me if you would have any difficulty in going into that anchorage by that chart?—No, I would not think I should, because I would be sure to land somewhere about Duncansby Head. I would not have any difficulty in running for it if the tide would favour me.

2057. (*Sir Frederic Smith.*) What is the tonnage of your vessel?—102.

2058. Have you ever anchored in the south bay of Peterhead?—No, I have not.

2059. Are you not at anchor now?—I am, in the harbour.

2060. (*Mr. Lindsay.*) Have you ever called at Fraserburgh or Wick for orders?—I have been at Wick, but never at Fraserburgh.

2061. How often have you been at Wick?—Twice.

2062. For orders?—No, I have been there loading a cargo.

2063. Do you know any Prussian ships that call at Wick or Fraserburgh for orders?—I do not.

2064. Do you know of any of your ships which have called at Wick or Fraserburgh for shelter?—No, except the wind is off the land. But I know many a ship calls for orders here at Peterhead. There is just one captain here. There are about ten or twelve letters lying at the post office for foreign ships to call for.

2065. (*Capt. Washington.*) How often have you been at Wick?—Twice.

2066. You were there for a cargo of herrings?—Yes.

2067. Had you any difficulty in getting in?—Oh yes, there is difficulty. I have been lying off the bay for three or four days, and could not get in, while the boats were in the harbour.

2068. There is no accommodation for shipping on account of the herring boats?—No.

2069. Do you think it would be a good thing if there were accommodation for shipping there?—Of course it would be a good thing, but for general shipping it would be better at Peterhead.

2070. But for the ships that are bound for Wick it would be a good thing to have accommodation for shipping there?—Yes.

2071. In short, a good harbour at both places would be a very good thing?—Oh yes.

(*Mr. Boyd.*) I may be allowed to state to the Commissioners that the three other witnesses to whom I alluded, are Captain Meyer, of the *Leonidas*, of Rostock, at present lying off Peterhead for orders, and who has been waiting there for the last two days. The second is Captain C. Joheneson, of Sandieford. now in the harbour, and the last is Captain Scehwz of the *Hermoter*, from Christiansand, which vessel is also lying at Peterhead, and these gentlemen are here. I am unwilling to take up the valuable time of the Commissioners by examining these witnesses now, but perhaps the Commissioners would not object to have it minuted that they were offered, and I shall examine them or not as the Commissioners may think fit.

(*Chairman.*) Proceed with the witnesses.

Captain MEYER examined.

2072. (*Chairman.*) What is your name?—C. Meyer.

2073. What is your occupation?—Shipmaster.

2074. (*Mr. Boyd.*) How long have you been at sea?—Twenty-two years.

2075. And how long have you been a shipmaster?—Four years.

2076. Have you called at Peterhead for orders?—Yes, twice.

2077. Do you know that there are eight or ten ships on their way from Archangel to call for orders just now?—Yes.

2078. Did you hear the evidence given by Captain Jopp?—Yes.

2079. Do you agree with what he said?—Oh yes.

2080. (*Chairman to Mr. Boyd.*) Is that all you wish to ask?—That is sufficient; he agrees with the last witness.

Captain JOHENESON examined.

2081. (*Chairman.*) What is your name?—Captain Joheneson.

2082. And your occupation?—Shipmaster.

2083. (*Mr. Boyd.*) How long have you been at sea?—12 days.

2084. How many years have you been at sea?—19 years.

2085. (*Chairman.*) Is Captain Jopp present?—Yes.

2086. Will he be good enough to act as interpreter to the witness?—Yes.

2087. (*Mr. Boyd.*) How many years have you been master of a ship?—10 years.

2088. Have you heard what was asked at Captain Jopp, and the answers he gave?—Yes.

2089. Would you have said the same thing?—All the same.

Mr. COLIN MACKENZIE examined.

2090. (*Chairman.*) What is your name?—Colin Mackenzie.

2091. What is your occupation?—Merchant and shipowner.

2092. (*Mr. Boyd.*) Have you been at sea?—I have.

2093. How long were you there?—10 years.

2094. Had you the command of a ship during part of that time?—I had.

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Mr. Boyd.

2095. For how long?—About three years.

2096. In what trade were you employed before and after you became a shipmaster?—Before I became a shipmaster I was employed in the coasting trade betwixt Newcastle and London, and in the Mediterranean, Baltic, and American trades; and since I became a shipmaster, I have been principally in the coasting trade.

2097. Are you well acquainted with the trade of the Moray Firth?—I am pretty well acquainted with it.

2098. You are a shipowner in the Moray Firth in Elgin?—Yes.

2099. Do you know the bays and harbours of Peterhead?—I do.

2100. Have you been at anchor in the bays?—I have taken refuge there.

2101. In the south or north bay?—In the south bay.

2102. Were you once there, in a gale of wind blowing from the north, blown out of the harbour?—I was.

2103. What was that owing to?—It was owing to the warp which we had breaking. We were blown out to sea.

2104. Where you able to get back?—We were with great difficulty. After rounding the Skerry, we came in betwixt the Skerry and the land.

2105. The tide did prevent you from reaching the harbour?—No; it did not.

2106. Which harbour did you take?—The south harbour.

2107. If you had been to the southward of Peterhead and driven back to the northward?—On that occasion I was driven back from the north as far south as Stonehaven.

2108. And could you get hold of Peterhead?—I did.

2109. Were you ever driven so far back as Cromarty, after being to the southward of Peterhead?—No; I cannot say I have.

2110. Do you know the harbour of Wick?— I am not very well acquainted with it.

2111. You know its position?—I do.

2112. Have you been down at Wick Bay?—I have.

2113. Did you say that a vessel could leave Wick with the wind coming on from the east-south or south-east?—No; I should say not.

2114. Would a harbour there be generally useful for the shipping upon the coast?—There is no doubt it would.

2115. Would it suffice all that is required for the shipping upon the coast?—No; I do not think so.

2116. Where should a harbour be?—In my humble opinion, the best place for a harbour of refuge is the Bay of Peterhead, from its natural position and the natural advantages it has, and being the most easterly point, where most vessels call at from foreign ports.

2117. Would a harbour there be taken more easily and more frequently than a harbour, if constructed at any other part of the coast, and leave it more frequently?—Yes; I think so.

2118. You know the Pentland Firth?—I do.

2119. How many times have you been through it?—Four times.

2120. Do you attach any difficulty to the navigation through the Pentland Firth, and if so, state what the difficulty is?—I do not attach any particular difficulty to the navigation, excepting that there is a very heavy sea runs there, with a strong flood tide and south-east wind; but vessels coming down from the southward, if it is blowing a gale of wind, can shorten sail and take up till such time as they can make it with a slack tide, when they have no difficulty whatever in passing through.

1121. Do you know Long Hope?—I have never been in Long Hope, but I know the harbour of Long Hope by chart, and the position of it very well.

Show Long Hope to the witness on the Admiralty chart.

This having been done,—

2122. Do you see Long Hope on that chart?—I do.

2123. Should you have any difficulty in running for Long Hope in bad weather by that chart?—I should think not, none whatever.

Captain SHAND, of Lossiemouth, examined.

Capt. Shand.

2124. (*Chairman.*) What is your name?—George Shand.

2125. And what is your occupation?—Seaman.

3126. (*Mr. Boyd.*) Are you harbour-master of Lossiemouth?—Yes.

2127. Have you been at sea?—Yes, for upwards of 30 years.

2128. During that time have you had command of a vessel?—I have, for 25 years.

2129. And what trade were you in?—Baltic and coastwise, and a good deal in the Mediterranean trade.

2130. Are you intimately acquainted with the requirements of the Moray Firth?—Yes, I think I know it pretty well.

2131. Have the harbours and south bay of Peterhead been always looked to as places of great service for the purposes of that trade?—Yes.

2132. Have you been in Peterhead frequently?—I have been a good many times, and riding in Peterhead Bay with my vessel.

2133. Did you find good anchorage ground in the bay?—Yes.

2134. Did ever you drive in it?—No.

2135. Have you been there in bad weather?—I have been there in heavy gales of wind from north-west and north-north-west.

2136. And you were in perfect safety?—Yes.

2137. Have you considered the question respecting a harbour of refuge for the trade in the east coast of Scotland specially?—I have.

2138. Both with regard to the necessity for such a harbour and the best situation for it?—Yes.

2139. Would you be so good as to state to the Commissioners shortly whether you think that such a harbour is required, and what place ought to be selected for it?—I think there is great necessity for a harbour of refuge; and there is no place that I know equal to Peterhead south bay, to the best of my knowledge.

2140. Have you been in the Pentland Firth?—Yes, I have.

2141. Have you been in Longhope?—Yes.

2142. Supposing that you were to meet with contrary winds in passing to the northward, where would you go for shelter?—If I were bound to the northward I would very likely, if I were not far across, come back to Peterhead Bay.

2143. If you were bound anywhere else, what would you do?—If I were bound through the Firth and across to the Caithness coast, I would very likely try to get into the Orkneys.

2144. Do you consider the Pentland Firth a dangerous place for navigation to men who know the tides in it?—I do not consider it a dangerous place to a mariner who understands the tides, and waits the proper time to take the Firth.

2145. You say that you have been engaged in the Baltic trade?—Yes.

2146. What land would vessels coming to the east coast endeavour to make?—Generally, when they wish to make any port here, or to go through the Firth, they always steer for Peterhead. Vessels if they are only coming this way, cannot pass that. I have come myself a good many times, and always steered for Buchan Ness.

2147. (*Chairman.*) You observe that this is a plan of Peterhead and the bay?—Yes, I do.

2148. Do you know Mr. Volume's house above the ropery?—Yes.

2149. Suppose a line drawn from Mr. Volume's house seawards over the ropery to the proposed breakwater, what is the nature of the holding ground so indicated?—Good ground.

2150. Does the witness know Mr. Anderson's house, called Mile-End, above the brickwork?—Yes.

2151. Is there any good anchorage ground south of a line drawn from Mile-End, a little from the north of the brickwork, seaward to the proposed breakwater?—Yes.

2152. Will the witness define on the plan the amount of good anchorage ground?

Witness having made some marks on the plan,—

2153. Has he got it down, Mr. Secretary?—He has marked three places, and he says he has no more to mark.

2154. Are you sure that you have distinctly understood the questions which I have put to you?—I think I have.

2155. (*Mr. Boyd.*) With reference to this plan, can you easily point out, upon a plan of this bay drawn to such a small scale as that, the holding ground with sufficient distinctness, especially seeing that you have not been there for some time?—No.

2156. Is not the best anchorage where the figure 8 is shown on Mr. Stevenson's plan, in the direct line of Merchant Street?—Yes.

2157. Are you aware that vessels have driven often from the best anchorage ground?—Yes. PETERHEAD.

2158. Did ever you know a ship drive on shore in the bay from any anchorage ground?—I saw a vessel drive ashore. *Capt. Shand.* 1 Sept. 1858.

2159. Is that the only case?—That is the only case during the time I was here.

2160. (*Mr. Lindsay.*) When was it that the vessel drove on shore?—About 14 years since, as near as I can guess.

2161. How was the wind blowing?—From south-east and east-south-east; she was riding, and the wind came round from north-north east to south-east and east-south-east. It came on to blow, and she drove ashore.

2162. Did she drag her anchors?—Yes.

2163. Had she two anchors down or one?—I cannot be certain. The vessel was laden with wheat, bound from the westward. The *Sarah* of Liverpool.

(*Capt. Washington.*) I have no question to ask. I have only to suggest whether it would be desirable to enable the Peterhead authorities entirely to disprove the truth of the statements made, that they should call their assistant harbour master, and allow him to contradict them if not true.

(*Chairman.*) The assistant harbour-master will, in pursuance of the course of procedure adopted by the Commissioners, have the opportunity of tendering his evidence if he thinks proper to do so.

Captain WINCHESTER, of Yarmouth, examined.

2164. (*Chairman.*) What is your name?—John Winchester.

2165. What is your occupation?—Shipowner.

2166. (*Mr. Boyd.*) Are you a shipmaster in Yarmouth?—Yes.

2167. How long have you been at sea?—36 years.

2168. How long were you a shipmaster?—21 years.

2169. What are you at present?—A shipowner and surveyor of shipping at Yarmouth.

2170. In what trade were you employed?—The Baltic and coasting trades.

2171. In coming from the Baltic to the east coast of Scotland, what land did you endeavour to make?—If the wind was from the southward, I endeavoured to sight Peterhead.

2172. And otherwise, if the wind was from the northward?—In that case, if I was bound for the Firth of Forth, I would endeavour to sight the Buchan Ness coast.

2173. Do you know if it is the practice of shipmasters to do so?—I think it is in general.

2174. Do you know the trade of the Moray Firth?—Yes, I have been for 10 years in that trade.

2175. During that time, or at any other time, have you been often in the South Bay of Peterhead?—Yes, I have been different times there. *Capt. Winchester.*

2176. Did you find good anchorage?—Very good.

2177. The ground holds well?—Yes.

2178. Is it of great importance to vessels trading in the Moray Firth?—It is of very great importance.

2179. Would a harbour at Wick be of much importance?—Not for the Moray Firth.

2180. What trade would it benefit?—I do not see it would benefit any trade except for itself.

2181. Have you considered fully the question of the necessity for a harbour of refuge upon the east coast of Scotland, and the place that ought to be selected for it; have you thought of that seriously?—Yes.

2182. Do you think, is a harbour of refuge necessary?—I do; and in my opinion, the Peterhead Bay is the best place for a harbour of refuge.

2183. You have heard the evidence given by Captain Shand and other witnesses who have preceded respecting the Bay of Peterhead; do you agree with that evidence?—Yes.

2184. Is there any part of it with which you disagree?—No.

Captain MACLEAN, of Portsoy, examined.

2186. (*Chairman.*) What is your name?—James Maclean.

2187. What is your occupation?—Seafaring.

2188. Where do you belong to?—Portsoy.

2189. (*Mr. Boyd.*) Have you been many years at sea?—42 years.

2190. Of these, how many a shipmaster?—37.

2191. You have heard a great deal of evidence here to-day by a number of witnesses?—Yes.

2192. Do you concur in their testimony or not?—I quite concur with it. *Capt. Maclean.*

2193. Is there any part of it which is contrary to your opinion in any way?—No, nothing material.

2194. You have been often in the bay of Peterhead?—Yes.

2195. And what trades have you been in?—The Baltic, American, Mediterranean, and coasting trades

Captain MATHIESON examined.

2196. (*Chairman.*) What is your name?—James Mathieson.

2197. What is your occupation?—Master mariner.

2198. Where are you a native of?—Banff.

2199. (*Mr. Boyd.*) How long have you been at sea?—Nearly 40 years.

2200. And of these how long a shipmaster?—Nearly 30. *Capt. Mathieson.*

2201. Are you well acquainted with this coast, and the Moray Firth, and the trade in their way?—Yes.

2202. You have been here to-day, I presume?—Yes.

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Mr. Boyd.

2203. Have you heard the questions that have been put to the different nautical witnesses, and the answers which they have given ?—Yes.

2204. Do you concur in these answers ?—Generally I do.

2205. Is there anything in particular occurs to you that is inconsistent with the opinions you hold ?—No.

2206. Were you many years trading betwixt Wick and London ?—Yes.

2207. How many ?—Two years.

2208. Were you master of a vessel at that time ?—Yes.

2209. Then I presume you are well acquainted with the localities about Wick, Fraserburgh, and Peterhead ?—Yes.

2210. Generally with the ports of the north-east coast of Scotland ?—Yes.

2211. Have you taken shelter often in the Bay of Peterhead ?—Yes.

2212. A great many times ?—A good many times.

2213. Could you enumerate them ?—Well, I suppose nearly 50 times.

2214. You have been in both harbours of Peterhead ?—Yes.

2215. For shelter ?—Yes.

2216. You were master of a vessel out of Fraserburgh for a time, were you not ?—Yes.

2217. For many years ?—About 10 years.

2218. Have you been in gales of wind often driven out of the Moray Firth ?—Yes.

2219. And on these occasions where did you find shelter ?—Peterhead Bay.

2220. Did you do that when you could not look at Fraserburgh ?—Yes.

2221. Supposing a vessel driven out of the Moray Firth in similar circumstances to what you have mentioned ; could that vessel find shelter at Wick ?—No, they could not.

2222. When you were in the Wick trade betwixt Wick and London, have you been under the necessity of finding refuge not far from Wick, when you could not run for that place ?—Yes ; I have run for Longhope when I could not take Wick. I once went to Cromarty, because I could not come near Wick.

2223. If you were in the circumstances which lead you to take refuge in Cromarty, did you do it in a gale of wind, or how ?—I was rather to the westward, and the wind was blowing hard about east-south-east, and I thought I would manage better by going to Cromarty.

2224. But I am speaking of the occasion when you took refuge at Long Hope ; were you able at once to enter the harbour, or had you to lie off for a while ?—Sometimes I put on as much canvass as I could, and sometimes, in fact, I have been running without any canvass at all, to pass it in the flood tide.

2225. That was in running for Longhope ?—Yes.

2226. Supposing there was a harbour built at Wick, under a south-east gale would it be safe to run for that harbour, in your opinion ?—I should not like to do it.

2227. Because of what ?—Because there is too much sea. The sea runs very high there, and there is a dead lee shore. There is no remedy after, if you happen to miss the harbour.

2228. Do you know the Pentland Firth ?—Yes.

2229. Is that a very dangerous place ?—Well, it is not so dangerous. It looks dangerous to a stranger when he is in it, but there is not much danger in it.

2230. Have you ever run for Longhope with a deeply laden ship ?—Yes.

2231. Did ever any accident occur to you ? Did you ever sustain any damage on such an occasion ?—Sometimes may be a few boards of my bulwarks may be lost. I have lost nothing else.

2232. With the wind at east-south-east, or south-east, is there a very heavy sea off Rattray Head ?—Yes, a very heavy sea.

2233. Would if be of great importance to a vessel in the circumstances to find refuge before she got as far north as Rattray Head ?—Yes, it would, if she sights Peterhead.

2234. (*Mr. Lindsay.*) With the wind dead upon the land, whether do you find more sea running into the south bay at Peterhead, or into Wick Bay ?—Much more sea into Wick Bay.

Captain BROCK examined.

Capt. Brock.

2235. (*Chairman.*) What is your name ?—George Brock.

2236. And your occupation ?—Shipping master at Aberdeen.

2237. (*Mr. Boyd.*) How many years have you been at sea ?—Thirty-six years.

2238. And of these, how many a shipmaster ?—Twenty-eight.

2239. You are well acquainted with the east coast of Scotland ?—I have a general knowledge of it.

2240. You have heard all the evidence that has been led to-day ?—I have.

2241. Generally do you concur in the opinions expressed by the different witnesses ?—Not by some of the first witnesses ; but I agree with the latter witnesses.

2242. Explain the difference.—I cannot go over the whole minutiæ, but it is about the easy access of the Pentland Firth. I cannot concur in that part of it.

2243. Any other thing ?—That is the only thing I remember at present.

2244. With reference to the three localities which have been mentioned—Peterhead, Fraserburgh, and Wick—as a site for a national harbour of refuge, which of these places would you say is the most eligible for such an erection ?—Peterhead, most distinctly.

2245. (*Chairman.*) State to me as briefly as you can the difficulties of the navigation of the Pentland Firth ?—The Pentland Firth cannot be taken at all times, even with a flood tide. In a gale of south-east wind there is a heavy sea at the entrance. Vessels often having a sufficient offing would rather take the Roost and I myself, in taking the Pentland Firth from the westward, after having run half through the gale of wind from the westward in double reefs, and carrying the main-top-gallant sail with double reefs and great risk, the wind fell light, and the ship came out of the Firth again, and we were like to have our decks swept.

2246. Nothing further ?—Nothing.

2247. State to me your opinion of Longhope as a harbour to run for in bad weather ?—It is a harbour of easy access, tide suiting.

2248. (*Capt. Washington.*) How long have you been at sea ?—Thirty-six years.

2249. You have often run through the Pentland Firth ?—About 12 times.

2250. You have given your own opinion of running through the Pentland Firth. Did you ever happen to have had an opportunity, as shipping master, to hear other captains express their opinion of it, talking about it quietly ?—I have.

2251. Did their opinion concur with yours ?—Pretty much.

2252. You have heard the evidence given in this room this day on the subject of running through the Pentland Firth ?—I have.

2253. Do you, as a seamen of 36 years' experience, concur with it ?—No.

2254. (*Mr. Lindsay.*) Do you consider the Pen-

land Firth dangerous to take at all times of tide, with a south-east gale of wind ?—Not at all.

2255. With an ebb tide and a south-east gale would you consider the Pentland Firth dangerous to take ?—No.

2256. Have you ever heard any of the masters who came before you express a fear of running through the Pentland Firth with a south-east gale and an ebb tide ?—Never.

2257. (*Chairman.*) Then, does your opinion of the difficulty of running through the Pentland Firth apply merely to the unfavourable circumstance of a weather tide and a strong gale ?—At all times, I should say, there is considerable risk in navigating the Pentland Firth. Winds are variable and subject to shift, particularly when a vessel is nearly through with a fair tide, and an adverse tide coming on.

2258. Therefore you would consider that to a man who was not tolerably well acquainted with the locality, it might be better, except in favourable circumstances, to go round the Orkneys?—Yes.

2259. (*Mr. Boyd.*) Did ever you take a pilot in passing through the Pentland Firth?—Once.

Captain Cargill, of Aberdeen, examined.

2260. (*Chairman.*) What is your name?—John Cargill.

2261. And what is your occupation?—I have been a shipmaster, but I have retired the last few years.

2262. Are you a native of Peterhead?—No, of Aberdeen.

2263. (*Mr. Boyd.*) How long have you been at sea?—Thirty-nine years.

2264. And how long in command of a ship during that time?—Twenty-nine years.

2265. Did you command the steam-ship *City of Aberdeen* during the time of the Russian war?—No; the *City of London.*

2266. During the time you were a shipmaster were you a good deal in the North American trade with this coast ?—Yes.

2267. Are you intimately acquainted with the coast, the tides, and the geographical position, and all that ?—I cannot say that I am perfectly acquainted here. I was never in the way of coming into this harbour.

2268. You have been present to-day, and heard the evidence that has been laid ?—Yes.

2269. Do you concur with that evidence generally ?—Generally I do, but there are several points on which I could not agree with them.

2270. Would you point out these things ?—There was one witness examined who considered a harbour of refuge as merely a harbour of shelter that ships would take in any wind. I have always been impressed with the idea that a harbour of refuge was, when a sailor was caught upon a lee shore and could not extricate himself, to get in there.

2271. What more ?—I do not know of anything else. Some spoke about the Pentland Firth—running through in a heavy gale of wind from the south-east with a flood tide—a thing that I could hardly do with a heavy gale of wind. I have run through it in the circumstances when the ship would overcome the tide by getting inside of Stroma, through Gill's Bay.

2272. (*Chairman*). What does the witness wish to state?—Am I to understand that the thing is decided between Wick, Fraserburgh, and Peterhead as a natural harbour of refuge ?

(*Chairman.*) The Commissioners think it unnecessary to give you any answer on that point.

(*Witness.*) The reason that I asked it is, it has been asked several times—On the north-east coast of Scotland which would be the best site for a harbour of refuge ?

(*Chairman.*) Observe, that it is the custom for witnesses to answer questions, not to ask them. Will you now, Mr. Boyd, proceed with your evidence ?

2273. (*Mr. Boyd.*) Is there any other point on which you disagree with the evidence ?—No, nothing else.

2274. Then I would ask you, with reference to the three places that you have named—Wick, Fraserburgh, and Peterhead—which of these places, in your opinion, do you think the most eligible site for a harbour of refuge ?—Peterhead, decidedly.

2275. (*Capt. Washington.*) Was it not you who piloted the royal yacht to Aberdeen two years ago?—I had the honour of so doing ; and I have a very handsome letter from the Lords of the Admiralty, thanking me.

(*Capt. Washington.*) I can certify to that, for I happen to know that the Queen expressed her opinion of the manner in which you piloted the yacht with great satisfaction.

Captain Buick, of Arbroath, examined.

2276. (*Chairman.*) What is your name ?—John Buick.

2277. What is your occupation ?—At present I hold a pilot licence from the Trinity House at Leith. I have retired from sea, and I am now acting as a licensed pilot.

2278. (*Mr. Boyd.*) How long have you been at sea ?—Since 1813.

2279. Have you been a shipmaster ?—For twenty-seven years.

2280. On what part of the coast have you traded ?—Right round the Baltic, and generally the coasting trade.

2281. You have been here all day ?—Yes.

2282. And have heard, I suppose, all the evidence which has been given ; I refer to the evidence of the nautical witnesses ?—Yes.

2283. Do you concur in that evidence ?—Oh yes ; it is as near as I could calculate, in every respect I think.

2284. Have you anything that you can name that you disagree with it in ?—Nothing particular, because of course it all comes to the same thing.

2285. What do you mean by that ?—Our opinions, I suppose, are similar.

2286. You are quite agreed ?—Oh yes.

2287. You are intimately acquainted with Peterhead, as well as Arbroath ?—Oh yes.

2288. (*Chairman.*) Where do you belong to ?—Arbroath.

Thomas Bain examined.

2289. (*Chairman.*) What is your name ?—Thomas Bain.

2290. Your occupation ?—Seaman. I have been at sea since I was ten years old.

2291. Do you reside in Burntisland ?—Yes.

2292. Do you hold a licence from the Trinity House as a pilot ?—Yes.

2293. You say you have been at sea since you were ten years old ; how long is that ago ?—I have been at sea 59 years.

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Chairman.

2294. Have you during that time been on board of a cruiser ?—Yes, for eighteen years and a half.

2295. What vessel was it ?—*The Regent.* I have sailed on this coast, round the Shetland and Orkney Islands, and all along the east coast.

2296. You held the office of second mate ?—Yes.

2297. (*Chairman.*) Is there anything more to be added to that answer ?—No.

2298. (*Mr. Boyd.*) Do you consider yourself well acquainted with all the coast, the Orkneys, Pentland Firth, and all the east coast ?—I do so.

2299. Have you been here during this day, and heard all the evidence that has been led by seafaring people ?—Yes.

2300. Do you concur in the evidence you have heard ?—Yes, I do.

2301. Is there any part of it that you disagree with ?—No, I could not say anything of that sort.

2302. It coincides with your own opinion, does it ?—Yes, it does so.

Captain Scehwz examined.

Capt. Scehwtz,

2303. (*Chairman.*) What is your name ?—Captain Scehwz.

2304. What is your occupation ?—A shipmaster.

2305. Do you understand English ?—Very little.

2306. Captain Jopp, will you be good enough to interpret ?—Certainly.

2307. (*Mr. Boyd.*) Do you trade generally with the east coast of Scotland ?—No, not always.

2308. How long have you been a shipmaster ?—Four years.

2309. Have you been often on the east coast ?—Five or six times.

2310. Do you know the place upon the coast of Great Britain where shipmasters from Norway generally call for orders ?—It is always here at Peterhead.

(*Mr. Boyd.*) In consequence of the remark which fell from Captain Washington, I have brought here the Assistant Pilot Master and Berthing Master, Mr. Alexander Souter, to explain the loss of the vessel which was driven on shore in the bay, and I think he will give a satisfactory explanation of it.

Mr. Alexander Souter examined.

Mr. A. Souter.

2311. (*Mr. Boyd.*) Do you remember a vessel called the *Sarah*, of Liverpool, having been driven on shore on the head of the South Bay ?—Yes.

2312. Do you remember how long ago it is ?—I have not the date exactly.

2313. But about the date ?—It might be some fifteen or sixteen years ago.

2314. Do you remember the cargo ?—Wheat. She was bound from Liverpool.

2315. Will you explain the cause of her driving ?—She did not drive. The vessel lost her fore yard and some of her canvas. The dark came on. She wanted to get into the north harbour, but the pilots could not get her there. We got her up into the south bay in good anchorage, in the centre of the bay, and it was about three quarters flood, I think, when the boat came in from the ship. I asked the pilots how they had brought the ship there. The wind was about south, and the night looking very dirty. I asked the pilots, "Why didn't you bring her into the south harbour ?" "The master wouldn't come." "Well, I'll go off with you, and I'll consult with the master." I went into the boat, and went off to the ship. I think it must have been from half-past ten to eleven o'clock at night; no moon, but very dark. It was blowing hard. I went aboard the vessel, and communicated with the master. Says I, "Captain, you should slip your cable, and I will run you into the south harbour. The ship is drawing ten feet water." I ascertained the draught of water. "You will save the ship there, but I would not care much about your quarters for the night where you are." Well, he consulted a while. The wind was always blowing. "Will you come below till I speak to you ?" I went down into the cabin with the captain, and he looks at his weather glass. Then he says, "It's standing." "But," says I, "I don't care *that* for your weather glass." The pilots were calling upon me that they would leave me if I wouldn't come; so of course I bade the captain good night, and told him to take care of himself, and I went on shore. About three o'clock in the morning I heard it blowing very hard, and running. I turned out, knowing that the vessel was riding there, and I met with some people about the shore, and could see about the spot where I left the vessel riding, but I could not see the vessel herself. I think it must have been nearly about five o'clock that we discerned her bold upon the bay there. She was lying then broadside on, but fortunately she was drawing about two feet of difference of water aft, and when the tide rose she slued with her head right in, and her stern to the sea. She fayed right up to the beach.

2317. Did the vessel part from her anchors, or did she drag ?—She parted.

Mr. George Gibson examined.

Mr. G. Gibson.

2318. (*Chairman.*) What is your name ?—George Gibson.

2319. And your occupation ?—Joint collector of shore dues.

2320. (*Mr. Boyd.*) Have you been many years connected with the collection of the shore dues at Peterhead ?—I have.

2321. During much of that time have you reported, so far as you could get information, to the *Shipping Gazette* the vessels that have called here for orders ?—I have.

2322. Is there any register kept ?—No.

2323. Were you asked to consider and endeavour to remember about the number that have called at Peterhead on an average annually for orders ?—I have reported from 100 upwards.

2324. Do you know that there are many vessels get orders that you don't get the reports of ?—A great many.

2325. When you have just reported upwards of 100, might the average be fairly stated at not less than 150 in one year ?—Not less than 150, or more than that.

2326. You have, no doubt, observed the number of vessels that have taken refuge in the harbours. You know that many take refuge there ?—Oh yes.

2327. Could you tell us the largest number that you have seen at refuge there at one time ?—86.

2328. Do you remember taking a note of any vessels that had taken refuge in the harbour of Peterhead at one time bound for the north as far round as Liverpool ?—As far as I could remember 78 at one time bound from the north and west.

2329. Do you know that a great many vessels take refuge in the south bay of Peterhead ?—I do.

2330. Is there any register kept of these ships ?—None.

2331. Could you tell us the largest number that you have seen at refuge there at one time ?—I have counted 96.

2332. Riding at anchor at one time ?—Yes.

2333. Could you form any idea of the number that on an average in a year take refuge in the south bay ?—I should say upwards of 600 annually.

Mr. Boyd then said: I beg to mention to the Commissioners that the evidence which I have had the honour to bring before them is now nearly closed ; but before I do so I wish to advert to various returns that were made by Provost Anderson yesterday. Among these especially I shall advert to three returns. The first is a return of wrecks in the vicinity of Peterhead since 1816, and I wish, so far as I am able, to verify these returns. In doing so I would beg to remark that a large portion of it, from 1816 to 1822 inclusive, was made up by myself in 1823 from files of the *Aberdeen Journal*, and the purpose of making it up at that time was that there was a contest between the people of Peterhead and those of Aberdeen respecting the erection of the Buchan Ness lighthouse. The return again from 1826 to 1846 was made up by my direction and under my immediate inspection. The return from 1847 to 1856 was obtained at the Buchan Ness lighthouse from a proper list, as we were informed at the time, of wrecks there. In order to be prepared as correctly as possible for this meeting, I had these lists revised. In the first place I had the advantage of having had a register book kept by the agent of Lloyd's at Peterhead, and therewith a large list was made up of the vessels that were not included in the preceding, and that brought us down to August 1855. And during the period from November 1856 to June 1858 we are indebted for the information contained in that last to the Receiver of Wrecks at Peterhead. I may mention that the information was obtained for the information of the Commissioners, and that I believe it has been made up with the greatest care that could be bestowed upon it, that it really has been so made up, and that I believe it is accurate. The next document to which I would—

Mr. Boyd was here interrupted ; and the Commissioners having retired for consultation for several minutes, on their return.

The Chairman said. We are very happy to receive the statement which accompanied the report, which appears to have been drawn up with great labour, but we are disposed to recommend that in giving in your other papers, you should confine yourself to as brief a statement as possible of their character.

(*Mr. Boyd.*) The other paper to which I was going to request the attention of the Commissioners is an abstract of returns of vessels that have entered the harbour and south bay of Peterhead. It is necessary that I should explain there was a return made before the Select Committee, but in the returns from the Custom House were not inserted vessels which entered the harbours, loaded and unloaded cargoes, and paid harbour dues, because they were vessels employed in the export of herrings coastwise, vessels with lime cargoes, and some others, which are not required to be entered at the Custom House. There is just one other return which has been made up. An account of the loss of life at Peterhead from boats, and account of the loss of life from ships, not included in the account of wrecks. It has just occurred to me to explain, with reference to what I spoke about the wreck list, that in making up this list we discovered that information should have been obtained at Kinnard's Head as well as Buchan Ness. These are the documents which the Provost has given in, and which I presume are to be received as evidence. I believe I have nothing further to say. I presume that these returns which I have produced will be received as part of the Provost's evidence.

(*Chairman.*) Are these distinct from the documents that were tendered by the Provost ?—No ; they were all tendered by the Provost.

Then, perhaps, the more regular way will be, that they form part of the Provost's evidence ?—I only do so for the purpose of bringing them before the Commissioners in a regular and legitimate form. As to the last return of boats, I am not quite certain that that was among the Provost's papers or not.

(*Chairman.*) Recall Captains Burnett, Scott, Young, and Gray.

(*Mr. Boyd.*) Captain Young has sailed.

Captain BURNETT re-examined.

Capt. Burnett.

2334. (*Chairman.*) Did I ask you any question with reference to Longhope ?—Yes.

2335. Have you anything further to add to your evidence on that subject ?—Nothing further.

Captain SCOTT re-examined.

Capt. Scott.

2336. (*Chairman.*) Did I put any question to you with reference to Longhope ?—You did.

2337. Have you anything further that you wish to add to your evidence on that point ?—Nothing whatever.

Captain GRAY re-examined.

Capt Gray.

2338. (*Chairman.*) Did I ask you any question with reference to Longhope ?—You did.

2339. Have you anything further which you would wish to add to your evidence on that point ?—Nothing.

(*Chairman.*) If there is any witness present whom I questioned with reference to Longhope, let him stand up.

Captain BROCK re-examined.

Capt. Brock.

2340. (*Chairman.*) Is there anything further which you wish to add to your evidence with respect to Longhope ?—Nothing.

Mr. BOYD examined.

Mr. Boyd.

2341. (*Chairman*). What is your name ?—Andrew Boyd.

2342. Your occupation ?—I am a solicitor in Peterhead.

2343. You have taken charge of the case of Peterhead to-day ?—I have.

2344. Are you entirely satisfied that you have had

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the opportunity afforded you of bringing forward all the evidence which you wish?—I am perfectly satisfied. I may say so, as having taken charge of the case, and as being myself one of the trustees of the harbours of Peterhead.

(*Chairman.*) Is there any other person present who wishes to tender any evidence with reference to the subject of our present inquiry?

No answer.

(*Chairman.*) The Commissioners will now close the evidence with reference to Peterhead. I believe there is a deputation from Elgin present; will you be kind enough to come forward?

Provost GRANT examined.

Provost Grant.

2345. (*Chairman.*) What is your name?—James Grant.

2346. What is your occupation?—Banker. I am also Provost of the city.

2347. What course is it you wish to pursue in tendering your evidence to the Commissioners?—The course which we wish to pursue is with a view to obtain a grant from Government to enable us to carry out the improvements which we intend making at Lossiemouth.

2348. Before you proceed to make your statement, you must permit me to remind you that the primary objects of our inquiry are national harbours of refuge; and, therefore, though we do not wish to decline to receive any evidence which may be tendered to us, as respects the eligibility of minor ports, which do not supply sites for harbours of refuge, for improvement, yet we have no reason to hold out any hopes that our recommendations on that subject will be attended to. And I have further to request that you will abstain, in any statement which you may make, from repeating any information of which we are already in possession in an official shape, in the Reports of the Committees of the House of Commons of 1857 and 1858. Will you now proceed with your statement?—The statement which I wish to make will be very short. The harbour of Lossiemouth was erected a good many years ago, principally by means of funds raised in the immediate locality from the public generally as well as from the proprietors of the surrounding district. Since its first erection, additions have been made to it from time to time; and the improvements which we now contemplate consist of a breakwater, 600 feet in length, projecting into the sea, and which, if carried out, will afford us fourteen feet at low water for a distance of several hundred feet. We have already laid out upwards of 30,000*l.* in the formation of this harbour, and we require from 20,000*l.* to 25,000*l.* additional, to complete this contemplated breakwater. We have prepared plans and estimates of the work, but we have difficulty in raising the means for carrying out the objects we have in view. We think that the contemplated improvements would be most advantageous in a local point of view, for the surrounding district and for the city of Elgin. We also believe that it would afford material accommodation and convenience to a large district of coast in that neighbourhood. From its local position, and in particular from the way in which the contemplated improvements we proposed to be carried out, we believe that fishermen or coasters overtaken by gales, coming from the north-north-east or east, could easily take the harbour; in short, that they would be running before the wind in approaching it, and from the extent of sea-room between the breakwater and the shore, they could easily enter it almost in any weather; I mean, in weather blowing severely from the north-north-east or east; that if it were erected, the lives of many who are now jeopardised would be in perfect safety, and had it been in existence for some years past, we believe that many lives which have been sacrificed, might have been saved by its means. We therefore trust that in a public point of view it is deserving of encouragement; and as we are unable ourselves to raise the means, in addition to what we have already subscribed, to complete this breakwater, we hope that it may come within the province of the duty of this Commission to recommend that a grant may be given from Government; not as a gift, but that a recommendation may emanate from this Commission, by which we may procure money at a reasonable rate of interest, and for which we are ready to pledge the existing revenue, and to pay up the principal within a reasonable time. I believe it will be unnecessary for me to say anything additional, because the subject, I think, has been treated at greater length and with more precision than I can do verbally, in written documents already lodged, and perhaps before the Commissioners.

2349. (*Capt. Washington.*) Who is engineer of the works?—Mr. Abernethy, of London. He has prepared the plans and the estimate.

2350. Are the plans deposited?—They were lodged. We believe they are in Aberdeen just now. There were plans lodged when we got the Act of Parliament for these contemplated recent improvements. You can have ready access to them in London.

Mr. GATHERER examined.

Mr. Gatherer.

2351. (*Chairman.*) What is your name?—George Gatherer.

2352. What is your occupation?—Writer or solicitor.

2353. You heard the remarks I made to the preceding witness?—Yes, and I quite concur.

2354. Will you now proceed with any statement you may wish to make, bearing in mind the remarks which I made?—I am a trustee of Lossiemouth harbour and breakwater, and have been since the present harbour was erected, about 20 years ago. I am also very intimately acquainted with this particular locality, being factor for the district, and although not a nautical man, I have taken every opportunity of examining shipmasters and seafaring men connected with the subject, and the expediency of extending the Lossiemouth harbour. I can state that the harbour is a harbour for the town of Elgin and a large and fertile district; and there is now a railway in connection with it going into the interior of the country, and is the means of developing the resources of the district very much. The harbour has proved a very profitable investment, having yielded for many years a dividend of 5 per cent. to the shareholders. Then, as to the contemplated improvements, we believe that if a breakwater was erected there, in the course of not many years—say six or ten—it would remunerate the expense of any reasonable sum, 20,000*l.* or 25,000*l.*, and that it would prove an immense advantage likewise to the fishing population, which is greatly increasing in the district. I have heard parties who are possessed of experience as seamen, and local knowledge, say that if this breakwater was made at Lossiemouth, it would be available to a district perhaps of 20 miles, from Nairn on the one hand to as far as or nearly Banff on the other. I have also heard from shipmasters, with reference to the calamity that happened last year, that if this breakwater had been erected at Lossiemouth, they believed that many of the lives then lost would have been saved. The fishing is increasing very rapidly, particularly what is called the white fishing. During the winter months, when of course severe weather more prevails, fishermen

are prevented often from going to sea, under the apprehension that during low water and a gale their lives are in danger. But were this breakwater made, which in a great measure comprehends a large portion of the bay, they could reach it under, I may say, almost any circumstances, having at low water 14 feet. With reference to the Report of the Committee of the House of Commons, and I think the 21st paragraph of that report, if it were carried out, it would supply our demands, and we would cheerfully give the per-centage there named (3 per cent.) I am not aware of any other points that I might allude to. I would refer to the evidence of Mr. Abernethy; also I should refer, with deference, to Mr. Stevenson's reports, which we have in our possession, but perhaps amongst his many employments he does not recollect us so well as those immediately interested—his reports saying that the extension of the harbour would be most advantageous at Lossiemouth, not only as a general local harbour, but as a fishing station. There is another feature, and I think a very important one. Betwixt Peterhead and Cromarty, it has been stated, there is no harbour at present. Lossiemouth is exactly midway between these two points, and at a headland well known as the Hulleman's Skerry. Vessels during easterly and north-easterly gales find a difficulty in rounding that head, and are obliged to go down and take Peterhead; they then dodge about may be for days. They have to return up the firth before they can get to Cromarty and lose as much time, whereas if they had been in Lossiemouth they could have availed themselves of the moderate weather, and saved a vast of time. There is another fact, I think, I may allude to, and I think I will be corroborated; the coasters frequenting the south side of Moray Firth, rounding Peterhead and Kinnaird's Head, and keeping the south side of the Moray Firth, are ten to one of the vessels coming from Wick to Cromarty, so that a harbour at Wick would be of no avail to us at Lossiemouth as it would be at Peterhead. We think if there were one at Lossiemouth, midway between that and Cromarty, it would subserve the interests of the district very much. I do not wish to speak of other localities, or say anything against them.

2355. (*Mr. Lindsay.*) If that harbour has proved a very profitable investment, and if, as you state, your extended harbour is likely to prove equally profitable, why do you not get the money for the completion of it in the usual channels?—For this very reason, that money is very difficult to be got just now. We made inquiry about money, and we find that money cannot be got for any harbour improvements under 10 per cent.

2356. You have told the Commissioners that you derive a dividend of 5 per cent. from the harbour?—Yes.

2357. And you want to borrow money from the Government at 3 per cent.?—Yes.

2358. That is to say, you would be receiving 5 per cent. for your money and you would be borrowing from the public purse at 3 per cent.?—No, begging your pardon. If we could get money at 3 per cent., we would save so much of our dividend. We do not say that we will have 5 per cent. of a dividend and pay the Government 3 per cent. We do hope that in the course of 10 or 15 years, with the facilities of trade, the developing of the country, and facilities afforded to the fishing, there might be 5 per cent. or 3 per cent., there might be 10 over the period, and we would be able to repay the Government, but just now we are positively retarded in our improvements from the want of money.

2359. You mean to say that you would enter into an agreement with the Government, provided they meet you on the terms you name, to the effect that individual proprietors were to derive no benefit, to the public loss, by any loan at 3 per cent. which the Government may make to you?—Certainly not. For instance, a dividend of 5 per cent. is yielded on the present expenditure of 30,000*l.* If 20,000*l.* additional were expended on the breakwater, we conceive it would partake more of a harbour of refuge for the whole district than a mere source of profit to the shareholders.

2360. Say that this new harbour also pays 5 per cent. as well as the present harbour, what would you do with the 2 per cent.?—We would propose to wipe off our debt as fast as possible with it.

2361. Yes; but you would enter into an agreement to wipe off your debt under any circumstances, and give security upon your harbour?—Decidedly.

2362. But what would you do with the 2 per cent., say that your new harbour paid you 5 per cent. as well as the old harbour, and you had borrowed money from the Government at 3 per cent?—We would necessarily out of our revenue pay the loan the sooner.

2363. Then you would pay back the money which you borrowed from the Government out of the extra 2 per cent. gained?—Oh yes; it is out of the revenue, as I understand the 21st section of that report, that the 3 per cent. is to be taken, to extend over a period of 50 years, but we would be able to pay it sooner.

2364. Then all you would consider that you were in duty bound to pay to the Government would be 20,000*l.*, with the interest upon it of 3 per cent. per annum during the time that you were in debt to the Government; is that your answer?—We would take it on any such terms, but it would depend on the details of agreement. I think that is the construction to be put on the 21st paragraph, to say that money should be lent by Government on the same as the drainage principle.

2365. That is not the question. I merely wanted to know from you if I put a right construction on the proposal you make for a loan from Government?—I wish it to be distinctly understood that it is not the object of this application to remunerate the present shareholders of the harbour. I may mention the fact that the shareholders, instead of paying money out of capital, paid no dividend; we added it to the improvements of the harbour. Our real object is to carry out this improvement, and satisfy the necessity of a very important district.

2366. Then, I suppose, if the shareholders were not getting it in the shape of interest, you would be getting it in the shape of increased stock?—It might have that effect.

2367. (*Chairman.*) Have you anything further to add to your statement?—No. There were two witnesses in the room, Mr. Mackenzie and Captain Shand, harbour-master at Lossiemouth, whom we intended, if agreeable to the Commissioners, to adduce in support of the statements we have already made, and the petition to the House of Commons from the town of Elgin, but I think from the statements now given it may be rendered unnecessary.

(*Chairman.*) As you have been good enough to attend here as a deputation to state your views on the subject of a harbour at Lossiemouth, and as we naturally feel that at this late hour of the evening you may be indisposed to produce evidence at any great length, we wish you to understand that we shall be happy to receive any written statements or plans with reference to the plans for a harbour at Lossiemouth which you may think proper to forward to our secretary.

(*Provost Grant.*) I am much obliged to you.

2367a. (*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sittings at Peterhead closed.

ABERDEEN.

Thursday, 2d September 1858.

PRESENT :

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain VETCH.
Mr. COODE.
Mr. SEWELL, Secretary.

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(*Sir John Stuart Forbes, of Fettercairn.*) I addressed a memorial to Mr. Calver, enclosing certain documents, at Peterhead; but as, from Mr. Calver's indisposition, they have not been received, I now lay them before the Commissioners. The memorial is addressed to the Commissioners by the landowners of Kincardine.

(*Chairman.*) The case of Stonehaven will be taken up subsequently to that of Aberdeen, and in the meantime it will be sufficient to lodge the memorial in the hands of the secretary.

(*Mr. Burnett*, Secretary to the Trustees of the Harbour of Montrose.) I put in extracts from the reports of Sir John Rennie, Mr. Robert Stevenson, and Mr. James Walker, relative to Montrose harbour.

Do you wish to follow up that memorial by any statement at a later stage of the proceedings?—We do.

(*Lord Provost.*) I have to make a very short statement in my own behalf in respect of the Commission. It would have been my desire, or it would have been in ordinary circumstances my duty, from respect to the Commission and to the importance of its objects, to have attended upon your deliberations during the whole course of your sitting. I believe, however, the Commissioners are already aware that any more unfortunate day could not have been selected than what they have thought proper to fix upon in the case of Aberdeen, where the great national meeting of the Highland Society takes place to-day, which entirely engrosses almost every one, and where, from the great numbers assembled, and the possibility at least of any misadventure happening, I find that my own attendance is required, in particular with reference to some of the arrangements for the evening. And I have been the more confirmed in my conviction that the interests of the proposed inquiry will not in the least suffer from my necessary absence, because the Harbour Board and the Town Council had a meeting on Thursday, and appointed a committee of their members, with Mr. Nicol as chairman, to conduct the case on behalf of Aberdeen. Mr. Nicol will be prepared to furnish a list of the witnesses who are proposed to be examined, and state generally the case of Aberdeen, which is in brief that there is no one point upon the north-east coast of Scotland where it would be a judicious expenditure of public money to lay it out in making one great national harbour of refuge, but that if any public money is to be expended on this coast, it would be better done by giving it in the way of relief and aid or otherwise to the existing harbours for their improvement. I hope, in these circumstances, the Commissioners will not think it any disrespect if I am reluctantly obliged to leave the meeting, which I would have otherwise such a pleasure in joining.

Before we came here we were perfectly aware of the circumstances in which you are placed, and we have to express our obligation to you for having given us the advantage of your presence at the commencement of our proceedings.

Mr. NICOL examined.

Mr. Nicol.

2368. (*Chairman.*) What is your name?—Alexander Nicol.

2369. What is your occupation?—Merchant, shipowner, and underwriter.

2370. Do you wish to make any statement on the subject of the present inquiry?—I wish to make a short statement. Simply a statement in some measure of what the Provost has now mentioned.

2371. Proceed with your statement.—I have in the first place to express regret that so many of our shipowners and shipmasters are just now from home, and otherwise engaged to-day, otherwise several of them would have been present who cannot be, and especially a shipmaster whose evidence I consider to be of great importance in determining as to the site of the harbour of refuge at all. We have very few of them here in Aberdeen at present. What there are I have endeavoured to get to be present here, to give their evidence on the subject, so as to corroborate what the Provost has now stated, that the shipowners here generally do not think that a very large harbour of refuge on this coast is absolutely necessary, or that it is the best way for Government to provide a remedy for the losses of vessels and losses of boats on this coast. I have endeavoured to glance at the evidence laid before the Committee of the House of Commons, with regard to Wick, Peterhead, and Fraserburgh. In regard to a harbour of refuge at Wick, it occurs to me that it would be more suited and more necessary for the fishing boats belonging to that coast than to the trade in such a port as Aberdeen, and I would wish, in making this remark, and bringing evidence before the Commissioners, that it might be looked to more as the trade of the country generally in large sailing vessels than as to anything connected with the fishing boats of this coast. There are three different localities where ships proceed to from this place that might be benefitted by harbours of refuge if we thought them necessary, that is, our American ships, our Archangel vessels, and the Baltic vessels. Now, we find that these vessels in coming to or going from the port of Aberdeen, if they are taken with an easterly gale when off any of these points, such as Wick or Peterhead, have the Cromarty Firth open to them on the one hand and the Firth of Forth on the other; that if they cannot go to a harbour of refuge at Peterhead if the wind is south-east, they might be driven out of the Moray Firth and reach Cromarty, and on the other hand they can go to the Firth of Forth. That seems to be the general evidence of the shipmasters and the general feeling amongst the practical shipping men belonging to this place. Therefore they come to the conclusion that a large harbour of refuge at either of these places indicated is not the best way for Government to lay out its money. But if Government is to make one large harbour of refuge it should be more to the south of Peterhead than any other place, somewhere between the Firth of Forth and Peterhead. It is there generally where vessels are taken at a disadvantage in a south-east gale, because if they reach Peterhead they are quite safe with the Firth on the one hand, and if they cannot reach it, they must necessarily either go ashore or go to the South Firth. Then with regard to Aberdeen as a port of itself, as to the

engineering part, we have Mr. Abernethy here, who has finished our large docks, and he will give evidence with regard to its capabilities, providing it was to be enlarged, which we are of opinion it should be, although from the large sum of money we have already laid out upon it and the high dues that we have necessarily placed upon the shipping, the trade of the place will not stand higher rates. I think I will now place before you the number of vessels that have taken shelter here during the last 10 years. This is a statement of the number and registered tonnage of vessels entering the harbour for safety from 1848 to 1857 inclusive, and I beg to give it in as evidence. This next document is a statement of the revenue of the harbour and of the debt at present, which I also beg to lodge, as well as the following documents. An abstract of the number and tonnage of arrivals at the port of Aberdeen for the years 1839, 1849, and 1857; an abstract of the number and tonnage of vessels belonging to the port of Aberdeen for the years 1839, 1849, and 1857; and a statement of the number of vessels wrecked at or near the entrance to the harbour in each year from 1846 to 1858. I think that is chiefly what I have to say.

2372. You have nothing further that you wish to say?—No.

2373. How long have you been connected with the port of Aberdeen?—I have been in business as a merchant here for 25 years.

2374. I think you are mentioned as an underwriter and shipowner?—Yes.

2375. Will you describe to me generally the character of the ships which leave the port of Aberdeen, and which are engaged in the foreign trade?—We have in the first instance a class of large vessels belonging to Aberdeen, built here, and what we consider a fine description of ships. These chiefly are engaged in trades from London, Liverpool, and other large places, and after being built here, and leaving the port, it is seldom that they return. And, in the second place, we have a class of very fine clipper brigs and schooners engaged in the Baltic trade, Archangel trade, and general and coasting trades. These vessels are constantly going from and coming to Aberdeen, and we consider them a very fine class of ships,—such ships as we shipowners cannot be disappointed with,—for they require to run almost to no harbour of refuge. I may state that I managed for three or four years four of the first clippers that ever were built at Aberdeen, and which are called now the Aberdeen clippers. They traded to London during these four years, and I do not think these vessels ever sought any harbour of refuge between London and Aberdeen above three or four times.

2376. Will you describe to me the character of the coasting trade which sails out of the port of Aberdeen?—Generally they are getting into that same class of ships as the old ones are lost. The coasters generally are a very good class of ships. There are some of them indifferent ships, and not of such a good build as those now built in the port, but they are now getting very few in number, as the clippers I have described to you carry our coals now, in a great measure, and lime and stones, and other goods of that description.

2377. You have stated that there are ships which sail in the American trade from the port of Aberdeen?—Yes.

2378. Do such ships take the passage north about?—Yes, always.

2379-81. Amongst the list of witnesses before me are there any captains who have commanded vessels in that particular trade?—There is one, and he is present.

2382. Amongst these witnesses are there any captains who have sailed in the Baltic trade?—Unfortunately, no; I have endeavoured to find them, but they are not in the harbour at present. They were chief masters in that trade.

2383. Could you procure the evidence of two or three captains who have sailed in the Baltic trade, and who having retired, may perhaps be resident at Aberdeen?—Yes, I can give you three.

2384. Will you be good enough to send for them?—Yes.

2385. (*Mr. Lindsay.*) You have expressed an opinion, that if there is to be a great national harbour of refuge on the north-east of Scotland, it ought to be somewhere between Peterhead and the Firth of Forth. Now, considering your experience, I would like to know from you if there is any particular part of the coast where you think such a harbour could be made?—I have had my attention directed to Aberdeen. We have had the idea that a harbour of refuge could be made here suitable for this locality. I cannot say that I have studied the subject so much as to go from home to know about the places in any part, particularly in the south. I can only speak as to Aberdeen.

2386. Has any gentleman made examinations so as to be able to speak as to the suitability of Aberdeen for a national harbour of refuge?—Yes, Mr. Abernethy.

2387. (*Capt. Vetch.*) Has it ever occurred to your views of the subject in connection with the proposed Government aid for the improvement of harbours, that it should be better to grant some of the money to various harbours, and give them local improvement, rather than to construct a new and a large harbour?—Yes, I am certainly of that opinion.

Mr. George Thompson examined.

2388. (*Chairman.*) What is your name?—George Thompson, junior.

2389. What is your occupation?—Shipowner and merchant.

2390. How long have you been connected with the port of Aberdeen?—40 years.

2391. To what parts of the world have the vessels traded in which you have been chiefly interested?—To all parts of the world.

2392. Have you at present any vessels trading to the Baltic?—None at present. I have interests indirectly. Some of our local companies have their vessels in the Baltic. This class of vessels now are larger than those which go to that particular quarter of the world.

2393. Have you any in the American trade?—Yes.

2394. And these vessels go north about?—Yes.

2395. Have you as a shipowner any desire for a harbour of refuge to the north of Aberdeen, with a view to the safety of your vessels which trade to America?—I am of opinion that a large harbour of refuge as contemplated by the Select Committee is not necessary upon this coast, in the district indicated between the Pentland Firth and the Firth of Forth. I feel diffidence in expressing this opinion, seeing it is so very opposite to a great mass of evidence which I find in the reports recently published; but still, having the opinion strongly, I wish fairly to give it before the Commissioners. And the reasons I should give are these: If a vessel or vessels are caught with a gale of wind on the east coast, she has, if the wind is from the south, the Moray Firth to run to. If it is a gale from the north, she has the Firth of Forth to run to, both natural and excellent harbours of refuge. And there is therefore really no necessity for expending a large sum of public money for a harbour of refuge in the district to which your inquiry presently extends. That appears to me very palpable from my own observation and experience over a long period of years; and also, I think, by glancing at the wreck chart which is at the end of one of these reports, you will find how very few wrecks there are in this district, the numbers being exceedingly few in com-

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parison to those other districts of coast in the United Kingdom, for which undoubtedly harbours of refuge are in many places very necessary. I may go on further to state, that if a large sum of public money is to be expended it would, in my opinion, be much more profitably expended and realize more entirely the views of the Legislature, which are to save life and property—it would, I say, tend more effectually to secure this desirable end if it were expended in improving the existing harbours within the district, which is now under our notice. I may further state that if other views prevail, as in all probability they will, that a harbour of refuge of an imperial kind should be placed in this district, then I should hold decidedly that Aberdeen is better entitled, from its local position, from the amount of its trade, from the great facilities which it would afford for repairing vessels coming in in distress, and from a variety of other circumstances, that it is imperatively more necessary that the harbour should be placed in one locality, although I think again, as I said, that I see no occasion whatever; but in the event of its being determined that public money is to be expended, assuredly Aberdeen should be the spot.

2396. You have stated to the Commissioners very clearly your opinion on the subject of harbours of refuge, viewing them in the light of the means of saving life and property, as I understand, from stress of weather?—Yes.

2397. Will you state to the Commissioners how you view the question, if you have ever considered it, of harbours of refuge as ports into which vessels may go for the purpose of saving themselves from the wear and tear which their thrashing about at sea with a foul wind, in bad weather, entails upon them?—I should think the Government of this country would never contemplate the idea of placing or constructing a harbour of refuge upon any coast for the mere purpose of saving the wear and tear which a vessel under canvas would have to sustain, by having to run back 50 or 60 miles where she would have a national harbour of refuge. It would be a preposterous expenditure of public money. It would only be a very trifling saving of the small distance the vessel had to run.

2398. What importance are you disposed to attach to the loss of time which would be entailed by a vessel running back, as you have stated, some 50 or 60 miles to leeward?—In a voyage to America it is not of very great importance, or a voyage to Archangel, or even a voyage to the Baltic, because we do not expect a vessel to arrive at her time as a steam-boat does, or at any specific hour of the day; and I state generally that a slight detention of a day or two upon an American voyage, or even a week or two, is not reckoned of any great importance.

2399. How should you be disposed to view the question of those harbours of refuge as bearing upon that feeling of honour which a captain in the command of a large ship would naturally feel in keeping the sea, and endeavouring to make his passage good in bad weather?—Perhaps the question is not altogether clear.

2400. I imagine that if one of your captains came to you and said that he had put into a harbour of refuge, having encountered a very strong foul wind, you would hardly be disposed to hold him in the same estimation as a seaman and as the commander of a ship, as one who came to you and stated that he had kept the sea with the view of endeavouring to make his passage?—That, of course, would depend upon my estimate of the captain's judgment. I should say that it would be much better to put into a harbour of refuge than to encounter the loss of the vessel. But assuredly, if he was a man of judgment, as he ought to be, he would know whether he could go on his voyage or not, and therefore if he had gone into a harbour of refuge when he should have gone on his voyage, I should have censured him, unless it had been a matter of absolute necessity that he should have done so. I should rather have my vessel in a harbour of refuge than be lost for a want of judgment in a master not taking it when it was essentially necessary to do so.

2401. (*Mr. Lindsay.*) I have a very great respect for your opinion upon all shipping questions, and I would like to have your ideas as to what constitutes a national harbour of refuge. Do you understand a national harbour of refuge to mean a harbour, which ships of all sizes can take at any time of the tide, and there anchor in safety from the prevailing winds which blow upon that particular coast?—Certainly.

2402. Well then, if that is your opinion, from your own knowledge of Aberdeen, do you think that Aberdeen could be converted into such an harbour?—I have been told by eminent men, engineers, that it could. Of course this engineering question is not one that I feel competent to answer, but I think that Mr. Abernethy, who was resident engineer at Aberdeen for many years, can give his evidence on that point, and, if I mistake not, but I may mistake, I think that Captain Washington, a member of the present Commission, was of that opinion, but I may be mistaken. I am referring to a period of eight or ten years ago, when some inquiry was instituted here.

2043. You are a large underwriter, Mr. Thompson? Yes.

2404. Do you make any difference in the premium of insurance for ships bound to America going through the Pentland Firth?—None whatever.

2405. Do you, as an underwriter, and as one deeply interested in shipping, as a shipowner, consider the passage of the Pentland Firth a dangerous passage for ships to take?—Dangerous, assuredly, to those not acquainted with it, but by our men on this coast, and those who are acquainted with it, it is not deemed extremely dangerous.

2406. Do you remember having had to pay, as an underwriter, any losses upon ships which suffered damage or were lost in going through the Pentland Firth, or in entering any of the natural harbours of refuge amongst the Orkney Islands?—I have once or twice, over a period of 30 or 40 years.

2407. And now, say that the Government considered it advisable to have one national harbour of refuge to the north of Aberdeen, which point would you consider—Peterhead, Wick, or Fraserburgh—best for the construction of a national harbour of refuge?—I should give my opinion again with great submission, that I consider no harbour of refuge necessary, for the reasons I have already given, and that if a large sum of money is to be expended, a harbour of refuge could be made at Aberdeen, which would be better fitted for the east coast generally than at either ports you mention. Peterhead is a salient point of the coast. When a vessel is caught in a gale of wind there she has no difficulty whatever; she has either to run to the right hand or to the left. But caught opposite Aberdeen, with a gale from the north, it is rather different. I hold that Aberdeen, as equidistant between the Pentland Firth and the Firth of Forth, is a better point for a sum of money to be expended, in my view, as a shipowner, than either Wick, Peterhead, or Fraserburgh.

2408. But though exceedingly glad to have your opinion on these general points—for it is an opinion which I, for one, very much respect—yet at the same time, should the Government arrive at the conclusion that it is advisable to have a harbour of refuge to the northward of Aberdeen, which of these three points that I have named would you consider the best?—It would appear to have a double object in regard to Wick, to protect the herring fishery, which I think is essentially necessary. The Board of Fisheries are prepared to lay out 40,000*l.* or 50,000*l.* for the improvement of Wick harbour, specially for the protection of the herring fishery, which is a most desirable object, and I believe that is only kept in abeyance till they know what course of action the Government is to take, if I mistake not.

2409. Do you know much of Wick; that is to say, the bay of Wick?—I know very little of it.

2410. Then I will not trouble you upon that ques-

tion, as to whether you think Wick is suitable for a great harbour of refuge or not; but I may ask you one thing. You say that vessels caught with a gale of wind near to Peterhead, bound north, have the Moray Firth to run for?—Bound south, if they were caught in a gale from the east, they have the Moray Firth to run for.

2411. But it is somewhere about 95 miles from the Pentland Firth to Cromarty?—But it does not follow that the vessel will be exactly on the point of the Pentland Firth. There is a great deal of intervening distance, and, as I have already remarked, it is nothing for a vessel to run back a matter of 50 or 60 miles. To run for a national harbour it is not sufficient for the sake of doing this to save a sailing vessel running back a few miles to a safe harbour, when the erection of such a harbour would undoubtedly entail an additional taxation on shipping.

2412. But the distance from the point of Peterhead to Cromarty Firth is 95 miles, consequently the distance a ship would have to run could not be less than that, and it might be a great deal more if she was caught with a south-east gale 30 miles off the coast. She would then have 125 miles to run. Besides, Cromarty Firth has been described to us as an awkward place for a ship to run for, on account of the variable winds which prevail in the bight of the bay, and the difficulty of ships getting out of it. Have you from your experience felt that?—Quite the reverse. It is a well known fact that all our vessels do run for it. You will see 50, 60, or 100 vessels wind bound at Cromarty at any time. They get to it quite easily and leave it quite easily. I have never heard of any difficulty. I may just mention the fact that at last fall, one of our largest Aberdeen vessels, called the *City of Quebec*, was obliged to take refuge in the Cromarty Firth, when she came back to the south, and had to be there till she came to Aberdeen. The *City of Quebec* is a vessel of 600 tons.

2413. You said you were decidedly of opinion that though a great harbour of refuge was not necessary on the north-east coast of Scotland, there were other places where national harbours of refuge ought to be made; could you name the places?—For instance there is the Tees harbour, Hartlepool, in the direction where I should think it very necessary, because the amount of traffic on this district of coast from the Pentland Firth to the Firth of Forth, is very little in comparison with the great traffic that there is round the coast of England and the west coast; and I again refer to the wreck chart as evidence on these points; and I say again, my opinion is that the estimate for Peterhead, which is 335,000*l*., —very likely to end in double that sum, or perhaps a million, if it is gone into with proper spirit—I say that that money would be infinitely better expended by the Government, because it would more effectually realise the great object in view, namely, the saving of lives and property, if it were expended in the improvement of the existing harbours, so as to put them in a position that vessels could run to them at all states of the tide.

2414. Then it is your opinion that life and property would be better protected if the sum you named, 330,000*l*. for the north-east coast of Scotland, were spread over the various harbours along that line of coast, so as to improve those harbours and make them accessible to the vessels generally frequenting that particular part of the coast, at all times of the tide and in all gales of wind?—Decidedly; because I look on this district of coast from the Pentland Firth to the Firth of Forth to be exceptional to the state of the other parts of this country, having really excellent natural harbours of its own—the Moray Firth and the South Firth, and having such a comparatively small number of vessels upon these shores that it is rather exceptional to the general question of harbours of refuge in the other parts of the country which are much more frequented by vessels, and where the trade is to a much larger extent.

2415. (*Capt. Vetch.*) I think you mentioned that a good many vessels have traded to America?—Yes, a few.

2416. Will you tell me what part of the voyage between this and America you consider most difficult and dangerous?—There are two places, the Gulf of St. Lawrence and the Pentland Firth. Perhaps some shipmasters who may be brought upon evidence may be better qualified to answer that question; but still that is my opinion of the matter.

2417. (*Chairman.*) I think you stated in a former part of your evidence, that though of opinion that a national harbour of refuge is not required on the north-east coast of Scotland, you are of opinion that it is required on the east coast of England?—Yes.

2418. Have you formed any decided opinion as to the exact locality which would be desirable for such a harbour of refuge?—I should not like to speak with confidence on that point, although I think the neighbourhood of the Tees, or something in that direction, might be a proper place, but not having directed my attention strictly to the subject, I should be very unwilling to express anything like a very confident opinion. Parties in the locality will be much better able than I could possibly be to offer an opinion of value upon that subject.

2419. It is perfectly true that in one sense parties residing in that part of the coast may be able to afford an opinion of greater value; but I should be disposed to attach very great value to your opinion on that subject, who must naturally be totally free from all bias arising from being resident in that part of the country. And therefore, if on reconsideration you feel disposed to offer an opinion on the subject, I shall consider it of value to the Commissioners.—I should not wish to give a very emphatic opinion as to any precise locality, but that a harbour of refuge of a national kind would be desirable on the east coast of England between the Fern Isles and Flamborough Head, there can be no doubt.

2420. Have you read the Report of the Committee of the House of Commons on that subject?—I have glanced at the Report, but more particularly to that part of it relative to our own locality.

2421. It will probably be in your recollection that the Committee have divided their report into several sections, in which they discuss the question as it relates to different districts on the coast of Great Britain and Ireland?—Yes, I have observed that the report is so divided.

2422. Would you give the Commissioners the advantage of your opinion as to the necessity of national harbours of refuge in any other districts besides that to which you have already alluded on the east coast of England?—I feel great diffidence in offering an opinion upon that point, but from the immense amount of property and life invariably exposed to danger upon the east coast of England, and the west coast, and all in that direction, I should think it extremely desirable to have such harbours where they would be favourably situated for refuge to vessels in distress.

2423. (*Mr. Coode.*) Were you residing in Aberdeen in 1852?—Partly in Aberdeen, partly in London.

2424. Do you remember a number of vessels being driven here from the east coast of England in the month of December 1852 in a gale?—I have a faint recollection of that being the case.

2425. Is your recollection pretty distinct?—Not pretty distinct; but I have some recollection of the circumstance you refer to.

2426. Do you think there were as many as 60 vessels being driven?—Yes, I recollect our harbour being pretty full of vessels windbound at that period.

2427. Do you know what point they had reached when they were driven back?—I cannot exactly say; some point, in all probability, between Newcastle and London. It was a great fleet of colliers, I think, chiefly which were driven on our shore at that time.

ABERDEEN.

Mr. W. Hogarth.

2 Sept. 1858.

Mr. WILLIAM HOGARTH examined.

2428. (*Chairman.*) What is your name ?—William Hogarth.

2429. What is your occupation ?—Merchant and salmon fisher.

2430. How long have you been connected with the port of Aberdeen ?—I have been in business since 1821.

2431. In what trades are the vessels chiefly employed in which you are interested ?—In carrying salmon from all the north ports of Scotland to London till within the last four or five years, when the railways and steamers have taken the place of sailing vessels.

2432. Then at present you have no pecuniary interest in shipping ?—Yes, I have vessels trading from the west coast of Scotland just now to Aberdeen.

2433. And these vessels necessarily go north about ?—Always.

2434. What sized vessels, generally speaking ?—Cutters of 20 to 70 tons.

2435. Are you desirous of a harbour of refuge to the north of Aberdeen for your vessels ?—No ; for the reason that perishable cargo is strictly forbidden to go into any port on the voyage. The master would be dismissed for doing so. He is obliged to keep the sea.

2436. Have you formed any opinion with respect to the necessity of such a harbour for vessels which are not engaged like yours in carrying perishable cargo ?—It depends on what part of the coast you mean to apply it to.

2437. To the coast between Aberdeen and the entrance to the Pentland Firth ?—I know the coast intimately, and I do not see any necessity for a harbour of refuge. Cromarty is a sufficient harbour of refuge.

2438. Do the masters of your vessels entertain any apprehension of navigating the Pentland Firth in bad weather ?—I can speak for myself only. I am an old yachtsman, and have been at the sea for the last fourteen years. I have been twice round the island. I entertain no apprehension, and would not put myself out of the way of it.

2439. You are aware of the strong tides which exist in the Pentland Firth ?—Perfectly.

2440. Do you consider them to be any difficulty in navigating the Pentland Firth ?—Yes ; if they are against you.

2441. And as respects endangering the safety of your vessels in heavy weather from the south-east, how do you view them then ?—I would not come through the firth then, I would go into Longhope or Widewall, or some of the other fine anchorages in the Orkneys.

2442. But with a heavy gale from the south-east, and a flood tide, how could you reach Longhope ?—I am presuming that I am to the westward of the Firth when I answer the question. I would lay the vessel to if I were on the east side, and wait till the tide turned.

2443. You have been in the anchorage of Longhope ?—I have been in it many a time.

2444. What is your opinion of its facility of access ?—It is much improved now by the lighthouse which is placed upon it. A vessel can take it now with more ease.

2445. You stated you were considerably experienced as a yachtsman ; what would be your opinion of the captain of any merchant ship who, having a chart of that description (*showing the Admiralty Chart, No.* 2581, *of Longhope*), told you that never having been previously at the anchorage of Longhope he was afraid to run into it by that chart ?—He has no occasion to be afraid of it if he has his chart. It is the easiest taken port I know. The ground is clean on both sides, and there is no risk at all.

2446. Have you ever known ships in strong north-west gales to drive out of the anchorage of Longhope ?—I have known of ships' anchors fouling by the quantity of weed in it. They did not give them chain enough when they dropped the anchor. It depended on the carelessness of the master if he dragged. If he gave chain enough there would be no fear of the ship driving.

2447. Is it of frequent occurrence, vessels driving out of the anchorage of Longhope in bad weather, to the best of your knowledge ?—To the best of my knowledge it is not of frequent occurrence.

2448. Do you consider that the anchorage of Longhope and the others in the Orkney Islands supersede the necessity of any harbour of refuge at Wick for the passing trade ?—I do. Ackergill Bay is the finest anchorage near to Wick. No vessel would think of coming near Wick unless the wind is only one point of the compass. That is the nearest anchorage to Wick. Then we have the Pentland Firth, a fair wind if they are going to the westward. Ackergill Bay is a beautiful anchorage.

2449. Have you ever been at Wick during the fishing season ?—Oh yes. I fish the bay of Wick for salmon as a business, so that I know it very well.

2450. What is your opinion as to the necessity of a harbour of refuge for the very large number of herring boats which resort to the bay of Wick during the fishing season ?—It would be of great advantage to the herring fishing ; there is no question about that.

2451. (*Capt. Vetch.*) I think your trade is at present in vessels from the West of Scotland to Aberdeen ?—Yes.

2452. Do you find that the Orkney Islands are rather peculiarly stormy at certain seasons of the year ?—I think the Orkney Islands are an excellent place for ships to take shelter.

2453. I speak not of the islands but of the weather in that part ?—No ; I do not think it is a bad climate.

2454. Not worse than other parts ?—No.

2455. Then would you tell me what, in your voyages from the west coast through the Pentland Firth to Aberdeen, did you consider the most dangerous part of the navigation in stormy weather ?—I did not like Cape Wrath very much. We are a long way from any roadstead on both sides of the Cape. There are very strong tides on the Heads, and no anchorage near it on both sides.

2456. You are aware that there are tides from nine to ten knots an hour running through Pentland Firth ?—I know it for a fact.

2457. You do not consider that circumstance would be any difficulty in stormy weather ?—No, because a vessel need not go through the Firth unless she please. They may go into any of the roadsteads in the Orkneys if they do not choose to go to the westward.

2458. But still they would be prevented going through ?—Oh yes.

2459. They could not always take it ?—If it were blowing heavy from the westward, that moment you get to the Island of Stroma you meet a very heavy sea from the westward. The vessel could not proceed westward, of course, from the wind. Therefore she would take the shelter of Longhope till the wind changed.

2460. Still, the circumstance of the tide running at that rate is a difficulty, and under these circumstances might create great danger ?—If the weather was bad the vessel does not pass to the windward among the islands, but passes to the leeward and into Longhope.

2461. It would require a person well acquainted with the navigation to avoid these rocks ?—If the master does not know the rocks there the tides of the Pentland Firth will carry him clear of everything. No man that has been once through the Pentland Firth requires to take a pilot again. His tide table is a sufficient guide for him.

Mr. HENRY ADAMSON examined.

2462. (*Chairman.*) What is your name?—Henry Adamson.

2463. And your occupation?—Shipowner and underwriter.

2464. How long have you been connected in these capacities with the port of Aberdeen?—As a shipowner I have been for the last 30 years, and as an underwriter for the last 18 years.

2465. In what trades are the vessels chiefly engaged in which you are at present interested?—In India, Australia, and South America.

2466. Do any of the vessels in which you are interested take the passage north about?—My vessels invariably go south about.

2467. Do they sail out of the port of Aberdeen?—The vessels that I built here, in Aberdeen, generally go from this to London or Liverpool, and very seldom return again, except when they require repairs, when they are brought back to Aberdeen for that purpose.

2468. Have you ever had an interest in vessels trading to the Baltic or to North America?—I had, in the early period, when I commenced ship-owning, vessels in the Baltic, but never any in the North American trade.

2469. Have you turned your attention to the subject of the present inquiry?—Yes, I have given it a little consideration.

2470. Will you state to the Commissioners what your opinions are with respect to a national harbour of refuge on the north-east coast of Scotland?—I am very much of the same opinion as has been stated before the Commissioners on this occasion, that we do not stand in want of a national harbour of refuge here very much, in so far as now we have a very different class of vessels from what we had formerly. Vessels that are able to keep off the shore when overtaken by a heavy gale of wind; and in the second place, our coast is so much better lighted up now, whereby I think, to a certain extent, a national harbour of refuge on the east coast of Scotland might be considered superseded, keeping in view that we have a very safe roadstead in Cromarty, where our vessels, in very bad weather, can run to, and also the Firth of Forth, and they are both perfectly safe.

2471. Do you attach any importance to the difficulties of navigation attendant on the tides in the Pentland Firth?—I am not certainly so very conversant with that. I never had my shipping sailing in that direction, but I am led to understand that the tides run through rapidly and that there is a danger to a certain extent, more particularly to shipmasters who are not so very well acquainted with the navigation of it. They consider it rather a difficult passage to make, although at the same time it is not the opinion of our nautical men, masters of vessels here, that the passage is by any means difficult. They would take it, in my opinion, sooner than they would go south about and down the English Channel.

2472. Have you ever underwritten vessels going north about?—Yes, to America frequently, from round to Ireland and Liverpool—all directions.

2473. Have you been in the habit of requiring any extra premium on ships that you have underwritten which pass through the Pentland Firth?—No, never.

2474. Have you ever had to pay upon losses incurred by wrecks or other accidents to vessels which you have insured passing through the Pentland Firth?—I have not; but my memory does not serve me to remember, never having paid a single loss of vessel passing through the Pentland Firth.

2475. Are you acquainted with Wick?—I know a little of it, having gone down by the steamer.

2476. (*Sir Frederic Smith.*) As an underwriter, would you be disposed to diminish the premium on vessels going north about, if a harbour of refuge were made either at Peterhead, Fraserburgh, or Wick?—I certainly would not.

2477. Would you be disposed to diminish the premium, if a harbour of refuge were made on the north-east coast of Scotland, to vessels coming south about?—No.

2478. In neither case?—In neither case.

2479. Do you know enough of Peterhead and Fraserburgh to be able to give an opinion as to the relative merits of those two places for a large harbour?—I do not think either of them, in my opinion, are suitable for a harbour of refuge at all.

2480. Neither the one nor the other?—Neither the one nor the other.

2481. (*Mr. Lindsay.*) As a large underwriter, would you reduce your premium in any way on vessels trading between London and Aberdeen, or on vessels from London going to the Baltic ports, or going to Archangel, if there were a harbour of refuge situated somewhere between Flamborough Head and the Fern Islands?—If it was the winter season of the year, I would make a little difference certainly.

2482. (*Chairman.*) Have you formed any opinion as to the proper site for a harbour of refuge on the east coast of England?—No, my attention was more directed to the east coast of Scotland, between the Firth of Forth and the Pentland Firth; and I think, if it should be resolved upon to have a harbour of refuge, I consider that Aberdeen is the most centrical point between the two, and it is here where it ought to be.

2483. I think you have stated, in a former part of your evidence, that you consider Peterhead and Fraserburgh to be both unfit sites for a national harbour of refuge?—Yes.

2484. Will you be good enough to state you reasons why for each place?—The distance, in the first place, between Peterhead and Fraserburgh is very little, and in the second place, when a vessel once gets as far as the Buchan Ness, she must be a very bad found ship indeed if she cannot reach the Moray Firth so as to take her up to Cromarty. And then, again, if the vessels are taken so as they come lee around, they can then reach the Firth of Forth upon the other hand. These are my views and opinions with regard to both these harbours.

Captain LESLIE examined.

2485. (*Chairman.*) What is your name?—George Leslie.

2486. What is your occupation?—Shipowner now, but lately shipmaster.

2487. How long have you been a shipowner?—About 40 years.

2488. How long were you at sea as a captain of a vessel?—I commanded a vessel for upwards of 20 years.

2489. When you commanded a vessel, in what trade were your vessels chiefly employed?—Sometimes in the Baltic, Mediterranean, but coasting particularly.

2490. Where were your coasting voyages chiefly to?—On the east coast betwixt this and London. *Capt. Leslie.*

2491. And on the north coast, from Aberdeen to where?—Through the Pentland Firth to Inverness, Cromarty, and so on.

2492. State your opinion as to the difficulties of the navigation of the Pentland Firth or otherwise?—I think Mr. Hogarth described that pretty clearly, perhaps fully better than I could do, because I have not passed through these 40 years. I think what he said is evident, and it is pretty clear that I could not say anything to give more light upon it.

2493. When you commanded a ship to the Baltic,

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did you ever return home late in the year?—Sometimes.

2494. About what time of the year?—In October and November.

2495. What are the prevalent winds in the North Sea at that period of the year?—They prevail principally from the north and north-east.

2496. A fair wind, I presume, across from the Naze to Aberdeen?—Yes.

2497. Would you therefore be disposed to say that ships returning from the Baltic in the fall of the year generally bring a fair wind across with them?—They generally do. The gales are in the fall of the year, when they prevail from the west, and are such that the vessels cannot leave the Sound, and they must wait for a fair wind in the fall of the year. They cannot go with a westerly wind.

2498. In coming across from the Baltic, is there any particular part of the coast which you prefer making in preference to the rest?—It would entirely depend upon the state of the wind. If the wind were hanging from the north, I should try to make the Buchan Ness, and from the south, as near Aberdeen as possible, having such a good light as at the Girdleness Lighthouse—a light that we can see in a clear night 30 miles off.

2499. What is your opinion as to a harbour of refuge on the north-east coast of Scotland?—I am decidedly of opinion with the parties that have already been examined. I do not see the necessity of it. It would be of great benefit to the fishing vessels which frequent the east coast; but my opinion is, that it would not be of general utility to the shipping going along the coast.

2500. Supposing it should be decided to construct a harbour of refuge on this district of the coast, which of the three places—Wick, Fraserburgh, or Peterhead—would you be disposed to recommend for the purpose?—I have no hesitation in saying that if it were to be erected, Peterhead has decidedly the advantage of the others.

2501. Will you state your reasons?—I do not think there is space in Wick for a harbour of refuge. I know it very well. I do not think it would hold a sufficient number of vessels in a gale of wind, were they to take it, and the place is very narrow. Then I consider it to be of very little use at Fraserburgh, because it is just the entrance to the Moray Firth; it would be of very little use there. If vessels were off Fraserburgh, and taken with an easterly gale of wind, they would decidedly run for Cromarty. It is one of the finest harbours to take on the east coast. It has two prominent hills on each side of the entrance.

2502. (*Capt. Vetch.*) I think you said you were well acquainted with Wick?—Yes.

2503. You are aware, I presume, that it is the resort of a very large number of fishing boats?—Yes.

2504. Which do not belong to the place itself?—Yes, I am aware it is a plentiful fishing station, and if anything could be done to save the lives of the fishermen it would be certainly a very good accomplishment indeed.

2505. Should it be decided to expend a certain amount of money on the north-east coast of Scotland, with the more specific purpose of saving life and property, how would you be disposed to view the claims of Wick for selection, bearing in mind the large number of fishermen who, during the fishing season, resort to it?—Well, that is more an engineer's question; but if anything could be done to make it more safe for the fishing boats, and not at a heavy expense, I certainly do approve of something being done.

2506. You have mistaken entirely the purport of my question; it is not at all an engineering one. There are a very large number of fishermen who, during the fishing season leave the Bay of Wick every evening; and as you must be aware, have little or no shelter at that place in the event of a heavy easterly gale coming on. Now, supposing that it is decided to spend a considerable sum for the purpose of saving life, where would you be disposed, to spend it of the three ports—Wick, Fraserburgh, and Peterhead?—I should say Wick for that purpose.

2507. My last question referred to life solely; how would you view the question further as relates to property?—I should say that when property can be saved, there is little risk of the lives being lost. If means could be adopted to save the property, there would be very little risk of losing the lives. If the harbour could be made in such a way that the boats could come in at all times of the tide and wind, it would be the means, I dare say, of saving many lives.

2508. (*Sir Frederic Smith.*) As a shipowner, would you consider it a great hardship to be obliged to pay a passing toll for the maintenance of any of the harbours proposed?—I should consider it a hardship to pay a toll for any harbour of refuge north of this.

2509. (*Mr. Lindsay.*) Would you consider it just to pay a passing toll if the Government decided on voting a sum of money to make Aberdeen a harbour of refuge?—Oh no.

2510. Would you not consider it unjust to the shipping interest as a whole to ask them to subscribe towards a harbour of refuge at this particular spot?—I do not think it, because there is no other harbour on the north-east coast equal to Aberdeen harbour. If you look at the amount of water we have got, and the docks which we have for the accommodation of shipping, I think it is the only place in the north of Scotland for a harbour of refuge.

2511. But if another place on the east coast of Scotland could be found where a better harbour of refuge could be made for the same sum of money than could be made at Aberdeen, would you in such a case as that consider it unjust for the shipowners to be called upon to pay passing tolls?—Not at all, but reasonable.

2512. I want your opinion, from your experience, on one point. Say that Government decided to spend 300,000*l.*, with the object in view of saving life and property, and affording greater facilities to commerce, whether do you think that 300,000*l.* would be better spent at one particular spot between the Firth of Forth and Duncansby Head, which includes Aberdeen, than divided amongst the various harbours within the limits I have named?—My opinion is that it would be much better divided. It would improve other ports to divide the money, and you would have a benefit to it, as well as to any other port.

2513–14. Then you think that the expenditure of 300,000*l.* by such means as these would tend more to save life and property, and afford greater facilities to commerce, than the spending of that one sum on any one particular spot?—I am decidedly of that opinion.

Mr. THOMPSON re-examined.

Mr. Thompson.

2515. (*Chairman.*) You are acquainted with the large number of fishermen who resort from different parts of the coast to fish at Wick?—I am not acquainted with it, but I am aware of the fact.

2516. Now, supposing that the Government determined to spend a certain sum of money for the purpose of saving life, taking into account the large number of fishermen who resort to Wick for a period of about twelve weeks, with the great risk to which they are exposed, in a heavy easterly gale, from the insufficient refuge which that harbour affords to them, of the three places, Wick, Fraserburgh, and Peterhead, where would you recommend that sum to be spent?—I should recommend it decidedly to be spent at Wick. I think that the Government would be doing a very good thing, and with the Fishery

Board's 50,000*l.*, together with their own 50,000*l.*, they would make a complete harbour at Wick for the accommodation and protection of the fishermen who assemble there from many quarters of the island.

2517–19. (*Mr. Lindsay.*) Say that it is decided to make harbours of refuge along the whole coast, both the north-east coast of Scotland and east coast of England, and other parts, do you consider that that sum ought to be taken from the Consolidated Fund, or raised by means of a tax in the shape of a passing toll or otherwise, upon the shipping interest? — Decidedly taken from the Consolidated Fund; but I trust that a large sum of money will not be expended by the Government in regard to a great harbour of refuge on the east coast of Scotland, because it is not required.

Mr. Adamson re-examined.

2520. (*Chairman.*) You have heard the last question I put to Mr. Thompson?—I have.

2521. Will you give the Commissioners your opinion on that special point? — I am decidedly of the same opinion as Mr. Thompson. With regard to Wick, if there is a sum of money to be expended there, it ought to be purely from the large number of boats during the fishing season that are congregated there; and I know that there is scarcely a season passes but what there is a great deal of loss of life and property at the same time, in consequence of not having sufficient accommodation.

2522. (*Capt. Vetch.*) I suppose you are aware of the fact, that at present the fishing boats at Wick are often prevented from going out to sea, from the apprehension of being driven on shore and being incapable of finding refuge?—Yes; I have heard that stated.

2523. As the consequence of that circumstance, they were very often deprived of a good night's fishing, when if they had had a place to run to, they might have gone out. Would that be an additional motive for providing security there?—Most assuredly.

Mr. Walter Hood examined.

2524. (*Chairman.*) What is your name?—Walter Hood.

2525. What is your occupation?—Shipbuilder.

2526. How long have you been connected with the port of Aberdeen?—Altogether I have been about 40 years.

2527. Have you considered the Report of the Committee of the House of Commons relative to the subject of our present inquiry?—No; I have not.

2528. Have you considered the question of a national harbour of refuge on this district of coast?—I do not consider that there is any great necessity for a harbour of refuge here, such as we are to have.

2529. Will you state your reasons for that opinion?—I think it would be much better to improve the present harbours so as to deepen them, that a vessel could get in at low water.

2530. (*Sir Frederic Smith.*) Are you at all aware of what the cost would be of deepening the existing harbours so as to take in vessels at all times of tide?—I am not.

Captain A. Somers examined.

2531. (*Chairman.*) What is your name?—Andrew Somers.

2532. What is your occupation? — Shipowner, formerly shipmaster.

2533. How long have you been at sea?—19 years.

2534. For what period a shipmaster?—12 years.

2535. In what trade were the vessels employed which you commanded?—The North American trade.

2536. Did you pass North about through the Pentland Firth?—Yes; in coming to Aberdeen or the Firth of Forth.

2537. State to me your opinion of the difficulties or otherwise of the navigation of the Pentland Firth.—I cannot say but what at some periods of the tide there is a difficulty in the Pentland Firth, but generally speaking, the difficulties of the Pentland Firth were not considered great by the masters of vessels in the North American trade. We generally did not take pilots either going through or coming. Of course, in a very heavy gale of wind, with the tide against the sea, it would not be prudent to go through the Firth, but on the whole, the navigation is perfectly safe with a good chart; at any rate, in my day, and that is about 16 years ago, and I suppose there are better charts now.

2538. State to the Commissioners your opinion of the harbour of Longhope in the Orkneys.—I consider the harbour of Longhope a very good harbour. I have been in it often, and that was when there was no light. Mr. Hogarth observed that there was a light upon it. I am not aware of that, not having been there recently, but during my time there was no light. But we found that there was no difficulty in getting into Longhope, with the exception, I would say, of a south-east gale of wind perhaps, and a strong flood tide, but then the vessel should be kept to west-north-west, with the flood particularly, till the tide eased, but she could come round eastward to the Orkney Islands for the Rostock. There are many good harbours in the Orkneys.

2539. You see that chart of the Pentland Firth and the Orkneys (*showing Admiralty Chart No.* 2180)?—Yes.

2540. Supposing you had never been in the anchorage of Longhope, and you were in possession of a chart of that description, would you have any difficulty in running for it?—I should say not by attending to the tide.

2541. Can you give me any opinion as to what would be the feeling of your brother captains on the same subject?—I think the feeling of my brother captains on the same subject out of Aberdeen is the same as mine generally. I do not know, though; perhaps not. Their feeling as to its being a safe harbour, I think, would be the same as mine. I should say so. A very good anchorage. No one particular part off Longhope. That is, perhaps the east end is choked up with weed, as was observed before, but if you go far enough up Longhope, you may lie there with one anchor down, blowing hard, and with plenty of scour cable. I have been there over and over again. We might have let go a second anchor, but very seldom.

2542. You have mistaken the purport of my question?—Suppose that I placed that chart in the hands of a captain who had never been at Longhope before, do you think, so far as you are acquainted with the opinions of your brother captains, that generally speaking they would be indisposed to run for Longhope with the assistance of that chart?—I do not think it, if the weather was so clear that they could see land.

2543. (*Capt. Vetch.*) I think you stated you have been frequently through the Pentland Firth?—Yes.

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Capt. Vetch.

2544. And you stated you have been frequently in the harbour of Longhope?—Yes.

2545. Will you tell me the object of your going into that harbour?—The object in going into it was, coming from North America in the fall of the year falling in with a south-south-east and a south gale, with a timber-laden vessel. I am bound out to Quebec sometimes with a very heavy westerly gale. We generally go into it as seldom as possible, because we wish to keep out, and try to make our passage, which we consider better. Still we consider it a very good harbour.

2546. If there were any peculiar tides in the Pentland Firth more than elsewhere, would you have been in the same necessity of so frequently putting into Longhope?—But then I did not have adverse tides. It was more with gales from the westward or eastward, with clear tides, that we were obliged to go in there; our vessels not being able to beat for the westward or south-eastward. It was not in consequence of the tides at all that we had to go into Longhope, certainly not.

2547. Then vessels do not go into Longhope on account of the particular run of the tide at the time?—I do not think that there is any necessity for that. It was merely as a wind-bound harbour that we went into Longhope.

2548. (*Chairman.*) State your opinion as to the necessity of a harbour of refuge to the north of Aberdeen up to the Pentland Firth.—I object to the three large harbours of refuge that are proposed; and my reasons are, that Wick is so near the Pentland Firth and the harbour of Longhope, that there is no necessity for it as a general harbour of refuge. The Pentland Firth itself is an outlet independent of Longhope at that quarter. It is at the northern extremity of the north-east coast, and could be got through supposing that we were not to get into Longhope. Then there is also Cromarty, which is a very safe harbour, although a little to the westward, and of very easy access, so that I think Wick is perfectly objectionable. Then Fraserburgh and Peterhead are objectionable also from the part of the coast that they are situated in; as in a gale of wind from east-south-east or east in that quarter, which are the most serious gales that we have, they do the most damage on this coast, a vessel can either go to the Firth of Forth from Peterhead with the wind that way, or she can go up the Moray Firth. The extent of coast there, from Buchan Ness to Kinnaird Head, is perhaps about 25 or 30 miles, but I may be wrong in that, for the coast, in going to the north, goes a little west, then goes to the west out of Fraserburgh. I consider the most dangerous part of the north-east coast of Scotland to be between the Buchan Ness and Fife Ness, that is the north side, I think, of the Firth of Forth. That is the most dangerous part, and with a south-east-and-by-south gale, about midway on that coast, it is very difficult, and sometimes impossible, for a vessel to get either north or south. Now Aberdeen is not far from midway; it is to the north of that perhaps about 15 or 20 miles, and is a very important harbour. Could it be made much more accessible than it is, although not bad as present, still it might be made accessible for vessels at low water, that presently have to come at high water, I should suppose; but I do not think, on the whole, that a general harbour of refuge is necessary, but about that point of the coast I should say that it is very important to have a good harbour.

2549. Have you commanded a ship from the Baltic?—Never.

2550. To Archangel?—Never.

2551. Now, suppose the Government determined to spend a certain sum on a harbour in this district of coast, taking into account the life and property exposed to risk in the fishery at Wick, at which of the three places, Wick, Peterhead, and Fraserburgh, do you think it most desirable that it should be spent?—I should say Wick for that purpose. Although I am not exactly acquainted with the harbour of Wick, I have been often past it, and am aware that there are a great number of boats exposed there very much.

2552. (*Mr. Lindsay.*) Were you supposing the case of a vote of money to make a harbour at Wick sufficient for the fishing boats, or a national harbour of refuge?—Merely for the fishing boats.

Captain MORGAN examined.

Capt. Morgan.

2553. (*Chairman.*) What is your name?—John Morgan.

2554. What is your occupation?—An old worn-out shipmaster for nearly the last fifty years.

2555. In what trade did the vessels sail chiefly which you have commanded?—I have sailed in vessels in the coasting, Baltic, Archangel, and American trades.

2556. Have you ever felt the necessity of a harbour of refuge to run for in bad weather on the district of coast from Fife Ness to the Pentland Firth?—Many a time.

2557. And where would you be disposed to name as the best site for such a harbour of refuge?—I would mention, if you thought I was not speaking partially, about Aberdeen, because it is in the centre.

2558. And in the district of coast north of Aberdeen, where would you be disposed, from Aberdeen to the Pentland Firth, to consider the best site for a harbour of refuge?—If it were going to the north of Aberdeen, I should say Peterhead, and that would give the ships that came along the coast some chance after they have got round there.

2559. State your reasons for preferring Peterhead to Fraserburgh.—I would say that a ship might get the length of Peterhead, and not get round Rattray Head.

2560. What are the prevailing winds in the North Sea in the fall of the year?—They are sometimes south and south-east winds.

2561. And from what quarter do the heaviest gales blow?—I think from east-south-east and south-east. These are the most dangerous upon this coast.

2562. Leaving the Naze of Norway with southerly winds, what land would you endeavour to make?—It would depend entirely on where I was bound, but if I was bound any way betwixt the Carr and the Buchan Ness, I would, with south-easterly gales steer for the entrance of the South Firth, because the coast is dangerous.

2563. Supposing that the wind were hanging from the southward when you take your departure from the Naze of Norway, how would you endeavour to make your passage?—Why, I would stretch along to the land as hard as I could to catch hold of the coast, and if it were coming to blow then I would try for shelter if I did not get a fair wind to make my voyage.

2564. And where do you think that shelter would be of most service to you?—Just here and hereabout upon this iron-bound coast, where there have been many people lost since 1800.

2565. Are you acquainted with the Cromarty Firth?—Yes, perfectly well.

2566. Give me your opinion of the Cromarty Firth as a harbour of refuge?—It is one of the finest harbours in the world. There are Cromarty, Milford, and Malta. I would consider these the three best ports in the world—although I am going past my story. If I could not get any other way, I have gone round Fort George on a coarse night, farther up still. But I beg your pardon, I am perhaps speaking more than is asked me.

2567. No; I am glad to hear everything you have to say. The Cromarty Firth is easy of access in winds from east-north-east and east-south-east?—Yes.

Mr. ABERNETHY examined.

2568. (*Chairman.*) What is your name?—James Abernethy.

2569. And your profession?—A civil engineer.

2570. Will you state for the information of the Commissioners what are the facilities which the port and bay of Aberdeen present either for a national harbour of refuge, or for a subsidiary harbour of refuge, supposing one great national harbour is not adopted on this coast?—I may state to the Commissioners that I have never considered Aberdeen, in common with the other ports on the north-east coast of Scotland, as fitted for a great national harbour of refuge. But I am of opinion that the entrance to Aberdeen harbour can be so much improved that it may be taken by vessels under any circumstances at any period of the tide with safety. And, therefore, undoubtedly it could be made an exceedingly valuable harbour of refuge for a certain section of coast. I have prepared the plan I now produce within the last day to show the Commissioners the present state of the harbour. These soundings which you see show the depth of water at the entrance between the pier heads at low water of a low spring tide. I may state that probably there are few harbours on the whole coast of Great Britain that have been so much improved as the harbour of Aberdeen. It had the services of the most eminent engineers, such as Smeaton, Rennie, and Telford; and at the entrance there is now a depth of water at medium tides of 21 feet, where formerly there was a bar, with a depth over it at low water of the same tides of 2 feet 6 inches, or 13 feet at high water. You will observe upon the south of the entrance a receding breakwater. That breakwater was originally designed as a mere protective work during the extension of the north pier, and it was placed there for no other purpose; for it is obvious that, being within or on a line with the point of the north pier, it cannot in any degree protect the harbour entrance from the south-east gales. On the contrary, by cooping up the current, particularly during floods down the river, between the pier heads in easterly gales, it causes a very heavy and dangerous sea at that point, so dangerous that even steamers within the last few years have lost steerage way when between the pier heads, and have been lost upon the North Pier point. The latest and most distressing instance of that being in the case of the *Duke of Sutherland* steamer, a powerful vessel of 800 tons burden, she was lost at the point of the North Pier in attempting to enter the harbour.

2571. Have you any chart which shows the coast about the immediate vicinity of Aberdeen?—There is a chart which shows the coast from the Fife Ness Head to the north part of Scotland separate and distinct, but I do not think there is one on a large scale.

2572. Proceed.—Years ago I brought before the harbour trustees the advisability of removing what is termed the breakwater from its present site much farther seaward, as indicated by these red lines, from Shortness Point; because I am of opinion that if a breakwater was constructed, as shown by the red lines, projecting from the Shortness Point, the receding harbour entrance would be effectually protected from the action of the east and south-east seas, and deep water also would be provided for the ordinary class of shipping at the period of low water. As a general rule, vessels that have been wrecked at the entrance of the harbour have been wrecked about the period of low water, when they were unable to enter. Therefore I think that the entrance to the harbour would be improved by the erection of such a work, shelter would be afforded from the east and south-east gales, and depth of water would be provided at the period of low water for the admission of vessels. With regard to the first part of the Commissioners' question as to a great national harbour of refuge, I have never said that Aberdeen, or any of the other northern ports, is a proper point for such a purpose, because I am decidedly of opinion, as I have before stated, that the best way to secure the safety of the shipping on this coast is to improve and extend the existing harbours—convert them from high-water harbours into what I should term low-water harbours. And I think, in addition to the safety of vessels generally, by adopting such a course a very great commercial advantage would be obtained, because it is manifest that if you extend and improve the existing harbours you will extend the shipping and commerce of the various ports; whereas if you provide one harbour of refuge, in a commercial point of view, you effect no object further than the protection of the shipping on the coast. I think that by improving the existing harbours you can not only provide for the safety of the shipping, but you can also obtain advantages which the other course will not attain.

2573. (*Sir Frederic Smith.*) Am I to understand you to say that the only change, or alteration, or improvement you propose here is the removal of this short pier or breakwater, and the construction of this larger breakwater?—That is one improvement. Another improvement is at present in progress, and has been for a considerable length of time, namely, the removal of the large boulder stones from the entrance, for which purpose the dredging has been carried out to a very great extent. In fact, during the last ten years upwards of a million tons have been taken from the entrance to Aberdeen harbour. I think the erection of such a work as that breakwater, with the aid which will be obtained from dredging, would improve and extend the harbour of Aberdeen so as to fit it for the admission of vessels at all periods of the tide and under any circumstances.

2574. Is this entirely an idea of your own, or have you consulted any experienced engineers of the day on this question?—It was an idea which occurred to me some years ago, and at that time Sir William Cubitt was consulted by the Harbour Commissioners of Aberdeen on the subject, and with him I inspected what is called the Bay of Nigg, round the Girdleness point, and the adjoining coast. I submitted to Sir William Cubitt at that time a design similar to that which you have before you, and it was his opinion that it was the best method of providing a deep-water harbour at Aberdeen.

2575. Is there any silting taking place in this harbour?—There is not at the entrance. Between the south pier head and the breakwater there is a small bay. The original intention of Mr. Smeaton was to continue that south pier parallel with the north pier, because it was apprehended that silting would take place at that part. During the last six or ten years the depth of water in that bay has not decreased; it is entirely free, and clear of deposit.

2576. I do not very clearly make out how any danger is occasioned by this shorter pier; would you tell me how that is effected?—By cooping up the current at the point between the north pier head and the head of that breakwater, particularly during an ebb tide and heavy easterly gales, a heavy irregular sea is caused immediately between the pier-heads, and during floods also there is a very powerful current running out there, so that vessels, when they reach that point, find themselves unable to enter the harbour, and are driven to leeward on the point of the north pier in easterly gales, or on the beach to the north of it.

2577. Have you any back water in this harbour?—There is a very large tidal reservoir.

2578. Is that used for scouring out?—That of course is discharged from that entrance, and there is also the additional current of the river Dee, which, in time of floods, is exceedingly powerful.

2579. Is it not to be apprehended that the removal of the shorter pier would retain and cause a deposit

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of what, with the backwater, is now scoured away? —I think not; because, by leaving a sufficient opening between the high-water mark and the proposed extended pier, so as to allow of the current along the shore to run round the Girdleness, the deposit would be removed as it is at present. There is no bar now at Aberdeen harbour, and has not been for many years.

2580. The increased depth of water to be attained is to be obtained by dredging?—By dredging, aided by the scouring current of the river.

2581. That will be a constant expense?—I apprehend not. After we have dredged, as I have mentioned, we do not find any tendency to deposit again.

2582. Is not that from the constant dredging, leaving no time for accumulating?—It is caused chiefly by the removal of the huge boulder-stones from the bed of the channel.

2583. How far do you dredge from the north pier? —We have never dredged beyond the north pier, for the removal of those stones takes place within it or along the channel.

2584. What is the shallowest part of this channel? —Seven feet nine at low water spring tides.

2585. What do you suppose it will be at the pier? —About ten feet, I suppose. The object of this pier is chiefly to prevent the heavy swell of sea in the north gales at the entrance; and it would also, at the period of low water, enable a vessel to take shelter, if there was not sufficient water for her to enter between the present piers, behind that breakwater. In fact, vessels have ridden at anchor there.

2586. You have not made up the estimate?—I have prepared a probable estimate, using the material of the existing breakwater, in so far as it would be available,—about the sum of 70,000*l.*

2587. Will you be so kind as to put this plan in evidence?—I will.

2588. You have no estimate to give in? I suppose this is merely a rough estimate?—It is a rough estimate merely.

2589. (*Mr. Lindsay.*) Say that this south pier was removed to where you propose, would that increase the depth of water?—The mere removal of the pier, of course, would not increase the depth of water, except to this extent, that it would do away with the present heavy sea between the pier-heads, and by that alone you would gain some four or five feet during on-shore gales.

2590. I ask the question because I understood you to say, that with these alterations which you propose you would make the harbour of Aberdeen suitable for vessels at all times of the tide?—Yes.

2591. That is to say, vessels drawing under eight feet of water?—In this way, that vessels making the harbour of Aberdeen at the period of low water, and drawing a greater depth than ten feet, could anchor under the shelter of the projected breakwater there, wait for the period of high water, and pass into the harbour, protected from the dangerous cross sea which exists at the period of high water during easterly gales between our present piers.

2592. Then what depth of water would you have at low water spring tides within the proposed pier? —25 feet. At low water at an equinoctial tide I think it would be less.

2593. Do you consider it safe for vessels to run in there and anchor even for a tide?—I think that vessels of the ordinary class frequenting the coast, if obliged to run for Aberdeen harbour at the period of low water, could take shelter under the lee of that breakwater. But the great material benefit which would arise from the construction of that work would be the doing away with the dangerous sea which exists at present at the period of high water between the pier-heads, and which has been the cause of the majority of our wrecks, and even of our powerful steamers.

2594. You say the depth of water between the present piers has been increased from two feet up to eight feet, and even to ten feet in some places; what greater depth of water do you think you would obtain in the channel by carrying out the plan which you propose in the water channel?— If the depth of water in the channel was increased by ten or twelve feet it would involve the necessity of securing the foundation of the present north pier, which could be easily done, and being continuously dredged a depth of fifteen feet at low water might be obtained.

2595. What does the bed of the river consist of between the north and south piers?—Gravel and boulder-stones.

2596. (*Capt. Vetch.*) You have now eight feet additional?—That depth of water has been obtained by dredging.

2597. Will you have any difficulty in removing the great boulders?—We are at present removing them steadily. Since I ceased to take an active part in the management of the harbour in 1846, upwards of two feet additional depth of water has been obtained.

2598. And if you wish to acquire other three feet? —That is a question simply of dredging.

2599. (*Mr. Coode.*) What do you estimate would be the cost of obtaining that additional three feet of depth?—I have not estimated the cost.

2600. Can you tell us nearly?—We go on dredging from year to year, and that is generally at a very low rate, I think for 5¼*d.* a ton, including the deposit on the adjoining sand beach.

2601. You will probably be able to give us some rough notion of the cost attendant upon these additional three feet?—I could, I dare say, make up an estimate, no doubt roughly.

2602. Will you send it to the Commissioners?—Yes.

2603. Do you imagine that, with that additional depth of three feet, there would be any difficulty in vessels making this harbour at all times?—At the period of high water there would be no difficulty whatever, unless in the dangerous cross sea which prevails now between the pier-heads. The most dangerous gale is from the south-east. The sea in those gales impinges directly upon the point of the north pier. That, combined with the outgoing current, causes a heavy, irregular sea at that point, and vessels at the period of high water generally come with safety until within a short distance of the harbour entrance, and it is only there that the danger takes place. I have repeatedly seen them come through heavy seas until they were cast upon the pier, and wrecked.

2604. At what period of the tide does that dangerous sea exist?—Probably from the period of half tide at high water. It gradually decreases with the tide.

2605. Is that cross sea worse at the period of high water?—At or about the period of high water.

2606. What is the greatest rate of tide past the mouth of the harbour?—About one and three-quarters or two knots an hour.

2607. That is on flood?—On floods.

2608. Do you find any inconvenience at ebb?— Vessels, as a general rule, do not pass into the harbour after the period of high water. The danger of not being able to enter the harbour is increased by the ebbing current.

2609. You spoke of vessels sailing up under the shelter of this proposed breakwater. Do you not apprehend there would be considerable sea when the wind was about north, or north-north-east?— Buchan Ness Point trending so far to the east, we find the north and north-east seas are not so heavy as our east and south-east seas. And again, the north-east gales are not the prevailing gales at Aberdeen. The prevailing gales are from east and south-east.

2610. (*Chairman.*) What is the compass direction of this north pier?—About east-north-east.

2611. Supposing that your proposed improvements are made, to what number of vessels would the harbour—I mean by the harbour as distinct from the wet dock—give refuge in heavy easterly gales?—A

hundred sail might be accommodated within the pier-heads.

2612. Will you mark on the plan the part of the harbour where they would anchor?—All along at the harbour in every direction; on both sides, in fact. Vessels in easterly gales sometimes come here, and in order to avoid the reefs they run upon the beach on the south side.

2613. I understand, then, that the part of the harbour which you describe as fit for refuge purposes is that which I have marked from A to B?—Yes, and also a very considerable extent along the portion of the harbour out of the fair-way channel or line of leading lights. This dotted line shows the line of the leading lights or centre of fair-way channel.

2614. From A to C how many additional vessels would obtain refuge?—When I speak of 100 sail I mean the whole. It is my opinion that 100 of the ordinary class of vessels, coasters and otherwise, could find shelter within the whole of the tidal area under the lee of the north pier. Therefore I would include the space of A—C with the space A—B. And I might add, that the additional space on the Torry side is also available in the spill-water channel, which extends about half a mile up.

2615. Between A and B how many vessels will find refuge? How long do you think these calculations would occupy you?—They would not occupy me above two minutes. I could furnish you with the details. Nearly 2,000 feet is the length at the point you speak of, by 450 feet in width.

2616. Will you furnish to the Commissioners at your leisure a plan of the harbour, showing the number of vessels which, in heavy gales blowing right in, can find safe refuge between the points which I marked A and B, between the points which I have marked A and C, and also between the points which I have marked C and D, on the plans now before me? Also, will you be good enough to supply a plan showing the still water, on which plan will be noted the number of vessels to which it will afford refuge?—I will do so. Would you allow me to add, that by dredging the spill-water channel a very considerable addition would be afforded to the amount of shelter I have stated.

2617. I wish these plans to show the soundings, and to afford every other information which will enable the Commissioners to form an opinion as to the facilities of refuge afforded by the harbour of Aberdeen?—I will notice that.

2618. In a heavy easterly gale, between the points D and C is it a perfectly secure anchorage for vessels, supposing you remove the breakwater at present existing, and construct the breakwater proposed?—Yes, I am of opinion that in a heavy easterly gale vessels would be in shelter between the points C and D.

2619. From what direction must the wind blow to make the worst sea in that portion of the harbour?—The sea from north to north-east would then be the only sea to which the harbour would be exposed, and that only to a limited extent; inasmuch, as I have before stated, that these seas are not heavy, and they are not the prevailing winds.

2620. And in that portion of the harbour which I have marked from D to C, do you consider that there would be safe refuge for vessels in a heavy gale right in?—I do not. I think that small vessels in heavy gales would be in comparative safety if obliged to run for the harbour at the period of low water—vessels of a size that could be admitted between the pier-heads, that is, 10 feet draught of water. But the great advantage which would accrue from the construction of that work is the doing away with the dangerous cross sea, at the period of high water, between the present pier-heads. I think also, to a limited extent, that even at the period of low water vessels could be sheltered behind the proposed breakwater. I can recollect an instance of a clipper schooner from London riding at that point till she sank at her anchors.

2621. (*Sir Frederic Smith.*) Is it intended that these vessels are to swing at their anchors, or to be packed up contiguously to each other along the pier?—This is a tidal harbour. Of course, at low water the majority of them would take the ground, as they do at present. All our wind-bound vessels take the ground.

2622. But they would be hanging at their anchors, would they not?—They would be moored to fixed moorings, and contiguous to each other.

2623. So that they could not swing?—They could not swing; that is to say, in the way they lie at present.

2624. (*Capt. Washington.*) Supposing the dredging you contemplate carried out, is there ample harbour accommodation within the flowing basin for any number of vessels that might be expected to resort here?—It is one of the largest single docks in the kingdom, and has an area of 37 acres.

2625. And the width of the entrance?—The lock is 60 feet in, and the entrance is 70 feet.

2626. I believe it is as large as any in the kingdom?—With the exception of the lock of the Victoria Dock at London, which is, I think, 80 feet in width.

2627. But it is ample for all purposes on this coast of Scotland?—It is.

2628. Is there, further, facility for repairing vessels in cases of damage, and for supplying them with machinery?—There are very extensive engineering works in the immediate vicinity of the harbour, and there are three patent slips.

2629. Then every requisite for repairing ships and furnishing them with supplies could be found at Aberdeen?—It could.

2630. (*Mr. Coode.*) I believe that the width between the north and south piers would be somewhere about 350 feet?—I think it is about that.

2631. Do you apprehend that that would be wide enough for a vessel to run in during a gale of wind in a dark night?—We find it is not wide enough at present. In south-east gales, unless they go well to windward, or close to the point of the breakwater. They perhaps go to leeward upon the point of the north pier.

2632. Is the area of the water space within the harbour so great that shelter could be afforded so that 100 vessels would not inconvenience the trade of the port?—I think it is so.

2633. Will you be good to put on your plan the bearing of the Girdleness from the extremity of your proposed breakwater?—I will.

2634. (*Chairman.*) Do you wish to lodge these plans?—No.

Mr. HOGARTH re-examined.

2635. (*Chairman.*) You are well acquainted with Wick and the extensive fishery which prevails there in the fishing season?—I am.

2636. Now supposing that the Government are determined to spend a certain sum on the north-east coast of Scotland, with the view of saving life, in which of the three places, Wick, Fraserburgh, or Peterhead, do you think their object would be promoted?—Taking the number of the inhabitants, or rather the fishermen, at these various places, I should say Wick.

2637. But confining your view not simply to the fishermen, but to the exigencies of the passing trade, where would you be disposed to place a harbour of refuge?—If I must name one of the three, I should say Peterhead for the shipping.

2638. My question is put with the view of ascertaining, considering the exigencies of the passing trade and the fisheries conjointly, with the view of saving life, where then you would place the harbour of refuge of the three places?—I do not think that Wick suits the passing trade, but for saving life it is the best.

ABERDEEN.

Mr. Hogarth.

2 Sept. 1858.

Chairman.

2639. Taking into view the property at risk, without respect to the life, where, for the purpose of saving property, would you be most disposed to spend this money,—at Wick, at Fraserburgh, or at Peterhead?—Certainly not Fraserburgh, and Wick requires it more than Peterhead. Peterhead is a weatherly point on the coast. A vessel might save herself there at any time. A vessel being caught with the wind on at Peterhead might go either north or south. It may be convenient for ships windbound to go up the Firth and take shelter in a roadstead, where she can let go her anchor; but for refuge Peterhead is not necessary.

2640. Are you well acquainted with the habits of the fishermen at Wick?—I do not know what you mean exactly.

2641. My meaning is as respects the mode in which they conduct their fishery?—I know very well how the herrings are caught on both sides of the Firth.

2642. Are you able to offer any opinion as to whether any considerable amount of fish are lost from the circumstance of the fishermen being unwilling to put out to sea in doubtful weather?—I could form no opinion as to the quantity, but if they had a better harbour they would go oftener to sea.

2643. And you can offer no real estimate of the value of the fish so lost?—No; I would not like to make an estimate.

(*Mr. Nicol.*) I do not think that we have anything more to say.

2644. (*Chairman.*) Are you entirely satisfied that you have had the opportunity afforded you of offering all the evidence which you wish to tender to the Commissioners on the subject of this inquiry?—There are one or two of the shipmasters of the more intelligent men trading to the Baltic and Archangel that I should have been glad, if they had been in the port, to have brought forward to give evidence generally upon the navigation of the North Sea, but otherwise I am not aware that there is anything further that can be said.

2645. Will you state the names of the captains in question?—There is Captain Allan.

2646. Any other?—Captain Howley.

2647. Anybody else?—No.

2648. Of course it will be in the power of the Commissioners, at a later period, to call upon the gentlemen you have named to give their evidence in London, if they think proper to summon them. Is there any other person present who may wish to tender any evidence with respect to the subject of an inquiry as relates to Aberdeen?

(*William Talbot.*) Yes, I will be most happy to give my evidence.

Mr. William Talbot examined.

Mr. W. Talbot.

2649. (*Chairman.*) What is your name?—William Talbot.

2650. What is your occupation?—Shipmaster.

2651. For what purpose do you wish to give your evidence?—I am very glad to see the present deputation come down to Scotland on the cause they have come,—to assist the seafaring population in saving life and property. I think you are working in a right direction.

2652. Have you any evidence to offer which has not been already tendered to the Commissioners?—Not particularly.

Then in that case we will dispense with any further evidence on your part.

2653-4. (*Mr. Lindsay.*) Have you any information to give to the Commissioners connected either with the port of Aberdeen or harbours of refuge on the north-east coast of Scotland, which the Commissioners have not already received?—I will be most happy to anwer any question which the Commissioners can put to me as a practical man.

(*Chairman.*) I may state on the part of the Commissioners that of course they are perfectly willing to enter into any evidence which may be tendered, but when a witness states, as in the present instance, that he has nothing new to offer, they think it unnecessary to occupy their own time, or that of others, with any further examination, as they have perfectly satisfied themselves on the points in question. Had you come at an earlier period of the inquiry, I have no doubt we should have been as happy to have taken your evidence as that of the others.

(*Witness.*) I should have been very happy to have given any evidence that I could.

(*Chairman.*) Thank you.

(*Mr. George Thompson.*) May I be allowed to make a remark with regard to the evidence which it is permitted to be taken in London? My reason for making this observation is this, that I feel assured there are many intelligent shipowners, shipmasters, and others connected with the port of Aberdeen, who are not present here to-day, this happening to be the chief day of this great Highland agricultural show. So, I think, if evidence is to be subsequently taken at London for Aberdeen, it is of great importance that we should send three or four shipmasters and leading shipowners, men who are not here to-day, to advocate the case of Aberdeen, which has scarcely been brought out so fully as I think it might have been, had circumstances been more favourable.

(*Chairman.*) I may state on the part of the Commissioners, that they were perfectly sensible that it might very probably happen at Aberdeen that you might not be able to produce some of the evidence which you might wish to offer them, on account of the absence of the parties in the Baltic and American trades. They were also perfectly aware of the other circumstance which you have mentioned, and they will be careful on their arrival in London, and on taking the evidence into their consideration, to give due attention to the request which I understand you to have made.

Deputation from Montrose.

Mr. A. Burns.

(*Mr. Burns.*) I am unwilling to occupy the time of the Commissioners at any great length, and I shall shortly state the views of the Harbour Trustees of Montrose. I lodge, first, an abstract of the harbour accounts for last year; secondly, a note of the number of vessels entering the harbour, and tonnage, for the same period; thirdly, the Admiralty report, or the last Montrose Harbour Act, 1850; fourthly, a printed copy of a petition lately presented to the Treasury by the trustees; and, fifthly, extracts from the reports of Sir John Rennie, Mr. Robert Stevenson, and Mr. James Walker, on the neglect of the harbour. Referring to these productions, it is the decided conviction of the trustees of the harbour of Montrose that it would be much more judicious to expend a sum of money in improving the existing harbours on the coast rather than to construct a harbour of refuge at a great distance from the coasting and foreign trade. The defects of these harbours have been alluded to by various engineers who from time to time have examined the harbours, not with any view of Government assistance, but to ascertain the capabilities of the harbours. These capabilities have been pointed out, and their defects, but from want of funds the local trustees have never been able to adopt the recommendations which these engineers have made. Their funds have been exhausted in internal improvements of the harbour, to

accommodate the trade under ordinary circumstances. Sir J. Rennie, in his report dated 1805, says—"From "this description it is evident that the entrance is "completely sheltered from all winds that blow from "the westward or south, but there is no protection "from the north, nor indeed any winds that blow from "points between thence and east beyond the Sands "End Ness, except what is afforded by the Annat, "which, from its being a low sand, is not very great. "A fine opportunity, therefore, presents itself for "the improvement of this harbour by a pier on "the Annat, which, if judiciously constructed, would "render the entrance to Montrose harbour one of the "best in Scotland; but the expense would be very "considerable, probably more than any reasonable "dues that could be laid on the shipping would "afford." Mr. Robert Stevenson, in his report dated 1816, says—"The reporter cannot conclude without "taking another view of the use that at some future "period may be made of the valuable depth of water, "say at least from 18 to 25 feet, together with the "advantageous position of such a harbour on this "coast." He observes that "Montrose being near "the entrance of the Firth of Forth, is well calcu-"lated as a shipping station in time of war for the "protection of the British trade in the German Ocean, "at least as a rendezvous for two or three of the "smaller classes of His Majesty's ships. The accom-"modation of such vessels would indeed require "the expenditure of a considerable sum on both sides "of the entrance of the harbour or channel, parti-"cularly on the northern side, to render its entrance "more safe and commodious. But were this done, it "were easy to show that there is not, perhaps, another "situation as the north-eastern coast of Great Bri-"tain which so particularly holds out and lays claim "to the assistance of Government than the harbour "or channel of Montrose." Mr. James Walker, in his report dated 1839, says—"I have already referred "to the principal features of the entrance and the "river up to the Stact. The harbour is considered "by you, and probably with reason, as the best "between the Firth and the Moray Firth. It is, "therefore, very important in a public view." I refer to the Admiralty report on the Montrose Harbour Act, and particularly a passage marked 9 on the report I gave in, regarding the capabilities of the harbour, in admitting the *Stromboli* at a time when no other port could admit it. I have to repeat that the Montrose harbour trustees consider that a judicious expenditure of money in improving the existing harbours, and particularly such a harbour as Montrose, would be much preferable to laying out a large sum on a harbour of refuge which is at a great distance from the coasting trade. The coasting trade, it is well known, and the foreign trade, are very trifling, comparatively speaking, north of Aberdeen; and certainly it is like placing a medical man, if I might use the expression, in a place where there is no people, instead of a place where there is a dense population. The Montrose harbour has a depth at the bar of 18 feet. Accumulation there is entirely prevented by the scour of the passing of slate, which counteracts any tendency of the bar to increase. Vessels can therefore enter the river almost at all states of the tide. A little farther up, at a place called the Cross Dykes, the depth diminishes to nine feet. Were this channel deepened, the harbour would be accessible at all times of the tide. This is a rough plan on a small scale showing the locality of the harbour, and another plan of the harbour.

2655. (*Chairman.*) Do you wish to lodge these plans?—The second plan is accessible to all who may wish to inspect it, but the other I can leave.

Witness resumed: There is one mode of improving the harbour that the trustees consider would be very desirable. There is a large bank called the Scalp, which, if removed, would give about 60 or 80 acres of ground within the harbour. I believe that the Commissioners have before them, in the shape of the Admiralty reports and surveys, and reports of the Tidal Harbour Commission, very full information in regard to this harbour, which I will be sorry to trouble the Commissioners with repeating. Captains Washington and Vetch conducted the inquiry before, and, of course, are well aware of the capabilities of the harbour at present, and if improved. I may mention also that the harbour trustees hold the view that the central situation of Montrose, being nearly midway between the Moray Firth and the Firth of Forth, renders the harbour worthy of improvement. The trustees have laid out about 50,000*l.* in the construction of a dock, and otherwise improving the harbour. I am prepared now to answer any question that you may ask. I may add that Arbroath is not very accessible in stormy weather in certain states of tides, and Arbroath vessels enter Montrose and lie there till they can enter conveniently the harbour of Arbroath.

2656. I understand you distinctly to state that you consider the improvement of the smaller ports along the coast to be preferable to the establishment of one large national harbour of refuge?—Most decidedly.

2657. (*Mr. Lindsay.*) You say the depth of water in one part of the entrance is nine feet?—It is in the channel referred to about 1,800 yards up the river. You are fairly within the channel before you come to that diminished depth.

2658. Is that at low water spring tides?—Yes; at a place called Cross Dykes, at the entrance of the river. This harbour is taken by vessels taking the bay lights in line. The depth is marked on the one side by a buoy, and on the other side there is what is called the Stone; and the vessel takes the harbour by the one light covering the other, and they get in up to this point before the diminished depth to which I referred takes place.

2659. What is your rise and fall of tide there?—About 16 or 18 feet.

2660. Then at the shallowest part of the river, do I understand you to say, that you have a depth of 24 feet at high water spring tides?—Most certainly.

2661. And do I understand you to say that at the entrance you have 18 feet at low water spring tides?—Yes; the depth varies slightly, according to prevailing winds and storms, but it is counteracted by the scour of the passing spate, as I have mentioned, which rushes down and counteracts the tendency to increase.

2662. And at high water spring tides at the entrance you have 42 feet?—We have 40 feet at least, but we have a nautical witness who will be able to satisfy you on that point.

2663. (*Capt. Washington.*) There must be some mistake about it?—I observe it stated in Mr. Stevenson's report at 18 feet, and the extract is produced.

2664. I thought you spoke about 40 feet?—I observe that Captain Washington submitted about 100 queries to the harbour trustees, and one of the questions was, "Depth of water at entrance at "low water at spring tides." The answer given at that time was 16 feet at the entrance of the river.

2665. (*Mr. Lindsay.*) He says he has a nautical witness here. I would prefer examining the nautical witness on one or two of these points.

2666. (*Capt. Washington.*) Is there a floating basin at Montrose?—Yes, a wet dock.

2667. What is its area?—3¼ acres. It is 55 feet wide in the clear, and admitted the *Stromboli*. But the excavation of the Scalp would give 60 or 80 acres of berthage within the river.

2668. Have you any estimate for the excavation of the Scalp?—We have no estimate.

2669. Are there facilities for repairing vessels?—Yes, there are three or four places.

2670. And repairs to steam-engines?—Yes.

2671. (*Chairman.*) Mr. Burns, I omitted to place your name on evidence. What is your name?—Adam Burns.

2672. And your occupation?—Solicitor.

ABERDEEN.

Captain BURN examined.

Capt. Burn.

2 Sept. 1858.

2673. (*Chairman.*) What is your name?—John Burn.

2674. What is your occupation?—A shipmaster.

2675. What number of years have you been at sea?—40 years.

2676. For how many years master of a vessel?—33.

2677. And where chiefly employed?—In the Baltic, and round to Archangel.

2678. Is it your opinion that a large national harbour of refuge is required on the north-east coast of Scotland?—It is my opinion that to deepen such harbours as this would be of more benefit to the shipping interest along the coast than one refuge harbour.

2679. (*Mr. Lindsay.*) Are you well acquainted with the harbour of Montrose, and the entrance to it?—Yes, I have been a long time going backwards and forwards.

2680. What depth of water is there at the bar?—We always reckon 18 feet at the lowest spring tides.

2681. But what is the shallowest part of the river?—Ships do not run in at low water.

2682. But what is the shallowest part of the river?—It is what we call the Cross Dykes, half way down from the lower light to that point.

2683. What depth of water is there at low water?—From 8 to 9 feet.

2684. (*Capt. Washington.*) Cross Dyke, I may mention, is the name of a rocky ledge?—Yes.

2685. (*Mr. Lindsay.*) Is the bed of the river sand?—No, it is generally boulders.

2686. Could the depth of water in the navigable part of the river be increased to the same depth as at the bar?—There is no doubt of it.

2687. By dredging?—Yes, and running the quay from the lower light out towards the Annat.

2688. Why would that quay, in your opinion, be necessary?—It would direct the water more low down by that means, and take away the sand from the eastward.

2689. Then are you of opinion that there might be obtained a depth of 36 feet of water in the navigable part of the channel at high water spring tides, with a comparatively moderate outlay of money?—As to outlay of money, I cannot say what it would cost; but I have no doubt it might be made.

2690. But in regard to the cost, what it would cost you cannot say?—No, I have no idea of the cost.

Provost NAPIER examined.

Provost Napier.

2691. (*Chairman.*) What is your name?—Thomas Napier.

2692. And your occupation?—Shipowner and fisherman. I am also Provost of Montrose.

2693. Is it your opinion that any large harbour of refuge is required on this district of coast, the north-east coast of Scotland?—It is not.

2694. (*Mr. Lindsay.*) Have you heard what the previous witness stated?—I have.

2695. Did you ever take in any estimate as to the cost of deepening the river to the extent he named, and build the pier which he referred to?—We have never taken any estimate of what has been referred to by the last witness. With regard to the Cross Dykes, it is but a narrow stripe, perhaps not more than 50 or 60 feet, and the cost of removing it would be very trifling. But the north pier, to keep the scour bay in the channel, would be very considerable, because it is sand to a very considerable distance. It has to be turned from the lower light to the Annat.

2696. Providing you removed this dyke, it would still be necessary for you to have a pier so as to maintain the depth of water in the river?—Yes.

2697. And what length of pier would you require?—I could not state the exact number of feet, but it might be 600 to 800 feet.

2698. (*Capt. Washington.*) Do you say that the expense of removing the Cross Dyke would be trifling?—Yes.

2699. Do you know about what?—I could not estimate the amount, but I know it is trifling.

2700. Of what material is it?—It is gravel and stone.

2701. If the expense would be so trifling, why do not the harbour trustees remove it?—We do not suffer from any want of energy; it is only our small funds that are not sufficient for that.

2702. I see by the chart there is a depth of 6 feet there; to what depth do you propose to remove it?—Were we to improve the Montrose harbour, we would make it 18 feet, the same as the bar.

2703. You are pleased to speak of the bar of Montrose harbour, but in the general acceptation of the term there is no bar?—We always mean the entrance.

2704. It appears that Montrose is in a very peculiar position, having no bar. It appears that you would remove this Cross Dyke at a very trifling expense, when you please?—The reason why we have not been able to remove it is this: our expenditure till within the last year or two was such that we were not in a situation to get it done.

2705. (*Chairman.*) You have stated that you are of opinion that no large harbour of refuge is required upon the north-east coast of Scotland; would you be disposed to say that that is the general opinion held by the parties interested at Montrose?—I would, and for reasons which I will shortly give.

2706. Will you do so?—Yes; we have had this subject thoroughly looked into and investigated, as to the three harbours which have been repeatedly named here this afternoon. Shipowners in the present times do not like harbours of refuge. I speak of the mercantile navy, and inasmuch as we do not want them to go to harbours, if possible. We are well aware of the situation of Wick, and the claims they have been setting up for it. I know the mode, and am well acquainted with all its important fishing operations. But to speak of a harbour of refuge for Wick is quite uncalled for. I consider a harbour of refuge a harbour to give accommodation to vessels with heavy draughts of water, perhaps ten or fifteen of Her Majesty's Navy, if necessary, to get in. Wick wants accommodation for the fishing, which lasts about two months; and it cannot be denied there is great necessity for giving some accommodation to Wick. For that purpose only, but beyond that shipowners do not consider it to be of any importance to them, having, as formerly has been stated, Longhope and Cromarty Firth quite available for any parties that wish to keep the sea; and 10,000*l.*, 15,000*l.*, or 20,000*l.* would be sufficient to give for an ample harbour for their fishing purposes. Well, I think that disposes of that. I come now to Fraserburgh. It is not suitable for a harbour of refuge; it is not worth the name of that; it cannot be done. But they no doubt want some little assistance to complete the harbour which they have commenced, and, like other harbours, would require a little money. That is our position too; the same as we want some money too, to deepen our harbour. Then we come to Peterhead. If the Government decides for a national harbour of refuge to take in 150 to 200 acres; a harbour, another of what some of the gentlemen present were looking at in France lately, then make it at Peterhead; but really it would be a question of money, that I could not recommend the Government to give for that purpose, because we have the Cromarty Firth and the Firth of Forth;

and if you improve some of the existing harbours, you can have vessels of an ordinary draught of water. I speak of Montrose. Give us 60,000*l.*, 70,000*l.*, or 80,000*l.*, and we will give you ample accommodation for half a dozen second-class vessels; and if it was necessary, we could have an harbour studded with men-of-war.

2707. For the purposes of the mercantile marine you are quite of opinion that a large harbour of refuge is not required at Peterhead?—Yes, inasmuch as every shipowner knows perfectly in these times, not only to get our vessels well made, and with good canvas, but to keep them at it, and not allow them to to be at harbours of refuge.

Mr. David Mackie examined.

2708. (*Chairman.*) What is your name?—David Mackie.

2709. What is your occupation?—Shipowner.

2710. In what way are you connected with the harbour of Montrose?—I am one of the trustees.

2711. For what period have you known the harbour of Montrose?—For thirty or forty years.

2712. Do you concur in the statement which has just been made by Provost Napier?—Quite.

Mr. David Walker examined.

2713. (*Chairman.*) What is your name?—David Walker.

2714. What is your occupation?—Shipowner.

2715. In what way are you connected with the harbour of Montrose?—As a trustee.

2716. For what period have you known the harbour of Montrose?—All my life, but I have been connected with it as a shipowner for the last twenty-five years.

2717. Do you concur in the statement of Provost Napier?—Generally, I do.

2718. Are there any points which you would wish to state in which you differ from him?—No, I do not think there is any point of importance.

2719. (*Mr. Lindsay.*) Are there no other points which you would wish to bring under the notice of the Commissioners with regard to Montrose harbour?—No, I coincide in the general opinion of the Provost. I think the main point is the great depth of water, and such a depth of water as naturally requires no dredging. It would be permanently a good harbour, once we got the water up.

2720. You have no further remarks to add than what the other gentlemen stated?—No.

2721. (*Capt. Vetch.*) Why have you not removed the Cross Dykes?—The reason is, that for our local trade the harbour is indifferently good, but if it were to be made a harbour for general purposes it would be highly expedient that they should be removed.

2722. If they were so removed would your trade not increase, and larger ships be accommodated?—The trade that we have at Montrose does not require larger ships.

2723. It would not be navigable for large ships?—Oh yes, it would be navigable; still I think, if it were to be made anything like a harbour for the general trade of the country, it would be expedient to deepen it, and to let in larger vessels than we had occasion for.

2724. Are you speaking of Aberdeen or Montrose?—Montrose.

2725. Then the present state of your harbour is quite ample for your trade?—It would be certainly too much to have Cross Dykes deepened.

2726. Not for the purposes of your trade?—Well, it would be a large increase for that, but the present state of the river is sufficient.

Mr. Burns examined.

2727. (*Chairman.*) In what relation do you stand to the harbour trustees of Montrose?—I am secretary. I would just wish to state in reference to the answer given by the last witness, that it would make it advantageous as a subsidiary harbour of refuge. If any further evidence is wanted in London the harbour trustees would be glad to send any nautical man.

2728. Your request will be duly considered.

2729. (*Capt. Washington.*) Perhaps Mr. Burns would furnish an estimate of the deepening of Cross Dykes, and removing the Scalp?—I will.

Deputation from Stonehaven.

Mr. James Tindall examined.

2730. (*Chairman.*) What is your name?—James Tindall.

2731. And your occupation?—Collector in Stonehaven, and clerk to the Harbour Trustees of Stonehaven.

2732. Is there any statement which you wish to make with reference to the harbour of Stonehaven?—Yes.

2733. Considered first as a fit site for a national harbour of refuge?—I am not capable of giving an opinion upon that point myself; but we were not aware until last night that the Commissioners were to be here to-day, and I happened to be here on other matters altogether; therefore I am not quite prepared to say so, but I know it is the opinion, and has been considered so for some time past, that it is a fit place for a harbour of refuge; if not a national harbour on a great scale, still as a small and subordinary harbour. Perhaps I may state that Sir John Forbes, who was here to-day, and who had a statement to make, was prevented from making it by being officially connected with the great cattle-show here. He lodged three or four documents, and there were two memorials sent to Parliament last session in reference to this subject, and the situation of the harbour of Stonehaven is fully stated in those documents. Perhaps it would be better to refer to them than make a separate statement at any length; but there are one or two things that I would like to state in addition.

2734. (*Chairman.*) Will you proceed with your statement?—The town of Stonehaven and harbour of Stonehaven, as the Commissioners know, is situated to the south of Aberdeen, about 15 miles—about half way between Aberdeen and Montrose; it is the county town—a small town, containing between 3,000 and 4,000 inhabitants, and has very little trade; but these are matters that perhaps do not apply to making a proper harbour of refuge. The harbour was a very small harbour; it was made by the proprietor of the ground, and was forfeited immediately after the rebelion in '45. It fell into the hands of different parties, and was kept up as a sort of private

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harbour, without having harbour dues. It was kept up in that way till about 30 years, when there being a great desire to improve it, an Act of Parliament was applied for and obtained, and trustees were named for having a new harbour made—the safe harbour. There is a south and a north harbour ; and the money for making it was borrowed from a bank to the amount of about 8,000*l.* That sum of 8,000*l.* still remains unpaid. The shore dues we received at the harbour, and for a considerable time they amounted to perhaps 500*l.* or 600*l.* a year ; but since the establishment of a railway running past Stonehaven, the trade of the harbour has been very much interfered with, and now the yearly harbour dues amount only to about 200*l.* This is applied in keeping the harbour in repair, which does not require very much, and paying the expenses of officers. The expenses and repairs amount to some 60*l.* or 70*l.* a year, and the remainder goes to pay the interest, as far as it is capable, of the money borrowed from the bank, so that the funds of the harbour are in a bad situation, and the trustees are not capable of doing more than they have been doing, and if anything is to be done it must be done otherwise. The ships belonging to the port are some 9 or 10 vessels of small tonnage—80, 90, or 100 tons ; they are chiefly employed in the importation of coal, lime, and other heavy articles ; and during the herring fishing season the harbour has been, for the last 20 years, overflowed by boats from other places to the number of 50, 60, or 70. The number during the present fishing, I think, is 70, all from other places, with the exception of one or two ; and from their having been successful this year it is believed, and I heard it from various quarters, that the number of boats next year, and perhaps in future years, will be very much increased. Before the Act of Parliament was obtained, Mr. Robert Stevenson, the engineer of the Bell Rock Lighthouse, was applied to to inspect the harbour, and make a report. He did so. The idea was merely to have a harbour suitable for the particular class which traded here ; but it struck him as being a place for a much larger harbour, and therefore he added to his report, that he conceived it would be a very suitable place for a large harbour—a harbour something of the nature of a harbour of refuge, in which even vessels of the navy might take refuge ; and he made a report to the same effect, and made a plan of it, and also a sort of plan of the proposed extended harbour. That plan and that report I have not with me to-day, as I was here accidentally on other matters ; but I shall be glad to send it to the Commissioners to-morrow to Dundee or elsewhere, or give it to the steamer in passing Stonehaven to-morrow.

2735. (*Chairman.*) Will you forward the plan in question at your convenience ?—Yes. (*The witness proceeded*) :—

The principal advantages of Stonehaven, as appears to those who have looked at the place, and who have thought of this matter for some time, are :—first, that it is situated exactly midway between the Firth of Forth and the Moray Firth. You will see, from what has taken place here, that this is correct, because the town of Aberdeen on one side of Stonehaven, and the town of Montrose on the other side—that those two places were central places between the two firths. Now, if that be so, of course Stonehaven being between them, must be made so. It is exactly midway between Buchan Ness and Fife Ness. Stonehaven is situated in an extensive bay, protected by headlands on both sides—particularly protected on the south and south-east by a high headland ; and the harbour is just immediately without that ; at present it is only a tide harbour, and as at low water there is almost no water, it is at high water that the vessels enter and leave the harbour. According to Mr. Stevenson, it appears from his report that the harbour could be so far carried out as to have a harbour capable of admitting vessels even at low water. I believe there would be considerable expense in doing that, but the material is just at hand. It is a place very favourable for the material necessary for building piers and breakwaters, there being a quarry, a very extensive one, close to the harbour, out of which the present harbour was built, and out of which harbours of a much greater extent could be built.

2736. (*Chairman.*) State, supposing the improvements you contemplate are carried into effect, to what number of ships it would be capable of giving shelter as a harbour of refuge in a heavy easterly gale.—It could be carried out so as to give shelter to 100 vessels, I should think, but it might be so carried out as to give shelter to 50. At present, I think, some 30 or 40 vessels in the harbour in an easterly wind run in for shelter. It is in some measure a harbour of refuge at present. In easterly storms vessels run into it very frequently.

2737. Would vessels be able to run into it at all times of tide if the improvements which you contemplate are carried into effect?—I think so. If the breakwater be carried far enough out they could come into it at all times of the tide, but that was not referred to by Mr. Stevenson, and not having his report, I would not like to say anything positive about that, but refer to his report and the plan which I shall send to the Commissioners.

2738. (*Mr. Lindsay.*) You say that if the improvements were made which Mr. Stevenson recommends vessels could enter at all times of the tide ; what sized vessels ?—He said the smaller vessels of the Royal Navy might enter.

2739. Do you remember what Mr. Stevenson's estimate of the cost of making such a harbour would be ?—The cost of the larger harbour, I think, that he lays down upon his plan, was something more than 40,000*l.*

2740. What depth of water have you in the bay? —By going a very short way out the depth increases rapidly.

2741. What kind of shore have you along the bay? —Sandy sort of beach along the bay. There were some rocks where the harbour is, but they were taken out. The name Stone, however, would give you some notion of the place, that there was originally some rock.

2742. Then does the present shipping trade of the place consist entirely of small coasting vessels and fishing boats ?—Yes, almost entirely at present. At one time foreign vessels occasionally came with timber, but there has not been much of that of late.

2743. (*Capt. Vetch.*) How many acres does the harbour contain at present ?—I should say perhaps four acres. There are two harbours, the old and the new ; the one to the north and the other to the south. I should think each about two acres.

2744. Are they dry at low water ?—They are almost dry at low water of stream tides, but not of neap tides.

2745. (*Capt. Washington.*) It is five acres, if you like to know. I am speaking without having reference to any measurement. I think it is fully what I say.

2746. (*Mr. Coode.*) Is there a plan attached to Mr. Stevenson's report ?—There is.

2747. Does that plan show the proposed improvements ?—It shows what he suggested himself.

2748. Is it suggested as a harbour of refuge, or simply for the trading purposes of the port ?—It went beyond the trading purposes of the port. It marked off a further harbour that might be built with more propriety and usefulness, and which was beyond the trade of the place altogether.

2749. And was the sum named in the report for which that work might be accomplished ?—There is an estimate attached to it. He proposed two or three scales, and there is an estimate applicable to one or two of them. What I have said, Mr. Stewart, one of the magistrates of the town of Stonehaven, will corroborate.

2750. (*Chairman.*) Can you hand in a list of the gentlemen who are with you ?—Yes.

Mr. STEWART examined.

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2751. (*Chairman.*) What is your name?—William Stewart.

2752. And your occupation?—Sheriff clerk of the county of Kincardine, and agent for the Bank of Scotland.

2753. Do you agree generally in the statement you have heard made by the last witness?—I do.

2754. Is there any point on which you are disposed to differ from him?—No. The whole I could say in addition is that I think, from its locality, and the locality of the situation on the coast, from the depth of water, and the advantage that it has as a place that could be easily taken by ships in north-east winds on the coast,—I think it has a claim for consideration by the Commissioners. The depth of water is so considerable as to be almost any depth if you carry it out far enough. But at all times, from the depth of water, ships could enter.

2755. (*Mr. Lindsay.*) What is the opinion of the people of Stonehaven with regard to a national harbour of refuge on the north east coast of Scotland?—I could hardly say. I believe they are of opinion, so far as I could gather, that if there were such a harbour contemplated or thought necessary, the bay of Stonehaven is so situated as to be well worthy of the consideration and the examination of the Commissioners, to see whether or not it should not be more advantageous and less expensive to make it a harbour of refuge than any of the others that have been mentioned, such as Wick, Peterhead, Fraserburgh, and those places.

Mr. KINNEAR examined.

Mr. Kinnear.

2756. (*Chairman.*) What is your name?—Arthur Kinnear.

2757. What is your occupation?—Bank agent and solicitor, lately connected with the shipping office.

2758. Do you concur generally in the statements which have been made by the two previous witnesses?—Yes.

2759. Is there any point on which you differ from them?—No. I may say in addition that I have often heard seamen say that it is the most easily taken port in the east coast during a storm.

2760. (*Mr. Lindsay.*) Do you know what is the opinion of the people of Stonehaven with regard to a great national harbour of refuge on the north-east coast of Scotland?—The general opinion is that it would be more valuable to assist the smaller harbours on the coast than erect one great national harbour of refuge. That is certainly the opinion that I have heard.

2761. Have you heard any of them say that they thought such a great national harbour was necessary?—They thought perhaps it would be a desirable thing to have in case of accident, instead of being an absolute necessity. They thought perhaps the Commissioners might have visited this place personally, so that they might have formed their own judgment on the matter. We were so situated that we had to employ the engineers with a view of making the necessary plans, and modelling the plans to suit the present views.

2762. (*Capt. Washington.*) You are probably aware that two of the Commissioners had visited Stonehaven ten years ago, and made a full report of it before Parliament?—Yes. Perhaps an opportunity might be afforded to parties connected with Stonehaven of forwarding any additional evidence to the Commissioners in London, should it be desirable.

(*Chairman.*) The report which you have made will of course be duly considered by the Commissioners: but at the same time, to prevent the possibility of any misconstruction, I feel myself under the necessity of acquainting you that the Commission has been appointed for a special purpose, and of course they select such evidence as appears to them most desirable. In that view they thought it unnecessary to call upon the harbour trustees and parties interested in Stonehaven to give their evidence, simply because they are so entirely in possession at the Admiralty of all the circumstances connected with the port that they considered it unnecessary for the purposes of their inquiry. But at the same time you must permit me to add, that we are glad to have had the pleasure of seeing you here this afternoon; and as you happened to be accidentally at Aberdeen, we have been most happy to hear everything that you have had to offer, and you have been able also to give us some testimony as to the feeling entertained by the people of Stonehaven as to the general question, which of course is valuable to us.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sittings at Aberdeen closed.

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Friday, 3d September 1858.

PRESENT:

Admiral HOPE (Chairman).

Mr. LINDSAY.
Captain WASHINGTON.
Captain VETCH.
Mr. COODE.

Mr. SEWELL, Secretary.

Provost LUMGAIR, of Arbroath, examined.

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2763. (*Chairman.*) What is your occupation?—I am a merchant, the Provost of Arbroath, and chairman of the Harbour Commissioners.

2764. Have you any statement which you wish to offer to the Commissioners?—With your leave I will lay before them a very short statement, and afterwards prove it by evidence.

2765–6. In the statement you are about to make, I wish you to bear in mind that the primary object of this Commission is to inquire as to the most eligible site for a harbour of refuge on the north-east coast of Scotland. And therefore in any statement you make, or any evidence you bring forward, I wish you to recollect that is the primary object. You will be at perfect liberty also to make any statement, or give any evidence as to Arbroath, to show its eligibility for being a subsidiary harbour of refuge, if you wish to do so.—I wish to speak as to its being a subsidiary harbour of refuge. There are some gentlemen here from Arbroath who have been long at sea, and who can give much better evidence regarding this than I can; therefore I will dispense with making any remarks as to the subject of a general harbour of refuge, and confine myself to the claim of Arbroath as being a subsidiary harbour of refuge. By deepen-

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ing the harbour of Arbroath a few feet, it could be rendered very serviceable as a harbour of refuge for the greater part of the shipping frequenting this coast. If this were done, vessels could take it very often when they are compelled to run on shore or to attempt taking some other harbour in the north, in which case they are frequently wrecked, and a great many lives lost. I prove my case, not so much on the commercial grounds that it would benefit the harbour of Arbroath, as on the grounds of public utility and humanity. What I believe is, that if the harbour were deepened a few feet, a great many lives and a large quantity of property, which are now lost in consequence of vessels not getting into Arbroath from want of depth of water, would be saved. At present these vessels run to other places, the access to which is very difficult, and the vessels are often lost. Arbroath is very easily taken; the great difficulty is, the want of depth of water. It is only vessels of small size that can come in, and only during a short period of the day. If there were an additional depth of water of about three feet, vessels of the ordinary size on this coast could come in 12 hours out of the 24. In advocating a grant from government, I will prove that we do not seek this without having first helped ourselves. In order that the harbour might be put into the hands of trustees, and taken out of the hands of the Town Council, who retained the dock for municipal purposes, the inhabitants assessed themselves for these municipal purposes. A sum of 60,000*l.* was raised to improve the harbour, and this has been raised principally on the security of the merchants of the town, of country gentlemen, and of others interested. By this expenditure, great improvements in the accommodation have been made, and the only deficiency now is the want of depth of water. By an estimate prepared by Mr. Leslie, civil engineer, a gentleman of great experience, it is shown that an additional depth of three feet of water could be obtained by an expenditure of 10,000*l.* This would admit a much larger class of vessels than at present, and in states of the tide in which just now it is impossible for any vessel to come in. The Harbour Commission have been encouraged to make the application by the very favourable report of the Arbroath harbour made by the Tidal Commissioners in 1845, and by the report made by the Board of Admiralty to the Lords of the Treasury in 1848, copies of which I will place at the disposal of the Commissioners. I will just read the following short extracts from the report by the Tidal Commissioners in 1845.

"The estimated expense of executing these works, "as in nearly all similar cases, has proved too small. "As far as they have been carried out, they are con- "structed with deep foundations, and are of a substan- "tial and stable character. But the deepening of the "harbour, with its entrance and approaches, is still "unfinished; and having exhausted all their re- "sources, the trustees have memorialized Your "Majesty's government for a small grant to enable "them to complete the projected works, without "which what has been done will be in a great mea- "sure unavailable. The works proposed, it appears "in evidence, would give a mean depth of 16 feet "at high water of ordinary spring tides, they would "render Arbroath a tidal harbour of refuge for 12 "hours out of the 24 for all vessels of the size which "usually frequent that coast, and they would thus be "as great a benefit to the public as to their enter- "prising owners; for the greater part of that rocky "coast, when it becomes a lee-shore, is extremely "dangerous, as was too fatally proved in the gale of "January 1800, when 40 vessels were wrecked, and "13 of them within a few miles of Arbroath. "Taking all the above-mentioned circumstances into "consideration, it appears to the Commission that "this case comes so distinctly under the fourth head "of inquiry pointed out to us by our instructions, "that, if in any instance Your Majesty's government "should be disposed to aid the local exertions of the "trustees of a harbour, this case seems deserving of "encouragement; and we therefore humbly beg leave "to recommend to Your Majesty the prayer of the "trustees of the harbour of Arbroath."

I then hold in my hand a report by the Board of Admiralty to the Lords of the Treasury, dated 1848. In this it is said:—

"That the statements in the memorial of the trus- "tees are fully borne out by the evidence taken "before the Tidal Harbour Commission, and by the "report of the Commissioners. The simple facts of "the case connected with this harbour are so forcible "that the bare enumeration of them seems all that is "necessary. 1st, that a harbour in the position of "Arbroath, on the east coast of Scotland, is much "wanted. That the present harbour, even in its in- "complete state, has proved useful in many cases in "saving life and property, and that it is the station "from whence the Bell Rock lightkeepers are "supplied with provisions and stores, and help in case "of need. 2d. That this harbour, like many others "in Scotland, was the property of the town, and its "revenue was applied to lighting and paving the "streets, &c. 3d. That the harbour accommodation "having become insufficient for the trade of the "place, the community voluntarily gave up the whole "of the dues towards its extension, taxing themselves "instead for municipal purposes. . . . . 6th. "That the works, as far as they have been carried "out, are substantial and good; but the deepening of "the approaches to the harbour, an essential part of "the plan, still remains to be executed. 7th. That "in order to admit vessels of 15 feet draught of "water, it would be requisite to clear a channel 100 "feet wide, and 3 feet deep, for a distance of 230 "yards, out to low-water mark. 8th. That such a "work would cost 10,000*l.*, but the judicious expen- "diture of that sum would double the value of the "present works by rendering the harbour available "to all vessels that usually trade along the east coast "of Scotland. 9th. That the present income exceeds "3,000*l.* a year, but as the trustees are now paying "5½ per cent. interest for the greater part of the "harbour debt, they have no funds which can be "applied to further improvement."

Then comes a recommendation, or rather a reference to what has been done by the people of Arbroath, as showing their claim to attain aid:

"Considering the praiseworthy spirit evinced by "the inhabitants of Arbroath, and the personal "sacrifice they have made for the public benefit, the "value of a good harbour on that exposed coast to be "obtained at so trifling a cost, and that for want of "a little timely assistance, much of what has been "done is in a great measure unavailable, we feel that "we are fully justified in concurring with the report "of the Tidal Harbour Commission, that if in any "case Her Majesty's Government should be disposed "to aid local efforts in the improvement of a harbour "the trustees of Arbroath, 'under all the circumstances "'of the case, are specially deserving of such aid in "'order to enable them to deepen the entrance and "'approaches to their harbour, and to complete the "'works they have so well begun.'"

I may state that from all the circumstances of the Harbour Trust, a loan would not be so great a boon now as at the period when it was asked. We, the Harbour Trustees, now ask a favourable report on the part of this Commission, in regard to our application to receive a grant from Government of 10,000*l.* for the purpose of deepening the harbour and the entrance; and the Harbour Trustees believe that sum would be sufficient for the purpose. Such is a general statement of the application we make to the Commission, and the grounds on which we consider we are warranted in making this application, that is, the benefits that would result to the shipping generally from the deepening of the harbour, the greater security to life and property, the previous worthy efforts of the inhabitants of the town, and also the very favourable reports by the Tidal Harbour Commissioners and by the Lords of the Admiralty.

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Mr. Macdonald, the clerk of the Harbour Trustees, is present, and is able to give much fuller information on the subject than I can do, and there are three gentlemen present from Arbroath able to give information as to the harbour of Arbroath, and also as to the general question of a large harbour of refuge.

2767. How long have you been acquainted with the harbour of Arbroath?—I am a native of Arbroath, and have chiefly resided in it.

2768. Then are you well acquainted with the shipping interest?—Yes, but I am not much connected with it.

2769. In your opinion is it desirable that there should be a large harbour of refuge on the north-east coast of Scotland between the Firth of Forth and the Pentland Firth?—I cannot say that I have directed attention to the question of a national harbour of refuge. The trustees have directed attention to their own harbour as a subsidiary harbour of refuge, but not to the question of a general harbour of refuge. I think the shipmasters will give much better information on the subject.

2770. (*Mr. Lindsay*). Do I understand that 10,000*l.* would deepen the harbour to the extent of 3 feet?—That is Mr. Leslie's estimate.

2771. You did not make clear the object you had in view. Do you come here to ask Government to grant 10,000*l.*, or to lend it?—We ask it as a grant.

2772. Do you wish the Treasury to make an advance of all the money you require for making your harbour a subsidiary harbour of refuge?—I think the advantage to the shipping generally would be great from making Arbroath a subsidiary harbour of refuge, so that the sum of 10,000*l.* to be given by the government would be very well laid out for the public interest.

2773. Would not an outlay of 10,000*l.* tend very materially to improve the revenue of the harbour of Arbroath and the trade of that place?—No doubt it would after the works were executed; but it would be a great public benefit.

2774. But would it not be a far greater benefit to you than to the public generally?—It would be of great advantage to us; but we have already done a great deal, and we are not able to do more.

2775. Then I would like to know what benefit the general shipping interest and the public at large would derive from it. In the first place what would be the depth of water?—16 feet.

2776. What is the rise and fall of the tide at Arbroath?—I am not sure.

2777. What depth of water have you at low water?—In the harbour none; it is a dry harbour.

2778. What winds are the most dangerous winds on this part of the coast?—South-east.

2779. You say that it is for the protection of the shipping sailing along this coast, and for the safety of life and property,—say that a ship were caught in a south-east wind, which is the most dangerous wind, could she not run for the Firth of Forth and find safe shelter there, or for the Firth of Tay?—I believe the Firth of Tay is difficult to take, and the vessel may be too far in shore to gain the entrance of the Firth of Forth.

2780. Do you think that an expenditure of 10,000*l.* would make Arbroath safer to take in a south-east wind, than the Firth of Tay?—I am not sufficiently versed in these points to answer the question. Some of the shipmasters, who are practical seamen, will answer it much better than me. But I can speak to the general statement that Arbroath can be taken by vessels who can take no other port on the coast; and that vessels that have been compelled to pass Arbroath, from there not being sufficient depth of water, have been lost going to Montrose. One thing I may mention. a number of years ago several boats came from Peterhead, and they could find no shelter all the way along the coast until they came to Arbroath. Fortunately there was water for them in Arbroath, and they got in there.

2781. Do I understand you to say that between Peterhead and Arbroath there was no harbour where boats could take shelter until they came to Arbroath?—Just so.

Mr. JOHN MACDONALD examined.

Mr. J. Macdonald.

2782. (*Chairman.*) What is your name?—John Macdonald.

2783. What is your occupation?—I am clerk to the harbour trustees of Arbroath.

2784. Are you well acquainted with the shipping interest of Arbroath?—I have been clerk to the harbour trustees for a long time, but I am not a practical sailor.

2785. Will you state whether in your opinion one large harbour of refuge between the Pentland Firth and the Firth of Forth would be of benefit to the shipping?—I cannot give an opinion on it myself. Any opinion I have I have formed from the opinions of parties who pretend to know. And that opinion is, that small grants to small harbours would be much more beneficial than a large grant for a national harbour of refuge. Will you allow me to call attention to some of the statements made by the honourable gentleman on the right hand of the chair in regard to the public benefits that would arise from Arbroath harbour being deepened?

(*Chairman.*) Certainly.

(*The witness proceeded.*)—I hold in my hand a statement by six of the most respectable men in Arbroath prepared in 1845, one of these persons is now present, in which they give a list of a great number of shipwrecks, nearly 100, that they all agreed would have been prevented, and the lives of those lost saved, had there been depth of water in Arbroath harbour. Arbroath harbour is very easily taken; all acquainted with shipping state that the only want is the want of water. The document states:—"It frequently happens in the winter season, say three or four times a week, and sometimes with about a dozen of ships, that when driven out of the Forth or the Tay by westerly gales (which they often are without anchors, and with sails much damaged) they try to take Arbroath harbour, but in consequence of the insufficient depth of water that is found impracticable, that is, with ships which draw more than 12 feet of water. Vessels of less draught often get shelter. There is no other harbour that vessels can take with a gale of westerly wind along the whole coast." There never was a ship, in the recollection of any of the gentlemen named, that could not take Arbroath harbour in any state of weather, provided there were depth enough of water; and they never saw a vessel attempt to take the harbour but succeeded when there was sufficient water. The case that the Provost mentioned of a fleet of herring boats coming from Cromarty Firth, I was a witness of myself. They were caught in a tremendous gale, and were driven out of the Moray Firth. They tried Peterhead, but they could not manage in there. They tried Aberdeen, and one was wrecked there. They tried Stonehaven and then Montrose. There were about 20 boats. The gale was increasing, the sea ran exceedingly high, there was immense excitement, the whole town turned out, and the life boat was brought out. The boats got into Arbroath quite safe. That was because they did not require much water. The same day four vessels made signals that they wanted to come in, and they were warned off because the water would not admit them. The community of Arbroath have spent about 60,000*l.* upon improving the harbour; and they taxed themselves to make up the amount formerly given for municipal purposes. They borrowed money to improve the harbour, and many of them gave their own personal security for it. They cannot do more, and all that they intended to do is not done. They intended to deepen the harbour so as to admit vessels of 400 tons instead of vessels of

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150 tons, and that would take in all the class of vessels frequenting the coast. All that we require is to deepen the harbour and the entrance. According to an estimate we have got from Mr. Leslie, a gentleman well known to the Commissioners, I have no doubt that can be done for something less than 10,000*l.* I have got the particulars of the estimate here, and will lodge them with the secretary. That is what we want, and we consider the matter one of great public importance. I have noticed, in the evidence taken before the Committee of the House of Commons, Mr. Calver, one of the witnesses stated he considered Arbroath harbour of only local importance ; but it is not so. It affects the lives and the property of the shipping interest generally, and not that of Arbroath only. Seeing that Arbroath has exhausted its own means, I think the public would get a very good bargain in the advantages they would obtain for the small sum now asked. I have held the situation of clerk and secretary to the Harbour Commissioners since they were first incorporated by Act of Parliament, and I will be very glad to answer any further questions.

2786. (*Mr. Lindsay.*) As you have now stated some facts of which I was not aware, can you now tell me how the 60,000*l.* was raised, and over what period it was expended?—It was raised by the Harbour Trustees partly on the security of the harbour dues, and partly on the security of private individuals. There were about 70 individuals who came forward and were security for the money.

2787. How was the 60,000*l.* expended? — In making a new breakwater and dock.

2788. And in deepening the channel? — That was what we could not accomplish. The expense of what we did exceeded the estimate.

2789. Then you spent the whole funds in the breakwater and dock?—Yes. There was nothing wanted but the deepening of the channel.

2790. Has there been anything done to deepen the channel of late years?—Very little ; we were not able.

2791. You said vessels take Arbroath in a westerly gale?—Yes.

2792. Do you mean to say that it is not safe for vessels in such gales to run for the Firth of Tay?—I believe the westerly gale would blow them out of the Tay.

2793. If a westerly wind blows them out of the Tay, does it not blow them from Arbroath?—It blows them to Arbroath, that has been proved often. You have got the statement of these 6 men which I read, and no better evidence could be given. They state that it happens three or four times a week in the winter season, that vessels are driven out of the Tay by westerly gales, and that they could take Arbroath were there sufficient depth of water.

2794. Are you able to answer the question, what course a ship must steer to enter the harbour of Arbroath?—I could not answer that question.

2795. Where did those ships belong to that were lost?—To various places. Besides these, I have got a list of five known cases, two of them belonged to England, and three of them to Arbroath. They were wrecked just for want of water in Arbroath. Everybody stated that the want of depth of water was the sole cause of the wreck in each of these cases. In each case, too, every soul on board was drowned.

2796. At what period did these 100 cases occur?—During a long period from 1800 downwards, but these five cases happened within the last few years.

2797. Did I understand you to say that these 100 vessels were lost within the last 50 years?—Within the last 45 years.

2798. What was the average size of these vessels?—From 100 to 150 tons. The five vessels were the schooner *Ellen and Jane* of Arbroath; she could not take the harbour from want of water, and she was driven northwards and lost all hands, 7 in number, off Stonehaven, on the 26th of February 1852. There was the sloop the *North Briton* was lost from the same cause off Montrose, and all hands lost, on the 22d December 1855. There was the schooner *Mavor* lost, from the same cause, near Montrose, on the 6th February 1856. The brig *Dew Drop* of Whitby, bound from Hartlepool to London, and after being as far as Flamborough Head was driven back, the gale being from the south-eastward, and becoming water-logged, ran for Arbroath, and ran ashore near the entrance to the harbour on 6th February 1854. The schooner *Commerce* from Aberdour, on a voyage from Elsinore with wheat, was lost on 9th January 1854.

2799. (*Mr. Coode, showing a plan.*) Does that plan show the harbour of Arbroath in its present condition?—No, it does not.

2800. Have you got such a plan?—No. Mr. Leslie furnished a plan which was laid before the Admiralty in 1848.

Mr. George Kidd examined.

Mr. George Kidd.

2801. (*Chairman.*) What is your name?—George Kidd.

2802. What is your occupation?—I am a shipowner in Arbroath.

2803. How long have you been connected with the shipping interest of Arbroath?—50 years and upwards.

2804. Have you ever been at sea?—For 35 years.

2805. In what capacity?—For 22 years I was a shipmaster.

2806. In what trade were the vessels employed which you commanded?—First in the coasting, and then in the Baltic, in the Baltic principally.

2807. Have you ever returned from the Baltic late in the year?—Often, at all times of the year.

2808. What was generally your landfall returning late in the year?—That depends on the wind. We generally steered from the Naze, and make the land farther north if the wind was from the south, and farther south if the wind was from the north. When the wind is fair, we make for the Bell Rock.

2809. What are the most prevalent winds there late in the year?—Westerly and south-westerly.

2810. And when these winds prevail, generally speaking, what part of the coast do you make first?—When the winds are from the west, generally St. Abb's Head, and sometimes as far north as Peterhead, and sometimes as far south as Shields. Then with a north wind we always made for the land wherever we could touch it.

2811. In taking your departure from the Naze of Norway late in the year, what course did you generally steer?—We generally steered for the Tay when the wind was southward. When the wind was from the south, we made the land generally more north, perhaps Buchan Ness.

2812. Is the land above Peterhead good to make?—Oh yes, it is very high, and you can see the land a far way off.

2813. Will you explain what course you steered with the wind south-west? — We steered for the Tay.

2814. And when the wind was from the south-west, how could you steer for the Tay?—Oh, that was a contrary wind and we did not steer for it. We were obliged to tack, and we made the land anywhere between the Tay and Peterhead, wherever we could reach it.

2815. (*Mr. Lindsay.*) From your great experience I would like to know if you think it would be desirable to have a national harbour of refuge somewhere between the Pentland Firth and the Firth of Forth? What I mean is a harbour into which ships could enter, of all sizes and at any time of the tide?—It would be very desirable to have a national harbour of refuge if it was placed in a proper situation.

2816. Now between the two points I have named, what point would you consider the most desirable for a national harbour of refuge?—I do not know where there would be an available place to make a harbour of refuge. Near the Pentland Firth you have the Moray Firth; and in the south you have the Firth of Forth. It would be of the greatest use in the Moray Firth or the Firth of Forth.

2817. Whether would you prefer Wick, Fraserburgh, or Peterhead?—I do not think any of them available, because at Peterhead you can run up the Pentland Firth to Cromarty; and at Wick, when the wind is east, you have the Moray Firth, and, if the wind is south, the Pentland Firth.

2818. When you were a master, have you sailed often through the Pentland Firth?—Yes.

2819. Did you consider it dangerous?—Yes; the Pentland Firth is dangerous if you go against the tide; if the tide is favourable it is not so dangerous, you can go through quite easily.

2820. Supposing that the Government decided to spend 300,000*l.* on the north-east coast of Scotland, whether do you think that 300,000*l.* should be spent in making one great harbour of refuge, or expended over various harbours for effecting improvements upon them; which of the two plans would tend most, in your opinion, to the saving of life and property of those frequenting these coasts?—I decidedly think that the money distributed in improving the present harbours would do much more benefit than to expend it in one large harbour.

2821. Then you think that for the saving of life, for the saving of property, and for the benefit of commerce, the 300,000*l.* would be better spent it distributed over various harbours than by forming one large harbour of refuge between the points I have named?—I do.

Mr. DAVID LESLIE examined.

2822. (*Chairman.*) What is your name?—David Leslie.

2823. What is your occupation?—I am a shipowner in Arbroath.

2824. How long have you been connected with the shipping interest of Arbroath?—For the last 40 years.

2825. Have you ever been at sea, and for what period, and in what capacity?—I have been a shipmaster for about 40 years.

2826. And in what trade were the ships employed which you commanded?—Principally on the coast and in the Baltic trade.

2827. Have you ever come home from the Baltic late in the year?—Frequently.

2828. What are the prevalent winds in the North Sea late in the year?—It is generally from the westward that there are heavy gales.

2829. And taking your departure from the Naze of Norway with the wind southward and south-west, how would you make your passage?—I would endeavour to make for the entrance of the Firth or the Bell Rock.

2830. Do you mean that you work to windward for the Bell Rock?—Yes.

2831. Therefore I understand that you would not stretch across until you made the weather shore?—Not with a south-west wind.

2832. Would you do so with the wind in any other direction?—With the wind at the south or south-east.

2833. Suppose the wind hung to the north-west and you were bound to Dundee, how would you endeavour to make your passage?—That is a wind almost right on end. The course would be about west and by north.

2834. In such a case would you stretch across to the weather shore or work to windward for your port?—I would endeavour to work to windward.

2835. Have you any opinion as to the necessity of a large harbour of refuge on the east coast of Scotland between the Firth of Forth and the Pentland Firth? and if so state it.—It would be very desirable to have a harbour of that sort.

2836. And where do you think the most eligible site for such a harbour?—Somewhere between Peterhead and the Tay.

2837. State your reasons?—About Peterhead, Wick, or Fraserburgh, you can always run for the Moray Firth, and Cromarty is the best harbour in the world.

2838. Are you therefore of opinion that Cromarty supersedes the necessity of a harbour of refuge at Wick, at Fraserburgh, and at Peterhead?—Yes.

2839. Is Cromarty easy of access in all winds and all weathers?—Quite easy with a sea wind, with a wind from the eastward and southward and so on.

2840. But if you were bound for Dundee, would not running for the Cromarty Firth in bad weather lose a great deal of time and a great deal of distance?—Yes.

2841. (*Mr. Lindsay.*) You said that you thought the best part for a harbour of refuge, if there was any, should be between Peterhead and the Tay?—Yes.

2842. Have you in view any particular point where such a great harbour could be made?—Well, I could not say positively what might be the best spot.

2843. Do you think if such a spot could be found, it would be more to the advantage of commerce, and tend more to save life and property, than if the sum to be expended in such a harbour were spread over various harbours between these points, for deepening and improving them and making them accessible at all times of the tide?—I think it would be better to spend the money in improving existing harbours.

2844. Do you know Arbroath very well?—Yes.

2845. Say that Arbroath harbour were deepened as proposed by Provost Lumgair, during what winds could vessels take Arbroath when they could not get into the Tay?—With the wind blowing north-west you cannot sail into Tay, if it is blowing hard, and yet it is easy to take Arbroath with a north-west wind.

2846. That, of course, will depend on the position of the ship at the time?—Yes, vessels belonging to the Tay often come to the Arbroath; those that find water.

2847. The usual track between the Firth of Forth, and suppose a vessel in the Baltic, and well to eastward of either of these points, and so she was obliged to steer for a harbour in this particular part of the coast, could she get into Arbroath when she could not get into Tay?—With a sea wind, she can always get into the Tay when the weather is clear.

2848. What depth of water have you at Arbroath?—13 feet at high water.

2849. What is the rise and fall?—At neap tides we have nine feet at high water.

2850. What water have you in the channel at low water?—It is dry, quite dry, at low water.

2851. If Arbroath harbour were improved in the way the Provost proposes, would it still be a dry harbour at low water of spring tides?—No, just now it is barely dry; during low water of high spring tides it is barely dry.

2852. Then the expenditure of 10,000*l.* would give 3 feet more water?—I am not very well acquainted with these matters, but it would do a great deal towards it.

2853. Then if 10,000*l.* were expended upon it, it would only be an ordinary harbour, and vessels could only take it at high water?—We would have 16 feet at high water, and vessels of 300 to 400 tons could take it.

2854. (*Capt. Washington.*) What is the average

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draught of water of coasting vessels generally along this coast?—10 to 11 feet.

2855. In the event of the harbour being deepened to the extent that has been proposed, could ordinary coasting vessels enter at neap tides as well as spring tides?—Quite so.

2856. Would you hesitate to take Arbroath, supposing there were depth of water, in a southerly gale?—No, if there was sufficient water.

2857. That is, if you had a vessel drawing 10 feet of water, and there were 13 feet in Arbroath harbour, would you venture in, in a southerly gale?—I would never hesitate.

2858. Is there any space or outset from the harbour?—None at all.

2859. Is it easier to take a harbour in which there is no outset?—Yes.

2860. Supposing there were depth of water, would it be as easy to take Arbroath as Montrose?—With the ebb tide it is very difficult to take Montrose. The entrance is very narrow.

2861. Do I understand you to say that, supposing there were depth of water, you would rather run to Arbroath than to the Tay or Montrose?—I would, and I have done it.

2862. Is it your belief that the several vessels wrecked you have heard mentioned could have been saved if there had been depth of water at Arbroath?—I am perfectly satisfied that they could. The *Dew Drop* and the *Commerce* were at the bar, and could not come in.

Mr. George Shield examined.

Mr. George Shield.

2863. (*Chairman.*) What is your name?—George Shield.

2864. What is your occupation?—I am a ship-master.

2865. In what trade were the vessels you commanded?—I have been in all trades. In the Baltic trade in my time, then in the Mediterranean trade, particularly in the Baltic trade.

2866. State your opinion as to the necessity or otherwise of a large national harbour of refuge between the Pentland Firth and the Firth of Forth?—I think if the money were laid out in improving existing harbours, it would do a great deal more benefit.

2867. (*Mr. Lindsay.*) I understand it to be your opinion that if a sum of money were voted, it would be much better to spread it over various harbours on the north-east coast than to expend it on any one harbour of refuge in particular?—My opinion is, that it would be better to spread it over various harbours.

2868. But say that the Government decide to have one great national harbour of refuge, what point of the coast would you consider most advisable?—If it was to be between Peterhead and the Tay, that would be the best situation, because if you were off Peterhead you could find a passage either to the Firth of Forth or the Moray Firth.

2869. And what particular part of the coast between Peterhead and the Tay would you recommend?—I cannot say where there would be ground and depth of water. I cannot point out a spot.

2870. (*Capt. Washington.*) You have heard what Mr. Leslie stated respecting taking Arbroath harbour—the facility of taking it—do you agree with him?—Yes I think there would be great benefit from three feet more water.

2871. Do you agree with him in saying that the harbour would be taken easily generally?—It is a very easily taken harbour. There would be no danger of damage hardly if it were not for want of depth of water.

Mr. W. E. Baxter, M.P., examined.

Mr. W. E. Baxter. M.P.

2872. (*Chairman.*) You are member for Montrose?—I am, and I am largely engaged in the commerce of Dundee.

2873. Have you any direct connection with the shipping interest?—None.

2874. Have you read the report of the Select Committee on harbours of refuge?—I have not read the whole, but I have read a considerable portion of it.

2875. Are you aware of the proportion which the maritime population of this country bear to those who are not in any way connected with the sea, and who are able-bodied and might be called upon to bear arms in defence of the country?—No, I am not.

2876. You are aware, however, I presume, that the proportion of the maritime population which may be called upon for the defence of the country, is very much smaller than that of the remainder of the population from which the army is recruited?—Certainly.

2877. Taking that into view, how would you, who have a large stake in the country, be disposed to view a considerable grant of the public money for the purpose of meeting the great risk to which the maritime population of this part of the coast, whether engaged in the passing trade or in the fisheries, are exposed?—I have long been of opinion that it would be a far wiser course to sanction the expenditure of small sums of money in improving the harbours along the coast, than in erecting harbours of refuge at a very large outlay of money, particularly as the experience of these harbours has not been satisfactory, I instance the harbour of Dover, where a very large sum has been expended, I am afraid to say how much, but it is known, no doubt, to many members of the Commission. I understand that on the harbour of Alderney 1,300,000*l.* have been expended on works, which we are now told require a great farther expenditure before they can be of the slightest public benefit. I understand that in Portland also, where a large sum of money has been expended, the benefit has not been at all commensurate with the expenditure; and although no doubt, in my humble opinion, it would be of great benefit that we should have as extensive harbours of refuge as possible, and although property may be saved to some extent by the erection of these works, I really cannot possibly bring my mind to believe that the amount of benefit which can be derived from such a vast expenditure would be sufficiently great to warrant the government of the country in making such a grant. Suppose we had a large harbour of refuge at Wick, and one on the north-east coast of England, and another on the coast of Ireland, I have no doubt that in the course of a few years some few vessels would take refuge there, but I think very great doubt might be entertained whether or not the public money might not be very much more satisfactorily and economically applied in aiding, as stated by some of the preceding witnesses, existing harbours who have already helped themselves, and where the expenditure of a few thousand pounds might render them quite sufficient to meet all the requirements of that part of the coast.

2878. And therefore, on principle, you would not object to a judicious outlay of the public money on harbours with a view to the saving of life?—On the contrary, I think in a time of peace, and when the finances of the country admit of it, that it is a wise and beneficial expenditure of the public money. It is an expenditure which other nations have sanctioned, and which I see no good reason why the greatest commercial nation in the world should not sanction, but very much the contrary.

2879. (*Mr. Lindsay.*) You read the part of the report referring to the east coast of Scotland?—Yes.

2880. Do you agree with it?—I am not sufficiently acquainted with nautical affairs to give distinct evidence as to whether or not we ought to have

vast harbour of refuge on the north-east coast; but I have a preliminary objection, as I stated before. Even supposing it were made out to my satisfaction that a few lives, and some property, were saved every year, I think the benefits would be very small from the erection of such a large harbour. I think it would be doubtful whether the legislature should sanction grants of such sums of money as have been expended on Dover, on Alderney, and on Portland.

2881. You are of opinion that a great public benefit would arise if a certain sum of money were expended over various ports on the north-east coast?—Yes, and on various ports throughout the country.

2882. Would you think it advisable also, or have you heard an opinion expressed among your constituents, that it would be advisable to spend the public money in the erection of one great harbour of refuge on the great north-east coast of Scotland?—I should like to speak cautiously on that point, because I doubt some gentlemen entertain the contrary opinion. All I can say is, that in this locality I never heard any man, whether acquainted with nautical matters, or connected with our commerce and manufactures, ever express a decided wish for such a harbour of refuge as that now referred to.

2883. You have alluded to the north-east coast of England. Do you think a great harbour of refuge is not necessary there, having in view, first, the saving of life; second, the saving of property; and, third, the increased facility to commerce?—I am not competent to answer that question, not being acquainted with nautical matters, or with that particular part of the coast. I have heard seamen and men interested in our commerce and manufactures complaining of the want of some port on the north-east coast of England, to which they could occasionally put in. At the same time, I have no doubt many of them think that there are various ports that might be improved at a comparatively small expenditure, and that that would be a preferable mode of expending money to erecting one enormous harbour at one point even on the north-east coast of England.

2884. Now, say that the Government should decide upon distributing a certain amount of money on the harbours of this coast; in which way, in your opinion, should that money be distributed, whether as a grant to the different harbours, or in the shape of a loan repayable at a fixed period, at a low rate of interest?—I should think that would depend very much upon circumstances. I should think you would require to judge of each individual case by itself.

2885. Do you not think it would be advisable, if the government were to give to harbours a fixed sum of money in the shape of a grant, that it should be required that the parties locally interested should in each case expend a sum equal to the grant?—That would depend upon circumstances. It would depend on what they had previously expended, and upon the particular circumstances of the Harbour Trustees at the moment. I would say that if a locality had spent 20,000*l.* on a harbour, it would be rather too much to ask a grant of 20,000*l.* from the public funds; but I am not prepared to say that a direct grant would not in many instances be preferable to either a loan or a grant with stipulations attached.

2886. (*Capt. Washington.*) I think I understood you to say that you did not see any necessity for a harbour of refuge on the coast of Great Britain?—I should like to explain that I doubt very much whether the benefits to be derived from such harbours of refuge as those at Dover and Portland would be commensurate with the enormous outlay; but I think it an exceedingly wise expenditure in a time of peace, and when the finances of the country admit of it, to give grants to harbours not exceeding a certain sum of money.

2887. You are aware that the subject under inquiry at this moment is harbours solely for the mercantile shipping of this country?—I understood so.

2888. May I ask you to look at the chart which I hold in my hand; you see it is a chart showing the wrecks which have occurred on the coasts of the British isles during the last five years?—Yes.

2889. You see that the total number of wrecks have been 5,128?—That is the number.

2890. And the total loss of life 4,148?—Yes.

2891. Do you not consider that, both as a question of humanity and policy, every effort should be made to endeavour to prevent that loss of life?—I decidedly think so.

2892. Do you conceive that in this rich country any very large sum of money would be too much to expend in saving the lives of 4,148 persons?—Certainly not, if smaller sums of money more judiciously expended would not serve the same purpose.

2893. (*Capt. Vetch.*) Supposing it were decided to expend the public money in the erection of a large harbour, have you any opinion as to about what particular part of the coast such a harbour should be placed?—No, I should think that would require either a nautical man frequently on the coast or a man acquainted with the wants of each locality. Probably it would be judicious to expend a sum of money at Peterhead as well as at Wick, Arbroath, and other places My strong opinion is, that, whatever sum of money is allocated by the government or the legislature, it should not be expended in one place.

2894. That it should be distributed over existing harbours rather than spent on one great harbour of refuge?—Yes.

2895. (*Mr. Coode.*) You speak of the inexpediency of expending one large sum in constructing a great harbour of refuge. Do you think that there is no exception to the proposition you have laid down, that the sum should be expended upon small harbours and improving them?—I doubt if there is any exception. My mind is certainly not made up.

2896. Do you think you have a sufficient knowledge of the whole coast and of the dangers of that coast to enable you to give an opinion?—Certainly not, and I studiously avoided doing so. In answer to the first question of the Chairman, I said I had no practical knowledge of the coast, and that the opinion I stated was given with great submission as an opinion formed upon imperfect premises, but an opinion on a matter which it was my duty as a member of Parliament to look into somewhat.

2897. You speak of the large sums expended on the harbour of Dover, and have mentioned 1,300,000*l.*?—Yes.

2898. Do you happen to know the exact amount expended there; do you know if 800,000*l.* have been expended there?—1,300,000*l.* was stated last year in the House of Commons.

2899. Already expended?—Yes; the statement was made several times in the course of the debate, and, so far from its being a mistake, I understood the gentleman whose duty it was to prepare the estimates admitted it, and it never was disputed.

2900. You speak of the expenditure at Portland; are you aware of the exact amount there expended?—I have forgot it, it was a very large sum. I think we were asked for an additional 60,000*l.* or 70,000*l.* last year.

2901. Are you aware of the total amount expended there?—I have forgot it.

2902. Do you know the amount of the shelter afforded there by the expenditure up to the present time?—No, but I have heard complaints of the amount of the dues, and shippers have said that in running in there for shelter they were running from Scylla into Charybdis.

2903. Can you tell the amount of the dues levied there?—No, I cannot.

2904. Can you tell whether there has been any imposition of dues since the money was expended on constructing the harbour?—No, I cannot.

2905. (*Mr. Lindsay.*) Captain Washington has referred to a very large loss of life along the coast

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of Britain; would you think that the expenditure of a sum of money in improving the existing harbours throughout the whole of Scotland, England, and Ireland, would tend more to reduce the number of these fearful casualties than the expenditure of that sum in the erection of three or four great harbours of refuge?—I do not doubt it; it stands to reason.

2906. (*Capt. Washington.*) I think, if I understood you aright, you stated the expenditure at Dover at 600,000*l.* or 700,000*l.*?—No; I said it was a very large amount, but I had forgot the exact sum.

Then I am gratified indeed to be able to inform you that there has not been 300,000*l.* expended at Dover. You stated that there had been a million and a quarter expended at Alderney; there has not been the half of that sum expended there, and you may like to know that there is not one halfpenny of dues charged at any harbour of refuge.

(*Chairman.*) I feel much obliged to you, Mr. Baxter, for having come forward at my request to give your evidence on this occasion.

Mr. G. Welch examined.

Mr. G. Welch.

2907. (*Chairman.*) What is your name and your occupation?—George Welch. I am at present a ship agent and shipowner to a small extent.

2908. Have you ever been at sea?—Yes; I went to sea in 1827, and left off in the end of 1849.

2909. Have you formed an opinion as to the necessity or otherwise of a national harbour of refuge on the coast between the Firth of Forth and the Pentland Firth?—I do not see that such a harbour is very much wanted.

2910. Will you state the grounds on which you have formed that opinion?—The grounds on which I form that opinion are, that at the north part of the coast you have mentioned there is the Moray Firth, which I consider a very excellent natural harbour, at the bottom of which lies Cromarty, a place which can be taken with sea winds at any time; and at the southern part of the limits you have mentioned there is the Firth of Forth, also an excellent natural harbour.

2911. (*Mr. Lindsay.*) You have been at sea?—I have.

2911*a*. Have you ever run for the Moray Firth?—I have not.

2912. Have you ever heard shipmasters say that in running for the Moray Firth they have met with baffling winds in the bight of the bay?—I have never heard such remarks made.

2913. Have you ever gone through the Pentland Firth?—Frequently.

2914. Do you consider it a dangerous passage for vessels to make?—Yes, in bad weather, and indeed I may say in any weather where the tides are so very strong, I consider it somewhat dangerous.

2915. Would you have any hesitation in running through the Pentland Firth with a strong south-east gale and an ebb tide?—None whatever.

2916. Would you with a flood tide in such a gale have any hesitation in attempting to go through?—I would not like so well to attempt it with a flood tide, but if I did I would keep to the southward of Stroma, and by that means would avoid the worst part of the tide.

2917. Have you ever anchored in Longhope and those other harbours of refuge about the Orkneys?—I have frequently anchored in Longhope, but it is such a long time ago that I would not like to say that I had any nautical experience of that place. It was when I was an apprentice in the whale trade that I frequented that harbour.

2918. (*Capt. Washington.*) You are master of the Trinity House, Dundee, Mr. Welch?—I am boxmaster of the seamen fraternity.

2919. What number of pilots have you?—I think there are thirteen or fourteen.

2920. Do they ever pilot ships for the north of Scotland as far as the Pentland Firth?—No.

2921. What is their limit?—The River Tay.

2922. May the entrance to the Tay be taken without danger in a south-east gale?—It depends on the extent of the gale and the state of the tide. At low water and with a south-east gale of wind which has lasted some time, and consequently a sea got up, it would be dangerous, with a vessel of any considerable draught of water, to attempt to take the Tay at low water.

2923. But at half tide?—At half tide there would not be so much danger; and I should think that with a vessel not drawing over twelve or fourteen feet of water, at half flood with a south-east gale of wind, there is not much risk in taking the Tay.

2924. And at high water?—At high water none at all.

2925. Then in fact we may look on the Firth of Tay as a harbour of refuge at tide time for all vessels frequenting the coast of Scotland?—I do.

2926. Is it sufficiently buoyed and lighted to enable a vessel to take it without danger?—It is so well buoyed and lighted at present that I am unable to see any improvement that could be made upon it. Improvements suggested by Mr. Stevenson of Edinburgh, and by the Admiralty through Mr. Stevenson, have all been made.

2927. There are facilities at Dundee for repairing ships?—Yes.

2928. And for repairing machinery as well as ships?—Yes.

2929. (*Mr. Lindsay.*) What part of the navigation of the Tay is the most dangerous? Is it the sandbanks outside?—It is what we call the bar.

2930. How far is the bar from the docks here?—It is about twelve miles.

2931. And how far outside from the narrower part of the river?—From the Buddonness Point to the bar is four miles.

2932. Are they shifting sands?—They do shift; the bar shifts.

2933. The channel is between the sands?—Yes.

2934. Are a portion of the sands dry at low water?—Yes, a considerable portion of the south bank, and a small portion of the north bank, a little from the dry land.

2935. Would it be safe for vessels to run, during a south-east gale at high water spring tides, for the Tay?—Provided the vessel was not drawing more than sixteen feet of water, I should say it was safe to run in any gale of wind.

2936. (*Capt. Washington.*) You have said there are shifting sands; do you mean to imply that they shift often?—No, what I meant was that we find the depth of water on the bar varies occasionally.

2937. And the sands are on each side of the bar?—They are on each side of the channel.

2938. And the edges of the channel are buoyed on both sides?—On both sides, with a large fairway buoy outside the river.

2939. Quite so; I was afraid the impression would go forth that it was a shifting sand across the bar which would prevent a vessel taking it?—Not at all. I only meant to say that the depth on the bar varies a little, and I think it is principally with a north-east gale of wind, that perhaps spreads a little of the sand over what we call the bar.

Mr. Thomas Neish examined.

Mr. Thomas Neish.

2940. (*Chairman.*) What is your name?—Thomas Neish.

2941. What is your occupation?—Merchant and shipowner.

2942. For what period have you been connected with the shipping interest?—Nearly forty years.

2943. State your opinion as to the necessity of a large national harbour of refuge on the north-

coast of Scotland ?—I may say that, not being a seafaring man, or one that has been much at sea, I cannot speak altogether from experience ; but I can say this much, that I am confident the general opinion of Dundee, and of those connected with the mercantile and shipping interests, is that no such thing as a harbour of refuge is required on the east coast of Scotland.

2944. Will you state to the Commissioners your opinion as to whether, taking into view the large call that in a period of war is necessarily made on the maritime population of the country, for its defence, in proportion to those who are called to serve the country in the army, you object to the expenditure of a considerable grant of money with the view of reducing the numbers of lives which are lost annually among those who are engaged in the coasting trade, and in the fisheries ?—It may be certainly quite justifiable in some parts of the land ; but I do not think that it would be at all justifiable to expend a large sum of money on this coast, because we have a very small number of shipwrecks on the east coast generally, and the loss of property would not justify it, in my opinion. And that is the reason that I believe I am correct in saying that those who have the greatest interest in the shipping of the port, and in the mercantile prosperity of the town, are decidedly of opinion that no such thing is required ; and hence the very little interest that the people of Dundee have taken in the question. From the circumstance of a deputation from Peterhead to Dundee having brought letters of introduction to myself, I introduced them to the gentlemen in this town whom I thought most likely to be acquainted with the subject ; and from the conversations I have since had with the merchants and shipowners here to whom I introduced that deputation I have been confirmed in the opinions I had previously formed ; and I am decidedly of opinion that the town of Dundee is against a harbour of refuge on the north-east coast of Scotland. The only exception is, that some consider that, if a harbour is at all necessary, it must be merely for the protection of the fishing at Wick.

2945. I therefore understand you to say that you do not object to a grant of money to save life or property by erecting harbours ; but that you are against the erection of a harbour on this coast ?—I do not think any one could object to a grant of money to save life and property, but it is quite possible to "pay too much for your whistle," as we say in Scotland, which is done in many instances. The general impression here is, I do not say how far it is correct, that in nine cases out of ten where money has been expended on harbours of refuge, there has not been value got for that money.

2946. (*Mr. Lindsay.*) Do you think there is any other port on the north-east coast of Scotland, where a sum of public money could be judiciously expended besides Wick, keeping in view the saving of life and property ?—No ; I know there is a great desire on the part of other ports to get a grant of public money if they could. We in Dundee have expended a great deal of money ; and our opinion is that if they want to improve their harbours, they should do it themselves. At the same time, if the expenditure of a few thousand pounds on the improvement of harbours would save life and property, most certainly it should be done.

2947. As you have consulted with many of your fellow townsmen on this subject, and as Dundee is an important port on this coast, can you state what is their opinion generally in regard to voting sums of money for the improvement of various harbours along the coast, where the local authorities have really not the means of improving these harbours and deepening them ?—I have already in some degree answered that question; because I have said that if it could be done for 20,000*l.* or even 30,000*l.* or 40,000*l.*, so that these harbours could be made to a certain extent harbours of refuge, and save life and property, most decidedly I think it should not be objected to ; but if the effect of the expenditure on these harbours was merely to improve the local trade, the feeling in Dundee is that the towns desirous of such improvements should make them at their own expense.

2947*a*. Then you think there are some cases, where the local authorities could not raise the money themselves, where a sum of public money might be voted for the improvement of harbours along the coast, on the condition that these were made harbours of refuge for the vessels frequenting these coasts generally, I mean auxiliary harbours of refuge ?—I would say that is proper ; but the great question would be what harbour ought to get the grant.

Captain EWING examined.

2948. (*Chairman.*) What is your name ?—Thomas Ewing.

2949. What is your occupation ?—I am a shipmaster.

2950. How long have you been at sea ?—Forty-five years.

2951. In what capacity ?—I was about thirty years a shipmaster.

2952. In what trade ?—Chiefly in the coasting trade.

2953. You have commanded steam-vessels between Dundee and London, I think ?—Yes.

2954. For how many years ?—Twenty years.

2955. Have you any opinion to offer to the Commissioners as to the necessity of a harbour of refuge on the north-east coast of Scotland, that is from the Firth of Forth to the Pentland Firth ?—No ; I have no opinion to offer.

2956. Have you any opinion to offer to the commissioners as to the necessity of a harbour of refuge on the north-east coast of England ?—Yes, there is plenty of room for harbours there.

2957. Where would you be disposed to say is the most eligible site for a large national harbour of refuge on the north-east coast of England ?—I would say Filey Bay.

2958. Will your state to the Commissioners your reasons for so saying ?—It is half formed by nature.

2959. Why do you select that particular part of the coast as the most eligible site of a harbour of refuge ?—Because it is half formed by nature, and the situation of it.

2960. By the situation of it, do you mean that it is the most eligible point of the coast for ships to take refuge in ?—Yes.

2961. Will you state to the Commissioners your reasons for saying so ?—Probably Bridlington Bay is in the neighbourhood, and that is a good harbour of refuge.

2962. (*Mr. Lindsay.*) You have been twenty years trading between Dundee and London ?—Yes.

2963. Say that a great harbour of refuge was to be made on the north-east coast of England, whether do you think one in Filey Bay, or Hartlepool Bay, would tend most to the saving of life and property ?—Well, I could not give an answer to the question.

2964. You have not considered it sufficiently ?—No.

2965. Do you know much of the north-east of Scotland, to the northward of Dundee ?—Not a great deal.

2966. Then you are not prepared to speak as to the desirability or otherwise of a great national harbour on the north-east coast of Scotland ?—I do not consider there is any necessity for it.

2967. Do you think there would be no necessity for aiding the existing harbours, with a view of saving life and property ?—I think some of the harbours would be better to be improved, Arbroath, for instance.

2968. But I am speaking of the saving of life and property of the ships frequenting that coast ; say, if such aid were to be given to harbours along the coast, what point of the coast between Dundee and the

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Pentland Firth would, with an improved harbour, tend most to save life and property ?—I do not know any harbour on the east coast of Scotland, that you could improve to any great extent.

2969. You do not know any harbour to the northward of Dundee that could be made a harbour of refuge suitable for the vessels frequenting the coast to enter at all times of the tide ?—No.

2970. (*Capt. Washington.*) Captain Ewing, are you acquainted with the coast between the Firth of Forth and the Pentland Firth ?—No.

2971. Have you ever had occasion to run to Fraserburgh ?—No, I have been in Cromarty.

2972. And that is a good place, is it not ?—It is a good natural harbour.

2973. Still, as a sailor, I presume you think that everything that can be done to save sailors' lives should be done ?—Certainly, I would say that.

2974. You probably know that eight hundred sailors' lives are lost every year around our own coast ?—Yes.

2975. You think it is worth trying to do something to save these lives ?—Well, if harbours of refuge would save them, it would be worth doing so ; but I am not of opinion that would save them. I have known many vessels lost going into harbours of refuge.

2976. I presume you refer to bar harbour, or tidal harbours, or harbours encumbered with sand ?—Yes.

2977. But supposing a harbour made in a convenient situation, accessible in all winds, and with no shoals in its neighbourhood, would not that be a desirable place to take ?—It certainly would, if there were no shoals.

2978. Had you ever occasion to run into a harbour of refuge ?—No.

2979. You have always commanded a fine steamer, I suppose ?—No, I had other vessels beside that.

2980. (*Capt. Vetch.*) How many years have you commanded a vessel ?—For about forty years.

2981. Had you ever occasion to run into a harbour of refuge ?—Yes.

2982. Which did you run into ?—Into the Humber.

2983. What other place ?—Bridlington.

2984. Was that in a steam-boat or a sailing vessel ?—A sailing vessel.

2985. Any other place ?—Harwich.

2986. Any other ?—Shields.

2987. Were you compelled to go into those places owing to the weather ?—Yes.

2988. Did that frequently happen ?—About once a year.

2990. (*Mr. Coode.*) You know the north-east coast of England ?—Pretty well.

2991. Is there any point more than another where vessels congregate in great numbers ?—Yes.

2992. At what point ?—Bridlington Bay and Yarmouth Road.

2993. That is, vessels at anchor ?—Yes.

2994. Is there no point more than another where you have seen vessels beating about ? I am speaking of vessels at sea.—I have seen vessels at all parts of that coast.

Mr. W. E. Baxter, M.P., re-called and examined.

Mr. W. E. Baxter.

2995. (*Chairman.*) You have heard, Mr. Baxter, that Mr. Neish stated in his evidence that the small attendance here to-day is a proof of the slight interest which the merchants and shipowners of Dundee take in this harbour of refuge question. Do you agree with that evidence ?—I would say the only interest the shipowners of Dundee take in the question is, that they are fearful of a large sum of money being expended at a particular place without any great benefit being derived. I believe Mr. Neish expressed the general sentiments of the mercantile body when he stated that there was no feeling among them that there was a necessity for a great harbour of refuge on the east coast of Scotland. I certainly never heard any one express an opinion that such a harbour was necessary.

Sir John Ogilvy, M.P., examined.

Sir John Ogilvy.

2996. (*Chairman.*) You are the member for Dundee ?—I am.

2997. Have you any opinion to offer to the Commissioners as to the general feeling of the merchants and shipowners of Dundee on this question of harbours of refuge ?—No, I have never heard the question much discussed, but so far as my observation goes, I should say my opinion concurs very much with that expressed by Mr. Baxter and Mr. Neish, I believe the small attendance here to-day may be attributed to the fact that many were not aware that this meeting was to be held ; but I believe it is quite correct that the inhabitants of Dundee do not take a deep interest in this question.

2998. (*Mr. Lindsay.*) If a sum of public money is voted among the harbours of the north-east coast of Scotland, do you think it would give more satisfaction to your constituents—seeing that they want no portion of the money—if it were spread over various harbours along the coast, or expended on one particular point? If you would rather not answer this question, just say so ; but if there is any feeling among your constituents on the subject, I wish to know which way it tends ?—Without giving an opinion as to other parts of the country, I think they would be in favour of such a grant as that to which you refer being given in small sums to existing harbours rather than to one large harbour.

2999. (*Capt. Vetch.*) Supposing the government were disposed to make a grant to the various harbours now existing, do you think there would be any difficulty in getting the parties supposed to be more particularly benefitted by that grant, to aid in producing an equal sum for the object?—If your remark applies to the harbour of Arbroath, which I suppose it does from the evidence led to-day ? I would say that while, as a general rule, it would be desirable that aid should be given by local contributions, I consider that in the case of Arbroath that has been already done, as they have already expended so much on their harbour that they may be said to have already complied with the rule.

Captain Ritchie examined.

Captain Ritchie.

3000. (*Chairman.*) What is your name ?—David Ritchie.

3001. What is your occupation ?—A shipmaster.

3002. How long have you been at sea ?—45 years.

3003. In what capacity ?—Principally in the Baltic trade, in the Mediterranean, and in the American.

3004. Was it as master, and if so, for how many years ?—I have been about 29 years a shipmaster.

3005. If you have any opinion or otherwise as to the necessity of a national harbour of refuge on the north-east coast of Scotland, state it to the Commissioners, —My opinion is, that we have not in Scotland so much necessity for harbours of refuge as there is on the north-east coast of England.

3006. Have you anything further to state ?—I have nothing further to state.

3007. (*Mr. Lindsay.*) Do you know the north-east coast of England well ?—Yes, I have been familiar with it all my life.

3008. Do you know the north-east coast of Scotland ?—Yes.

3009. Are there better tidal harbours in Scot-

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land than in England?—There are not many tidal harbours in Scotland that you can run into as a place of safety.

3010. Can you tell me what ports there are between the Firth of Forth and the Pentland Firth where ships of about 300 tons could take refuge during a south-east gale, or an easterly gale, at low water?—There is no place but the Firth of Forth and Cromarty where vessels of 300 tons could enter at low water.

3011. Then do you not think that life and property are placed in great jeopardy when there is no harbour along that whole line of coast that even so small a ship as one of 300 tons could enter at low water?—Yes, they are.

3012. Is there no port except Cromarty, between the Pentland Firth and the Firth of Forth, where a vessel drawing 12 feet of water could enter at low-water spring tides during a south-east gale?—Yes, the river Tay.

3013. No other?—They could run to Montrose; but it is narrow and more difficult to take.

3014. Then, could a vessel at low water enter the Tay with safety, drawing 12 feet of water during a south-east gale?—Oh yes.

3015. There is only the Tay, then, with that wind?—Yes, with a heavy gale and a running sea.

3016. What ports between, say the Tyne and Yarmouth Roads, could such a vessel run for during an easterly gale, and at low water?—I know of no harbours that ships of that size could run into, drawing 12 feet at low water.

Mr. JOHN JACK examined.

Mr. J. Jack.

3017. (*Chairman.*) What is your name?—John Jack.

3018. What is your occupation?—Harbour-master of Dundee.

3019. Will you state to the Commissioners what is your opinion as to the necessity of a large national harbour of refuge on the north-east coast of Scotland?—I am very little acquainted with that coast.

3020. Would you therefore decline to give any opinion?—On that subject; if it was the north-east coast of England, I could give an opinion.

3021. Well, will you now state to the Commissioners what is your opinion as to the necessity of a harbour of refuge on the east coast of England?—We have no harbour of refuge after you pass the Humber till you come to the Firth of Forth. You have an anchorage in one direction, but not any safe anchorage for easterly gales.

3022. Have you any opinion as to the most eligible site for such a harbour of refuge?—My opinion would be, to put it as near the centre as possible between St. Abb's Head and the Humber, which I would say was about the Tees, or Hartlepool, or somewhere thereabouts.

3023. Can you state more particularly to the Commissioners your reasons for selecting the neighbourhood of the Tees or Hartlepool?—It is most embayed, and when off it you can take the assistance of the tide, and it is more central than any other quarter.

3024. (*Mr. Lindsay.*) Do you think a harbour of refuge at Filey Bay would be desirable?—You have got anchorage not far from Filey Bay if the wind is to the north; but if you are north there is nothing between St. Abb's Head and Flamborough Head. My opinion would be that to put a harbour of refuge at Filey Bay is too near the quarter where you can get anchorage.

3025. Whether do you think a harbour of refuge in Hartlepool Bay or Filey Bay would tend more to save life and property?—I should say Hartlepool Bay or thereabouts.

3026. From your knowledge of the north-east coast coast of England, whether do you think a sum of money expended in one great harbour of refuge, or that same sum distributed over various harbours there, so as to make them fit to receive at half tide the description of vessels usually trading along that coast, would tend more to save life and property?—I would have a harbour of refuge rather than distribute the money among these ports, as I do not see what good it would do to distribute the money in that manner.

3027. Do you not think it would tend to save life and property if various of these harbours along the north-east coast were made accessible to vessels at half tide in strong easterly gales?—It is my opinion that to make one harbour that would take ships at all tides and at all weathers would do more to save life and property than to distribute grants among existing harbours for improvements which would not make them of any service in a gale of wind.

3028. Say that it rested between two points, that is to say whether it was more advisable to expend a sum of money to make one harbour to take vessels of all sizes at any time of the tide, or to spend that sum of money over say those harbours that could take the usual class of vessels trading along the coast at all times of the tide; which course would tend most to save life and property, speaking now of all times of the tide?—The harbour of refuge still is my opinion.

3029. It is your opinion that one great harbour of refuge on the north-east coast of England is more advisable than to distribute the same sum over existing harbours?—Yes, more particularly from the form of the coast.

3030. (*Capt. Washington.*) As an old sailor, and as one who has been associated with sailors all your life, do you think that harbours of refuge should be on the bight of the bay or on a prominent point of the coast?—So long as a sailor has a little room he can make the best of it; but I would never put a harbour on a point, there are two sides and it is not easy to take.

3031. Do you consider a harbour of refuge specially designed to catch vessels that are disabled and can not get off the shore?—That is my opinion.

3032. Is it your opinion that a large sum of money should be expended on a place for the convenience of vessels stopping to get a fair wind?—Yes; but for the saving of life and property it should be down in the bight of a bay.

3033. (*Mr. Coode.*) You have spoken of the north-east coast of England. Do you happen to know whether the greater number of wrecks have occurred to light or loaded vessels?—I have no particular knowledge on that point. One remark I would make, which is this, that for one ship we have wrecked going round the north coast of Scotland I would say we have fifty on the coast of England, so that the necessity is greater to have a harbour erected there in the first place.

3034. That is not quite a reply to my question, which had reference to whether there were more light or loaded vessels wrecked on the coast of England?—Oh, more light vessels; I have seen twenty-two vessels lost in one gale. The great loss on the north-east coast is the light colliers coming down.

3035. If you were told that the Government returns show more loaded vessels wrecked than light ones, would you say they were wrong?—If they said that about Yarmouth Roads more loaded vessels were lost I would think them right, but on the north-east coast of England there are more light vessels lost.

3036. You made some remarks as to the eligibility of different positions for harbours of refuge, and as to the bight of a bay being preferable to a point. Would not a point be easier made?—I think a prudent shipmaster would keep off the shore as much as possible.

3037. Did you ever see vessels brought up on the north side of Flamborough Head?—Often.

3038. If they were brought up there, supposing a gale of wind were to spring up could they remain?—You must slip and just make the best of it.

3039. But if there were a harbour there, their

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position would be much improved?—Yes; but there might be fifty harbours there to keep all safe.

3040. Is there anything like fifty waiting-places on the north-east coast of England?—No; but I could get fifty anchorage places.

3041. Are you aware that a great many coal-laden vessels bound to the southward get baffled by head winds off Flamborough Head?—That often occurs.

3042. And that such vessels often go in and anchor in Filey Bay?—They do at times.

3043. Does that often happen in the winter season?—It may; but it is not a pretty place to go by.

3044. Do you think that vessels bound to the southward are peculiarly liable to be baffled by head winds?—Head winds often at all places.

3045. Does it not often happen that vessels bound to the southward just manage to get Flamborough Head, and are there met by head winds?—Yes; and ships coming the opposite way the same.

Captain D. CRIGHTON examined.

Captain D. Crighton.

3046. (*Chairman.*) What is your name?—David Crighton.

3047. What is your occupation?—I am a shipowner.

3048. Have you any opinion as to the necessity of a harbour of refuge on the north-east coast of Scotland?—I scarcely think that a large harbour of refuge is necessary on the north-east coast of Scotland.

3049. How long have you been connected with the shipping trade of Dundee?—I have been resident in Dundee since 1820, and I went to sea in 1805.

3050. Being agent for Lloyd's you must be tolerably well acquainted with the loss which takes place by shipwreck on this coast?—Yes.

3051. Have you anything further to state to the Commissioners as to these harbours of refuge?—I think, as has been stated by some of the gentlemen before, that if some of the existing harbours were improved it would be more beneficial to the north-east of Scotland than one great harbour would be for the safety of life and property.

3052. And with reference to the north-east coast of England, can you offer any opinion?—In my younger days I was well acquainted with the north-east coast of England, when it was worse lighted than now; and when harbours of refuge would have been more available; but I do think that a harbour of refuge there would be of great advantage indeed.

3053. Where would you be disposed to say would be the most eligible place?—From the immense number of vessels proceeding from coal ports, and verging to the Tees and Sunderland, I should say about the Tees would be the best place for the saving of life and property.

3054. (*Capt. Washington.*) You thought it desirable rather to give money over existing harbours than to one harbour?—I think a large sum would be more beneficially disposed of if it were given to improve existing harbours than to one large harbour to the north-east.

3055. Do you think it would be fair to these harbours that they should advance a certain portion to meet any grant that must be given?—I should think that, as they have a local interest, that would be very proper, if they have not already expended large sums.

3056. Many of the harbours have already made large outlays, have they not?—Yes.

3057. Dundee, for example?—Yes.

3058. And Arbroath?—A considerable sum there.

3059. And Montrose?—They have made a very good dock there, but I do not think much has been done to improve the entrance to the harbour.

3060. And Peterhead?—I believe they have expended a large sum there.

3061. And Fraserburgh?—I never was in Fraserburgh.

3062. Have you ever been in Wick?—I happened to be there last year; it is a very crowded place.

3063. Were you there in the herring season?—No; in the spring.

3064. Do you know the number of fishing boats?—From a thousand to twelve hundred annually.

3065. Would these boats be in danger in a gale of wind?—I would think so.

3066. How many lives may be exposed in these twelve hundred boats?—There are five men in each boat.

3067. Then there would be six thousand lives exposed there; and at low water, in case of a sudden gale of wind, they have no place to run for?—No place.

3068. Do you think something should be done to provide shelter for these boats?—I think something should be done.

3069. Is it within your knowledge, having been at Wick, that ten years ago, in one single night, about fifty boats and thirty-five lives were lost?—I heard of the loss of these boats at that period.

3070. Do you think it desirable that everything should be done to prevent the recurrence of a similar calamity?—I think it desirable that everything should be done to save life and property; and as the fishery there is so important, it might be very much improved for the accommodation of the fishery.

Captain WALKER examined.

Captain Walker.

3071. (*Chairman.*) What is your name?—John Walker.

3072. What is your occupation?—A shipmaster.

3073. What vessels have you chiefly commanded?—I have been chiefly in the coasting trade.

3074. North or south?—South of the river Tay.

3075. Have you any opinion to offer as to the necessity for a national harbour northward of the Tay?—No; I could not speak to that.

3076. State to the Commissioners what is your opinion as to the necessity of a national harbour on the east coast of England?—My opinion is, that it would be a great saving both to life and property, and that it is necessary such a harbour should be erected.

3077. Where would you point out as the most eligible site for such a harbour of refuge?—Filey Bay.

3078. State your reasons for doing so?—My first reason is, that about that point generally the wind is to the southward, we find, when we get as far as Flamborough Head the wind gets a little more southerly, and the vessels, if deeply laden, have no other point of refuge until they run to the Firth of Forth. Again, on the other hand, the vessels coming light and going north, and the wind from the westward, find on opening up the head from the south, that the wind comes in from the north. They then take shelter in Bridlington Bay generally, or else run for the Humber. In running for the Humber many of the light vessels fall to leeward, and others again are afraid to lie in the bay for fear of the wind coming from the south-east, which would embay them, and they would have no other resource than to run on shore or to the dry harbour at Bridlington. Then the steam trade there is greatly increasing, and we often have to run from the north part of Yorkshire to the Humber for shelter and coals; and I think that if we had a harbour of refuge at Filey Bay we would be likely to have a coal depot there too, by which we would not have to run so far to seek coals.

3079. (*Mr. Lindsay.*) Have you spoken to many masters of ships as to the necessity of a harbour of refuge on the north-east coast of England?—Yes.

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3080. Whether do they, as a rule, give preference to the Tees Bay or Filey Bay?—Filey Bay generally.

3081. Whether do you think a sum of money spent in a harbour of refuge at Filey Bay, or that sum expended over four or six harbours in the north-east coast, so as to make them accessible at low water for the vessels usually frequenting that coast, would tend most to save life and property?—I really believe in the large harbour.

3082. (*Capt. Washington.*) Do I understand you to say that a harbour of refuge in Bridlington Bay is desirable?—No; in Filey Bay.

3083. I think you said your chief reason for mentioning Filey Bay was, that coals might be found there?—No, not the chief, but one of the reasons.

3084. What would be your chief reason?—Not only the extent of damage done to the vessels beating about in that locality, but the distance they have to run down from coal ports deeply laden, which is great.

3085. Then you do not agree with Captain Jack, that a harbour of reguge should be placed in the bight of the bay?—Not in that locality.

3086. Do you mean by "that locality" the north-east coast of England?—Yes; if there were to be two harbours, that would be a very good site for one.

3087. What do you mean by "that"?—About Hartlepool. If there were to be two harbours of refuge that would be a good site for one; but if there is to be only one, then Filey Bay is the more eligible.

3088. But generally on any coast, would you think it desirable to place a harbour of refuge in the bight of a bay, or near a prominent point?—That would entirely depend upon the locality, I think.

3089. You have seen a small pamphlet drawn up by the Committee, who propose Filey Bay as a harbour of refuge?—I have seen it, but I have not had time to read it.

3090. (*Mr. Coode.*) Are you aware, from your own experience, that large numbers of vessels are often congregated off Flamborough Head?—Yes.

3091. Have you seen them?—Yes.

3092. Is it a very common occurrence?—Yes.

3093. Have you ever had occasion to bring up off Flamborough Head yourself?—Never.

3094. Have you ever seen vessels brought up there in passing?—Yes, very often.

3095. Do you command a steamer or a coasting vessel?—A steamer just now.

3096. How long have you been in that steamer?—Three years.

3097. About how many times have you passed Flamborough Head in the course of these three years?—About seventy or eighty times, going and returning.

3098. I understand you give a very decided preference to Filey Bay as the site of a great harbour of refuge?—Yes.

Mr. G. WELCH re-examined.

Mr. G. Welch.

3099. (*Chairman.*) Will you state to the Commissioners what is your opinion as to the necessity of a harbour of refuge on the north-east coast of England?—I think a harbour of refuge in the Tees Bay is highly desirable, either Redcar or Hartlepool; but from the little knowledge I have of that locality I should say that Hartlepool is the better place of the two.

3100. You have said that you have little knowledge of that locality. Do I understand that remark to apply to the coast generally, or to the immediate locality of Hartlepool?—To the immediate locality of Hartlepool.

3101. (*Capt. Washington.*) Are you aware that a large number of vessels are driven ashore every year at Hartlepool Bay?—I have seen it stated in the newspapers.

3102. You are a sailor?—I should not like to be called no sailor.

3103. I should like to hear your opinion, whether a harbour should be on the bight of a bay, or on the prominent point of a coast?—I should say the bight of a bay. An important reason is, that I should never seek a harbour of refuge until all other means of safety were exhausted, and then I would be more likely to fetch the bottom of a bay than a weather point.

3104. If your vessel were disabled, would it be possible to reach a prominent point?—I would be more likely to reach the bottom of a bay than a prominent point.

3105. (*Mr. Lindsay.*) But if you were to windward of both at the time, and your vessel were disabled, whether would you reach the prominent point or the bay first?—The prominent point, of course.

3106. If that is your opinion, if there were two harbours, one in the bay and one on the point, would you not run to the nearest?—Decidedly.

3107. Well, whether is the Tees Bay or Flamborough Head more in the track of vessels going along the coast?—The Tees Bay.

3108. What does that arise from?—From being centrally situated between Flamborough Head and the coal ports, where the great number of vessels trade to London; for instance, Shields, Sunderland, and those places. I mean that Hartlepool is more centrally situated than Filey Bay, or any other part of the coast.

3109. Is Hartlepool in the track of vessels from Dundee, or the Scotch coast generally, to London?—Yes.

3110. Is it as much as Flamborough Head?—Quite as much. It lies not so much to the course of the vessel in ordinary weather. With off-shore winds, and favourable weather, we cross the bay; and when I speak of a harbour of refuge I would not say it was necessary to provide a harbour of refuge for a westerly wind.

Mr. WILLIAM NICOLL examined.

Mr. Wm. Nicoll.

3111. (*Chairman.*) What is your name?—William Nicoll.

3112. What is your occupation?—A shipowner.

3113. Have you been long resident in Dundee?—More than thirty years.

3114. You have heard the statement made by two or three of the former witnesses, that the small attendance here to-day indicates the opinion of the mercantile men in Dundee as to the non-necessity of a harbour of refuge on this district of the coast?—That may be accounted for by their being generally not acquainted with nautical affairs.

3115. And therefore you attribute it to that cause, and not to any particular opinion which they entertain upon the subject?—Yes.

3116. (*Mr. Lindsay.*) Have you formed any opinion as to the necessity or desirability of a harbour of refuge on this coast?—I do think there is a necessity for harbours of refuge on this coast.

3117. Have you any idea about what point of the coast, if such a harbour was to be made, it would be most desirable to erect it, considering the objects in view?—I would not be in favour of expending a large sum of money upon one part of the coast.

3118. Would you think it more desirable to separate a grant of public money over various parts of the coast?—I would.

3119. Do you think that would tend more to save life and property?—I do.

3120. (*Capt. Washington.*) Are you acquainted with the north-east coast of England?—Part of it.

3121. You have traded from Dundee to London?—No, I never was a sailor.

DUNDEE.

Captain Neish examined.

Captain Neish.

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3122. (*Chairman.*) What is your name?—James Neish.

3123. What is your occupation?—It is jack on shore now, but my occupation was at sea till within the last twenty-two years.

3124. How long did you follow the sea?—For upwards of thirty years, and it is upwards of fifty-five years since I first went to sea.

3125. In what trade were you employed?—Generally in the Baltic trade.

3126. In what capacity?—As an apprentice, mate, and master.

3127. How many years as master?—I was only one voyage as master on this coast, and that tired me of it.

3128. You have heard the question put to the last witness as to whether the thin attendance here to-day indicates an opinion among the mercantile men of Dundee and the shipowners as to there being no necessity for harbours of refuge; what is your opinion?—My opinion is, that they are all so much interested in their own affairs that they think nothing about this, and care less.

3129. (*Mr. Lindsay.*) Have you any opinion about harbours of refuge on this coast?—No.

3130. If it is the opinion of Government that they should devote a certain sum of money to that purpose, from your great experience, whether do you think that a sum spent on one harbour at a particular point of the coast, or distributed over the existing harbours, would tend most to the saving of life and property?—As I know no place where one great harbour of refuge would be of service on this coast at low water in all states of the wind and weather, it is out of the question to spend money on such a harbour, and it would be more beneficial to expend the money on various harbours.

3131. But if a place could be found where vessels of all sizes, and during all winds, could find shelter at any time of the tide, whether do you think the sum would be more beneficially expended at one place, or distributed over various harbours?—I should think that one place would be of more service generally.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sittings at Dundee closed.

LEITH.

Saturday, 4th September 1858.

PRESENT:

Admiral Hope, (Chairman).

Sir Frederic Smith.
Mr. Lindsay.
Captain Washington.
Captain Vetch.
Mr. Coode.
Mr. Sewell, Secretary.

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Mr. Wm. Thompson, merchant, Leith:—I have come here to represent the district of Anstruther and Cellerdyke, where the inhabitants wish generally to have a harbour of refuge. The matter, I may state, has been brought before the Lords of the Treasury, and I have a copy of the memorial which has been forwarded to their lordships, and I am ready to answer any questions connected with this proposal which the Commissioners may think proper to ask me. I am in charge of this memorial, gentlemen, and I have connected with it evidence that the memorialists wish to tender to the Commissioners.

(*Chairman.*) We shall be happy, Mr. Thompson, to receive it at a later period of the sitting.

Mr. Broadfoot examined.

Mr. Broadfoot.

3132. (*Chairman.*) What is your name?—John Broadfoot.

3133. What occupation do you follow?—Merchant and ship agent at Leith.

3134. How long have you been connected with the port of Leith?—I have been connected with the port of Leith all my life.

3135. How many years actively so?—For 30 years more or less in active agency.

3136. Could you furnish us with the names of captains of vessels trading out of this port, whose evidence would be of value to us in this inquiry?—I should be able to do so, but not from memory alone; but if some time was allowed me by the Commissioners to do so, I could give the names of shipmasters who have spent all their lives on the north-east coast of Scotland.

3137. And of those who have traded between this port and London?—Yes; also of those who have commanded vessels to London. I can easily procure this. They are men who have had long experience in this trade before steam became so common, and who have commanded vessels of large size—men who have great practical knowledge of the general inconveniences and obstructions to the coasting trade.

3138. Will you be good enough to forward, at your convenience, to the Secretary of the Commission, the names of a few of the captains whom you might consider most worthy to be consulted, from age, experience or reputation, who have a knowledge of the north-east coast of Scotland, and also of the east coast of England?—It will afford me much pleasure, and I shall endeavour to do so.

3139. (*Mr. Lindsay.*) I should like to ask Mr. Broadfoot his opinion on one point. You say, as the Government has been considering the formation of a great harbour of refuge on the north-east coast of Scotland, on what point of that coast between the Firth of Forth and the Pentland Firth, do you consider the construction of such a harbour would do most for the facilities of commerce and the saving of life and property?—My opinion would rest on Peterhead and Cromarty, I mean the Moray Firth. The Firth of Cromarty is naturally formed by the sutors of Cromarty.

3140. As there is a natural shelter there already, do you think a harbour of refuge is necessary in addition?—I am quite of opinion that Peterhead would afford great facilities for saving life and a large amount of property if a harbour of refuge was to be erected there.

3141. Whether would you consider Peterhead or Wick the better point for the formation of a harbour of refuge?—Well, I have had no practical experience of Wick, but I have been frequently to Peterhead and have had occasion to take shelter there, and all along I have thought that the natural capacities and

capabilities of the place, which could be increased, would make a very excellent harbour.

3142. I should like to have your opinion on another point. If the Government decided upon spending the sum of 300,000*l.* on the north-east coast of Scotland, whether do you think that that sum would be better spent in one great harbour on the coast, or would be better applied if it were spread over the existing harbours, say, half a dozen of them, so as to make them accessible for the usual vessels frequenting the coast?—You mean the usual vessels frequenting the north-east coast of Scotland?

3143. No, such as the Baltic and Archangel ships, averaging perhaps 350 tons or thereabout. Do you think that the sum of money I have mentioned would be better spent in one great harbour, or in improving the existing harbours, so as to make them accessible to these ships at all times of the tide?—If you could make two or three small harbours, so that they might receive vessels at half tide, it would do much more good than if you brought the money to one large harbour, because we know that vessels on this coast are frequently caught in heavy north and north-east gales of wind, and have not got the power to run up to one great port; and it is much better, therefore, that we should have four or five ports, so as to be applicable to this very important branch of our commerce, I mean the fishing trade. The fishing trade is a trade of great importance, and accidents often happen to fishing boats when they are overtaken, as they often are, by violent gales of wind going into the harbour. And five or six harbours of refuge, capable of receiving boats at all tides, and commercial vessels of 300 or 400 tons at half tides, would be much better, in my opinion, than one would be; for one would not be accessible at an hour's warning, as it would need to be.

3144. Your opinion is then that by spreading money out in the way which you have mentioned, it would be the means of giving much greater facilities of commerce, and saving life and property?—It is; that is my opinion.

3145. Do you know anything personally of the north-east coast of England?—I cannot offer any opinion on it.

3146. Can you tell me anything about this harbour of Leith, and what amount of money has been expended on the docks and piers?—I can hardly state from memory. There is, if I mistake not, a debt of about 208,000*l.* on the docks, or above that, 240,000*l.* I hope it is obsolete. It is an old debt, and it hangs around our necks like a millstone, and there is no doubt that all the people at Leith are very anxious to get quit of it. Otherwise, without it, the trade of the port yields a sufficient surplus revenue to enable us to carry on operations.

3147. Was this debt contracted for the construction of the docks or the pier?—Principally for the construction of the west wet docks, I believe it was.

3148. Where was the money obtained for those very fine piers which we see running into the Firth?—The money was originally obtained for building the piers in this way. We had formerly, when I was in business, only one short stone pier at Leith. The money obtained for the elongation of that pier formed part of the debt hanging upon us, and the money for the other piers was obtained out of the regular revenues of the docks.

3148*a*. Have you ever received a loan from the Government?—So far as my knowledge goes, beyond the 240,000*l.* advanced by the Government to finish the improvements of the west dock, we have not got any.

3149. Was this in shape of a loan by the Government, advanced for the purpose of finishing those works?—It was given as a grant, and not as a loan. It was an advance on the security of the docks constructing at that time.

3150. It was a loan then? Did you pay interest on it?—No, we paid no interest on it.

3151. Have you any fixed time named to repay the loan to the Government?—No, none whatever.

3152. Have the Government security for the repayment of the loan?—They have security over the revenues of the harbours and docks of Leith.

3153. Have they exacted any interest yet?—No, they have exacted no interest.

3154. What would you suppose the depth of the water is at Leith at low water spring tides?—There are two docks; the east and the west dock, and we have also a new one. At low water spring tide there is no access either to the old or to the new docks.

3155. What is the depth of the channel?—The channel between the piers is about nine feet deep at low water. Mr. Macgregor will, perhaps, be kind enough to assist my memory.

(*Mr. Donald Macgregor.*) The depth from the extreme entrance of the channel up to the Victoria Dock gates at low water spring tides is nine feet and a half. We sometimes have 23 feet in the channel at high water spring tides, showing a difference between high and low water marks of 14 feet spring tides.

(*Mr. Broadfoot.*) If I may take the liberty of mentioning it to the Commissioners, there is a brother merchant present who has given more attention to the Leith docks and their claims than myself; I mention the name of Mr. Donald Macgregor.

Mr. Donald Macgregor examined.

3156. (*Chairman.*) How long have you been connected with the shipping interest?—Since 1838 I have been connected with shipping.

3157. Are you able to offer to the Commissioners any opinions as to the most eligible site for a harbour of refuge either on the north-east coast of Scotland or on the east coast of England?—Yes, I think I can give a very decided opinion upon that. We want a harbour of refuge on the north-east coast of Scotland and the north-east coast of England. As to the particular locality, that, as far as Leith is concerned, is a matter of less thought to us than the obtaining a harbour of refuge. The matter of locality is not so much considered.

3158. (*Mr. Lindsay.*) Have you paid much attention to shipping matters?—I have paid very great attention to shipping.

3159. Have you not formed any idea as to what point of coast would be most suitable for a harbour of refuge?—Well, the matter will rest, I should say, between Peterhead and Wick. Peterhead for the Baltic and Archangel boats, and on the other hand Wick for its locality and its connection with the fishing trade and the American trade. The fishing and American trade render it necessary that there should be a harbour of refuge constructed at Wick.

3160. Could you give us a list of shipmasters who have had a good deal to do with this trade, and the London and American trade, and others?—As regards harbours of refuge on the English coast there are many gentlemen here who can give opinions about that, as they are well qualified, much better than myself to do so.

3161. You have heard the question put to Mr. Broadfoot in regard to whether the sum of 300,000*l.* spent at one spot in the construction of one harbour of refuge, or having it spread over a number of small harbours so as to admit vessels at half-tide, would be better. Can you give us your opinion upon this point?—The question is not a simple one, because if you could get that sum of money and spread it over three or four small harbours, and make them all available, it would be much better than spending the money on one large harbour; but then again, if you could only make one good harbour for the money only, it would be much better to do that than to make two or three bad harbours of a smaller size, for

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they would be of very little use compared to the larger one.

3162. Then you say, that if with this sum of 300,000*l.* you could make a harbour in which ships of all sizes could take at any time of tide, and one which would afford shelter to vessels in all winds, this money would be better laid out on a particular point of the coast than if it were applied in the other way, that is, in making four or five harbours along the range of the north-east coast, so as to be suitable to receive laden vessels of 300 tons and under at half-tide. Would you prefer the latter, is that what I am to understand ?—Indubitably not. I would sooner have the larger harbour so as to take in ships of all sizes.

3163. Then say we could with that sum of money improve the existing harbours, so as to receive ships of 300 tons at low water at spring tide. I am speaking of the four harbours to receive vessels not larger than 300 tons ?—I think at the present moment, looking at the present state of things, I would be inclined to an opinion in favour of the four small harbours ; but again looking at the future state of things and the prospects of the country, and the commerce of the country generally speaking, it would, I think, turn my opinion in favour of the one large harbour.

3164. As you are aware, there is a very large trade carried on on the north-east coast of England ?—I am aware of it.

3165. Do you think then that one large harbour of refuge is necessary on the north-east coast of England ?—Well, as to that I cannot speak with any great amount of certainty, but you would do much better if you could obtain the opinion of men from North Shields, who are competent to form an opinion on the matter. My own opinion would be very general, and the Commissioners would do much better if it obtained theirs.

3166. Are you aware that the north-east coast of England is much more important, in regard to its large trade, than other coasts ?—I am.

3167. As to you not being able to give anything but a very general opinion, what I want is the opinion of an intelligent shipowner, who has no direct interest in the trade of the north of England ?—I understand you perfectly.

3168. Can you give the Commissioners any idea which you may have in your mind as to the desirability of any particular site on the north-east coast of England, for the construction of a harbour of refuge ? I merely want your ideas on that point ?—I have a steamer running between this and Rotterdam, and we have no place between the Firth of Forth and the Humber in which a steamer can run into in case it is overtaken by a heavy gale of wind. Generally speaking, vessels go out from the port of Leith very heavily laden, and there is no place but Holy Island to make to in case of stress of weather. Holy Island is a very awkward place to make to, and a dangerous one, and there cannot be two opinions as to the necessity for making a harbour of refuge between the Firth of Forth and the Humber.

3169. Then what point do you consider a harbour on the north-east coast of England would be most advantageous ?—I cannot help thinking that some place somewhere about Whitby or Scarborough, would be a very excellent site ; but I am not competent to form an opinion on the subject. I would strongly recommend you to take the opinion of shipmasters engaged in the London trade, who could tell every thing about the nature of the coast. I think that men who have been knocking about on that coast for forty years, or perhaps all their lives, would be the very men to give an opinion on the subject.

3170. Would you still give the preference to four small harbours, if they were provided on that coast, and made suitable for ships of three hundred tons, and at low water ?—In the present state of things, I would have four small harbours, but in looking to the future of things, I would much prefer the harbour for large ships at all states of the tide. The tendency of the trade, I may venture to state, is decidedly towards ships of large dimensions ; and in ten years from this time I dare say there will be very few ships of three hundred tons in existence. The tendency is all towards steamers—large steamers; and in fact I may say, as large ships as can possibly be employed in the trade.

3171. Then the tendency is to the coasting trade being conducted wholly by steamers ?—Yes, our small coasters are very fast disappearing year by year before steamers.

3172. Are screw steamers employed ?—Yes, the trade is almost entirely done by screw steamers ; at least to a very great extent.

3173. (*Capt. Washington.*) In the event of a war with the northern powers of Europe, would it not be desirable to have a harbour which could protect ships of war on the north-east coast of Scotland ?—There is no other place for their protection than those now in existence.

3174. Then they would have no protection if a war were to take place ?—No, they would not.

3175. Then looking to the trade passing through the Pentland Firth to Archangel and the Baltic, you think protection is required for those ships ?—I do.

3176. And what would you think the best position for the construction of a harbour of refuge for these vessels ?—Why I should say Peterhead, most assuredly.

3177. On what account ?—Because it is more centrical in position. It is more convenient for all boats.

3178. What do you think would be the distance from Peterhead to the Pentland Firth ?—I should say about 120 or 140 miles.

3179. Is there not a harbour at Scrabster ?—There is a very fair natural harbour I believe at Scrabster.

3180. Then your opinon as to the Pentland Firth is that it is a rather formidable place ?—I should say it is. I should say that very few of the enemies' ships would care to cruise about the Pentland Firth in the event of a war.

3181. Have you been there yourself ?—No, I have not been there myself.

3182. (*Capt. Vetch.*) Mr. Macgregor, did you not mention Holy Island as a place for small vessels? You say it is an awkward place of refuge; are the capabilities of the place at all improveable ?—Well, I should say the less improvement made at Holy Island the better, for the access is so very dangerous that vessels running for it very often get into mischief. I certainly hope they won't improve it, the access to it could scarcely be worse than it is.

(*Capt. Vetch.*) I recollect going into Holy Island harbour (on the 19th November 1821) before daylight, in the brig of war *Protector*, which I believe saved the ship. I thought I should never get out of it again, and that our ship would have been lost.

3183. (*Mr. Lindsay.*) What about the Leith Docks ? How much money has been expended upon them ; I mean, how much altogether in their construction and formation ?—Well, the question is a difficult one to answer, and on this account : the city of Edinburgh had a superiority over the harbour and docks of Leith previous to 1838, but now we are under a new constitution, and have nothing to do with the city of Edinburgh. Edinburgh had borrowed from the Treasury the sum which has been mentioned by a witness, viz., 228,000*l.* and odd for the construction of a harbour and docks. The harbour and docks were then invested with a special commission which numbered eleven representatives altogether. Three of these were appointed by the town council of Edinburgh, three by the port of Leith, and five by the Lords of the Treasury. The harbour and the docks were vested in them, subject to this debt of the Goverment, which amounts to 228,000*l.* Upon this 228,000*l.* no interest was to be paid until there was a surplus, that is, we were not to pay any

interest upon it until we had some money to pay it with. But in return for this again, we became bound to pay so much money towards the support of the ministers, so much for the city creditors, and so much towards the funds of the High School, amounting to the sum of 7,680*l.* a year. The interest upon this 228,000*l.* is, I hold, just being paid annually in the shape of these sums which are being regularly paid over to the city of Edinburgh creditors, in support of the clergy and the High School. On this matter there was a good deal of discussion both in Leith and in Edinburgh. The interest of this money was to be deferred until there was a surplus revenue to pay it with after paying this sum of 7,680*l.* The city of Edinburgh was not getting the money, it was not getting payment, and the college was going to wreck, professors were not receiving their pay. The truth was, the city of Edinburgh had become bankrupt, and there was a great outcry. In order to arrange matters it was agreed that the Government should advance this 228,000*l.*, and that the harbour and docks of Leith should be burdened with the debt. They said, Oh! we will keep over the debt, we will hand the debt over. I don't think this fair. I suppose they did not know very well how to come before Parliament without this story. We in Leith did not think ourselves fairly used by them. They have got only the trouble of appointing five commissioners, and they put us to the trouble of being in continual correspondence with the Treasury for all to no purpose. They never will get anything; indeed they look upon it quite as a bad debt.

3184. But still, have you to pay this 7,680*l.*?—Yes, to the city of Edinburgh, to the city of Edinburgh creditors, to the college, and to the High School.

3185. From what sources was this payment to the city derived before?—It was derived from the general resources of the city of Edinburgh.

3186. Then in fact the general revenues of the city of Edinburgh have been saddled upon the public purse?—To a very great extent.

3187. Have they not been so altogether, according to your statement, to the extent you have named?—Practically this 7,680*l.* was a Government grant, because the Government would release their hold of the interest of this money, 228,000*l.*, on condition that they should be paid.

3188. In fact, the city of Edinburgh has received from the Treasury the sum of 228,000*l.*?—It looks very like it.

3189. Because you were bound to pay annually 7,070*l.* [*Witness interrupting*, 7,600*l.*,] Well, this 7,600*l.* and odd which the city of Edinburgh had formerly been obliged to pay?—This 228,000*l.* was borrowed by the city of Edinburgh and not by us; we never got any of it. The Treasury were entitled to take the docks altogether, and in my opinion it would have been a good job if they had done so. But instead of doing this they gave us a new constitution, burdening the revenues for this annual payment of 7,680*l.*; and we are merely keeping back the question of interest until we are able to do it.

3190. What is the state of the revenue and expenditure now derived from the docks?—We have a surplus, but it is being swallowed up fast by the increasing necessities of the port. We must make all those modern improvements which are being carried into execution at all other ports, in order to keep up the reputation of Leith as a port, or the port will soon lose its name.

3191. Then over and above this payment of 7,680*l.* to the clergy and colleges you say you have a surplus?—We have.

3192. What does it amount to?—Oh, it varies; I should say it averages from 1,200*l.* to 5,000*l.* per annum.

3193. Not higher or lower than those sums?—No.

3194. Do you allow this sum to accumulate as a fund?—We have borrowed upon the strength of this considerable sums from several of the Scotch banks for the extension of the docks, the deepening of the water, and other alterations and improvements. We have got an additional depth of nine or ten feet more water than we had before, and we are likewise engaged in building a new graving dock, so as to be able to accommodate vessels of large size; so that in the course of the next 40 years, even supposing there is a surplus going on, it will be all disposed of.

3195. Then the banks, if I understand you rightly, have not got security over the surplus revenue to cover their advances?—Yes.

3196. (*Sir Frederic Smith.*) Will you look at this chart (*producing a chart of England and Scotland*, i.e., *the east coast*)? You will see that by this chart, with the exception of Sunderland, the greatest number of wrecks have occurred off the Firth of Forth in the course of the last five years?—I see by the chart it is marked so. There may have been. I should not at all wonder at it.

3197. How do you think this is to be accounted for?—I think it is accounted for wholly by so many vessels running for the Firth of Forth in heavy gales of wind, from the Humber.

3198. This then is an excellent harbour, in your opinion, the Firth of Forth?—It would be a very admirable harbour if properly attended to.

3199. Could it not be made available for vessels running there, if something were done to improve its capabilities?—It would form a very valuable harbour for the Shields colliers.

3200. But your opinion is, that harbours of refuge, if constructed on the north-east coast, would prevent any of these casualties which have occurred?—Well, these vessels must have been wrecked before they got to the Firth of Forth, that are marked on this chart.

3201. (*Capt. Washington.*) All these wrecks, which are set down here are wrecks which have occurred in the different small harbours of the Firth of Forth—In some of the great gales of wind which arise a great number of vessels are wrecked through taking the wrong side of Inchkeith Island, and there are a great many also which take place just at the foot of the strait. If a breakwater could be erected, it would be of great service, it would give us smooth water, a breakwater from Inchkeith to the Black Rocks. A good many vessels coming up to Inchkeith without pilots are wrecked at Inchkeith.

3202. It is an important question for the Commissioners. We are told that if there were two harbours of refuge erected at Cromarty, and the Firth of Forth, they would be of very great use in preventing wrecks, and other casualties. The Firth of Forth does not appear to be that valuable harbour of refuge which it might be. What would you suggest to improve it?—If the breakwater I mentioned was erected from Inchkeith to the Black Rocks, it would form a most excellent safeguard, and not only give us smooth water, but would form the very best harbour and contain the whole navy of Britain.

3203. Have you any notion as to the expense of the undertaking?—The expense would certainly be very considerable.

3204. When did the change take place by which you were bound to make these payments to the High School, the college, and to the clergy of Edinburgh?—In the year 1838.

3205. Under the order of the Treasury?—No, under the Act of Parliament.

3206. How do you entitle it?—It is called an Act for the settlement of the affairs of Edinburgh and the harbour and docks of Leith.

3207. Can you give us a copy of the Act?—It followed on the reports of some special commission of the House of Commons inquiry into these matters, and they recommended that these annual payments should be made, and the government debt withdrawn altogether or cut in half.

3208. From the answers you have given to Mr. Lindsay previously, you say the smaller harbours, if

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erected, would not give that assistance that one large harbour would give if it were erected at Peterhead ?—Yes, I understand they would not give such protection.

3209. (*Capt. Washington.*) You mentioned St. Margaret's Hope as a national harbour of refuge, can you say that it is a safe one ?—No ; you cannot run up it at night. It is all very well in the daytime.

3210. Is it sufficiently lighted, buoyed, and beaconed ?—It is buoyed and beaconed sufficiently for daytime, but it is not lighted at all.

3211. Then by simply lighting that, do you think it would make a good harbour of refuge ?—It would make a very good harbour to run for at night.

3212. Are you acquainted with the Yarmouth Roads, do you know they are well buoyed and beaconed ?—I have passed through them. They are lined with sands and they are lighted, and ships constantly run through at night both ways.

3213. Is there any reason why St. Margaret's Hope should not be as safe if it was as well lighted as the Yarmouth Roads ?—I would not like to sail there without a pilot ; strangers sometimes get on the sands at Yarmouth, and I would not like to go at night without a pilot.

3214. Then your opinion is, that this approach to St. Margaret's Hope, if lighted, would be an excellent harbour of refuge ?—I don't say that, but it would be of great importance to have the Firth of Forth lighted above Leith. If it were so lighted you would have a good many vessels running up the Firth of Forth for shelter. The lighting of our Firth of Forth has been very well attended to, and if anything could be well done to improve it, it would have been done already. We have very important places at Grangemouth, Alloa, and Borrowstounness, and if lighting could have been done easily for night vessels, it would have been effected there.

3215. Are you aware that night lights were recommended to be placed on the Orkneys and the Shetlands ?—I am aware that they would be of very great service there.

3216. But you do not know that they have been placed there ?—I do not know myself that they have been placed there.

3217. Well, they have not been placed there; so it shows that it does not follow, that because it could have been done, it would have been done. Do you know that it would be a great advantage to the pilots in the Firth of Forth if it were better lighted ?—Beyond a doubt.

3218. Are you a practical sailor ?—No, I am not a practical sailor ; but there are several gentlemen here who would give this Commission valuable information, and may I be allowed by you to call some of those gentlemen.

(*Chairman.*) We shall be happy to hear any gentleman who you may wish to call.

Captain Dickson examined.

Captain Dickson.

3219. (*Chairman.*) What are you, Captain Dickson ?—I am a retired shipmaster.

3220. How many years have you been connected with the shipping trade ?—I was for fifty-eight years at sea before I retired.

3221. What vessels were you principally employed in commanding, and where did they trade to ?—They traded between Leith and London.

3222. And how many years were you a captain?—Twenty-eight years.

3223. Have you any opinion to offer the Commissioners as to the eligibility of a site for the construction of a harbour of refuge on the east coast of England, or can you give an opinion as to the necessity for the formation of such a harbour ?—One is very much wanted indeed.

3224. What is your opinion as to the site, then ?—I should say Hartlepool.

3225. Will you state your reasons for preferring Hartlepool ?—It is a deep bay, and if ships are taken into it not one out of a hundred would get clear out of it ; and if there was a harbour formed at the bottom of the bay, it would be the means of saving a large amount of life and property.

3226. (*Sir Frederic Smith.*) Have you been in the habit of running for any of these harbours on the east coast of England at low water ?—There are no harbours which you can take at all. I have been to Shields at high water. I have run into it, but at low water there is no place to run to along the whole range of coast.

3227. What would you do if caught in an easterly gale on that coast at low water ?—I should decidedly work the ship out, or else I would be blown ashore.

3228. But if you were not bound to any one of the ports, would you keep clear of the bay ?—I would get into the bay.

3229. You might keep out of it ?—I would not go there if bound to Hartlepool.

3230. Supposing you were bound south of Hartlepool considerably, say to London, you would not then remain in the bight of the bay ?—No.

3231. If the wind were to chop round to north-east, could you get out of the bay ?—I could not get out.

3232. Then altogether you consider Hartlepool as the best district for a harbour for vessels so caught from Flamborough Head to the Firth of Forth ?—I do.

3233. Do you ever meet with foul wind off Flamborough Head ?—Yes.

3234. Were you ever obliged to come back to the Firth of Forth when so caught ?—No, I was never.

3235. If a south-east wind arose would you keep out at sea ?—I should do so.

3236. And on the whole you prefer Hartlepool Bay ?—I do prefer it. A vessel caught there is more likely to find the bottom of the bay than any other point. And, therefore, Hartlepool Bay, I think, is the best point for a harbour of refuge.

3237. Have you ever navigated the north coast as far the Baltic ?—Not much. I have been north, but not a great deal.

3238. In returning from the Baltic do you make Buchan Ness, or do you come straight on to the Firth of Forth ?—I come straight on to the Firth of Forth.

3239. Are you anxious to have a harbour of refuge at Peterhead ?—We should be the better for it certainly, but it would not be so important as a harbour on the south.

3240. (*Mr. Lindsay.*) Then do you think the harbour of refuge more wanted on the north-east coast of England than on the north-east coast of Scotland? —Yes.

3241. What are your opinions about Filey Bay, which is close to Flamborough Head, as a site for a harbour of refuge ?—It would not be so good as one at Hartlepool.

3242. Then you think more lives and property would be saved by a harbour of refuge at Hartlepool ?—I do.

3243. (*Capt. Washington.*) Have you traded much along the coast ?—Yes ; I have.

3244. For how long ?—For forty years.

3245. Between where ?— Between Leith and London.

3246. Have you ever had occasion to run yourself for shelter ?—I never had any place to run for shelter all along the east coast, but I have had occasion to run up to the Firth of Forth.

3247. Where did the foul wind generally catch you ?—From all parts of the Scotch coast.

3248. But I mean the gale of wind which generally caught you, obliging you to run to the Firth of Forth ?—About the Fern Islands.

3249. And have you known many wrecks take place at Hartlepool?—Yes, I have known a great many.

3250. Compared with other parts of the coast?—Yes, more than any other part of the coast, except near Whitby, where there are perhaps more than off any other ports of the coast.

(The name of Captain Hall was at this stage of the inquiry called, but that gentleman was not in attendance.)

Captain BENJAMIN MANN examined.

3251. (*Chairman.*) What has been your occupation, Captain Mann?—Shipmaster.

3252. Between what ports have you commanded ships?—Between Leith and London.

3253. How long have you been a shipmaster?—For thirty years.

3254. Of what description were the vessels that you commanded? I mean were they steamers or sailing vessels?—They were first smacks, and then schooners.

3255. Have you any opinion to offer the Commissioners as to the most eligible site for a harbour of refuge on the east coast of England?—I think Hartlepool is about the best point for general use to the shipping of any place from the Fern Islands to Flamborough Head.

3256. Do you consider such a harbour wanted?—I do, and often wish we had one there. We have been caught on that coast several times. Very many ships have gone ashore there.

3257. Do you know the coast of Scotland north of the Firth of Forth?—Yes, I know it. But I have no opinion to offer the Commissioners as to the necessity for a harbour of refuge on that coast.

3258. What do you think about Peterhead?—Well, a great many people speak about Peterhead as a good place, and I think so myself, because it is on a point of land, and ships cannot get past it when there are east winds. Vessels either bound north or south could go in there.

3259. (*Sir Frederic Smith.*) Do you know Filey?—Yes, I have been in Filey Bay.

3260. What do you think of Filey Bay as a place for a harbour of refuge?—Further than this I don't know much about Filey Bay, but that I have been at anchor in it.

3261. What wind are you protected from there?—From the north-east wind.

3262. What sort of breakwater would you require to complete your protection there?—Really, I could not say, but I should say it must be a very long one.

3263. Do you know Redcar?—No.

3264. Then on the whole you give the preference to Hartlepool?—I do. For vessels caught off Flamborough head or off Filey Bay can either get to the north or south, but if they are caught in the bight of Tees bay they cannot well get out. A great many ships are caught on shore there.

3265. Have you ever seen them running from the shore?—I have seen fleets of colliers running from Flamborough Head. This was a few years ago.

3266. How many have you seen at a time?—Oh, maybe as many as a hundred.

3267. For those vessels, which would have been the better port as a harbour of refuge?—Well, there is no place between the Humber and the Firth of Forth.

3268. Are you aware of any wrecks which have taken place in the Firth of Forth during the last five years?—Oh, many.

3269. How do you account for those wrecks?—By reason of persons not being well acquainted with the coast or not seeing the land. Many ships get embayed at Dunbar Bay, because they are not acquainted with the nature of the land or do not see it.

3270. If persons were well acquainted with the Firth of Forth would there be any danger in running in?—If a man only gets sight of the Mary Island there is no fear but that he can run up the firth safely.

3271. (*Mr. Lindsay.*) Have you been master of one of those crack vessels called Leith smacks?—Yes; they are well-manned able boats. Sometimes we went into Holy Island and into the Humber, but there is no harbour along the coast which a man can take at all in bad weather.

3272. If there had been a harbour of refuge on the east coast of England would you have taken it on many occasions?—Yes, I certainly would, that is when I was master of a Leith smack.

3273. You say you prefer Peterhead, which is on a point of land on the north-east coast of Scotland. Why would you prefer it, and why prefer Hartlepool for being a deep bay on the east coast of England? How will you reconcile these opinions?—Peterhead Bay is a deep bay. I should say it is a much better site than Wick; it is on a point of land the other side of Buchan Ness.

3274. But why do you prefer a point of land on the east coast of Scotland when you prefer a bay on the north-east coast of England?—Because there are many vessels that cannot get up the Moray Firth in bad weather, and they would go for Peterhead, and it is a pity there is not a harbour of refuge at Peterhead, for the lives and property of many persons would be saved.

3275. (*Mr. Coode.*) Were you not exposed to considerable risks in Tees Bay on the east coast of England?—We were.

3276. Could you not have got out?—I often watched the opportunity, to see if there was a sign of wind shifting, so that I might get out to sea, but if there was a breakwater in Filey Bay I would put in and shelter there. I have seen many times large fleets driven from Flamborough Head as far as there. Those large fleets would have been very much benefited by a harbour in Filey Bay.

(*Mr. Macgregor.*) May I, gentlemen, volunteer a piece of information which would absolve the Firth of Forth from all the black-balling it has got? We don't often hear of wrecks occurring here, but we have an immense number of small traffic in the Firth of Forth, colliers and vessels laden with pig iron, on the Fife coast a great number of them carry coals. Whenever there comes on a gale of wind down they go, and then down goes a black mark or a black cross on the chart.

Captain ALEXANDER BROWN examined.

3277. (*Chairman.*) What occupation have you followed, Captain Brown?—That of shipmaster.

3278. For how many years have you been at sea?—Forty years.

3279. And in what vessels were you employed? What kind of vessels were they you commanded?—Between Leith and London.

3280. Were they the ordinary sailing vessels?—They were formerly smacks, and then a splendid class of clippers.

3281. Have you any knowledge of the Firth of Forth, I mean the coast of Scotland north of the Firth of Forth?—No, I have not.

3282. Are you of opinion that there is any necessity for a harbour of refuge on the east coast of England?—I am. It would be very beneficial both for the saving of life and property if we could get one formed.

3283. Have you any opinion as to the most eligible site for such a harbour?—Well, fixing a line between Flamborough Head and the Farn Islands, I would say the most adapted place is Hartlepool.

3284. You say you prefer Hartlepool. Will you state your reasons for preferring Hartlepool to any other place?—I will. Because when a gale of wind arose a vessel could not clear herself off Flamborough

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Head, or between Flamborough Head and the Farn Islands.

3285. (*Mr. Lindsay.*) Do you think that if a harbour of refuge was constructed in Hartlepool Bay, it would do more towards the saving of life and property than a harbour in Filey Bay?—I do.

3286. Does this arise from the fact that when vessels are caught by the east gales which are the most dangerous on that coast, they could get more easily to Hartlepool Bay than to the north of Flamborough Head?—Yes.

3287. From your experience does the danger arise principally when vessels are caught to the northward of Flamborough Head?—Vessels going south are often driven back there by heavy gales of wind which are frequently occurring.

3288. If harbours such as Hartlepool, Sunderland, and the Tyne could be improved so that laden vessels of 300 tons could enter them at all times of tide, do you think the expenditure of money in that way would do more to the saving of life and property than the erection of one great harbour?—No; a vessel bound north of those ports could fetch Hartlepool when it could not fetch either of those north ports, such as Sunderland or the Tyne, and in the same way vessels going south could not possibly get to Filey Bay. In my opinion, Filey Bay is all very well for vessels which are close by it, but they could never get to it from the north in an easterly gale.

3289. (*Capt. Vetch.*) Are you of opinion that many wrecks take place north of Hartlepool Bay?—A great many in the course of the year, annually. If caught off there in a southerly gale or a strong easterly gale, they must either try to run to port or go ashore, but if they had a harbour at Hartlepool to run to it would prevent these things from happening.

3290. Then you think that Hartlepool requires artificial shelter for the prevention of these dangers?—Yes.

3291. (*Mr. Coode.*) Of the vessels wrecked off Hartlepool Bay are the greater number of them laden or light?—Oh, partly both.

3292. Are you aware that the greater number of them are laden?—Well, I should say more were laden than not.

3293. Do you think there are more vessels caught off the bay of Hartlepool than off Flamborough Head?—I do.

3294. Do you not think a harbour would be better a little south of Hartlepool for vessels caught in the bight of the bay?—I do.

3295. Have you seen many vessels caught off Flamborough Head?—Yes, I have, I have seen many waiting for the westerly wind, and I have seen many wait for shelter.

3296. Then if those vessels had occasion to wait there and the wind came on from the east, would a harbour of refuge be better at Filey Bay than at Hartlepool?—Well, it might suit those vessels which were there at the time, but if you take a general average for all classes of fleets of ships lying along the coast, it would be much better for them if there was a place at Hartlepool.

3297. And you think Hartlepool Bay is the safest place?—Yes, it is the safest place you can get; it is the most likely place.

3298. What do you suppose is the best place for vessels to run to that are bound to the south, and caught in head winds along that part of the coast?—Well, there is no place that I know of excepting the Humber. That is the only place.

3299. Where do you get the head winds mostly?—Oh, from all parts of the coast.

ROBERT COLME, Fisherman, examined.

Robert Colme.

3300. (*Chairman.*) What is your occupation?—I am a fisherman and a pilot.

3301. Are you acquainted with the North Sea and the Pentland Firth?—I am.

3302. How many years have you been pilot in the Queen's service?—Eight years.

3303. (*Mr. Lindsay.*) Have you had much experience in navigating the north east coast of Scotland?—Not a very great deal, except when I went in fishing boats.

3304. How long have you piloted on the north-east coast?—About eight years.

3305. How long have you been going between the Firth of Forth and the Pentland Firth?—Do you mean how many journeys I have made?

3306. Yes.—Well, I really can scarcely say.

3307. Have you made a hundred?—Well, I dare say not.

3308. About fifty?—Yes, I might say fifty.

3309. Then, as a pilot, what is your opinion as to the necessity of a harbour of refuge between the Firth of Forth and the Pentland Firth? Do you think there is any necessity for it?—There is very great necessity for it, particularly in the winter season, for vessels coming from the Baltic and from America. Between the Firth of Forth and the Pentland Firth there is no place except Cromarty where you may take a vessel to.

3310. Is navigating Cromarty Bay easy?—That depends very much on the winds.

3311. Do winds very often blow home there during easterly gales?—Yes, very often.

3312. During an easterly wind is there any difficulty in getting out of Cromarty?—No, no difficulty.

3313. Have you any baffling and variable winds to encounter in the bight of the bay at Cromarty? Have you ever encountered any?—I cannot say I have.

3314. Speaking in a commercial point of view, and looking to the saving of life and property, what point along the whole range of the coast do you think most suitable?—Why, Peterhead.

3315. Why so?—Because it commands both north and south; that is, that a vessel getting into Peterhead in a heavy gale of wind cannot reach the Moray Firth, and a vessel, if she could get round Rathlin Point, she might get to Cromarty; that is, if the wind were south-east.

3316. And if the wind were south-east she could get to Peterhead?—Yes. If a vessel can get out to sea there is no danger about getting to Cromarty.

3317. Do you know the fishing stations between Leith and Peterhead?—I know most of them.

3318. Name one of them in particular where the expenditure of money would be the means of saving life and property.—There is not a fishing station anywhere in the Moray Firth where a harbour within five miles would not be of much service both to life and to property.

3319. Then what points do you think would be so improved by the expenditure of money as to save the lives and property of fishermen?—I should think Craigroan.

3320. Have you anything to tell the Commissioners as to the small harbours of the coast near Craigroan?—Well, man is a selfish animal; we all look to our home first.

3321. Where is your home?—At Newhaven. As to Newhaven, we want something to be done very greatly, or we shall soon have to remove, because the grounds are all going away.

3322. Is Newhaven a fishing station?—Yes.

3323. How many boats are there engaged in the fishing trade there?—About 300.

3324. Have you a harbour there?—No, we have no harbour at all. We have sent petitions to Parliament, but somehow or other they don't seem to take any notice of them, or they are not supported, or something; at least we don't hear anything about them after they are sent.

3325. Do you think the improvement of Newhaven would be the means of saving a great number of lives?—Yes, I think it would.

3326. Have you a pier there?—Yes, we have a pier, but no harbour. It has been the means of saving life and property without a harbour, and I don't know what it would be with one.

3327. Is Newhaven much exposed?—Yes, very much so.

3328. Can boats enter Newhaven at all times of the tide, or in an east gale of wind, or at high water?—No; they can't enter at all.

3329. At what time of tide can they enter?—You cannot get there at all at high water spring tide. A harbour has been talked of at Newhaven, and we have had estimates, but we could not meet them. They were too high. We applied to the Fishery Board.

3330. What did the Fishery Board say?—Oh, I think the board wanted us to raise a part of the 14,000*l.* which was the sum fixed upon to make the harbour. They were, we understood, to give two thirds of the money, and we were to subscribe the one third; but we could not find the money to do so.

3331. You were too poor?—Yes, we were; I suppose so.

3332. Then do you think the construction of a harbour of refuge at Newhaven would be the means of saving life and property?—Yes, I should say so.

3333. If such a harbour as that proposed or talked about were erected, could boats take it in all weathers?—Yes.

3334. Have you had any experience on the north-west coast of England?—Except Shields, I have not had much; not much beyond that.

3335. Can you give any opinion on the necessity for a harbour of refuge on the north-east coast of England?—I am not competent to form an opinion.

3336. (*Capt. Washington.*) You are a pilot?—I am.

3337. And you have piloted at St. Margaret's Hope?—Yes.

3338. Can a vessel run through there by night?—A pilot could take her up.

3339. In daytime, could a strange vessel do so?—Yes, easily.

3340. If it was lighted, as it might be, could strangers use it as a harbour of refuge?—Yes.

3341. Where would the lights be placed?—One should be placed on Inchcolm, and one on Garvie Island.

3342. Then you think two small lights would make St. Margaret's Hope a harbour of refuge?—Yes. There is nothing in the way except a small rock above Queensferry, which is a bad place if the weather is thick.

3343. Is it lighted?—Yes, it has got a large beacon on it. Ships can hardly run foul of it in daylight.

3344. (*Chairman.*) In a heavy easterly gale of wind could a stranger run up the Firth of Forth to St. Margaret's Hope in safety?—Yes, if he had confidence in his chart, and if he sees the buoys on the Drum Sand.

3345. How would a vessel do in thick weather?—Well, he must have a thorough knowledge of the depth of water.

3346. Then in thick weather, unless the land is not visible, could a stranger go by his soundings?—Not very well.

3347. Do I understand you to say that if the Firth is lighted as you have named, a stranger could run up to St. Margaret's Hope in a heavy easterly gale at night?—Yes.

3348. (*Capt. Vetch.*) Do you know Fraserburgh?—Yes, I know Fraserburgh well.

3349. Did you ever see a number of vessels lying at shelter in the bay there?—I have.

3350. How many vessels at a time?—Perhaps fifteen or twenty.

3351. In west gales of wind, when a vessel could not come up in heavy weather, have you seen them take shelter there?—Yes. When a heavy westerly wind is blowing, vessels bearing up on Banff Bay will get anchorage there, or at Lossiemouth; but, when they can get off, they may go to Fraserburgh.

3352. If, with baffling variable winds, or other contrarieties, the vessel could not make to Cromarty Bay, could it not find anchorage at Fort George?—Oh yes.

3353. And in unfavourable wind?—Yes.

3354. Failing this, could you get out there?—Yes, but as to getting to Cromarty in a gale of wind, if a vessel will work there is nothing to stop her getting anchorage.

Mr. William Thompson examined.

3355. (*Chairman.*) What are you, Mr. Thompson?—I am a merchant and shipowner at Leith.

3356. What is the nature of the information you wish to render to the Commissioners relative to Anstruther?—The necessity of a harbour of refuge for the fishing-boats employed in that locality.

3357. Will you now proceed with your statement, observing that the present object of this inquiry is a national harbour of refuge?—The fishing property of the district of Anstruther is second to Wick alone, in Scotland; and, from the memorial I hold in my hand, it seems that there are employed, official boats, during the last three years, belonging to the two towns of Anstruther and Cellerdyke, 315 boats. This is on the average. The present accommodation in the harbour is quite insufficient for the trade carried on. Besides being the fishing station at the mouth of the Firth, the harbour is frequented by boats from all the fishing towns in the Firth, Newhaven and Dunbar, and other places. There is no place to which the fishing boats of Anstruther can run to, if a violent east wind comes on. In the year 1856 a very serious gale of wind, which took place when the harbour was crowded with shipping, did a great amount of damage to property, and also some loss of life occurred; all this arising from the crowded state of the harbour. A heavy gale occurred during the fishing season. Here is a copy of a memorial (*producing a paper*) signed by 1,243 fishermen belonging to the Firth of Forth, and 370 belonging to the district immediately adjoining Anstruther, asking for some assistance to enable them to construct a harbour of refuge, for their own use, and that of all engaged in the fishing about the Firth of Forth, showing that it is not merely a local matter, but that it is a matter affecting the interest of all the fishing places connected with the Firth of Forth, representing, I believe, no less than 700 boats. The value of the fishing in that quarter is about 85,000*l.* per year. This was the average of the five years ending 1857. Plans were prepared by the Messrs. Stevenson, C.E., for a harbour which would be quite sufficient for the whole of the fishing on the Firth of Forth, showing that a harbour could be provided at an expense of 30,000*l.* The locality is willing to raise 12,000*l.* if a loan of 18,000*l.* was advanced by Government; and the revenue of the fishing, which amounts to 1,200*l.* a year, would be handed over in security for the payment of the interest and the redemption of the debt. In the the memorial which I have handed in there are statistics given, on which my statements are established.

3358. And you are quite sensible that the port of Anstruther is not one, either in point of situation, or capacity, or capability, for the formation of a national harbour of refuge?—Decidedly so.

3359. And you don't think that on the north-east coast of Scotland a harbour of refuge is needed?—Well, as a shipowner, I don't think there is any necessity; but certainly on the north-east coast of England one is greatly needed.

3360. State on what ground you have formed that

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opinion with respect to a national harbour of refuge not being required on the north-east coast of Sotland? —I think that for foreign vessels and coast-going vessels there is no occasion for a harbour of refuge; but, as regards the fishing, there is required a harbour of refuge at Wick. For the ordinary vessels or foreign going ships there is no need for one.

3361. State on what ground a harbour of refuge is required on the east coast of England? — Between the Firth of Forth and the Humber there is no harbour which a vessel can take. There are an immense number of vessels going to the ports of Shields and Newcastle, and when a gale arises they are liable to get on a lee shore, and there is great difficulty in working out from it. There is no protection between the Firth of Forth and the Humber.

3362. Have you formed any opinion as to the most eligible site?—I agree with the evidence which has been hitherto given, that Hartlepool or thereabouts is, perhaps, the very best place that could possibly be selected for the locality. I am not a practical man, but having occasionally gone along the coast I may say that my private opinion is, that the bay is perhaps the most suitable place.

3363. Were you ever at Holy Island?—I once put in to Holy Island, and I lay there for two days; and certainly it is not at all an easy place. I certainly would not like any shipping of mine attemping Holy Island.

3364. (*Sir Frederic Smith.*) You said that there were 315 boats at Anstruther. Do you mean that those boats belong to Anstruther alone?—No; they belong to Anstruther, Cellardyke, and Pittenween; all of which form a connection with one another.

3365. And you say, that as far as regards the fisheries, that collection of boats is next to Wick?—Yes; it stands next to Wick according to the fishery returns.

3366. Have you ever made a voyage to the Baltic from Leith?—No.

3367. Do you know much of the east coast of Scotland?—No, beyond what I have heard, and from the reports of the shipmasters. We have a number of vessels trading to North America from Leith, and they never complained of want of shelter.

3368. As a shipowner, would you be willing to pay a passing toll for a harbour of refuge at Peterhead? —No, I certainly should not.

3369. Would you do so for a harbour south?—I would willingly, as a shipowner, do so for vessels trading to the south on the east coast of England.

3370. Are you aware that there is an objection to paying toll at Peterhead?—I believe there is. There is Rattray Riggs, near Peterhead; and my fear is, that in a gale of wind ships should go there, and make for Peterhead. Of course it would be for a practical man to consider this, and also as to the danger of the rocks.

3371. (*Mr. Lindsay.*) Have you not heard many loud complaints on the part of the shipping interest against passing tolls?—Yes.

3372. Don't you think that putting on a fresh tax would be complained of by the shipping interest?— It would.

3373. Do you think we can tax any particular class of the community for a national harbour of refuge?—I think it would be an unfair tax. I would object to the passing tolls altogether. I don't think it is fair.

3374. How many boats did you say there were at Anstruther?—315.

3375. Is that the highest number?—No; sometimes there are between 500 and 600 during the fishing season.

3376. What is the number of men employed in these boats?—There is a population of about 7,000, and half of them are fishermen.

3377. How many men are required for a boat?— About six or eight.

3378. Have you known the lives of these men placed in great jeopardy?—Yes; I have known many lives to be lost. Within the last three years, two steamboats were lost on a reef of rocks coming to Anstruther. One of them was a Dundee ship, and the other was an Aberdeen one.

3379. Do you think if a harbour of refuge was made there, it would be the means of saving life?— It would, to a very great extent.

3380. What kind of harbour is there at Anstruther now?—It is formed by two piers running out.

3381. Could boats take it at all times of the tide? —No, only at half tide up to high water.

3382. Can the boats take it in gales of wind at half water?—Yes, I should say they can. The reef of rocks is covered at half tide, so as to allow a fishing boat to pass over it.

3383. What is the revenue of the harbour at Anstruther?—500*l*. The people of Anstruther are willing to raise 12,000*l*., if they can get a loan of 18,000*l*. from the Government for the formation of a harbour of refuge.

3384. Besides the revenue 12,000*l*., the revenue of the harbour will be included in the indemnity?—Yes; they will give it as security for the loan.

3385. Do you think that if such a harbour was erected there, many more boats would frequent the place than now?—That depends very much on the shoals of fish. Next to Wick it is the principal place to which boats resort. The fishing has been on the increase.

3386. What has been the increase?—The record begins in 1842, at 45,000 barrels, and it rises up to 49,000 barrels in the next year. The average from 1850 to 1857 was 68,000, and last year it was 95,000. Application has been made to the Treasury for the construction of a harbour.

3387. (*Capt. Washington.*) You say that 500 or 600 boats frequent the locality. In the event of a gale of wind rising, how would they escape it?— Their only course would be to run up to Leith roads, or else to Elie.

3388. Is there any shelter at Elie?—There is, but it is a worse harbour than Anstruther. The present proprietor, Mr. Reard, has got an Act of Parliament for the improvement of the harbour, but it has not been begun yet. I am speaking of it as it is at present.

3389. Do you think the fishermen are entitled to have a harbour of refuge constructed for their service? —I do. The loss of life has been very great among that class. They are well deserving of protection, as they are of great importance to our commerce.

3390. When is the fishing principally done, by day or by night?—The fishing is all done by night. Vessels go out in the evening, and return to port in the morning.

3391. How many men are there manning these boats?—Taking the average, about six men to each boat.

3392. And these men are exposed to their calling how long in the year?—They are engaged during nearly the whole of the year. January, February, and March they are employed in the herring fishery. In July, August, and September is the fishing season. In other months they go for cod and ling.

3393. How far do they go out?—They go about 20 miles from the mouth of the firth. They are more exposed than any other trade on the coast of Scotland. This extends generally to all the fishing along the coast, the fishing in the Moray Firth, and on the coast of Caithness also. I am glad they are doing something at Wick. Something should be done for the protection of this class of vessels.

3394. Have you ever been at Wick?—No, I have never been there; but I know its general situation, and that it is a little south of the Pentland Firth. I am not sufficiently acquainted with the bay to say whether a fishing harbour would be well at Wick or not. My opinion would only be from hearsay.

3395. (*Capt. Vetch.*) What are your opinions as to a harbour of refuge north of the Firth of Forth?

—I don't think it would be necessary for the sea-going trade.

3396. But you mentioned that it would be necessary for the shipping at Wick?—Yes.

3397. (*Mr. Coode.*) And the value of the fish last year was how much?—The number of barrels was 95,000. I don't know their value, but the average value of the last five years was 85,794*l.*

3398. (*Capt. Washington.*) Then you state that boats were wrecked at Cellerdyke?—Yes; in 1856 very serious damage was done. This memorial states the fact. It is signed by 1,243 fishermen. The boats were caught at night during a gale, and driven from their moorings, and 16 of them were most severely damaged. Most of the damaged boats belonged to Buchan and other places.

3399. Were any lives lost?—No.

3400. Has any great loss of life occurred in the fishery in the Firth of Forth?—Oh yes; in coming in, boats which could not find shelter were sometimes lost, and boats lying off swamp. There is no harbour to which they can run.

3401. Can they not run into Dunbar?—If the wind is south-east they cannot do so.

3402. Has any loss of life taken place off Dunbar—the fishing there?—I don't know. Latterly there was a great loss of life at Helmsdale and Wick, off the coasts there.

3403. Do you know of any loss of life during the last three years off the coast of Scotland?—I have seen accounts of them in the newspapers. In 1856 there was a most enormous loss at Wick, and scarcely a season passes in which there are not occurrences of this kind—loss to fishing boats.

3404. Are you aware that 100 lives were lost off the north-east coast of Scotland in 1848?—I cannot say what the number was.

3405. But you say that a harbour of refuge sufficient for the fishing boats should be erected wherever needed?—Yes.

3406. (*Mr. Lindsay.*) Are you aware, of your own knowledge, whether the loss of life is greater in proportion to the number of fisherman employed than it is amongst men following other maritime pursuits?—Without being able to say positively, my impression is, in reading the accounts of the losses, and on considering the matter, that it is so.

3407. Then you say that there is a greater average loss among fishermen than among any other sea-going class?—No.

3408. Have you any means of obtaining the returns of the lives lost?—I think, with a little exertion, I could get them.

3409. Could you get them for the last 5, 10, or 20 years?—I would not go as far back as 20 years, but I dare say I could get them for 5 or 10 years past.

3410. (*Chairman.*) Then will you do so, and hand them in to the Secretary?—I will.

Mr. Charles Jackson, of Gretham Hall.

3411. (*Chairman.*) What do you wish to offer, Mr. Jackson, on the subject of the present inquiry?—I have no evidence to offer personally. I am one of the Commissioners of West Hartlepool. My being here to-day is purely accidental, and being very much interested in the formation of a harbour of refuge on the north-east coast of England, I have been endeavouring to get the opinions of nautical men on the subject, and on the nature of the different points of coast; and I have them here to offer if the Commissioners will take them. You will find evidence that is very valuable here.

The witness then produced papers, and handed them to the Secretary.

3412. (*Chairman.*) Do you wish these witnesses to be called?—I do.

(*Secretary.*) They have already been called.

(*Mr. Macgregor.*) Two of them, I think, are present now.

3413. (*Chairman to witness.*) Have you anything to offer yourself?—No.

(*Chairman.*) I think that anything you have to offer on the subject of harbours of refuge on the north-east coast of England would be much more properly given before the Commissioners when they visit that district.

(*Witness.*) My only object is that I thought this evidence that I have would be valuable.

3413*a*. (*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sittings at Leith closed.

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Monday, 6th September 1858.

PRESENT:

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Vetch.
Mr. Lindsay.	Mr. Coode.
Captain Washington.	Mr. Sewell, Secretary.

Mr. Allan Gilmour examined.

3414. (*Chairman.*) What is your name?—Allan Gilmour.

3415. What is your occupation?—I am a merchant and shipowner.

3416. How long have you been connected with trade?—I have been resident in Glasgow twenty years, but I have been connected with trade for a longer period.

3417. In what trade are the vessels in which you are interested chiefly employed?—Chiefly in the North American trade in timber and cotton, but some are employed in other trade.

(The Chairman then instructed the Secretary to place a chart of the north coast of Ireland in the hand of Mr. Gilmour.)

3418. Do you see Portrush on the chart?—I do.

3419. Are you of opinion that a harbour of refuge at that part of the coast would be beneficial in any degree to the Clyde shipping engaged in the American trade?—I certainly think not.

3420. Will you state to the Commissioners the reasons which have induced you to adopt that opinion?—I think not, because vessels coming from the Atlantic Ocean have our harbour quite clear to them; and then again, suppose there is any real case of necessity, they can run into Lough Foyle, and I cannot see the least need in any way for harbours of refuge.

3421. Are you of opinion that there is any other point on the coast on which a harbour of refuge might

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be desirable for ships trading with America?—No, I see no use in harbours of refuge for ships of large tonnage. I may state that I am not a nautical man, and it is only as a merchant that I am expressing an opinion.

3422. Are you interested in any ships which take the course by the south coast of Ireland?—My ships either go out by the north or the south passage, according to the direction of the wind. That is a matter left entirely to the discretion of the captain, and must depend upon the wind and weather.

3423. Are you of opinion that an improvement of the harbours of Carlingford and Wexford would be desirable to afford refuge to shipping bound in that direction in bad weather?—I do not think so at all. I cannot say how beneficial it might be to small coasting, but it is not in any way necessary for vessels of large tonnage.

3424. Do you see Douglas, Isle of Man, on the chart?—I do.

3425. Have you any opinion as to the necessity or otherwise of a harbour of refuge there for the benefit of shipping?—I do not think that there can be the least need of a harbour of refuge. I cannot see on what account an outward-bound ship in distress should run there; she would be much more likely to run for Liverpool, and a vessel going in a contrary direction would be more likely to make for the Clyde.

3426. Looking further south on the chart about the neighbourhood of the Land's End, say St. Ives, have you any opinion as to the necessity or otherwise of a harbour of refuge at that point for ships bound to the southward?—I am not particularly well acquainted with that part of the coast, but as regards my opinion, I should say that there was not the least need of one.

3427. Will you inform the Commissioners what is the nature of the shipping in which you are chiefly interested?—They are ships varying from 600 to 1,600 tons.

3428. (*Mr. Lindsay.*) Speaking generally, is it your opinion that harbours of refuge, if established, would be the means to any great extent of saving life and property? I ask you as one of the largest shipowners in the country?—I believe that harbours of refuge, marked down as such, are the means of causing loss of life and property rather than of saving it, by inducing captains to run down to them instead of keeping the sea. I believe that if a ship is well found and properly fitted out, it is far better to keep the sea than to run for a harbour of refuge. The instructions which we give to the masters of our ships are, in the event of any accident, if it is necessary, to return to the port from which they started, but by all means to keep the sea, and not to run for a harbour of refuge. These are our instructions, and it may, perhaps, not be amiss to state, that out of our large number of ships we have only lost 10 during the last 20 years. I cannot state positively, but I believe we have made 1,700 voyages to all quarters of the globe.

3429. What is the tonnage of the vessels in which you are interested?—About 25,000 tons, and that is not so much as it used to be; that is the amount held directly by our own house, but there is more with which our interests are connected.

3430. Are you aware that there is annually a loss of 800 lives, and that shipping property to the extent of 1,250,000*l.* is also lost?—I know the amount of loss is large.

3431. Do you not think that harbours of refuge would tend to reduce that serious loss of life and property?—I do not think that it would.

3432. Are you speaking with regard to those points alluded to by the chairman, or with regard to the whole north-east coast of England and east coast of Ireland?—I take the country generally. As I have said, my observations apply to harbours of refuge marked as such; vessels are caught in a gale of wind, and the master makes up his mind to run for one of these harbours, when he ought to do nothing of the kind; and it is in making for these very harbours that accidents very frequently occur. I believe, also, that at present there are plenty of harbours to which, in cases of such necessity, a vessel can safely go.

3433. Then is it your opinion that there is a greater loss of life and property occasioned by attempts to run for these harbours than there would be if none existed?—Certainly it is, and for the reason which I have already given, that it is generally safer for vessels to keep the sea than to run for a harbour of refuge when caught in a storm.

3434. Then it is your opinion, that if ships caught in a heavy gale were to be hove-to instead of being run for a harbour, there would be a smaller loss of life and property than there is at present?—That is my decided opinion.

3435. So that if it were determined to expend three millions of money on the construction of harbours of refuge, you do not think that the expenditure of that large sum would tend to reduce the frightful casualties which now take place?—I think it more than doubtful.

3436. Are you acquainted with the east coast of Scotland?—No, I cannot say that I am.

3437. With the north-east coast of England?—No, I never examined it particularly.

3438. Are you aware that in that part of the coast between the Firth of Forth and the Pentland Firth, with the exception of the Moray Firth, there is no place for a ship to run for shelter?—I have ships every year running through the Pentland Firth engaged in the timber trade with Hull, and I have never lost a single ship upon that coast.

3439. Then do you think that in the event of harbours of refuge being constructed, shipowners would gain anything by a saving of maritime insurance, that is, do you think the premiums paid would be lightened by their construction?—I believe not, I do not think it would make any difference.

3440. Your experience has been confined to the larger class of vessels, but do you mean your present observations to apply to all classes of vessels, large as well as small?—Yes, I think they will apply to all vessels.

3441. Then you have not heard any desire expressed on the part of your captains, or on the part of any large number of the captains with whom you have necessarily been brought in contact, for the construction of harbours of refuge?—No, I have not.

3442. (*Capt. Washington.*) I think you stated that you are not a sailor?—Yes, I said so. I am not a sailor, but I have been a good deal to sea.

3443. And have you been so fortunate as to have had none of your vessels caught in distress except the 10 you have mentioned?—In the course of 20 years we have only lost 10 vessels.

3444. Do you remember where they were lost?—I could not at this moment, but I could in a very short time ascertain.

3445. Perhaps you could let me know on some future day?—I remember that I lost three in the St. Lawrence.

3446. You lost none on the coast of the United Kingdom?—No.

3447. As a large shipowner your opinions carry great weight, and I want to know whether examining the east coast of England, and remembering that 10,000 vessels pass annually, and out of that number some few must be embayed and unable to get an offing, would you still adhere to the opinion that there is already a sufficient number of harbours?—Yes, I believe there is sufficient room for more vessels if they are in proper order.

3448. But while, as a matter of fact, a number of wrecks does take place every year, do you remain of the same opinion?—Yes.

3449. Would it not be humane to find places of shelter if we found that they are absolutely required?—I admit that if you could make a place of

shelter which could be accessible at all times without risk it might be desirable.

3450. Are you aware that in the south-east coast of England ships have not any place of escape if caught in any easterly gale?—I believe that it is so. I am only speaking as a merchant, and I have told you that in my experience I have had ships passing through the Pentland Firth going to Hull, deeply laden with timber; and I don't remember one getting in distress, and they pass through chiefly in the very worst months of the year.

3451. Yours are large and well-appointed ships; but is not your case the exception, and not the rule?—I cannot say.

3452. Did I understand you to say, that if a place of shelter could be erected on the east coast of England at a moderate expense, you should think it desirable to erect one?—That may be qualified. I do not mean to say that if such a place could be erected cheaply, it might not be desirable; but then look at the cost, and I must still repeat that ships in straits instead of running for those harbours of refuge should keep out to sea, and harbours of refuge marked down as such are very likely to induce masters of ships to to run down to them instead of keeping at sea as they ought to do.

3453. May I ask what you mean by the expression, "harbours of refuge marked down as such"?—I mean that if harbours are marked down on the chart as harbours of refuge, captains are very apt to run for them.

3454. At present none such exist, and the proposal into which we are inquiring is as to the expediency of constructing some places of shelter; does that circumstance alter your opinion?—In my experience (and experience is, perhaps, better than any opinion), I have had large ships carrying heavy cargoes passing through the Pentland Firth, and I never lost any of them.

3455. (*Chairman.*) I think you stated, in a former part of your evidence, that you were prepared to lodge a statement of the vessels you have lost, with some details, with our Secretary?—I can tell it at once.

3456. At present?—No, but in a very short time.

3457. Will you at your convenience forward to the Secretary to the Commission a detailed statement, with the fullest information which it is in your power to afford, as to the number of ships that have been lost amongst those interests with which you have been connected, giving us every detail connected with it?—Yes, I shall be happy to do so.

3458. Can you inform us, as your experience relates to large and well-found ships, whether there is a feeling among shipowners that a captain should do all in his power to continue his voyage and not run into port?—I think every man of consideration and spirit would keep out to sea, and endeavour to make his passage. There cannot be any doubt about it, I should think.

3459. Do I understand you to say that you give positive instructions to the masters of your vessels to act in that manner?—Yes, we have the instructions printed, and by them our captains are desired never to put into any port in case of accident, but to return to the port from which they sailed.

3460. Would you be good enough to lodge a copy of those instructions with the Secretary to the Commission?—I should like to look through them before I promise.

3461. By all means; and if there is anything you would like to omit perhaps you would oblige us with an extract?—Certainly.

3462. Are you still disposed, on consideration, to consider harbours of refuge unnecessary for the smaller class of vessels, as well as for that class of large and well-appointed ships with which you have been connected?—There may be exceptional cases; but taking it as a great general principle, I believe that at present there are sufficient harbours open for any vessels caught in a gale of wind, and I believe that even for that small class of vessels; but then, again, I must qualify that by saying that, although I have been a good deal at sea, I am not a practical seaman.

3463. Are you aware that the existing harbours, which you have stated in your opinion to be sufficient, are tidal harbours, and can only be entered at high water, or that vessels laden cannot enter them except at a favourable moment?—That, no doubt, is so.

3464. Is it, in your opinion, the duty of shipowners to send their ships from port so found as to be able, if caught in a gale, to keep the sea?—I have no hesitation in saying that it is their duty, and also their interest, to do so.

3465. Have you ever examined the wreck chart of the years 1852–53–54–55?—I have not, but I have seen the wreck chart of some years.

3466. I suppose that you are aware that the average loss of life annually is 800?—I am not aware what is the exact amount, but I believe that it is very large.

3467. You are aware that a very large amount of property is sacrificed annually?—I am.

3468. Should you think the imposition of a passing toll for the construction and repair of harbours of refuge an injustice?—Certainly I should.

3469. You think the imposition of such a toll would be a grievance?—Most certainly I do. It would be taking from men like myself; or, in fact, it would be picking our pockets without any return whatever.

3470. Then, I understand it to be your opinion that harbours of refuge are unnecessary, that ships ought to keep the sea, and that it is the duty of every shipowner to find his ship in such a way as to enable them to do so?—Certainly, that is my opinion.

3471. (*Mr. Lindsay.*) Is it not a fact that a very great number of vessels are lost from being badly found?—Yes, I believe so.

3472. Would the formation of harbours of refuge tend to encourage shipowners to find their vessels better, or would it have a contrary effect?—I believe that it would encourage them to send their ships to sea in a worse condition even than they do at present.

3473. Then, are you of opinion that if the owners of ships knew that there were no harbours they would for their own interest find their ships better than they do at present, and that if there were some of those harbours to run into the tendency would be to induce them to find them worse than they do at present?—Yes, that is my opinion.

3474. Be good enough to look at the wreck chart for a moment, and tell me whether it is not the case that a large number of wrecks appear to have taken place near the entrances to the harbours?—Do those marks indicate wrecks?

3475. (*Mr. Lindsay.*) Yes. Do you not observe a large number of wrecks near the entrance of the harbours?—A very large number of ships appear to have been lost at the entrances of harbours.

3476. (*Chairman.*) Is there any suggestion, or are there any observations, which you would wish to address to the Commissioners?—I would wish to say a few words on a point which, although perhaps, strictly speaking, it is not connected with harbours of refuge, yet nevertheless, has reference to the number of shipwrecks, and is, I think, of great importance. It is as regards the improvement of our seamen. I think that a great many shipwrecks occur from ships being manned by sailors who do not know their duty. I do not know the cause, but this I feel, that seamen have deteriorated, and that you can't depend on them as you formerly could do. This I know is foreign to the case of harbours of refuge, but it is so distinctly connected with shipwrecks that I think it ought to be taken up by the Commissioners. Many wrecks occur in consequence of ships leaving port with crews unfit to manage the vessel, and I think that one of the most crying evils connected with the mercantile marine of this country

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is the fact, that one fourth, if not one third, of English seamen afloat are sailing under fictitious names, and that is a question which ought to be taken up and considered as being very intimately connected with the question of shipwrecks.

(*Sir F. Smith.*) I think this is a most important part of the subject, for, of course, as the object of harbours of refuge is to save life and property, it is desirable to ascertain if we can accomplish that object in any other way.

3477. Do many ships leave English ports insufficiently manned as regards the number of the crew?—No, not inadequately manned with regard to number, but they often leave port with their crews in such a state that they can't take care of the ship.

3478. Do you mean that the crew is not composed of seamen?—Some of the crew or all the crew may be regular seamen; but what I mean is, that they leave port in a state of intoxication, and consequently wrecks occur.

3479. Do I understand you to say that even if the crew is fit under ordinary circumstances to navigate the ship, they leave port in such a state of inebriety as to be disqualified to do so?—There can be doubt of that.

3480. Is the remedy not in the hands of the shipowner?—Not necessarily.

3481. Is not the captain appointed by the shipowner?—Certainly he is.

3482. Well, then, is a captain justified in going to sea with his crew in such a state?—No doubt he takes the responsibility on himself, but often he is unable to know what state part of the crew is in.

3483. Does the responsibility of collecting a good crew rest entirely with the captain?—Every captain is obliged to engage men, under the provisions laid down by Government.

3484. Do you think the Government responsible for this state of things?—I have no hesitation in saying, that our mercantile marine law is very defective.

3485. Could you explain to the Commissioners what modification of it would conduce to improvement?—I have already endeavoured to impress upon the Government the principle, that seamen should be engaged under the same certificate as officers of ships are, and I am perfectly persuaded that if seamen were engaged and taken on board ship under those certificates, we should get better men; and I believe, and I state it most sincerely, that the adoption of that principle would confer a great benefit both upon the seamen themselves and on the country generally.

3486. You say, I think, that a large number of seamen enter under fictitious names. Can you assign any reason for their doing so?—The reason is very simple:—the Government, although they have shown every desire to perfect as far as possible the mercantile marine Act, still they have gone the wrong way to work. As the case at present stands, a seaman engages in this country and goes to another port; he deserts his ship there, and is engaged at a shipping office under another name, and returns to London The consequence of this state of things is, that men can't be trusted, and they go on in that way for years and years, obtaining money, not for the purpose of benefiting themselves, but to be squandered in debauchery. This is really and truly the case; and any large shipowner, or any one who knows anything about the matter, will confirm what I say.

3487. Do you see any remedy for such a state of things?—The remedy that I have proposed is, to apply the same rules and regulations, so far as regards certificates to seamen, which are now applied to their officers on board the same ship; the adoption of such a plan would be very simple, as I have already explained to the Government. Let each man have a certificate of identity, by which he can be traced. If that certificate be lost, then the man would be looked upon as a deserter, if he could not show how he had lost it.

3488. I think that it is easier to talk about the adoption of such a system, than to carry it into operation?—I really see no great difficulty, and I am sure that such a system carried into effect would do more for the preservation of life and property than any number of harbours of refuge that could be constructed.

3489. But do you not see that, under the system you propose, there would be no safeguard against a man of bad character borrowing a ticket from a good man, and so imposing on the shipowner? How would you propose guarding against that?—It is always easy to point out exceptional cases, and we all know that there have been many frauds even in our own class of society; but I think my proposal as a great general system quite practicable. I have never heard of a case of the misuse of a certificate on the part of a captain or any officer of a ship, although, as regards numbers, there is a captain with three officers in every large ship who sail under these certificates; and I cannot see the least difficulty in extending the same principle to seamen, not only as an act of justice to themselves, but as being likely to confer great benefit upon the country, and to tend, to a considerable extent, to the preservation of life and property.

(*Sir F. Smith.*) If it could be carried out, I admit that the project looks well.

3490. (*Mr. Lindsay.*) Was it not the case that some such plan was once adapted in the form of a register ticket?—Yes, but the plan adopted as carried into practice was totally ineffective. I have now in my office a statement which would show that since the year 1852, my firm has lost no less a sum than 20,000*l.* by the desertion of sailors.

3491. Do I understand you to say that, since the year 1852 you have lost the large sum of 20,000*l.* by deserters alone?—That is the case.

3492. To what parts of the world do the ships in which you are chiefly interested trade?—To all parts; to Callao, New York, the West Indies, Mobile, New Orleans, St. Thomas, and in fact to all parts of the globe.

3493. Do you think that the plan which you have shadowed forth would tend to any extent to check desertion?—I have no doubt that it would, to a very great extent.

3494. But are you not aware that there was a plan brought into operation for registering seamen by giving them each a ticket of registration, and that that plan turned out a signal failure?—No doubt that is so, but the reason is easily pointed out. Those tickets were rendered worse than useless, from the facility with which they could be procured; and upon the loss of a ticket the people at the Custom House would grant another upon payment of half a crown, or any other small fee they might think fit.

3495. Then you think that the main cause of the failure of that plan was, that a man, if he should lose his ticket, was able to get another on the payment of a small fee?—Just so, I have no doubt about the matter.

3496. What plan would you adopt? Would you rigidly require, in all cases where seamen came forward to engage themselves, the production on their part of a ticket of registration?—Most certainly, what I should require would be this:—I should have a register of all seamen, requiring them to have a certificate from the minister or magistrates of their parish, stating who and what they are, and where born; and, every man having such a ticket, I should compel any one who lost his, to prove how and where he lost it before he could get another. It is a very simple thing. If a man could show that he had actually and absolutely lost the ticket, and explain how he had done so, I should have no doubt or hesitation in giving him a new one, but if he could not do so, I should hold him to be a deserter. I propounded this plan some years back to Her Majesty's Government, and the objection taken by the Government was, that the regulation would be too stringent, and would have the effect of driving seamen into foreign service. Now to that objection I can only say, let them who want to go, go.

but I am satisfied that with a very few exceptions they would not go. I am perfectly persuaded that English seamen would act differently, and would be as careful of their ticket of registration as their officers now are, and they would soon begin to find the benefit of it. Another objection to my plan was, that it would increase the rate of wages; well, it would do so, but I am prepared to pay an increased rate of wages to get well qualified crews. If we do increase the rate of wages, we know the beginning and the end; and to get proper and efficient crews, I should never object to the rate of wages being increased; and from my long experience and study of the subject, I am quite confident that we shall never have seamen in this country in the state of efficiency they ought to be in until some such plan be carried into operation.

3497. Is it not a fact that there is a very large number of British seamen in the American service?—No doubt that is so.

3498. Do you not think that the stringent regulations which you propose would have a tendency to drive many more men into that service?—I believe not; but I say again, let them go if they are inclined; we should be no worse off than we are at present, for we should have them throughout the world, and could employ them as foreign seamen, and have their services just as we do at present.

3499. Turning from that point to the one which is more immediately the subject of our inquiry, you say, so far as I remember, that one cause of a very great number of shipwrecks is, that ships put to sea in many instances with their crews or a portion of their crews in a deplorable state of drunkenness. Now can you propose any alteration connected with the mode of shipping seamen which would be likely to prevent in any degree such melancholy occurrences as too often take place?—Well, I have not been thinking lately upon that subject, but I do not know anything that would tend to check such a state of things so much as something which would improve the condition of the seamen, and make them a more regular set than they have hitherto been.

3500. The point is one of the greatest importance, and perhaps you would have no objection to turning it over in your mind with a view of seeing if any alteration as regards the machinery of the shipping office could be made which would in any way tend to mitigate these frightful evils; and having so turned the matter over would you kindly put your views into writing and send them to the Secretary to the Commission?—The fact is, that it is a very large subject.

3501. I do not refer to the general subject, but I speak merely of the machinery connected with the shipping offices; and it would be of great service to the Commissioners if you would consider the subject with the view of seeing if any alteration could be made which would tend to mitigate the evils which at present exist?—I have no hesitation in saying that in my opinion shipping offices have not done any good whatever.

3502. Perhaps you would prefer now stating to the Commissioners the point in which you consider that the shipping offices have been a failure?—Yes, perhaps it would be better that I should state that now; it would be more to my convenience.

3503. Do you think that the evils which have been named prevail to a greater extent now than they did before shipping offices were established?—I think not—— the evil is increasing, in my opinion; crews of ships are taken to sea in quite as inefficient a state as formerly, and I believe that more drunkenness prevails now than formerly did.

3504. Is it your opinion that shipping offices have in any way produced that result?—That I cannot say, but I believe that the only benefit produced by the Marine Act was the regulation requiring an examination of masters and officers of ships; that I believe is the only point in which the Mercantile Marine Act has proved of any real benefit.

3505. Do you think that shipping offices have tended in any way to elevate the character of the seamen, and to afford facilities to the shipowner, and have thus been of any benefit?—Most decidedly not, I believe they have been quite the reverse.

3506. Then do you not think that they have elevated the character of the seamen?—Most certainly not, quite the reverse.

3507. Do you not think that they have been of benefit in keeping seamen from the clutches of the crimps?—No, I do not think anything of the kind.

3508. Why, does not the Act prohibit any shipowner from engaging seamen except from the shipping office?—Yes, that is so, but I do not think anything of that.

3509. Do you think that it is the case that the crimps act in spite of the law, and that engagements are made through them?—They do not openly violate the law, but the seamen lodge in their houses, and they keep their things, and get their advance notes, and having them in their power they make their own arrangement with them, and then themselves take them to the shipping offices.

3510. Then is it your opinion that the crimps find as much occupation now as they did before the establishment of the shipping offices?—That is certainly my opinion.

3511. Can you propose anything in addition to what you have already stated, which would in your opinion tend to improve the condition of the seaman, and send him to sea a better man than he at present generally goes?—I have thought a great deal upon this subject, and taken a great deal of trouble about the matter, and as you know, Mr. Lindsay, some years ago I placed before the government a scheme which I had drawn out for registering seamen, which I have explained to the Commissioners; that scheme, however, was objected to on the ground that it was too stringent and would drive men into foreign services, and also that it would tend to increase the rate of wages; and since its rejection I have taken little interest in the matter. I am perfectly satisfied however, that even if my plan should raise the rate of wages it would be much better; it would be all the better for the shipowners, for we should get better men; and if it would drive men into foreign services, which I do not think it would do, we should be none the worse, and it would come to quite the same thing, for they would not be driven out of the world, and we could employ them as foreign seamen. I say again, most emphatically, that the subject is one which ought to meet with the most careful and anxious consideration at the hands of the Legislature, for I believe that a vast number of shipwrecks, which occasion an immense loss of life and property, are caused by ships leaving port with their crews in an inefficient state.

3512. Do you think that a more stringent system of registration would tend to lessen the number of wrecks?—I have no doubt on the subject. Let the sailors be placed on precisely the same footing as regards a certificate as the masters and officers at present are, and I believe that efficient crews would be obtained, and a large number of wrecks prevented.

3513. Under the provisions of the Act the masters and mates of ships are required to undergo an examination, would you be disposed to extend that provision to the seamen?—No, certainly not. All that I want is, that the men should be required to produce a certificate of their birth and their native place, and where they last came from, and then it would be known at once who and what each man was.

3514. Would you not, before granting such a certificate, require some proof of qualification as a seaman?—No, I do not think that would be necessary for the object. I should explain that what the shipowners require is, to have some hold upon the seaman which can enable them to compel him faithfully to perform his duty. It must always be borne in mind, that you cannot legislate for seamen in the same way that you can for persons who are settled in any locality, and the error which the government have committed has been to

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forget that circumstance. You have no hold upon them; they shift like the sand of the sea, here to-day, and away to-morrow. It is very difficult to deal with them, and that more particularly as at least one fourth if not one third of the men are at present sailing under fictitious names, and surely it is for the government to find out a remedy for such a state of things.

3515. Is it your opinion that, when a seaman engages to perform certain duties at a certain rate of wages, the law should punish him more severely than it does at present if he should desert without completing the term for which he had engaged himself?—In point of fact the law at present is quite unable to reach him.

3516. You think, as I understand, that some stringent law should be enacted to compel a seaman to fulfil his contract?—Most certainly, I think so.

3517. Would it not require a very stringent law to prevent a seaman who had engaged at say 2*l.* 10*s.* a month accepting an offer of 10*l.* or 12*l.* a month?—No doubt it would be a great temptation for the man, but then again the country has within its reach the means of making regulations which would prevent such offers as 10*l.* or 12*l.* a month being made.

3518. How can this country possibly regulate the demand and supply. In Quebec 10*l.* a month is given as wages, and that high rate is caused by the demand for seamen, as they are very scarce there; and I cannot see how we can pass any law to regulate the rate of wages throughout the world?—I think that we might pass a law which would have the effect which I have mentioned in this way:—we might enact that ship-builders in the colonies where there are no native sailors should be compelled to import a certain number of seamen to man their ships; that would be no great hardship, and it would tend to equalise the rate of wages.

3519. That is to say, that you think that at Quebec, where they are building a great many ships, the builders should send to Liverpool or to other ports for seamen instead of tempting seamen away from their vessel by the offer of an extra rate of wages, unless they can find an American crew and master to man those ships?—Certainly, I think so. I well remember, in one of the interviews I had with Mr. Labouchere, I told him that such a law had been enacted in New Brunswick, and he replied that he had never heard of it? I was much astonished at that observation, and I was more astonished to find that the government had afterwards refused their sanction to it. I do not think that anything could be more just or reasonable than such an arrangement, and I could never understand why it was disallowed by the government.

3520. Was any reason ever given why the home government did not sanction that enactment?—None that I am aware of; I never heard of any.

Mr. John Allan examined.

Mr. John Allan.

3521. (*Chairman.*) What is your name?—John Allan.

3522. What is your occupation?—I am a merchant and shipowner.

3523. How long have you been connected with the trade of Glasgow?—I should think about twenty years.

3524. For the whole of that period as a shipowner?—Yes.

3525. Had you previously been yourself at sea?—Yes; I had previously been at sea for a period of about eighteen years.

3526. May I ask in what capacity?—I served on board ship in all capacities from apprentice to master.

3527. During how long a period did you act as master?—I cannot exactly say.

3528. I do not want to know the exact time, but about how long?—Well, speaking from recollection, I should say about eight years.

3529. Where did your vessels principally trade to, that is, how were they chiefly employed?—Mostly in the trade with North America.

3530. What is the trade in which you are now chiefly interested?—Well, chiefly in the North American trade; but my ships occasionally go to the East Indies, to South America, and other parts of the world.

3531. Have you any opinion to offer to the Commissioners as to the necessity or otherwise of a harbour of refuge upon the north coast of Ireland, say in the neighbourhood of Portrush?—I do not think that there is any necessity for a harbour of refuge in that neighbourhood. I myself never found any need for one.

3532. State to the Commissioners the reasons you have for entertaining that opinion?—I do not think that there is any need for one, for inward-bound ships could always find shelter, while outward-bound ships could run out in almost any state of the wind.

3533. Have you any opinion to offer to the Commissioners as to the necessity or otherwise of improving the harbours at Carlingford, Waterford, and Wexford, with a view of affording a refuge to shipping from the Clyde in bad weather when bound southward?—I have no particular opinion to offer on the subject, but I do not think that such improvement is necessary as regards shipping from the Clyde.

3534. Have you any opinion to offer to the Commissioners as to the necessity or otherwise of a harbour in the Isle of Man as regards Clyde shipping?—I do not think that a harbour there would be of any advantage to Clyde shipping.

3535. Will you look at the chart, about the neighbourhood of the Land's End, and tell the Commissioners if you see any need for a harbour of refuge in that neighbourhood, say in the vicinity of St. Ives?—I do not think that there is any need for one; I never found the necessity for one.

3536. Will you state to the Commissioners briefly, the reasons upon which you have arrived at that conclusion?—I think generally that it is far better that a ship should keep the sea than attempt to run into a harbour of refuge. I may state that I very much agree with Mr. Gilmour, in his opinion with regard to a vessel keeping at sea or going into port, and I do not think it desirable, if it can possibly be avoided, that any ship should run for a harbour in the event of a storm after she has once left her port.

3537. You have heard Mr. Gilmour's evidence?—Yes, I have.

3538. Has Mr. Gilmour expressed any other opinions in which you are disposed to say that you also concur?—I concur very generally with the opinions he has expressed. I do not agree with him in every minute particular, but generally speaking I agree with his views on the subject.

3539. Would you be good enough to state to the Commissioners any of the points to which Mr. Gilmour has referred, in regard to which you would be disposed to dissent from his views?—I do not at this moment remember any particular opinion from which I dissent. As regards the east coast of Scotland, it might be advisable to establish some place of refuge for the numerous fishing boats there under their lee. I do not know the coast myself. I am not acquainted with it, but I have often seen that in an easterly gale there has been a severe loss among the fishing boats, but I see no necessity for any such harbour for foreign ships. I have never myself lost a ship on the coast, nor have any of my ships ever met with an accident there.

3540. What is the average burden of your ships in tons, and what number of ships are you interested in?—I think that I am interested in about seventeen sailing ships, which average from 600 to 700 tons, as the ships run from 300 to 100 tons.

3541. Are you also interested in any steam ships?—Yes, I am.

3542. Will you state the number of steam vessels and their burden in tonnage, in which you are interested?—I am interested in five steam vessels, and I should think that they average from 1,800 to 2,200 tons.

3543. I am to understand then, that you, as an owner of a large and well-found class of ships, entertain a distinct opinion that national harbours of refuge are not required upon the east or north coast of Ireland, or the west coast of Scotland, but that you feel strongly the necessity of a harbour of refuge on the east coast of Scotland, for the benefit of the fishing vessels plying their traffic on that coast?—I think that a place of refuge on that coast would be beneficial. I see that in easterly gales there is considerable loss on that coast, and if a harbour could be made in a secure and accessible spot, I think that it would be very desirable. I guard myself, however, by saying, that I am only speaking in a general way, for I am not acquainted with the locality.

3544. Then you think that, as it appears clear that great loss of life does occur, if such a harbour could be constructed it would be very desirable to construct it?—Yes, that is my opinion.

3545. (*Sir F. Smith.*) If I understand you rightly, you are opposed as a general principle to harbours of refuge?—Most decidedly so.

3546. You think that, if vessels are properly found and properly manned on leaving port, a captain should endeavour to proceed with his voyage without reference to any harbour of refuge?—Certainly I think so.

3547. You think that in a well found ship, the captain should make every effort to reach his destination, and should not require a harbour of refuge in any way?—Yes, that is my opinion.

3548. As a shipowner, should you object to paying a passing toll for the construction and maintenance of a harbour of refuge?—Yes, certainly I should, as I consider them quite unnecessary.

3549. Are you acquainted with the east coast of England?—I cannot say that I ever sailed along it.

3550. Do the observations which you have made to us apply to small coasting vessels as well as to larger ships?—Yes, I think they apply equally.

3551. Have you examined the wreck chart?—No, I have never seen it.

(*Sir F. Smith to the Secretary.*) Will you be good enough to place the wreck chart in the hand of Mr. Allan?

3552. Do you see by that chart that a great number of wrecks are marked as having taken place on the east coast of England?—I do.

3553. Are you of opinion that a great proportion of these catastrophes have resulted from vessels going to sea with crews not in a fit state to navigate them?—I do not think that there can be any doubt upon the subject.

3554. Are you, of your own knowledge, aware that in many instances crews go to sea in such a state of intoxication as to be unable properly to navigate their vessel?—Yes, I have known repeated instances of it.

3555. Have not shipowners a remedy in their own hands?—The only one I know is, to wait till the crew have had sufficient time to get sober.

3556. May I ask you if in your experience crews are in the habit of going on board their ships on leaving port in a state of drunkenness?—Yes, it is very common indeed.

3557. Can you not suggest any remedy for such a deplorable state of things?—The only way I can see to avoid casualties from that cause is, to wait till the men are sober before putting to sea. To put an end to the drunkenness, the only way I can see is to elevate the character of the seaman.

3558. Would not a captain who perceived that his crew were in such a condition, as a matter of course, delay his departure?—Captains are frequently compelled to do so.

3559. (*Mr. Lindsay.*) You are opposed to the construction of harbours of refuge in general?—I am.

3560. Would you, as a shipowner, object to pay a tax in the shape of a passing toll, to defray the expense of the construction and maintenance of such harbours?—Certainly I should, for I consider them useless.

3561. You would consider it an injustice to be called upon to pay extra taxation for the construction of such harbours?—Yes, I should most decidedly; but at the same time I think it might be desirable to establish a place of refuge on the east coast of Scotland.

3562. I understand you to mean, that, although, generally speaking, you would object to paying a tax in the form of a passing toll for the construction of harbours of refuge, yet that, as a large shipowner, you would not object to pay your quota for the establishment of a place of refuge on the east coast of Scotland; am I right?—Yes, I should not object to an increase of taxation for the construction of a harbour on the east coast of Scotland, if I was satisfied that the work was judiciously and properly done.

3563. In saying that you are opposed to all harbours of refuge, do you mean your observations to apply merely to Portrush and the other places to which the Chairman has alluded, or do you mean them to be quite general?—I mean them to be quite general. I think that we have harbours enough as it is.

3564. In fact, you mean generally that there is no necessity for the construction of harbours of refuge?—Yes, that is my meaning.

3565. From your experience, do you think that if harbours of refuge were constructed, ships would often be saved by running into them?—I am afraid that it would be just the reverse.

3566. Did you hear Mr. Gilmour's evidence as to the drunkenness which prevails on board ships leaving port?—I did.

3567. Is it your opinion, that of late years that drunkenness has been on the increase?—Well, I cannot speak exactly as to that; it may be that, because the ships now-a-days are larger and require more men in them we perceive the drunkenness more.

3568. Do you think that the general character of seamen has improved or otherwise since you yourself commanded a ship?—I do not think that their general character has improved; in fact, I should say rather the reverse.

3569. Do you think that they are more given to drink and disobedience than they formerly were?—I think that more desertion takes place now, and that demoralizes the men very much; and it is also a fact to be regretted, that most of the seamen now-a-days have two or three names.

3570. Is it your opinion that a system of registration such as has been shadowed out by Mr. Gilmour would tend to prevent desertion?—Yes, I think it would have that effect.

3571. Do you not think that that system would have the effect of driving a great many sailors into the American service?—Well, perhaps it might have that effect upon some, but on the whole I should think it would do good.

3572. Do you think that it would tend in any degree to elevate the character of the seamen?—Yes, I feel pretty sure that it would.

3573. Do you think that the shipping offices have been productive of any benefit?—I think that they have not, that is, as regards the common seamen.

3574. I am anxious to have your opinion upon this point. The shipping offices, I believe, require an examination in the case of masters and mates?—Yes, they do so.

3575. But as regards the men, you do not think that they have been productive of any benefit either to themselves or to the shipowners?—I think that that they have not.

3576. Could you mention to the Commissioners any point in which the working of the shipping offices might in your opinion be improved?—I am not

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prepared to mention any improvement which occurs to me at this moment.

3577. Do you experience much trouble in getting men on board after you have engaged them at the shipping offices?—You have no conception of the trouble we have in getting men on board.

3578. Do you think that arises from the action of the shipping offices? Do they consider that they have performed all their part of the agreement when they have engaged the men?—After the offices have engaged the men the sailors at once get dead drunk, and it is impossible to know where to find them; and even if you do find them, they sometimes get two or three together, and refuse to go on board. The owner of the offices can, legally speaking, be asked to put them on board, but, practically speaking, his services are quite useless.

3579. If the shipping masters of the ship were vested with magisterial powers, that is to say, with the power of punishing those men who refuse to go on board ship after they have engaged themselves, do you think that would tend to mitigate the evil?—Yes, I have no doubt that it would considerably.

3580. The process now, I believe, is, when a man declines to go on board ship after engaging himself, to get a summons from a magistrate, and that takes up a great deal of time, and the owners are naturally anxious to get their ships to sea, and they cannot detain the master to appear against deserters, so that, in point of fact, they escape unpunished, and therefore men break with impunity the engagements into which they have entered. That is so, if I am not much mistaken?—Yes, that is how the case stands.

3581. Then do you not think that vesting the shipping masters of the ship with magisterial power would tend greatly to mitigate the evil?—Yes, I think that it would very much.

3582. Do you not think, also, that it would tend to check the evil if it were made part of the duty of the master of the shipping office to see that the men went on board after they were engaged?—Certainly, I think that it would.

3583. You think, then, that it ought to be made the duty of the shipping offices not merely to engage the men, but also to see them on board ship after they were engaged?—Yes, that is my opinion.

3584. Do you think, also, that the owners of ships should not be called upon to pay the fees until the engaged men are fairly on board ship?—That, I think, would be of great advantage.

3585. As the matter stands at present, I believe that the shipowner is compelled to pay the fees when the men are engaged, whether they go on board or not?—Yes, that is the case.

3586. It is a matter of truth, indeed there is no possibility of denying the fact, that a very large amount of wrecks, most lamentable wrecks, take place every year shortly after vessels leave port, when the crews are in such a state of stupidity from drunkenness that they are unable to manage the ship. Now I ask you, as a man of large experience, do you think that some such alteration in the machinery of the shipping offices as I have just shadowed forth would tend to lessen the number of those wrecks by sending men on board more regularly, and in a better state of sobriety, than they are sent on board in at present?—I think that it would.

The Chairman having inquired whether any of the Commissioners wished to put any other question to the witness, and being answered in the negative, said that the Commissioners would not detain him any longer.

Mr. Hugh Tennant examined.

Mr. Hugh Tennant.

3587. (*Chairman.*) What is your name?—Hugh Tennant.

3588. What is your occupation?—I am a brewer.

3589. Have you been accustomed to yachting, and if so for how long a period?—I have been accustomed to yachting for 25 years.

3590. Have you ever turned your attention to the subject of the necessity of constructing harbours of refuge?—I have.

3591. Have you formed any opinion which you should wish to offer to the Commissioners on the subject?—I have sailed a great deal round the coasts of Scotland and Ireland, and up among the Orkney Islands, and in my opinion, from my experience of the coast, it would be most desirable to establish harbours of refuge at different parts of the coast. I think that either Wick, Peterhead, or Fraserburgh, would be very desirable places for the construction of such a harbour, and such a place of refuge would be most desirable for vessels engaged in the fishing and coasting trade.

3592. Will you state your views as to the most desirable place for constructing a harbour of refuge on the north-east coast of Scotland, bearing in mind that Wick, Peterhead, and Fraserburgh are the three sites to which our attention has been more particularly called by the Committee of the House of Commons?—I am disposed to think that owing to the amount of fishing which is carried on in summer in the neighbourhood of Wick, that that would perhaps be the more desirable site of the three. No doubt a great number of vessels pass along by Peterhead; and I saw a statement from which it appeared that 15,000 or 20,000 vessels passed Peterhead every year, besides ships in ballast, and perhaps Peterhead, as regards larger vessels, would be the most desirable locality; but, taking into consideration the vast extent of the fisheries at Wick, I am inclined to think that a harbour of refuge at that point would be more generally useful.

3593. Looking at the danger which they respectively encounter in the vocation they follow, which class of men do you consider have the greatest claim upon the country for the erection of a harbour of refuge to save them from exposure to shipwreck, the men engaged in the fisheries and in the coasting vessels, or those engaged in the passing trade?—I think that those men engaged in the coasting trade and in the fisheries are the more particularly and immediately concerned, especially those engaged in the coasting trade, for the coasting vessels run at all seasons, while the fisheries are confined to a short time during the summer months, and therefore I do not consider the fishing vessels so important to consider as the coasting vessels.

3594. Another site has been mentioned for the erection of a harbour of refuge, in the Isle of Man. Will you state your opinion upon that subject?—I can only say that I have frequently been to the Isle of Man, and have been very anxious to get in, but I could find no place which I considered secure. At Ramsay the water is very shallow and you cannot get far up the bay, that is to say far enough for shelter. Douglas is very much exposed in certain winds, and then it is impossible to lie there.

3595. For what class of vessels do you think a harbour in the Isle of Man would be desirable?—For larger vessels.

3596. Do you think that a harbour on the coast of Ireland would be desirable?—Yes; I think Portrush would be a very good site.

3597. I understand that with reference to small craft you think that a harbour of refuge at Wick would be desirable, and that with reference to larger vessels, it would prove advantageous to construct harbours of refuge on the south-east coast of Ireland and in the Isle of Man?—Yes, I think that those would be very desirable points for the construction of harbours for large ships.

3598. What is the best point, according to your judgment, for the construction of a harbour of refuge in the Isle of Man?—I think perhaps Ramsay would be the best place, if the bay could be deepened, for

there is very good shelter if vessels could get in, and the place is easy of access.

3599. What site would you be disposed to recommend for a similar purpose on the north-east coast of Ireland?—Well I cannot say that I have paid so much attention to that question; but I have often heard that there is a very great want of a harbour of refuge there.

3600. (*Mr. Lindsay.*) In giving an opinion upon the most desirable place for a harbour of refuge on the east coast of Scotland, do you think that a harbour at Wick would be preferable to one at Peterhead, for the saving of life and property, with regard to all descriptions of ships?—No, but I beg to express with great diffidence my opinion, that, considering the large number of vessels employed in the fisheries in the neighbourhood of Wick, and the value of those fisheries, I think it would be very desirable if a harbour of refuge could be established at Wick sufficient to serve for both large and small ships.

3601. Do you mean for foreign-going vessels?—Yes, I think it would be desirable to erect a harbour of refuge for the wants of all descriptions of vessels.

3602. I think you say that the number of fishing vessels in the neighbourhood of Wick renders it more desirable than Peterhead as a locality for the establishment of a harbour of refuge?—Yes, I think so, because the boats engaged in the fisheries are very liable to be suddenly taken by a gale of wind when on the fishing ground, and they would then be able to run into Wick. At the same time for larger vessels Peterhead would be I think the better locality, but as we can hardly expect to have two harbours of refuge constructed, I should prefer seeing one constructed at Wick.

3603. Supposing it were decided to construct one harbour for all descriptions of vessels, whether do you think that a harbour of refuge at Wick or Peterhead would tend most to the preservation of life and property?—I almost think that one at Wick would do so.

3604. (*Capt. Vetch.*) I think you said that the fishing at Wick is confined to a few weeks in the summer?—Yes, that is the case.

3605. Is that during the time of the herring fishery?—Yes.

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3606. If they are liable to stress of weather during a fine summer, they are not likely to proceed to sea for white fish in winter, should you think they were?—I should think not.

3607. On the coast further south the fishermen, I believe, fish for herrings also during the summer, and in the winter for cod, is it not so?—I believe it is.

3608. If the fishermen at Wick knew that they had a place of refuge to run into, do you not think that they might be induced to do the same thing?—I should think it very probable.

3609. (*Chairman.*) Is there any observation which you would like to make to the Commissioners?—Yes, I may mention that if harbours of refuge were generally established and diffused about, it would enable us to get marine insurances effected at a much lower rate than at present, and in that case shipowners should I think be ready to pay some small tax for the benefit of those harbours of refuge.

3610. Are you acquainted with the names of any masters of vessels at present in Glasgow who could attend and afford any information on the subject of this inquiry?–I think Captain Crawford of the Sasine Office, who has had great experience, could afford you some information; and I will venture to say, that I think that if you get some first-rate masters of ships before you, you will probably hear a very different account of the advantage of a harbour of refuge from that which you here heard from Messrs. Gilmour and Allan.

3611. Will you state the names of any such masters who are available for this inquiry?—I do not know any immediately, but I will endeavour to get you a list of two or three names if you intend to continue the examination to-morrow. I have no doubt I should be able to find several in the harbour of Glasgow able to give very valuable evidence to the Commissioners.

3612. When could you be prepared to hand in a list of those names?—I will go after one now.

3613. Will you lodge it with the Secretary?—Yes, I will endeavour to provide him with one.

MR. JOHN CAMERON examined.

3614. (*Chairman.*) What is your name?—John Cameron.

Mr. John Cameron.

3615. What is your occupation?—I am a steam-packet agent.

3616. Have you heard the evidence of the former witnesses?—I did not hear the whole of Mr. Gilmour's evidence, but I heard the latter part of it.

3617. Did you hear the other witnesses?—Yes, I did.

3618. Have you any opinion to offer to the Commissioners as to the necessity or otherwise of constructing harbours of refuge on the north-east coast of Scotland?—No, I am only connected with the north-east coast of Ireland.

3619. Well, then, will you state your opinion as to the necessity or otherwise of harbours of refuge on the north coast of Ireland?—I think a harbour of refuge at Portrush, such as I have seen proposed, by joining the Skerries, would be a most invaluable harbour.

3620. Will you state to the Commissioners the reasons you have for entertaining that opinion?—In the first place it is an iron-bound coast, and as storms there are by no means uncommon, captains would be glad to have a place of refuge to run to in that locality.

3621. Are you acquainted with Islay?—No, I have not been there.

3622. Supposing that there were good anchorage in the bay of Loughindall, would that be as good a locality for a harbour of refuge as Portrush?—No, I do not thing that it would be as good.

3623. Will you state why you think that it would not be as good?—Why, for ships passing along the north coast of Ireland, a harbour at Portrush or the Skerries would be more easy to get to.

3624. Have you any opinion as to the necessity or otherwise of a harbour of refuge in the Isle of Man?—No, although I have often passed the island, I dont know that I can offer any information on the point.

3625. Do you know any cases of shipwreck or loss of life which might have been prevented if there had been a harbour of refuge at Portrush?—There have been many cases of shipwreck at Rathlin, not very far from Portrush, and the steamers have gone to the assistance of ships in distress in that neighbourhood, and I have no doubt that a harbour of refuge would be of great advantage.

3626. (*Capt. Washington.*) Did I understand you to say that the steamers frequently went to the assistance of ships in distress in that locality?—Yes, that is the case.

3627. Do you know Church Bay?—Yes, I am acquainted with it.

3628. Do you consider that a favourable site for a harbour of refuge?—No, not so favourable as Portrush, because it is not so much sheltered.

3629. Have you seen the plan proposed for the construction of a harbour of refuge at the Skerries?—Yes, I have seen it.

3630. Where do the vessels with which you are connected trade to?—To Sligo, Derry, Belfast, Liverpool, and other ports.

3631. Do you think that a refuge harbour made at the Skerries would be taken advantage of by other vessels as well as by the steamers and regular vessels trading on that coast?—Yes, I think so.

3632. Is there a large traffic carried on?—Yes, a very large traffic.

3633. Could you give any statistics as to the

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number of vessels which pass that way?—I doubt if I could; I do not know if they are all registered.

3634. Can you ascertain the number of steamers that pass?—Yes, I can ascertain that, and make up a statement.

3635. It is a most important element in the inquiry before we decide upon the locality for a harbour of refuge to know how many vessels pass along the coast, and will you supply the information?—I will endeavour to supply the number of steamers.

3636. Do you think that Loughindall would be a good locality?—Not so good as the Skerries, where there is almost a natural harbour already; and I have heard that steamers have often taken refuge there, and a harbour there would be most beneficial.

3637. What do you think of Church Bay as a site?—I do not think it as favourable a place as the Skerries.

3638. (*Capt. Vetch.*) Can you tell us how many vessels trade between Lough Foyle and the Irish Sea?—Yes, there are ten going and ten coming every day.

3639. In passing from Lough Foyle to Fair Head do the vessels run through the Skerries?—No, they generally pass outside.

3640. In the event of a gale springing up from the east, do they ever take refuge in Church Bay?—They do sometimes, but that is very seldom.

3641. Is there good holding ground there?—I could not speak with any certainty on the subject, but I believe not.

3642. Do any sailing vessels take the same course as these steamers?—Oh yes, a great many, but their course will depend upon the wind.

3643. But large ships from the Atlantic, I believe, pass outside Rathlin Island, is that so?—Yes, I believe that that is the case.

3644. Then a harbour of refuge at the Skerries would not be of any advantage to those vessels?—I do not know that; I think that they would be very likely to take advantage of it, and in the event of their being caught in a gale of wind I have no doubt that they would be glad to have a harbour of refuge there to run into.

3645. A gale of wind from what quarter?—From the north-east.

3646. (*Mr. Coode.*) You have stated, I believe, that, in your opinion, a harbour of refuge at the Skerries would be preferable to one at Loughindall; is that opinion formed upon the ground of there being greater facility for the formation of a harbour at the Skerries, or is it upon the general ground that the position would be more advantageous for the protection of shipping?—For both reasons; I consider that at the Skerries a harbour of refuge is half formed already, and at present vessels often take refuge there.

3647. But, irrespective of all facility for construction, do you consider the position of the Skerries at Portrush preferable to that of Loughindall or Church Bay?—Yes, I consider it the better locality.

3648. Will you state to the Commissioners the reasons upon which you have formed that opinion?—I cannot state them in detail, but I have often passed there, and I have heard masters of vessels say that they prefer the Skerries. It is a more sheltered situation, and more protected from the north wind, and larger.

3649. But assuming that a good harbour of refuge, as regards shelter and capacity, could be made at Loughindall, which locality would you prefer?—I have seen the plan of a proposed harbour at Portrush, but not having seen any plan for the construction of a harbour at Loughindall or Church Bay, I can express no opinion.

3650. Assume that a harbour can be made equally capacious and equally sheltered at Loughindall, which site would you prefer?—I should prefer the Skerries, so far as my own trade is concerned.

3651. Do you think that the greater number of masters of ships are of opinion that Portrush is the better position?—I believe that the masters of ships are unanimous upon that point, but there are many masters of ships who could give you information on the subject.

3652. Will you be prepared to furnish the Commissioners with a list of masters of ships at present in Glasgow, who would come before us and state their views upon the subject?—I think Captain Turnbull will be here by to-morrow. Captain McGowan, of the *Garland*. Captain Thompson, master of a sailing vessel, will, I think, be in town to-morrow. Captain McLachlan, of the *Rose* steamer; these are all I can remember at present. O yes, there is Captain Johnstone, harbour master, of Glasgow, who could also give you very valuable evidence.

3653. If the Commissioners resume their sitting to-morrow at 11 o'clock, do you think that the masters you have named could be present?—I think all but one, who will not be in Glasgow until Wednesday.

3654. What is the name of that one?—Captain McGowan.

3655. Are you prepared to say that you will secure the attendance of the remainder?—Yes, I think I can say so.

3656. Is there any other observation you would wish to offer to the Commissioners?—No, I think not; there is a steamer sailing to-morrow which will pass the Skerries, and I shall be happy to give the Commissioners a free passage, and then they can judge for themselves.

(*Chairman.*) Thank you, you are very kind; but we have a steamer of our own; we are, however, equally obliged to you.

Bailie CLANSTEN examined.

Bailie Clansten.

3657. (*Chairman.*) What is your name?—William Clansten.

3658. What is your occupation?—I am an insurance broker and underwriter.

3659. Can you name any persons who could appear before us at 11 o'clock to-morrow, who could give us evidence bearing upon the subject of the present inquiry?—I think the persons mentioned by the last witness could give valuable evidence; and there is also Captain Small, who has had considerable experience, and Captain Rain, resident at Greenock.

Captain CRAWFORD examined.

Captain Crawford.

3660. (*Chairman.*) What is your name?—T. Crawford.

3661. Have you been in the room during the inquiry?—No; I have only been here about 10 or 15 minutes.

3662. Have you followed the sea?—I have for nearly 40 years.

3663. In what capacity?—I have served in every capacity; from apprentice up through the different grades to that of master.

3664. For how many years have you served as master?—For about 30 years.

3665. In what class of vessel have you chiefly been employed?—For 20 years I have commanded steamers in the Liverpool and Glasgow trade, and I have commanded steamers in other trades.

3666. Are you acquainted with the north-east coast of Scotland?—I am very well acquainted with it.

3667. Have you any opinion to offer to the Commissioners as to the necessity or otherwise of a harbour of refuge on that coast?—To what part of the coast do you refer?

3668. Have you any opinion as to the necessity of erecting a harbour of refuge at any place between the Firth of Forth and the Pentland Firth?—Yes, I entertain an opinion on the subject.

3669. Will you state that opinion?—I consider that Wick would be the most favourable place for the construction of a harbour of refuge.

3670. Will you state the reasons which have led you to such a conclusion?—Because I think that it is more exposed; and I also think that a harbour would be more easily constructed there than at any other point.

3671. Do I understand you to say that you prefer that locality because it is more exposed, and that a harbour there would be easily constructed?—Yes, that is my opinion.

3672. Have you any opinion to offer to the Commissioners as to the necessity or otherwise of a harbour of refuge on the north-east coast of Ireland?—Yes, I entertain an opinion upon that subject.

3673. Will you state it?—My opinion is, that no harbour of refuge is necessary there; at least, I know no place on that coast which to my mind stands in need of such a harbour.

3674. Have you any opinion as to the necessity or otherwise of a harbour of refuge in the Isle of Man?—Yes, I have formed an opinion on that point, too.

3675. Will you state it to the Commissioners?—I think that Douglas is the most desirable locality for a harbour of refuge in the Isle of Man.

3676. Will you state the reasons which lead you to entertain that opinion?—I think that, from its proximity to Liverpool, a harbour of refuge constructed there would be of great benefit to trading ships generally.

3677. Have you any opinion to offer as to the advantage or otherwise which would be derived by the Liverpool and Clyde shipping by an improvement of the harbours of Carlingford, Waterford, and Wexford, with the view of affording them refuge in the event of meeting with bad weather?—No doubt an improvement of either of those places would be of great advantage.

3678. Do you consider that such improvement would be of so much service as to warrant the expenditure of the national funds for such a purpose?—Yes, I think that it would.

3679. Have you any opinion as to the necessity or otherwise of a harbour of refuge in the neighbourhood of the Land's End?—No, I have formed no opinion on the subject.

3680. (*Sir F. Smith.*) I think I understand you to say, that you do not think a harbour on the north coast of Ireland necessary?—No, I do not think that it is.

3681. Do you not think that vessels going to America along the north coast of Ireland may stand in need of a place of protection?—If they should be in a storm they always have Lough Swilly to run into.

3682. But is it not difficult to run in there?—No, it is the easiest place to run into on the north coast of Ireland.

3683. Do many sailing vessels pass that way?—Yes, a great many.

3684. If the Commissioners have heard evidence to the effect that Lough Swilly is a difficult place to get in and out of, do you dissent from that evidence?—Yes, certainly I do.

3685. Then you think that there are sufficient places of refuge on the north coast of Ireland already?—Speaking as a practical man, and having been in most ports of that coast, that is my opinion.

3686. Were you ever at Portrush?—No, I never was there.

3687. Are you aware that it has been proposed to construct a harbour of refuge there?—Yes, I have seen the proposed plan.

3688. I believe the bay there is very nearly landlocked?—Yes, I believe that it is.

3689. Do you still think that it would be undesirable to expend 400,000*l.* or 500,000*l.* there in constructing a harbour of refuge?—I can see no use for it except in the case of a few small coasters.

3690. Why do you think that an improvement of the harbours of Carlingford, Waterford, and Wexford would be so desirable?—On account of the number of vessels that pass close by those ports.

3691. You are not of opinion, then, that it is desirable that vessels should leave port under instructions to keep the sea and not to run into harbours of refuge?—No, I am not of that opinion.

3692. But ought not captains to endeavour by all means to prosecute their voyage?—Why they can't do so against contrary winds, and they must take shelter as a general rule.

3693. Do you think that a tax in the shape of a passing toll should be levied upon vessels to aid in construction and maintenance of harbours of refuge?—Yes, that is my opinion.

3694. Do you think that a portion of the necessary fund should be paid by the shipowners, and the remainder should be defrayed from the general taxation of the country?—Yes, I think that would be a fair arrangement.

3695. May I ask you if you are acquainted at all with the navigation of the Bristol Channel?—I have been up it as far as Cardiff.

3696. Have you any information you could give the Commissioners with regard to the ports in that channel?—No; I am not well enough acquainted with the locality.

3697. (*Mr. Lindsay.*) Have you ever heard any complaints on the part of shipowners as regards being called upon to pay passing tolls for the construction and maintenance of these harbours?—No; the complaint has never reached me.

3698. Do you think that shipowners as a body would consider it a hardship to pay a passing toll for the construction and maintenance of harbours of refuge?—No; some may think so, but I do not.

3699. Do you consider that it would be more just to tax the shipowners for the construction and maintenance of harbours of refuge than it would be to throw the whole burden upon the consolidated fund?—Yes, I think so; that is, I think that it would be only just to make the shipowners pay their fair proportion.

3700. Would you think it unjust to throw the whole burden on the shipowners?—Yes, I should not think that fair.

3701. Would you consider it unjust to tax them to the extent of one moiety?—No, that I think would be fair enough.

3702. Then it is your opinion that if harbours of refuge are constructed one moiety of the expense should be borne by shipowners, and the other moiety should be thrown on the consolidated fund?—Yes; I think that would be a satisfactory arrangement.

3703. Are you acquainted with the north-east coast of England?—Yes, very well.

3704. Do you think that the construction of harbour of refuge on that coast would tend to the preservation of life and property?—Yes, I think it would do so to a great extent.

3705. Whereabouts on that coast do you think that it would be most desirable to construct a harbour of refuge?—I am not a scientific man, but I should fix on Hartlepool.

3706. Whether do you think that a harbour of refuge at Filey Bay or Scarborough would tend most to the preservation of life and property?—I should think a harbour at Filey Bay.

3707. Do you think that a harbour of refuge there would tend more to save life and property than one at Hartlepool?—(No answer.)

3708. How many voyages have you made between Liverpool and Glasgow?—I could scarcely remember the number, but I have been on that station for twenty-two years, and have been going generally three times a week.

3709. Then you have made between 2,000 and 3,000 voyages?—Yes, about that number.

3710. From your great experience on that coast do you think that a harbour of refuge in the Isle of Man would be the means of saving life and property in

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the case of vessels belonging to Liverpool and vessels belonging to the Clyde proceeding to sea?—I think that it would be a very desirable place for a harbour of refuge for vessels from Liverpool waiting for a fair wind, and for vessels from the Clyde going to sea or proceeding down channel.

3711. Do you think that it would be a safe place for vessels bound for Liverpool to run to in stormy weather, when it would be dangerous to run for the channel?—Yes, that is my opinion.

3712. You think that it would form a safe refuge for many vessels?—Yes, I think that it would be made use of by a great many vessels in a north-west wind.

3713. Do you think such a harbour there would be most used by outward-bound ships, and that it would tend to preserve life and property?—Yes, I think so, for vessels would run in there instead of incurring the risk of keeping out at sea.

3714. It has been stated in evidence before us, that a great number of shipwrecks arise from the crew going on board in a state of drunkenness, which renders them incapable of managing the vessel. Now, from your experience as a shipping master, can you state if you have observed that crews frequently go on board in a state of drunkenness?—There can be no doubt that such is the case.

3715. Could you suggest any remedy to the Commissioners, or could you recommend any alteration in the machinery of the shipping offices, which you think would tend to prevent the fearful state of things which at present unfortunately prevails?—So far as the Clyde is concerned, the danger from that cause is not by any means so great as it is at Liverpool, because sailing from Liverpool it is a very short distance down the Mersey and the vessel is at sea in a short time, whereas, going from Glasgow, the crew have time to get sober in the passage down the Clyde, in addition to which, ships frequently shelter for a time at the tail of the bank.

3716. You mean that that delay gives the men time to get sober, and to be brought into some sort of discipline?—Yes, just so.

3717. But it is the fact that a very large number of vessels are dispatched from port with the crews in a state of drunkenness?—Yes, unquestionably so.

3718. Could you suggest any remedy for such a frightful state of things?—Yes, I could suggest a remedy, but the great difficulty would be to apply it.

3719. Will you inform the Commissioners what that remedy is?—The only remedy I know would be to reduce the number of public houses.

3720. (*Capt. Washington.*) Did you hear the evidence of Mr. Gilmour?—No, I did not.

3721. Have you sailed ever from the coal ports on the east coast of England?—I have.

3722. What point on that coast do you consider the best for the construction of a harbour of refuge?—Well, I should say Filey Bay.

3723. Have you been at Hartlepool?—Yes, I was once wrecked in the neighbourhood.

3724. Do you think a harbour of refuge in Filey Bay would have saved you?—Yes, in my opinion it would have done so.

3725. Will you state the circumstances under which you were wrecked near Hartlepool?—We had been driving about for nearly a week in the North Sea, with the wind in various quarters, when a strong gale sprung up from the eastward, and so we were embayed there, and could not get out.

3726. But if you were embayed, how could you have got to Filey Bay?—If there had been a harbour there at first we should have run there, but there being none we preferred, on account of the sand, to run the ship ashore at Hartlepool.

3727. Was your ship a good sailer, and well found?—She was well found, but was not a particularly good sailer.

3728. Taking the usual class of colliers, would they under similar circumstances have been able to reach Filey Bay?—I think that they would.

3729. Is it not a fact that a great many go ashore in Tees Bay?—I believe they do.

3730. Do you consider that these vessels would in many instances be able to run into Filey Bay if there was a harbour there?—I think so, but it would depend upon the state of the wind.

3731. May I ask you what you consider the best locality for a harbour of refuge, the bight of a bay, or the prominent or salient point?—I should consider the bight of a bay the best locality.

3732. (*Capt. Vetch.*) To advert to the track between America and the Clyde and Liverpool, let me ask you if any of the vessels in that trade, when homeward-bound, would pass near Portrush?—Only in very extreme cases, if they were afraid of being caught on a lee shore.

3733. How far north of Portrush is the general track of those vessels?—That would depend upon the wind, but generally speaking all large ships go north of Portrush.

3734. Do you find large ships ever taking a course near Portrush?—Never with an easterly wind.

3735. Then practically, if a harbour of refuge were constructed there, its advantages would be restricted to steam boats?—Just so.

3736. To revert for a moment to Douglas. Are you aware that vessels from Liverpool are frequently unable to enter the bay in its present condition?—Yes, I am aware that such is the case.

3737. And the consequence is, that delay is caused?—Well, there is sometimes a little delay.

3738. Do you consider it important, in dealing with that place, to make a harbour of refuge of a capacity to admit all descriptions of vessels?—Yes, I think it would be very advantageous.

3739. (*Mr. Coode.*) Are you aware whether or not vessels are frequently detained at Flamborough Head, loaded vessels bound for the south?—Yes, I have seen it happen.

3740. Has it ever happened to yourself?—Yes, it has.

3741. It is, I believe, a matter of common occurrence?—Yes, there is no doubt that it is so.

3742. I believe there is great danger to the ships detained there from the risk of collision?—There is certainly.

3743. Speaking of the abstract question, you have stated that in your opinion the bight of a bay is preferable, for the construction of a harbour of refuge, to the prominent or salient point, but may there not be exceptions to that rule?—Certainly there may, everything depends upon the peculiarities of the place.

3744. (*Chairman.*) Suppose that it were finally determined to construct a large national harbour of refuge upon the east coast of England, what spot in your judgment would be the most suitable, Filey Bay or Hartlepool?—I should decidedly be inclined to say Filey Bay.

3745. If I am not mistaken, you have expressed an opinion that a harbour of refuge at Wick would be a very desirable thing?—Yes, I think that it would be very advantageous.

3746. State whether you consider it advisable to construct a harbour of refuge at Wick with a view to the benefit to be derived by foreign ships, or more especially with a view of benefit to the large number of vessels engaged in the fisheries there, and to suit exigencies of the coasting trade?—I think that it would be chiefly advantageous to the fishing boats and vessels engaged in the coasting trade.

3747. Supposing that the government should determine to spend a certain sum of money in constructing a harbour on the east coast of Scotland, with a view to the preservation of life and property, how would you be disposed to expend it? Would you chiefly take into consideration the claims of the men engaged in the fisheries and the coasting vessels, or would you principally have regard to the exigencies of the foreign trade?—I should say, that the persons engaged in the fisheries and in the coasting vessels have a more urgent claim for provision to be made for them.

3748. You will see, by looking at the wreck chart, that in proportion to other parts of the coast, wrecks on the north coast of Ireland, or at the entrance of the Clyde, have not been so numerous; now how do you view that circumstance as bearing upon the question as to there being a want of a harbour of refuge in that locality or not?—Do you mean as regards the entrance to the Clyde.

3749. Both as regards the entrance to the Clyde and the north coast of Ireland?—I am not aware of many wrecks occurring on the north coast of Ireland, or at the entrance of the Clyde, for want of a harbour of refuge.

3750. Do you see by the chart that a large number of wrecks and casualties occur annually near Liverpool?—I do.

3751. Can you suggest any remedy with a view of remedying the evil?—No, I do not know that I can.

3752. (*Sir F. Smith.*) I think you stated that you considered that the bight of a bay was better adapted for the construction of a harbour of refuge than the prominent or salient point?—Yes, if the bay is large and extensive.

3753. But what is your general opinion?—I have not studied the matter scientifically, but certainly, as a general rule, I think so.

3754. Well then, that being the case, how is it that you recommend Filey Bay for a harbour of refuge in preference to Hartlepool, seeing that Hartlepool lies much deeper back than Filey on the eastern promontory of Flamborough Head?—Because I think a harbour there would be more easily constructed, and it is better situated, and of greater capaciousness.

3755. Are there not frequently a great number of vessels detained at Flamborough Head?—Yes, I believe that there are.

3756. (*Mr. Lindsay.*) You have been asked about the north-east coast of England, now I should like to put a question to you with regard to the east coast of Scotland; are you familiar with that part of the coast?—With part of it I am well acquainted.

3757. Now suppose that the Government decide upon establishing a harbour of refuge on the east coast of Scotland, the object being in the first place the preservation of life, in the second place the protection of property, and in the third place to afford facilities for commerce, and taking into consideration the property which is afloat in the North Sea, and the large number of lives which are at stake in ships bound for the Baltic, for Archangel, and other northern ports, and also for America through the Pentland Firth, taking also into consideration the number of vessels employed in the coasting trade, and the number of men engaged on board of them, and also the number of boats engaged in the fisheries on that coast, and the number of lives at stake in that employment, and also the value of the property; taking all these things into consideration, and supposing that it were decided that there should be only one harbour of refuge constructed upon that coast, upon which of the three points would you decide that it should be established, Wick, Peterhead, or Fraserburgh?—I should have little hesitation in deciding upon Wick.

(*Mr. Cameron.*) I have drawn up a short list of masters who, I believe, will be able to attend to-morrow.

(*Chairman.*) Will you read it?

(*Mr. Cameron.*) "Captain Brown, Captain Wilkie, Captain Jones, Captain Campbell, Captain Conch, and Captain Johnston, harbour-masters."

(*Chairman.*) Will those gentlemen be ready to appear before us, say at 11 o'clock to-morrow?—

(*Mr. Cameron.*) Yes, I think that they will.

Captain GOODWIN examined.

3758. (*Chairman.*) What is your name?—John Goodwin.

3759. What is your occupation?—I am a seafaring man.

3760. How long have you followed the sea?—Since the year 1829.

3761. In what capacity?—From apprentice, through all grades, to master.

3762. How long have you been a master?—About 14 years.

3763. In what trade have the ships which you have commanded chiefly been employed?—Both in the foreign and coasting trade.

3764. Do you know anything of the north-east coast of Scotland?—Yes, I am acquainted with it.

3765. Have you any opinion to offer as to the necessity or otherwise of a harbour of refuge on that coast at any point between the Pentland Firth and the Firth of Forth?—I have been often to Wick in command of a ship, and I should think that a harbour of refuge there would prove of great advantage.

3766. Supposing that the government should determine to spend a certain sum of money in the construction of a national harbour of refuge on the east coast of Scotland, which place should you consider the most suitable for that purpose, Wick, Peterhead, or Fraserburgh?—I should say Wick would be a very good place for a ship running in an easterly gale of wind in a spring tide, causing a heavy sea.

3767. Have you any opinion to offer as to the necessity or otherwise of a harbour of refuge on the north coast of Ireland, for the benefit of shipping from the Clyde, or from Liverpool going south?—No, I have no opinion to offer. I am well acquainted with the Skerries and Portrush. At the Skerries there is almost a natural harbour at present, and a sailing ship can easily beat through between the Skerries and the mainland, and get shelter from the north-east or north-west gale of wind. There is good anchorage there, and I should sooner come to these than in any harbour on the coast; and another great advantage it has is, that it can easily be run into at all times without a pilot.

3768. Have you any opinion as to the necessity or otherwise of a harbour of refuge in the Isle of Man?—Well, I have never been in at the Isle of Man, although I have frequently passed in sight of it.

3769. (*Sir F. Smith.*) Have you ever passed by Portrush?—Yes, very often; in fact, I have frequently run in there.

3770. Did you run in to take refuge there?—No, I never went in to take refuge there.

3771. What depth of water is there under the lee of the Skerries?—Well, I could not pretend to say exactly, but I should, speaking at random, say about ten fathoms, but there may be less perhaps.

3772. However, do you think that there is a considerable depth of water?—Certainly, there is enough to float any size ship.

3773. I believe that from the position of the rocks it is already to a certain extent a harbour of refuge. Is that the case?—Yes, it is a good natural harbour.

3774. Then supposing that it could be completed at a small expense, and made into a perfect harbour, do you not think that it would be very desirable?—Yes, perhaps it might be.

3775. Have you ever navigated the north-east coast of England?—Yes, I have done so.

3776. Have you ever observed any necessity for a harbour of refuge on that coast?—I have not myself much considered the matter.

3777. Have you been on the Yorkshire coast?—I have.

3778. And have you seen vessels detained there?—Yes, frequently.

3779. Have you ever seen them obliged to bear up from Flamborough Head?—Yes, I have.

3780. Do you think that a harbour at Filey Bay

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would be of service to those vessels?—Yes, I think it might be.

3781. (*Mr. Lindsay.*) What is the name of the ship you command?—The steamship *Glasgow*, running between Glasgow and New York.

3782. What is her size?—About 1,960 tons burthen.

3783. In what trade was the vessel engaged in which you were brought up?—Both in the foreign and coasting trade.

3784. Then I am to understand that from a boy employed in vessels on the coasting and foreign trade, you have risen to your present high command?—Yes, such is the case.

3785. Have you often gone through the Pentland Firth?—I should say scores of times.

3786. Do you think that there is any risk in running through the Pentland Firth in a south-east gale of wind?—I myself would rather not do it, at any time when the wind was from the southward.

3787. Not even with an ebb tide?—No, I would rather not do it even then.

3788. Have you known many vessels to be lost in the Pentland Firth?—There have been a good many ships lost there, I myself have been in the firth at all times, both night and day, but I would not like to run in there in a south-east gale of wind.

3789. Do you consider that the danger arises from the tides in that firth in a south-east wind?—No doubt then the tides are much higher than when the wind is blowing from any other quarter.

3790. May I ask you if, from your experience, you consider that there is danger in running through the Pentland Firth even in light winds?—No doubt; for without sufficient wind you could not get sufficient way upon your ship to keep her under command.

3791. Then am I to understand that you consider it more dangerous to take the Pentland Firth in light winds than in a gale?—Well, in a gale of wind you may keep command over your ship, but if there is no wind you cannot keep her in her proper course, and the tide will carry her anywhere.

3792. You are familiar with the navigation of this particular line of the coast, and I wish to ask you, as a man of experience, your opinion upon this point: Suppose that the government were to decide upon constructing one national harbour of refuge upon that coast, which locality would you consider the most suitable for the purpose of protecting life and saving property, Portrush or some place in the Isle of Man?—A very considerable number of ships pass by the Skerries.

3793. Taking all things into consideration is it your opinion that it would be more desirable to construct a harbour of refuge at the Skerries than it would be to do so in the Isle of Man?—Yes, that is my decided opinion.

3794. (*Capt. Washington.*) I think you say that you have been at sea some 20 years?—I have followed the sea since 1829.

3795. Taking all things into consideration, do you think that harbours of refuge are, as a general rule, desirable for the larger and better found class of ships?—Yes, I think that they are.

3796. Were you in the room when Mr. Gilmour and Mr. Allan were giving their evidence?—No, I was not.

3797. I think I understand you to say that a harbour of refuge at the Skerries would be very desirable for the north going trade?—Yes, that is my opinion.

3798. With regard to the construction of a harbour of refuge in the Isle of Man for the benefit of ships engaged in trade in the Irish Sea, and ships from Liverpool and the Clyde going southwards, do I understand you to say that such a harbour is, in your opinion, unnecessary?—I cannot really say, for I never was in any harbour there.

3799. I do not speak of any harbour existing at present, but suppose that a good harbour of refuge suitable for every description of vessel could be constructed at Douglas, do you think it would be desirable to construct one?—Most decidedly; yes.

3800. Are you acquainted with the east coast of Ireland?—I am to a certain extent.

3801. Do you know Carlingford, Waterford, and Wexford?—I know Carlingford.

3802. Do you think that if the channel leading to the present harbour at Carlingford were deepened and widened, so that the harbour was made accessible to every description of vessel at all times of the tide, do you think that it would be desirable to improve the present harbour to that extent?—Yes, I think so, for at present ships of any size cannot run into it.

3803. Would you consider a similar improvement desirable in the case of the present harbour at Waterford?—I really cannot say, for I never was at Waterford.

3804. (*Mr. Coode.*) I think you have spoken of the Skerries at Portrush as a most favourable position for the construction of a harbour of refuge; now with regard to the opposite coast, do you know Loughindall and Church Bay?—Yes; as regards Loughindall there is no water, and the bottom is foul, in addition to which it requires a person to be very well acquainted with the navigation to run in at all.

3805. How often have you been in there?—At least a dozen times.

3806. Have you brought up there a dozen times?—Yes, I have.

3807. Have you ever found your anchors drag?—No; but I have seen twenty vessels ashore, at a time.

3808. Can you tell the Commissioners how it happened that those vessels drove ashore?—Yes, I think I could give a reason for it.

3809. Will you state it to the Commissioners?—The water is shallow, and there is a most dangerous sea with a strong tide, and the bottom is foul, and makes very bad anchorage.

3810. Are you acquainted with Church Bay?—I am.

3811. Do many vessels anchor in that bay?—I never myself anchored there, although I have been there; but that was merely to wait for the tide.

3812. Is Church Bay used regularly by vessels as a waiting place for the tide, or do ships run there for shelter in bad weather?—I think it is more used as a waiting place for the tide.

3813. Do many vessels run to Loughindall for shelter?—Yes, a great many.

3814. If it were possible to make a good harbour of refuge at the outer part of Loughindall, do you think it would be desirable to do so?—No, I do not think it would, for the tide is too strong there, and the sea too heavy.

3815. But assuming that a perfect harbour of refuge could be made there, do you think it would be desirable to make one?—No, I do not; for, as I said, the tide is too strong, and the sea too heavy.

3816. But assuming it were possible to construct a perfect harbour of refuge which should be completely sheltered from the sea, would there be then any objection to vessels running for it?—Yes, there is this objection, that there is a very strong tide in Lagness Bay, and that bay so strongly resembles Loughindall Bay that masters, if they had not got proper bearings, would be as likely to run for one as the other.

3817. If a proper harbour of refuge could be constructed there, and the entrance to it could be well marked, so that any master of a vessel could readily find his way in, do you still think that there is any objection to that locality for such a harbour?—Yes, I consider that the strong tide to be encountered in reaching it forms a very strong objection.

3818. Then, as regards locality, what do you consider the best position for the construction of a harbour of refuge?—I should say that on the west side of the Skerries, or Portrush, was the best adapted for the purpose.

3819. Is there any tide there which would make that situation objectionable?—There is no doubt a strong tide there, but there is not so heavy a sea as at Loughindall.

3820. Does the tide at the Skerries run nearly as strong as it does at Loughindall?—Yes, it runs as strong, but the sea is not so heavy.

3821. Can you account for that in any way?—No, I cannot say how it is unless it arises from the foulness of the bottom at Loughindall.

3822. Then upon the whole, you think the Skerries decidedly the best position for a harbour?—Decidedly so, I have no doubt on the subject.

3823. I think you told us, that a great many vessels run into Lochindall, does not that indicate that if a harbour of refuge were made there, it would prove of very great advantage?—I am not prepared to say that.

3824. But if many vessels run in there at present, surely they would be able to run in if a proper harbour of refuge were constructed, and do you still consider that there is any objection to such a harbour being made?—I think that many would not run there, but they might if the wind was from the east.

3825. Does your experience enable you to say that there would be no danger in running into the Skerries if a proper harbour were made there?—I do not think that there would be any whatever.

3826. Do you know the nature of the holding ground there?—Yes, I do, and it is very good indeed.

3827. Is there a firm hold for a ship's anchor?—Yes, particularly so as the bottom is blue clay.

3828. Is the whole of the anchorage ground blue clay?—That I cannot say, I can only speak of those parts where I myself have anchored.

The Chairman having inquired whether any of the Commissioners wished to examine the witness any further, and having received a reply in the negative, Captain Goodwin withdrew.

Mr. TURNER, Town Clerk of Glasgow, examined.

3829. (*Chairman.*) What is your name?—Angus Turner.

3830. You are, I believe, town clerk of Glasgow?—I am.

3831. Have you seen the list of witnesses who have been before us during the course of this inquiry?—Yes, I have looked through it.

3832. Do you consider that those witnesses fairly represent the feeling of the shipping interests, both the shipowners and the shipmasters of this locality?—I think, in addition to the witnesses you have heard, it might be proper to take the opinion of persons more immediately connected with the coasting trade, as distinguished from the foreign trade and the trade between Glasgow and America. The witnesses you have heard are, I believe, almost entirely engaged in the foreign trade, and I think there ought to be some witnesses examined whose interests are confined to the coasting trade, which, in my opinion, more requires the advantages of harbours of refuge than the larger and better found class of ships.

3833. In speaking of these witnesses whom you consider ought to be examined, are you alluding to shipowners or masters of ships in the coasting trade?—I allude both to shipowners and to masters commanding the smaller class of vessels.

3834. Will you be prepared to procure the attendance of any such witnesses by eleven o'clock to-morrow?—I think many of them can be in attendance.

3835. Have you any further suggestion to offer which may contribute to our obtaining the information which we require?—I observe that there is a society in existence which has taken up with great energy the question of the construction of places of refuge on the coasts of Scotland—I mean the Society for the Vindication of Scottish Rights; and I see that Lord Eglinton has been on various occasions speaking very strongly upon the subject of the necessity of provision being made for the construction of harbours of refuge for the shipping on the coasts of Ireland and Scotland. I think that it might be desirable that some officers of that society, which has expressed such strong opinions, both in representations to Parliament and in the local press, should be called upon to assign some reason for those opinions before the Commissioners.

3836. Do you think that you could procure the attendance of the secretary to the society here to-morrow at eleven o'clock?—I have seen here to-day Mr. Dreghorn and Mr. Burns, who are both officers of the society; they have gone away now, but I have no doubt that they will be prepared to-morrow to state their views to the Commissioners.

(*Chairman.*) Very well, then, we shall be happy to hear them.

Tuesday, 7th September 1858.

PRESENT:

Admiral HOPE, Chairman.

Sir FREDERIC SMITH,
Mr. LINDSAY,
Captain WASHINGTON.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Captain MAIN examined.

3837. (*Chairman.*) What is your name?—Hugh Main.

3838. What is your occupation?—I am master of a ship.

3839. How long have you been at sea?—Forty years.

3840. In what trade were the ships in which you have been employed chiefly engaged?—Between Liverpool and Glasgow.

3841. Are you acquainted with any part of the east coast of Scotland?—No; I cannot say that I am.

3842. Have you any opinion as to the necessity or otherwise, of constructing a harbour of refuge in the Isle of Man?—I think that Ramsay Bay would be a very suitable place for the construction of one.

3843. Are you of opinion that Ramsay Bay is the best site for the construction of such a harbour in the Isle of Man?—Yes, I think it is the best locality.

3844. Will you be good enough to state the reasons upon which you have come to that conclusion?—The bay is easy of access, the water is shallow, and it is very easily got into both from the north and south.

3845. What is your objection to Douglas Bay as regards the construction of a harbour of refuge at that point?—I am not very well acquainted with it, but I think that, comparatively speaking, the bay is small and the water is a little deeper.

3846. Do you consider that a harbour of refuge in the Isle of Man, say at Ramsay, would be of use for the coasting trade between Liverpool and Glasgow?—Yes; I feel sure that it would.

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3847. Will you state your reasons for coming to that conclusion?—I think that a ship coming from Liverpool with the wind from the westward or north-west would fetch Ramsay Bay quite well.

3848. Are you acquainted with the north-east and east coasts of Scotland?—No; I cannot say that I am.

3849. Are you acquainted with the north coast of Ireland?—I have no particular acquaintance with it.

3850. Then you are not prepared to offer to the Commissioners any opinion as to the necessity or otherwise of constructing harbours of refuge on those coasts?—No; I am not.

3851. (*Sir F. Smith.*) How long have you followed the sea?—About 40 years.

3852. How long have you commanded a ship?—I should say for about 33 years.

3853. Has your whole time been taken up in navigating between Glasgow and Liverpool?—My time has chiefly been occupied on that line, but I have made other voyages.

3854. Would you tell me where those voyages were made to?—I have been to the Brazils, to Portugal, and other places.

3855. Have you ever sailed round the north coast of Ireland?—Yes; I did once sail round it.

3856. May I ask if that was lately?—No; I should say that it was above 20 years ago.

3857. Were you in command of a ship at that time?—I was.

3858. Did you meet with any adverse weather?—No; I do not remember that I did.

3859. Did you put into Portrush or any other port?—No.

3860. Will you tell me the various anchorage grounds round the Isle of Man?—I am not acquainted with any, except the east part of Ramsay Bay.

3861. Have you ever been wrecked?—Yes, I have.

3862. May I ask where?—In the Brazils.

3863. Do you ever find on leaving port that your crews are in a state of drunkenness, and therefore unfit to work the ship?—No; I have always found my crews perfectly sober.

3864. Then you have never had any complaint to to make on that head?—No; none whatever.

3865. (*Mr. Lindsay.*) You say that you prefer Ramsay Bay for the erection of a harbour of refuge to Douglas Bay, is that on account of your being better acquainted with Ramsay Bay than you happen to be with Douglas Bay?—Of course it is the case that I know Ramsay Bay; and I think it is easier of access.

3866. Do you think that a harbour of refuge constructed in Ramsay Bay would be the means of saving life and preserving property to any very large extent?—Perhaps it might, for there have been many wrecks at the north end of the Isle of Man.

3867. From your long experience as captain of a ship, do you think that if a harbour of refuge had been constructed at Ramsay Bay it would have been the means of saving life and property to a large extent?—Possibly it might.

3868. Do you know any instance of ships having been lost which would in all probability have been saved if there had been such a harbour of refuge?—Yes; I think several ships might have been saved which were lost by driving from their anchors.

3869. Was there any loss of life in any of those wrecks?—I think so, but I do not clearly remember.

3870. Would a harbour of refuge constructed in Ramsay Bay in the Isle of Man afford any facility or advantage to ships belonging to the Clyde or to ships bound for Liverpool?—I think it would be an advantage to ships going down Channel to Liverpool.

3871. Do you think it would be any advantage to ships bound to the Clyde as well as to ships bound to Liverpool?—It would be of advantage to vessels bound from the Clyde, but not to inward-bound ships, for they would not get so far to leeward.

3872. (*Capt. Vetch.*) I think you said that you had never been to Douglas?—Yes; I was once there many years ago.

3873. Are you aware that by running out a pier in Douglas Bay from the Two-Gun Battery Point you could get anchorage with 8 or 9 fathoms of water?—I was not aware of it, but I never paid particular attention to the subject.

3874. Which do you consider the most dangerous part of the passage between Liverpool and the Clyde?—I should say all along the coast of Galloway.

3875. What part of that coast would you consider the most dangerous?—I should say from the Mull to Corsewall Point.

3876. (*Mr. Coode.*) You say that you prefer Ramsay Bay as a position for a harbour of refuge, are you aware of the number of wrecks which occur in Ramsay Bay as compared with those which occur at Castleton?—No, I cannot say that I am.

3877. I see by referring to an official document that 54 wrecks have taken place within a short distance of Castletown during 25 years, while the number has only been 29 in the neighbourhood of Ramsay Bay?—A great many fishing boats frequent that part of the coast.

3878. Do you attribute the number of wrecks to that circumstance?—That may be the cause, but I really cannot say.

3879. (*Chairman.*) Suppose that a harbour of refuge could be constructed at Douglas, providing sufficient accommodation for the wants of the trade, should you still consider Ramsay the better site?—Yes, that is my opinion.

Captain KELSO examined.

Captain Kelso.

3880. (*Chairman.*) What is your name?—John Kelso.

3881. What is your occupation?—I am master of a ship.

3882. How long have you commanded a vessel?—About 30 years.

3883. In what trade have the ships in which you have sailed been chiefly employed?—I have been employed in the foreign trade and the coasting trade, but chiefly in the coasting trade.

3884. What coasting trade have you been chiefly employed in?—On the north-west coast of Ireland, and in fact all round the three kingdoms.

3885. What foreign trade have you been engaged in?—I have been to Quebec and the West Indies.

3886. Have you made any voyages to the Baltic?—Yes; I have made three or four voyages there.

3887. Have you formed any opinion as to the necessity or otherwise of constructing harbours of refuge on the north-east of Scotland; if so, will you inform the Commissioners what conclusion you have come to?—Upon the north-east coast of Scotland I consider that a harbour of refuge would be very desirable about the locality of Wick, and I think that Sinclair's Bay, as being both easy of access and very roomy, would be well adapted for the construction of such a harbour.

3888. Will you state, without any reference to the exact locality, what are your reasons for considering that a harbour of refuge is necessary in that district of the coast?—I think that such a harbour is necessary, because in that district there is a great traffic with the Baltic, the North Sea, and Archangel, and round the north coast.

3889. Have you had any personal experience of the necessity of a harbour of refuge in that district when trading there yourself?—Yes, I have.

3890. Would you be good enough to state to the Commissioners any particular instance in which you have found the necessity for such a harbour?—Yes; on one occasion in particular, when I was going through the Pentland Firth, the wind chopped round

to the south-east, and there was no place that I could get into but the Moray Firth, and the result was that I was dead locked at Duncansby at the head of the firth.

3891. Do I clearly understand, that you decidedly prefer Wick to Peterhead for the construction of a harbour of refuge?—Yes, that is my opinion.

3892. Will you state the reason why you prefer Wick?—I prefer it on account of the vast concourse of vessels from all parts which there is always in that locality.

3893. Have you any opinion to offer to the Commissioners as to the necessity or otherwise of a harbour of refuge in the Isle of Man?—No; I don't see that the construction of a harbour of refuge in the Isle of Man would be any benefit to us in the Clyde, but it might be of use as regards large ships from Liverpool falling in with westerly or south-westerly gales; those large ships require some place of refuge to run into.

3894. Then I understand you to say that as regards the Isle of Man a necessity does exist for the construction of harbours of refuge for large Liverpool ships?—Yes, that is my opinion.

3895. That being the case, what part of the Isle of Man do you consider to be the best adapted for the construction of such a harbour?—I think the best place would be inside Langness Point.

3896. Will you state the reasons that you have for considering that, the best locality?—A vessel going up St. George's Channel may weather the Calf and get in there; but if the harbour were at any place to the east of that point, heavy ships could not get up to it.

3897. Have you formed any opinion as to the necessity, or otherwise, of a harbour of refuge upon the north coast of Ireland, for the benefit of Clyde or Liverpool ships?—I think that any harbour constructed in that locality ought to be upon the lee and not upon the weather coast; and I see no necessity for any harbour of refuge upon the Irish coast; in general the gales blow from the south-west, and a harbour might be constructed at Loughindall or at Islay, by making a breakwater similar to the one at Plymouth Sound.

3898. Have you formed any opinion as to the advantage to be derived by ships going down St. George's Channel, by the improvement of the harbours of Carlingford, Waterford, and Wexford?—Certainly some improvement is very much wanted in the harbour at Waterford.

3899. Will you state why you consider such improvement necessary?—I think that it is required, because there is no place to run into from Queenstown to Tuskar, as it takes a man well acquainted with the navigation to get into the passage.

3900. Have you formed any opinion as to the necessity, or otherwise, or of the advantage to be derived from the construction of a harbour of refuge in the neighbourhood of the Land's End?—Yes. I think that a very good harbour of refuge might be constructed in Mount's Bay.

3901. (*Mr. Lindsay.*) You said, I think, that in your opinion a harbour of refuge would be very desirable at Wick, and would be the means of saving many lives and much property, there being at present no place of refuge for shipping upon that coast?—Yes, that is my opinion; but with a south-east wind one might run through the Pentland Firth.

3902. Would you hesitate in taking the Pentland Firth?—Not generally; but I might hesitate with spring tides.

3903. Have you often made a passage through the Pentland Firth?—Yes, I have frequently done so.

3904. It is considered a dangerous passage, is it not?—Yes, it is.

3905. From what does the danger arise?—There is a very heavy sea running during spring tides, and I have known a ship go down with all hands on board.

3906. Would you be good enough to tell us what was the size of that ship?—I should think she was about 120 tons burthen.

3907. Was she lost during a gale of wind in attempting to run through the Pentland Firth against adverse tides?—Yes; that was the case.

3908. Have you ever been in the neighbourhood of Fraserburgh and Peterhead?—I have often passed those places.

3909. Taking all things into consideration, the traffic with the Baltic, with Archangel, and with America, through the Pentland Firth, taking also into consideration the number of vessels engaged in the fisheries upon that coast, and also the number of ships engaged in the coasting trade, is it your opinion that Wick, Peterhead, or Fraserburgh would be the best place for the construction of such a harbour?—It is my opinion that Wick would be the most suitable locality.

3910. I think I understood you to say, that you considered that a harbour of refuge would be desirable at Langness Bay or Castletown Bay, may I ask you if you have ever anchored at either of those places?—I have been there dodging the tide, but I have never anchored there.

3911. Do you think that Langness Bay would be a good place for the construction of a harbour of refuge?—Yes, I think one might be constructed thereby running a breakwater out from the point.

3912. You think then, that if a breakwater could be constructed outside Langness Point that a good harbour might be made there?—That is my opinion.

3913. Do you think that a harbour there would be more desirable than one at Douglas or Ramsay?—Ramsay is very easy of access from the southward, but large ships could not well fetch up there in a heavy gale of wind.

3914. Would you prefer Ramsay Bay to Douglas Bay for the construction of a harbour of refuge, supposing that government decided upon constructing one in that locality?—I think that Ramsay Bay is better suited for the purpose than Douglas Bay, as regards heavy shipping.

3915. I think I understood you to say, that if a harbour of refuge were to be constructed in the north channel, you would prefer Loughindall as a site either to Portrush or any other point? — Yes, that is my opinion.

3916. Have you ever been in Loughindall?—Yes, I have.

3917. What sort of anchorage is there there?—There is very shallow water up from Saltpans to Bowmore.

3918. May I ask about what depth of water there is?—There is different depth in different parts, 9, 4, and 5 fathoms.

3919. But is not that quite sufficient depth of water for a ship to anchor in?—Yes, there is plenty of water; but in a heavy gale of wind a breakwater is required on account of the heavy sea, to afford a secure anchorage for heavy ships.

3920. At Bowmore is the depth of water 3 fathoms?—Yes.

3921. Are you speaking of low water or at spring tides?—At low water; but I do not mean close into Bowmore.

3922. Do you think that if a breakwater were made there it would tend more to the preservation of life and protection of property than any harbour which might be constructed at Portrush?—Yes; that is my opinion.

3923. How would you propose constructing a breakwater at Bowmore, the town lying east and south east?—I would run it from Saltpan's Point across towards Langness.

3924. What sort of anchorage ground is there?—There is very good holding ground.

3925. As the bay is at present without the protection of a breakwater, have you known ships drag their anchors there?—Yes; I have known 17 do so in one night in a south-west gale.

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Captain Kelso.

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Mr. Lindsay.

3926. About how many ships were there in the bay at the time?—I should say about 20.

3927. And out of 20 ships in the bay, in one night, 17 have been driven on shore?—Yes, I have known that to be the case.

3928. It would appear then that a very heavy sea runs into that bay?—Yes, there is.

3929. Was it in consequence of that heavy sea that the vessels dragged their anchors?—Yes, I should think that was the main cause.

Mr. DAVID DREGHORN examined.

Mr. David Dreghorn.

3930. (*Chairman.*) What is your name?—David Dreghorn.

3931. You are, I believe, a town councillor of Glasgow?—Yes.

3932. May I ask in what capacity you appear here?—As connected with the Society for the Vindication of Scottish Rights.

3933. Will you be good enough to state to the Commissioners your opinion as to the advantage or otherwise of the construction of harbours of refuge on the north-east coast of Scotland?—I am not myself personally very conversant with it, but the subject has undergone much discussion in the society of which I am a member; it has been very frequently referred to at public meetings, and the society generally have considered it a great grievance that, as regards the Scottish coast, no harbours of refuge have been constructed. In England harbours have been constructed at the public expense, but not one has been constructed in Scotland with, I may say the small exception, that 2,000*l.* was expended at Portpatrick. The Earl of Eglinton is the president of the society to which I belong, and in speaking on the subject of the construction of harbours of refuge upon the Scottish coast, at a public meeting in Edinburgh, in November 1853, said, in reference to the subject, "The winds blow as hard on the Scotch "shore, and the eastern shore is as bleak as any that "a mariner has to contend with; and a Scotch "sailor's life is as dear to his family and his country "as that of any, but we have no Dover, no Harwich, no Portland, no Jersey, no Holyhead; in fact, "there is not a harbour of refuge from Wick to Berwick." I think there can be no doubt that a harbour of refuge on the east coast of Scotland would tend greatly to the preservation of life and property. I have myself been in a yacht, and have found how great an advantage it would have been to have had a harbour of refuge. I may say also, that at a meeting of the society to which I belong, a very large shipowner expressed his opinions upon the subject.

3934. (*Mr. Lindsay.*) May I ask his name?—Certainly; it was Mr. Mitchell; and he said, in referring to the subject of harbours of refuge, "One other "great and important matter in which Scotland has "suffered a grievous injustice, is the total want of "harbours of refuge. There is indeed expended on "Portpatrick the sum of 2,000*l.*, but that is not a "harbour of refuge; no vessel can enter the rocky "narrow channel. It is merely a packet station for "the carriage of mails from Scotland to Ireland, from "Cape Wrath to the Mull of Cantyre, one of the "most dangerous coasts in the world; where I have "seen the Atlantic rolling in waves 25 feet high, in "which no vessel could be safe, although the ship "and her ground tackle be all of the best description. There is not one. But if we had harbours "of refuge, such a shipwreck as that of the *Annie* "*Jane*, with the loss of 340 souls, would have been "prevented, and much valuable property would be "saved. A vessel of my own was a few years ago "wrecked on the same spot, dashed to pieces, and all "on board perished; but had there been a harbour "of refuge the catastrophe would have been prevented. Now, I think we should all put our "shoulders to the wheel to get harbours of refuge "along the coasts of Scotland, and, I think, if we "were unanimously, knocking at the Treasury door "until we were listened to, we would undoubtedly "succeed. Then, with regard to the east coast, the "navigation there, like the west coast, is highly "dangerous, and there is not a harbour there either. "No doubt Queensferry is a harbour of refuge, but "no thanks to Government for that, to nature only "are we indebted for it, as Government has not laid "out a farthing on its construction. But while such "is the case as regards Scotland, what has been done "in the same field in Ireland? At Howth, a poor "fishing village, they have expended half a million "of money in making a harbour; which, now that "it is constructed, no vessel can get into it. When "over lately, I looked at it with astonishment. I "recollected that when the *Great Britain* was built, "they had to take down the dock walls to get her "afloat; but this Howth Harbour was exactly the "reverse, you cannot get a vessel into it. There is "another great grievance, the light dues. The "Trinity House takes out of the country yearly "30,000*l.*, which they spend nobody knows how. "They are an irresponsible body; but if they were "called upon to spend that money drawn from our "shipping alone, in building harbours of refuge, the "saving to life and property would be incalculable." At another meeting of the society Mr. Hugh Tennant drew attention to the small sum of money spent in the improvement of the Scottish coast. He said, "The survey of Scotland was commenced so far "back as the year 1809, it was then discontinued for "three years, in order to expedite the survey of England; it was renewed in 1813, and, with certain "intervals, was languidly carried on until 1822, in "consequence of the demand made for the completion "of the survey of Ireland. The whole sum expended "on the Scottish survey until the beginning of this "year has been 130,000*l.*, while 800,000*l.* has been "expended on the English, and 850,000*l.* on the Irish "survey. The survey of our coast has been much "neglected, and the money granted quite inadequate "for the accomplishment, within a reasonable time, of "an object so important to navigation." At the close of his speech Mr. Tennant also observed:—"It is "also material to keep in view the very marked "neglect exhibited towards Scotland in the very "important matter of dockyards, arsenals, and harbours of refuge. It is an astounding fact that "while there are eight dockyards and six arsenals in "England, all supported at the public expense, such "establishments are wholly unknown in Scotland. "Vast sums have also been expended in England and "Ireland on harbours of refuge; thus, the following "are the estimates as returned to Parliament of the "cost of such works now in course of construction in "England:—Dover, 245,000*l.*; Harwich, 110,000*l.*; "Alderney, 620,000*l.*; Jersey, 700,000*l.*; Portland, "588,950*l.*; Holyhead, 91,279*l.*; making a total of "2,355,229*l.* While in Ireland 1,000,000*l.* has been "expended in Kingstown Harbour, and in the "Channel Islands the same amount has been granted "for the breakwater at Jersey, in Scotland the "paltry sum of 2,500*l.* has been granted for the "packet station at Portpatrick; and hence, as already "noticed, nothing that can with propriety be termed "a harbour in Scotland has received any Parliamentary grant. This exclusion is all the more "remarkable, from the circumstance that repeated "applications have been made for a share in such "grants, enforced by strong and peculiar claims on "any enlightened Government. I would just refer, "in illustration, to the case of Peterhead. It is well "known that Peterhead is the only place on our "eastern coast adapted, according to the opinion of "the most eminent engineers, as a harbour of refuge; "and thus a rocky and dangerous line of coast, extending 250 miles, and having no intermediate point "of shelter between the Friths of Forth and Cromarty, "and along which, and the port of Peterhead, it

"appears from official returns that no less than "11,453 vessels, exclusive of those in ballast, passed "in 1845, going and returning from the Baltic, "Norway, and Sweden, as well as our eastern ports, "are in this way left without protection. So early as "1705, the Scottish Privy Council—that is, before the "Union—recognized the importance of this harbour "as a national undertaking; but though the subject "has been strongly urged upon successive adminis-"trations, no grant has yet been obtained for an "object so necessary to our inland and foreign navi-"gation." I myself have nothing to say personally on the subject; but I may state that I was lately in a yacht on the west coast in a strong gale of wind in Lamlash Bay, and the vessel was in a very uncomfortable state, and if a breakwater were erected there it would form as good a harbour of refuge as any that could be required on that coast. As regards the necessity for a harbour of refuge in the Isle of Man, I cannot speak from personal experience, but I have always heard, as regards the western coast, that a harbour of refuge at Loughindall would be desirable.

3935. (*Mr. Lindsay.*) Then the grievance complained of by the society of which you are a member, extends to the non-construction of harbours of refuge on the east coast of Scotland?—Yes, that is so.

3936. As regards the west coast of Scotland, what is your opinion as to the necessity for the construction of a harbour of refuge?—I think that a harbour at Loughindall would be of advantage; if a breakwater were constructed at the northern entrance of Loughindall Bay, it would render the place a much more secure anchorage than it is at present.

3937. Have any complaints been made by the society to which you belong as to the construction of a harbour there?—Yes, great complaints have been made that the bay there at present was not a proper place for anchorage.

3938. Are you aware of any representations having been made to the Government by the society to which you belong of the necessity of constructing harbours of refuge upon the east coast of Scotland?—I understand that such representations have been made. I believe that the proceedings of the society for the Vindication of Scottish Rights have been from time to time duly made known to the Government.

3939. Are you aware whether or no any hopes have been held out by the Government in answer to such applications?—Yes, I think that hopes have been held out to us.

3940. Do you think that Mr. Mitchell himself would be willing to come before us and give evidence?—Yes, I believe that he would.

Captain TURNBULL examined.

3941. (*Chairman.*) What is your name?—James Turnbull.

3942. What is your occupation?—I command a steam ship.

3943. How many years have you been at sea?—I cannot say exactly, but I should say about forty years.

3944. How many years have you been master of a vessel?—Twenty-two years.

3945. What sized vessels have you commanded?—They have been from 110 to 700 tons burthen.

3946. In what ports have the vessels in which you have been employed chiefly been engaged in trading?—I have been principally employed on the Irish station, and for thirty years I have served on ships engaged in plying between Glasgow and Liverpool and Ireland.

3947. Have you formed any opinion as to the advantage, or otherwise, of the construction of a harbour of refuge in the Isle of Man, as regards the passing trade?—In my opinion Ramsay Bay would be the best place for the construction of such a harbour.

3948. Will you state your reasons for thinking that Ramsay Bay would be a better locality than Douglas Bay?—In a south-west gale of wind Douglas Bay is not so easy of access.

3949. Is it your opinion, taking everything into consideration, that the construction of a harbour of refuge in the Isle of Man would be a good thing for ships passing in that direction?—Yes, I think a harbour of refuge in Ramsay Bay would be a very desirable thing.

3950. Will you state the reasons you have for holding that opinion?—In a westerly gale of wind, vessels which could not make Holyhead might get into Ramsay; with a north-west or south-west gale they would get to leeward of the island.

3951. Are you speaking of vessels from Liverpool and from the Clyde?—Yes; in a gale from the west or north-west Ramsay Bay would be a great advantage to them as a harbour of refuge.

3952. Can you offer any opinion as to the advantage, or otherwise, of the construction of a harbour upon the north coast of Ireland?—Yes; I think the Skerries, at Portrush, would be a very good locality for the construction of a harbour of refuge.

3953. Would a harbour of refuge there be of advantage to the passing trade?—Yes; in a north-west gale of wind vessels could run in there.

3954. Are you acquainted with Loughindall Bay?—I myself was never there.

3955. But would you prefer, if a harbour of refuge were to be constructed in that locality, that it should be constructed on the Irish coast, or on the opposite side?—I should much prefer the Irish coast, for vessels in a north-west gale of wind might run into the Skerries at Portrush, which could not get into Lochindall Bay.

3956. (*Sir F. Smith.*) Have you seen the wreck chart which has been published?—No, I have not seen it.

(*Sir F. Smith to the Secretary.*) Will you be good enough to place the wreck chart in the hands of the witness?

3957. (*To the witness.*) Do you see that a great many wrecks are marked upon that chart as having taken place opposite Liverpool?—Yes, I see that there are a great many marked down upon it.

3958. Have you yourself ever been in danger of being wrecked, either upon entering or leaving the port of Liverpool?—The banks opposite the entrance to Liverpool are very dangerous in a gale from the north-west.

3959. Do you think that the loss of life, and the many wrecks, may in any degree be attributed to the state of the crews when they leave port; I mean, the drunken state?—I really cannot say.

3960. In your experience, have you noticed that it is the habit for vessels to leave port with their crews in a state of intoxication?—I myself never saw anything of the kind.

3961. To what would you attribute the number of wrecks in that locality?—It would be to vessels being caught by a north-west wind, and not being able to keep off the lee shore.

3962. Have you ever been upon the north-east coast of England?—No, I never was there.

3963. Do you know the east coast of Scotland?—Yes, I am well acquainted with part of it.

3964. Have you ever commanded a ship that ran upon that coast?—Yes, I have commanded a steamer running between Leith and Hull.

3965. But as regards the north-east coast between the Frith of Forth and the Pentland Firth, are you acquainted with that part?—No further than that I have just gone round it, and I don't pretend to know the coast sufficiently to offer any opinion with regard to it.

3966. (*Mr. Coode.*) I think you said that you preferred Portrush as a site for the construction of a

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harbour of refuge to Loughindall ?—Yes, that is my opinion.

3967. Do you form that opinion as regards the locality itself, without regard to any facility for the construction of such a harbour ?—Yes, I think that that would be the most desirable locality.

3968. Do you think that a harbour of refuge constructed there would tend more to the preservation of life and protection of property than a harbour constructed anywhere else in that neighbourhood ?—Yes, that is my decided opinion.

Mr. JOHN MITCHELL examined.

Mr. John Mitchell.

3969. (*Chairman.*) What is your name ?—John Mitchell.

3970. What is your occupation ?—I am a merchant and shipowner.

3971. Are you acquainted with the object and intention of our inquiry ?—Yes, I think I am.

3972. Will you state to the Commissioners briefly your opinion generally upon the subject of harbours of refuge, that is, if you entertain any ?—I may state generally that great advantage would be derived, both by the shipping interest and by the public at large, if more harbours of refuge were constructed. The result must be a reduction in the premium upon maritime insurances, as the risk of loss would be considerably diminished.

3973. How long have you been connected with the shipping interest ?—I should say about 30 years.

3974. In what trade were the ships employed in which you have been interested ?—Oh, they have gone to all parts of the world ; the East and West Indies, and, in fact, to all quarters of the globe.

3975. Are you acquainted with the north-east coast of Scotland ?—I know a little about it.

3976. Have you any opinion to offer to the Commissioners as to the best point upon that coast for the construction of a harbour of refuge ?—No ; but I have heard and believe that a harbour of refuge is very much required upon that coast.

3977. Then you are not able to assign any particular place for the construction of one ?—No ; but I have heard and believe that one is much wanted on that coast.

3978. Do you think that a harbour of refuge is required anywhere upon the west coast of Scotland ?—One is much less required there than anywhere else, for we have there a great number of very fine natural harbours, such as Lamlash Bay and Rothesay Bay ; in fact, I don't know any river the entrance to which is better protected than the Clyde ; but it would be a great advantage if those natural harbours of refuge were buoyed off.

3979. Does not the duty of buoying them off fall upon the Northern Lights Board ?—The Commissioners of Northern Lights have nothing to do with the matter ; but it would be of immense advantage to have those natural harbours buoyed off.

3980. Do I understand you to say that there is no public body charged with the duty of buoying off those harbours ?—No, certainly not ; there is no fund for the purpose. These harbours are quite free, and any vessel that likes may run in, and pay nothing ; but it would be of immense advantage to have them buoyed.

3981. Have you any opinion to offer to the Commissioners as to the advantage or otherwise of the construction of a harbour of refuge at Portrush ?—I think that the construction of a harbour of refuge there would prove of great advantage for vessels going out to the north. I am not certain that that would be the best locality ; but a harbour of refuge is very much wanted in its vicinity.

3982. Could you mention any other site that you would think preferable to Portrush ?—No ; I do not know that I could name any particular spot.

3983. Have you formed any opinion as to the advantage of a harbour of refuge being constructed in the Isle of Man ?—Yes, I have thought over the subject.

3984. Will you state to the Commissioners the opinion that you have formed ?—Well, I think that it would be a very great advantage to vessels going from and coming into the Clyde, as Liverpool is a remarkably bad harbour to get into in a gale of wind, owing to the numerous sandbanks in its vicinity.

3985. To go to the Irish coast, do you consider that an improvement of the existing harbours at Carlingford, Wexford, or Waterford would be advantageous ?—There can be no doubt whatever about the matter.

3986. Will you state your reasons for saying so ?—At present a vessel drawing any depth of water cannot get into them ; and if the channel were deepened 15 or 20 feet, ships might run in at all states of the tide.

3987. In what would the advantage consist ?—Why, I can only say that I myself have had a vessel go ashore on that coast, and been much damaged ; and I know that if there had been a harbour of refuge, she could have run there for protection.

3988. As regards the neighbourhood of the Land's End, have you any opinion to offer to the Commissioners as to the advantage or otherwise of constructing a harbour of refuge in that locality ?—I am not certain about the matter ; but I think a good site might be found about the Skerries.

3989. I think I gather from your evidence that you consider that the construction of harbours of refuge for ships in stress of weather would be advantageous ; but have you any opinion to offer to the Commissioners as to the advantage or otherwise to be derived by the use of such harbours by vessels not absolutely in distress, but delayed by bad weather, as regards a saving in wear and tear ?—They might be of some advantage in that respect, but very few vessels would run into a harbour of refuge unless they were compelled to do so ; for captains would much prefer keeping on their voyage then run the risk of delay.

3990. Am I to understand that it is your opinion that in a mercantile point of view it is better that a ship should bear the wear and tear of lying to in a heavy gale of wind than that she should run into a harbour of refuge ?—In a mercantile point of view time is of the utmost importance, and a saving of time being a saving of money I think it would be better for a captain to keep the sea, if he possibly could do so, and stand the wear and tear rather than run into a harbour of refuge.

3991. Then, in point of fact, the object is to make as speedy a passage as possible ?—Yes, just so ; it is the duty of every captain, even in bad weather, to do all that he can to make a good passage.

3992. Have you ever made a practice of underwriting ships ?—Yes, I insure largely ; in fact I pay nearly 10,000*l.* a year for insurances, and I underwrite to a considerable extent also.

3993. (*Sir F. Smith.*) Are you in the habit of insuring all your ships ?—Yes, that is my practice.

3994. Are you of opinion that the construction of harbours of refuge along the coast would tend to diminish the rate of insurance ?—I have no doubt that it would, and to a considerable extent.

3995. That being the case then, I presume that you, as a shipowner, would not object to pay a passing toll for the construction and maintenance of harbours of refuge in return for the benefit you would thus derive in the reduction of the premium upon maritime insurances ?—No, I do not think that any shipowner would grudge the money if he were sure that it was properly and judiciously applied.

3996. Then do I understand that it is your opinion that if harbours of refuge were well placed and properly constructed, and the expenditure well regulated and properly applied, the shipping interest would not object to contribute their fair proportion towards the

expenditure?—No, I do not think that they would, for the saving upon maritime insurances would more than counterbalance any sum they might be called upon to contribute.

3997. I think you have expressed an opinion in favour of the construction of a harbour of refuge at Portrush?—There or somewhere in the vicinity.

3998. Have you ever considered the question of the expediency of constructing a harbour of refuge at Lochindall?—No, I have never thought about the matter.

3999. Then you are not prepared to offer any opinion to the Commissioners upon that point?—No, I am not.

4000. Now, as regards the Isle of Man, which point there would you prefer as to the locality for the construction of a harbour of refuge?—I should have thought Douglas was the best place; but I have not deeply considered the subject. Douglas seems to me to be much more sheltered than Ramsay, and from the natural formation of the bay, I think that much less expense would be incurred in the construction of a harbour there than would be the case at Ramsay.

4001. As regards the entrance to the Clyde, I think you said that there were very good natural harbours, but that they wanted to be buoyed off. Do you think that shipowners would grudge the expense?—No, I do not think they would.

4002. Supposing that it were determined to levy a toll for the expense of buoying off their natural harbours, how do you think it would best be collected?—I think the custom-house officials would be the proper persons to collect the toll, both for the expense of buoying, and also of constructing and maintaining harbours of refuge, and I certainly do not think that shipowners would grudge the expense.

4003. As regards the north-east coast it has been suggested to us that instead of laying out the public money in the construction of two or three harbours, the same money would be more advantageously expended in improving the harbours which already exist, is that your opinion?—It would be very desirable to improve the present harbours.

4004. Are you aware, or do you think it probable, that the class of vessels employed in the coasting trade has very much increased as regards size of late years?—I do not think that the coasting vessels have increased so much in size as the vessels employed in the foreign trade.

4005. But do you think that the improvement of existing harbours as regards deepening and widening the entrance would affect ships employed in the coasting trade?—Yes, I think that it would.

4006. I think that speaking of the harbours of Carlingford, Waterford, and Wexford, I gathered from your evidence that it would be desirable to improve them so that ships could enter at all times of the tide rather than to construct a new harbour of refuge?—No doubt that would be a great object, and it would be a most advantageous thing so to improve those harbours that ships could run in at all stages of the tide.

4007. Do you mean ships of all tonnages?—Large vessels now-a-days draw less water than large ships did ten years ago; a modern constructed ship of 1,000 tons does not draw more water than an old fashioned ship of 600 tons.

4008. Have you seen the wreck chart?—No.

(*To the Secretary.*) Will you be kind enough to shew the witness the wreck chart?

4009. Now from your practical knowledge do you think that any of those wrecks could have been avoided if harbours of refuge had been in existence?—No doubt of it, not half of them would have occurred.

4010. Are you aware also that taking an average of 5 years 800 lives have been lost annually by shipwrecks?—I know that a great number of lives have been lost.

4011. Do you imagine that any large proportion of that loss resulted from vessels being sent to sea badly found?—No doubt in some cases.

4012. Do you imagine that any of those ships were lost in consequence of leaving port with the crew in such a state of drunkenness as to be unable to manage the ship?—Hardly a crew leaves Liverpool or Glasgow without a large proportion of the crew being in a state of intoxication, and when a ship arrives at a foreign port some of the men get drunk again, and others desert and engage themselves on board other ships under different names.

4013. Do you know, of your own knowledge, of any ship being wrecked on account of the drunken condition of the crew?—I do not know of any, but I know that many wrecks occur upon leaving port from that cause.

4014. (*Mr. Lindsay.*) Did you hear Mr. Gilmour give evidence?—I heard part of his evidence, but not all of it.

4015. From what you now state to the Commissioners you appear to dissent from the views expressed by that gentleman?—Most decidedly so; and I must say that I was quite astonished at hearing that evidence.

4016. I understood Mr. Gilmour to state that in his opinion a great number of wrecks took place in consequence of ships running for harbours of refuge, may I ask what orders you give to your captains?—I give them orders to keep the sea at all times if they possibly can do so, and not to run into port unless in cases of absolute necessity.

4017. Now, for instance, in the case of a ship meeting an adverse wind and making no progress, even though the ship might not be in jeopardy, do you think that the master would be acting prudently if, to save wear and tear, he ran into a harbour of refuge?—Unless there was danger of running upon land I think he ought to keep to sea.

4018. Do you yourself think that the shipping interest would object to pay half the cost of the construction of harbours of refuge?—No, I do not think that they would.

4019. Are you not aware that even at present a great many complaints have been made against the payment of passing tolls?—Yes, perfectly; I have made many myself, but those complaints refer rather to the manner of collecting the toll than the toll itself; for instance, I think it is a most unreasonable thing to demand a passing toll from a ship that does not pass at all, and many of my vessels have to pay passing tolls to harbours when they never see them or go near them, and that I think a very great hardship.

4020. Then you think that the hardship consists in being taxed for the support of a harbour from which you derive no benefit?—Just so, I think the tax ought to be paid by vessels using the harbour.

4021. As far as I understand, it appears to me that you consider that any tax which might be levied for the construction and maintenance of harbours of refuge ought to be paid only by the ships which make use of such harbours?—Yes, that is my decided opinion.

4022. But do you not think that the adoption of such a system would be calculated to prevent masters of ships making use of those harbours?—I think not; and it appears to me to be only common justice that those who really get the benefit of the harbours should pay for them, and no captain of a ship would ever in case of absolute necessity be deterred by the consideration of expense from making use of such harbour, I can assure you.

4023. I think you said that there has been a large increase in the size of ships engaged in the foreign trade of late years, has there been any corresponding increase in the size of vessels employed in the coasting trade?—I think steam ships are now taking the trade from the old class of vessels employed in the coasting trade.

4024. Do you think they are doing so to any con-

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siderable extent?—Yes, I should say to a very great extent.

4025. Is it not the case that about two thirds of the coasting trade is carried on now by steam vessels?—No, I should think not so much as two thirds.

4026. Would you say one half?—No, but I should think one quarter of the trade is.

4027. Is it your opinion that the building of steamers is on the increase just at present?—No, I should think not just at present.

4028. Do you think that the building of sailing vessels is on the increase?—No, I think not.

4029. Then I am to understand that upon the whole you are of opinion that harbours of refuge are necessary as a means of saving life and protecting property to a considerable extent, and also for affording great facilities for commerce?—Yes, I am clearly of that opinion.

4030. And are you, as a large shipowner, and, therefore, deeply interested in the matter, so strongly of opinion that the construction of such harbours of refuge is a matter of necessity that you are willing to pay a fair proportion towards their construction and maintenance?—Yes, if the money be properly expended I would pay my share with the greatest pleasure.

4031. That is to say, that you would not object to the shipping interest being called upon to pay one moiety of the expense of the construction and maintenance of such harbours of refuge, if the tax were levied in the form of a passing toll upon vessels actually making use of the harbours?—Decidedly; I myself should have no objection.

4032. (*Capt. Washington.*) I think you stated that you were an underwriter?—Yes, that is the case.

4033. Is it a fact that in winter vessels passing through the Pentland Firth pay a double rate of premium on insurance?—Yes, that is the case, to my own knowledge.

4034. Do you think that that is the best proof which could be given of the risk to ships passing through the Pentland Firth?—Yes, I think so.

4035. Do you know of any other test which could be compared to that, as showing the risk and danger involved in the navigation of that firth in the winter months?—Yes, I should think that the number of vessels lost in that firth is another test. I lost one myself there some few years ago. She was a total wreck, and nothing was saved at all; and that was close near where the *Annie Jane* was lost with 340 passengers on board.

4036. Were any lives lost in your ship?—Yes, four men perished, but the remainder of the crew were saved.

4037. May I ask how many years ago that occurred I mean the loss of the *Annie Jane* and of your own ship?—I should think about five or six years ago.

4038. Do you know of any similar disaster to shipping occurring on that coast?—No; I cannot say that I do.

4039. Then, in your opinion, the most serious disaster to shipping which has occurred upon the east coast of Scotland occurred in the Pentland Firth?—Yes, decidedly so.

4040. Should you, then, be disposed to agree with any opinion which may have been given to us to the effect that there is no danger in navigating the Pentland Firth?—I can only say that, as far as my experience goes, there is great danger; and I think the increased rate of insurance required by underwriters is a very good test in the matter.

4041. Did you ever in your whole life hear a doubt cast upon the matter?—No, I cannot say that I ever did; it is generally admitted to be a most dangerous navigation.

4042. I think you said something about the necessity of buoying off the natural harbours at the entrance of the Clyde?—Yes; I think it would be of great advantage.

4043. I think you said also that you did not think that the Commissioners of Northern Lights were bound to place buoys there. Are you aware that they place them in the Moray Firth?—No, I am not aware that such is the case.

4044. Buoys are placed all along the east coast by the Commissioners of Northern Lights, to the best of my belief; are you aware whether that is so?—No, I do not know anything about it.

4045. Are you aware of any application having been made upon the point to the Northern Lights Commissioners?—No; I do not know of any application ever having been made.

4046. I think, though, I am not wrong in saying that the Commissioners of Northern Lights buoy all the east coast of Scotland?—That may be so, but I do not know.

4047. But do you not think that the same Act of Parliament which gave the Commissioners power to levy dues for lighting purposes also imposed upon them the duty of buoying where it might be necessary?—Well, I do not know; but we do not get any help from them here.

4048. I do not know whether it is done by private agreement or not, but I feel sure that the Northern Lights Commissioners buoy the east coast of Scotland?—I cannot say; but certainly they do not buoy the west coast.

4049. The Firth of Forth, the Moray Firth, Inverness, and Cromarty, are all buoyed by the Commissioners of Northern Lights, I feel certain?—That may be so; but we get none of those good things here.

4050. I think you say that you yourself, as a large shipowner, would be prepared to pay any amount that was fair and reasonable for the construction and maintenance of harbours of refuge?—Yes; decidedly so.

4051. Do I understand you also to say that shipowners, as a body, would gladly pay any fair and reasonable amount for the construction of harbours of refuge, having in view the benefit which they would derive in the diminution of the premiums on maritime insurance?—Yes; that is my opinion. If the expenditure were judiciously managed, and applied to its proper purpose, I think that no shipowner would grudge paying his share at all.

4052. (*Mr. Coode.*) Do I rightly understand you, that in the wreck of the *Annie Jane* 340 lives were lost?—Yes; I believe that was the number.

4053. I think you also said, that in a ship of your own, which was lost in the same locality, there was a loss of life. Can you tell me how many people perished?—There were four persons drowned.

4054. Were they the whole crew on board the ship at the time?—No; there were 12 hands on board, and the rest were saved in boats.

4055. (*Mr. Lindsay.*) I think that you stated just now that you are of opinion that generally speaking shipowners would not object to the payment of tolls for the construction and maintenance of harbours of refuge in consideration of the advantages which they would derive from the decrease which would take place in the rate of insurance. May I ask you if you have talked with many shipowners upon the subject?—Yes; I may say that I have.

4056. And may I ask if those shipowners with whom you have conversed have expressed any objection to the payment of a portion of the expense necessary for the construction of harbours of refuge in the form of a passing toll?—Well, of course there are differences of opinion on the subject; but, speaking generally, I think that the shipowners are agreeable to being taxed for that purpose if they receive any guarantee that the money will be judiciously and properly expended.

4057. Do you not think that the nation would gain largely by the construction of harbours of refuge?—I think that the construction of such harbours would be a great gain to shipowners, to underwriters, and, in fact, to the whole commerce of the country generally.

4058. Do you think that they would be the means

of saving life to any considerable extent?—Yes; I think that they would.

4059. I think I gather from you that you consider that the owners of ships ought to contribute a fair proportion towards the construction and maintenance of harbours of refuge?—No; I consider that the sum might most legitimately be raised as a national tax; but at the same time I think, that rather than go without the advantage to be derived from the construction of harbours of refuge, the owners of ships would, generally speaking, not at all object to paying their fair share of the expense.

4060. Then, if I understand you correctly, you think that such harbours ought to be constructed by the nation, but, rather than forego the advantages to be derived from them, you, as a shipowner, would be willing to contribute a fair proportion towards their construction?—Yes; I would not object to contributing a fair proportion.

4061. Have you yourself underwritten ships passing through the Pentland Firth at any time?—Yes; I have done so.

4062. Have you ever charged double premium upon the insurance upon ships passing through that firth?—Yes; I have done so upon ships passing through in the winter.

4063. Do I understand you to say, that in cases where the premium would be 20*s.*, you in winter time would charge 40*s.* upon vessels passing through the Pentland Firth?—Decidedly so.

4064. Would you decline taking the risk at a less premium?—Yes, I should.

4065. May I ask you if in winter time you would charge an extra rate of premium upon ships going north of the Orkney Islands?—Yes; I should do so in winter.

4066. Would the premium upon ships going north of the Orkney Islands be as heavy as it would upon ships going through the Pentland Firth in winter?—Well, I think that it would.

4067. Now, will you let me clearly understand, is that increased rate of premium caused by the dangers of the navigation of the Pentland Firth in winter, or from the general danger of navigating in northern latitudes during the winter months?—Well, the winter season is very bad for the navigation of the Pentland Firth, and it becomes dangerous.

4068. Let me clearly understand you. If a vessel were offered to you, and the owner told you that she would not go through the Pentland Firth, or north of the Orkney Islands, would you be disposed to make any difference in the rate of insurance?—Yes; I think that a less premium would be demanded. A ship coming from America to the east coast of Scotland, either through the Pentland Firth or by the Orkney Islands, would be charged a higher premium than one merely going to Glasgow.

Mr. George Smith examined.

4069. (*Chairman.*) What is your name?—George Smith.

4070. What is your occupation?—I am a shipowner and ship agent.

4071. How long have you been connected with the shipping interest?—About 18 years.

4072. In what trade have the ships in which you have been interested been chiefly employed?—Almost exclusively in the trade with the East Indies.

4073. Are your ships, generally speaking, of considerable size?—Yes; they are about the largest sized ships that sail from the Clyde.

4074. Have you formed any opinion as to the advantage or otherwise of the construction of harbours of refuge on the west coast of Scotland, and if so, will you state it to the Commissioners?—I have not given the subject much consideration; but my own impression is, that upon that part of the coast they would be of little or no use; indeed, I do not know of any place where a harbour of refuge would be desirable all along the west coast of Scotland.

4075. Have you any opinion to offer as to the necessity or otherwise of the construction of harbours of refuge on the north coast of Ireland?—Yes; I may say that I have seen a petition praying for the construction of a harbour of refuge at the Skerries, which I was asked to sign; but I refused to do so, as I considered it would be an unnecessary waste of public money.

4076. Do you know Loughindall?—Not very well. I know the position of it, and have been in that quarter, but I have only seen the place itself from a distance.

4077. Are you acquainted with the north-east coast of Scotland?—Yes; I may say that I am.

4078. Have you any opinion to offer as to the advantage of the construction of a harbour of refuge upon that coast, either as regards the passing trade, or as to contributing to the safety of persons engaged in the fishing trade there?—Yes; I think a harbour of refuge is very necessary upon that coast, and that it is much wanted by the boats engaged in the fisheries. I think that if such a harbour could be constructed at a moderate expense in the neighbourhood of Wick it would be very desirable.

4079. You, as a large shipowner, have a large stake in the question. Would you be disposed to object to any expenditure of the national funds for that purpose?—Not if the money were judiciously expended; but care would have to be taken that particular places were not selected for jobs or party purposes. I cannot think that any harbour of refuge can be necessary at Portrush.

4080. May I ask what instructions you give to your captains with reference to making use of harbours?—As far as we are concerned, our instructions to our masters are not to make for any harbour of refuge, but to keep out to sea, and continue on their voyage, if they can possibly do so.

4081. Although such instructions might be applicable to large and well-found ships, do you think that they would be applicable to a smaller class of ships not so well found?—My impression is, that they would be generally applicable to all ships. As a general rule, masters of coasting ships are acquainted with every hole and corner on the coast, and it is very rarely that we hear of a coasting vessel being lost. The want of education on the part of the masters of those ships has been spoken about, and attempts have been made to get them under the same control as masters of foreign going vessels, but if we look to the facts of the case, it is clear that those vessels must be most admirably managed when we consider the great number of them and the very few losses that occur.

4082. Supposing that the Government came to a determination of expending a considerable sum of money in the construction of a harbour of refuge, with a view of saving life and property on the north-east coast of Scotland, both as regards vessels engaged in the coasting trade and vessels engaged in the foreign trade, where do you consider would be the best locality?—I think that the number of persons engaged in the coasting trade on that part of the coast must be much greater than those engaged in the foreign trade, and I think that Wick would be a very good place for the construction of such a harbour; there are at times as many as 1,400 boats engaged in the fisheries, having on an average each 5 or 6 men on board.

4083. (*Sir F. Smith.*) I think I understood you to say that the captains and masters of vessels engaged in the coasting trade are so well acquainted with all the natural harbours and places to which they can run, that in consequence the loss of life and property is very limited, is that so?—Yes, in the particular district to which I referred.

4084. Do you mean the west coast of Scotland?—

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Sir F. Smith.

Yes, that is the only district of which I speak of my own knowledge.

4085. (*Mr. Lindsay.*) Will you state to the Commissioners what is your general opinion upon the subject of the construction of harbours of refuge, not confining your opinion to those particular points to which your attention has been more particularly called, but taking into consideration also the Bristol Channel, the north-east coast of England, the east coast of Scotland, what do you think as to the expediency of constructing such harbours as a means of saving life and property ?—I must say that I question very much whether any advantage would have arisen in the cases which have been referred to by Mr. Mitchell, if any harbours of refuge had existed on the east coast of Scotland. In the case of the *Annie Jane*, I do not think that the existence of a harbour of refuge would have been the means of saving life, because persons acquainted with the navigation of the Pentland Firth could have run either to the north or to the south and have found shelter. In the Orkney Islands there are numerous natural channels which a vessel could run into if the approaches to them were properly lighted, and, generally speaking, I cannot say that it is my opinion, that, speaking generally, any great advantage could arise from the construction of such harbours.

4086. But allow me to ask you if it should appear in the course of the present enquiry that harbours of refuge, well constructed and well planned, would be the means of saving life and property to a considerable extent, would you, as a large shipowner, object to being taxed for the construction and maintenance of such harbours, or is it your opinion that the nation should bear the whole of the expense so incurred ?—If it were found to be necessary or desirable for the preservation of life and property that such harbours should be constructed, I think the fairest way of meeting the expense would be to cast a moiety on the consolidated fund, and the remaining moiety upon the shipping interest.

4087. Is it your opinion that that moiety should be levied in the form of passing tolls, or do you think that the expense should be borne by those ships which used the harbour ?—I think that a passing toll would be the best means of levying the amount, for if it were thrown upon those ships alone which use the harbours, it will fall very heavily on them.

4088. It has been stated to us, in the course of the inquiry, that it is a common practice for ships to leave port with their crews in a state of drunkenness, and that consequently the lives of those on board are placed in great jeopardy ; can you speak as to that point of your own personal knowledge ?—I am sorry to say that it is a common practice for crews to go on board in a beastly state of drunkenness.

4089. Do you think that in that respect things have become worse since the establishment of the shipping offices ?—I do not think that they have made things worse, but I am satisfied that they have caused no improvement.

4090. Do you think that the evil prevails to a greater extent than it did many years ago ?—I have not noticed any material alteration myself.

4091. Do you think that any alteration in the machinery of the shipping offices could be made which would tend to the improvement of the existing state of things ?—The only thing I can suggest would be to make the men more dependent upon character ; it is desirable always that shipowners should have some hold upon the crews, and it was a great mistake ever to do away with the system of registration; that system might have been much improved, but by abolishing it seamen are able to take any number of aliases, and the constant practice is for men to engage themselves under fictitious names. An improvement of that system might easily have been effected, which would have tended to make seamen depend upon the possession of a good character, and that would have been of great advantage; the great defect of that system as established was, that it afforded too great facilities for obtaining tickets of registration.

4092. Have you ever found that after you have engaged seamen they have declined going on board their ships ?—Very often indeed.

4093. But have you no remedy in such cases ?—No real remedy. By the law as it at present stands we are enabled to stop the day's pay for every day a seaman remains on shore after the end of his leave, but no master would ever entertain the idea of stopping a sailor's pay, it is a thing they would not like to do, and even if they were to do it it would be no return to us for the injury which we sustain, frequently being compelled to keep 30 men waiting at the tail of the bank until the whole crew have gone on board.

4094. What facility have you for compelling men to go on board after they have signed articles ?—If you can get your hands on the sea you can compel the owner of the shipping office to put them on board.

4095. Has the shipping master power to compel the officers of the shipping office to put them on board ?—I am not aware if he has ; I cannot answer the question, nor do I know if their officers can punish the men for not joining their ships after engaging themselves.

4096. (*Capt. Washington.*) Are you yourself a sailor ?—No ; I am not.

4097. I ask the question in reference to the opinion which you expressed that there was no great difficulty in the navigation of the Pentland Firth ?—I am no sailor, but I have been through that firth.

4098. Are you an underwriter ?—I was one some years ago.

4099. But you are not at present ?—No.

4100. Did you ever underwrite vessels passing through the Pentland Firth ?—No ; I do not remember that I ever did so.

Captain KELSO re-examined.

Captain Kelso.

4101. (*Capt. Washington.*) Did I understand you to say that in your opinion Wick or Sinclair's Bay would be a better site for the erection of a harbour of refuge than Peterhead ?—Yes ; that is my opinion.

4102. And I think that the reason you assigned for that opinion was the large number of vessels engaged in various trades in the neighbourhood of the Pentland Firth ?—Yes, that is so.

4103. What is your opinion with regard to the construction of harbours of refuge on the Irish coast ?—I do not think that they are much wanted there.

4104. Do you think that, as regards St. George's Channel any harbour of refuge would be desirable ?—I think that such a harbour constructed in Mount's Bay would be of considerable advantage.

4105. That would be as regards ships running up channel ?—Yes, and outward bound ships.

4106. Coming back to the north, is there any place where you think that a harbour of refuge would be beneficial ?—I do not see any locality better adapted for the construction of such a harbour than the Isle of Man.

4107. And in the Isle of Man which locality would you prefer ?—I should consider Langness Point a very good place.

4108. Do the tides run strong at Langness Point ?—From three to four knots an hour.

4109. Now, does the tide run nearly as strong as that in Douglas Bay ?—No, there is scarcely any tide at all there.

4110. But is that not in favour of selecting Douglas Bay for the construction of a harbour of refuge?—Yes, that circumstance perhaps might.

4111. Are you acquainted with the harbour at Carlingford ?—Yes.

4112. Do you think that it would be desirable to to deepen and widen the approach to the present harbour ?—Yes, I think that it would.

4113. Going south, do you think that it would be desirable also to improve the harbour of Waterford?—Yes, I think that it would be, but sailors are afraid of getting among the rocks on that coast.

4114. Do you know Carnsore Point?—Yes.

4115. Do you think that a harbour of refuge there would be of any advantage to shipping?—I do not think that one is wanted there at all.

4116. Now suppose the bar of the channel at Waterford were deepened 20 feet at low water, would that be of any benefit to shipping in your opinion?—(No answer.)

4117. Is there any difficulty in taking Queenstown?—It is very well buoyed.

4118. Are you acquainted with the north coast of Ireland?—Yes; I have traded between Liverpool and Sligo and Westport.

4119. For how many years?—About six or seven years.

4120. Would any advantage be derived from the erection of a harbour of refuge in that locality?—Yes, I think it would be desirable to construct one somewhere about Galway, on the west coast.

4121. Do you think that another is wanted upon the north coast, near Lough Swilly or Lough Foyle?—No; I do not think that a harbour of refuge is so much wanted on that coast as on the Highland side to which ships might run in a westerly or south-westerly gale of wind.

4122. Have you ever been at anchor in Loughindall?—Yes, frequently in south-west gales.

4123. Could you get in there in a north-west gale?—Not unless you are to the westward of it.

4124. Is the holding ground there good?—Yes, there is very good holding ground; but the sea is very heavy there, and the water shallow.

4125. Do you think that a breakwater run out from Langness Head would be of advantage?—I think a breakwater from Saltpans half across the bay would be of great advantage.

4126. Would there be sufficient depth of water?—Two cables from Bowmore there are, just opposite the place, two fathoms, and the depth coming in is from 9 to 2 fathoms.

4127. Would you rather see a harbour there than at Portrush Skerries?—Yes, for the safety of large heavy ships.

4128. Does the tide run very strong at Langness Point?—Yes, about eight knots an hour.

4129. Do you know Church Bay, Rathlin; and if so, do you think that there would be any advantage in constructing a harbour there?—A very good harbour could be constructed at the north-east point of the bay, and would be useful to ships passing through the north or south channel; but a place of refuge is not so much required there as in the south channel during south-west wind.

4130. (*Capt. Vetch.*) In going to America, along the north coast of Ireland, do you take the course from the Mull of Cantyre, keeping outside the light-house at Innistrahul?—Vessels give the lighthouse a wide berth.

4131. Do you know if any vessels take refuge in Lough Swilly or Lough Foyle?—Very likely some do.

4132. Would a harbour of refuge in that locality be useful in any way?—In a north-west gale it might be useful for a great number of steamers and coasting vessels, but I consider that a harbour on the Highland side would be more beneficial.

4133. (*Mr. Coode.*) Supposing that equal accommodation could be provided at Waterford as at Wexford, and at the same expense, which place would you prefer?—I should certainly prefer Waterford.

4134. Will you state your reasons for preferring Waterford?—Because there is easy access to it, and there are no banks in the way, and you have the slack as a guide, however dark it may be; whereas, about Wexford there are a great many banks in the way.

4135. (*Mr. Lindsay.*) Have you ever been on the north-east coast of Scotland?—Yes.

4136. Have you formed any idea as to the necessity of the construction of a harbour of refuge between the Firth of Forth and the Pentland Firth?—I do not see any place where a harbour would be more useful than at Wick or Sinclair's Bay.

4137. Do you think that a harbour of refuge constructed at either of those localities would prove of benefit to all descriptions of vessels, or merely to those which are engaged in the coasting trade and in fisheries on that coast?—I think that it would be of advantage to all classes of ships. There is a great concourse of vessels about the Pentland Firth. Large ships to North America, as well as vessels going to the North Sea and the Baltic, and those engaged in the coasting trade and in the fisheries, meet in great numbers near the Pentland Firth.

4138. Is it your opinion that more vessels pass in the neighbourhood of Wick than of Peterhead?—Yes, I think so.

4139. Are you taking into consideration vessels from the north of England trading to the Baltic?—Yes, there are a great many of those vessels.

4140. Then am I to understand that, in your opinion, Wick is the most desirable locality on that coast for the construction of a harbour of refuge?—Yes, I should think either Wick or Sinclair's Bay the most desirable localities for that purpose.

4141. (*Capt. Vetch.*) Do you think a harbour at Sinclair's Bay would be as approachable as one in any other locality?—Yes, I do; and perhaps more so.

Captain JOHNSTONE, Harbour-master of Glasgow, examined.

4142. (*Chairman.*) What is your name?—J. Johnstone.

4143. What is your occupation?—I am harbour-master of Glasgow.

4144. Previous to obtaining that situation, what occupation did you follow?—I was a seafaring man.

4145. Did you ever command a vessel?—Yes, for about 13 or 14 years.

4146. In what trade was the vessel which you commanded chiefly engaged?—In the foreign and coasting trade.

4147. From Glasgow to anywhere else?—Yes. from Glasgow to Liverpool.

4148. Have you formed any opinion as to the advantage or otherwise of the construction of a harbour of refuge anywhere in the Isle of Man?—Yes; when I have been sailing in the neighbourhood I have often thought that such a harbour in Ramsay Bay would be of great advantage.

4149. Will you state the reasons which led you to think so?—I found many times ships waiting to get out, and it is very hard to get out in an east or south-east wind.

4150. Do you consider Ramsay Bay a better site than Douglas?—Yes, I think that it is better adapted for the purpose.

4151. Will you state your reasons for thinking so?—I think that Douglas Bay is too small. There is much more accommodation at Ramsay Bay than at Douglas.

4152. Have you formed any opinion as to what particular class of vessels would derive most advantage from a harbour in the Isle of Man?—I think that a harbour of refuge there would be very advantageous to all vessels, both those engaged in the foreign and those engaged in the coasting trade.

4153. (*Mr. Lindsay.*) Were you ever on the north-east coast of Ireland?—No, I never was there.

4154. Have you formed any idea as to the necessity or otherwise of a harbour of refuge in that

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locality?—No; I have not turned the matter over in my mind.

4155. You have been in communication with a large number of masters of vessels, can you tell us whether you have heard any of them state any opinion as to its being desirable to have a harbour of refuge there?—I have frequently heard it said that such a harbour would be of advantage there.

4156. Have you ever heard anything about the anchorage at Loughindall? I mean have you ever heard any masters of ships express any opinion upon that subject?—Yes, I have heard masters of ships say that they could not depend on the anchorage there.

4157. But supposing that equally good anchorage can be found there as at Portrush, and that a harbour of refuge equal in point of accommodation could be constructed there, to which would you give the preference; to Loughindall, or to the Skerries at Portrush?—I am not able to express any opinion of my own upon the subject. I can only state what views I have heard expressed, and I have always heard the Skerries preferred to Loughindall.

4158. (*Capt. Washington.*) I think you said you are harbour master of Glasgow?—Yes; that is so.

4159. Then I presume that you are well acquainted with all the points within the jurisdiction of the Clyde trustees?—Yes, I think I am.

4160. Something has been said of natural harbours at the entrance to the Clyde not being properly buoyed, do you know anything of it?—No; I have not heard of any complaint being made.

4161. I believe those harbours are not within the jurisdiction of the trustees, but are at the entrance to the Clyde?—I have never heard of any complaint being made.

4162. Is the mouth of the river, which is within the jurisdiction of the Clyde trustees, properly lighted and buoyed?—I think so; and I do not think any port is better lighted.

Bailie CLANSTON re-examined.

Bailie Clanston.

4163. (*Chairman.*) Have you been in the habit of underwriting ships to any considerable extent?—Yes, to a very considerable extent.

4164. Will you state to the Commissioners whether in your opinion the construction of harbours of refuge would tend in any degree to lessen the rate of premium upon maritime insurances?—I am not inclined to think that it would. At the present moment the rates of premium are screwed down so low that there is very little margin left for diminution.

4165. Are you in the habit of charging an additional rate of insurance upon ships going through the Pentland Firth?—There is a difference in the rate paid by ships from America to the west coast and the east coast.

4166. May I ask how much?—It sometimes comes to about 20 per cent., and in other cases not to five shillings. Much depends on the amount of the premium. Upon American ships the increase of the premium is very small.

4167. Is there much difference in the rate of insurance charged in winter and summer upon vessels going through the Pentland Firth?—Upon coasting vessels the difference is considerable, but there is not so much difference upon foreign ships.

4168. (*Sir F. Smith.*) Do you mean that there is an increased premium for foreign vessels or for coasting ships?—There is an increase in the case of both; but with regard to foreign-going ships the premium is very much the same throughout the year, but upon coasting vessels the increase for going through the Pentland Firth in winter is at least double?

4169. Are you of opinion that harbours of refuge are more necessary for coasting vessels than for foreign vessels in that locality?—I am.

4170. Is that opinion founded on the fact that the premium on insurance is so high?—I think that coasting vessels always hugging the shore are more exposed to risk.

4171. Do you think that many wrecks result from crews going to sea in a state of intoxication?—I think a great deal of loss arises from that cause.

4172. (*Mr. Lindsay.*) Supposing the case of a ship going to the Baltic from Glasgow, would you charge a lower rate of premium if there were a prohibition to going through the Pentland Firth?—No, I think not.

4173. Would you make any difference between a ship going through the Pentland Firth and one going north of the Orkney Islands?—No; a ship would be allowed to take her own course.

4174. If a vessel were going from Glasgow to Peterhead, would you make any condition that she should not go through the Pentland Firth?—I should generally make a condition that she should go through the Caledonian Canal; and that would make an alteration in the premium.

4175. In taking the risk on a ship bound from Glasgow to Peterhead, would you have a clause inserted in the policy, that if she went through the Pentland Firth there would be an extra premium to be paid?—No, I should not.

4176. Then does the entire rate of premium depend generally upon the danger of navigation in northern latitudes in winter, or upon the danger of the navigation of the Pentland Firth in particular?—Generally there is a great difference upon ships in winter coming to the east or west coast; I should charge 25 per cent. more upon a ship coming from Quebec to Peterhead, than I should upon one coming to Glasgow.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sittings at Glasgow closed.

PORTRUSH.

Friday, 10th September 1858.

PRESENT:

Admiral HOPE (Chairman).

Mr. LINDSAY.
Captain WASHINGTON.
Captain VETCH.
Mr. COODE.

Mr. EVANS, Secretary.

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I, Counsellor Tottenham, Dublin, with whom is Mr. Alexander Keenan, Ballycastle, appear in support of a memorial from Ballycastle praying that the claims of that place to be made a harbour of refuge should be taken into consideration. I also ask liberty, as I have been unable from want of time to bring several witnesses before the Court, to cross-examine those produced in support of the harbour of Portrush.

(*Chairman.*) That is not in accordance with our usual course of procedure, and the better plan for you will be to meet the Commissioners at Belfast, at their meeting there on Monday the 13th of September, with any witnesses available.

Mr. Samuel Patton, Harbour-master of Portrush, examined.

Mr. Samuel Patton.

10 Sept. 1858.

4177. (*Chairman.*) What is your name?—Samuel Patton.

4178. What is your occupation?—Harbour-master at Portrush.

4179. Have there been any wrecks within the last few years here?—Eleven.

4180. Do vessels at present take advantage of the Skerries as shelter?—They do.

4181. Is that a return of wrecks you hold in your hand?—It is.

4182. Do you wish to put it in?—I do.

4183. Is it the general opinion of owners and captains of vessels frequenting the port, and passing east and west of it, that there should be a harbour of refuge at Portrush?—It is. I have heard it very generally talked of, and it is my opinion that for all kinds of vessels it would be of very great advantage to have it, and they would take less freight if there were a harbour of refuge at Portrush. During the month of February 1857 there were 14 vessels windbound in Larne Lough bound for Portrush, Londonderry, and Lough Swilly, one of them for five weeks. The captain of that vessel told me, that if there had been a harbour of refuge at the Skerries he could have made his voyage in as many days, because he would have had a place to run for in any gale of wind and with any tide.

4184. In the event of a harbour of refuge being made at the Skerries, which sound in your opinion should be closed?—Decidedly the western sound.

4185. What are your prevailing winds?—West and north-west.

4186. In what direction do the tides run?—North-west; consequently that causes a very heavy sea in the western sound.

4187. State the number of coasting vessels that pass here?—607 vessels, with a register tonnage of 61,451 tons; that only includes the number from 12 different ports.

4188. From what source did you get your information?—From the Customs.

4189. Can you hand in the return from them?—Yes.

4190. State the number of foreign vessels that took the North Channel from Liverpool and Glasgow for 12 months, as far as you can?—866 vessels; the tonnage from Liverpool being 9,681 tons. The tonnage from Glasgow is not given, but that number includes the vessels from Glasgow.

4191. From what source do you obtain your information?—From the Customs and coast guards.

4192. Have you any other returns you wish to put in?—No; but I wish to state that I saw 17 vessels anchored in the Skerries roads at one time.

4193. What do you mean by the last few years?—Fifteen years. From 1843 to 1858.

4194. How long have you been harbour-master?—Three years.

4195. How long have you resided in Portrush?—Twenty-five years.

4196. What was your previous occupation?—In business.

4197. Were you connected with seafaring matters?—I was not.

4198. (*Mr. Lindsay.*) How many of those vessels that were wrecked would have been saved if a harbour of refuge as proposed had been made at Portrush? Can you state?—I can state as to one of them, the *George A. Hopley*; decidedly, she passed here about 4 o'clock P.M., going west; 'twas then blowing very fresh, and after she had passed an hour out of sight she returned again, when there was a gale of wind blowing and a very heavy sea running; she was then opposite Broad Sound Skerries, and there would not have been the slightest difficulty in coming inside the Skerries roads and riding there in safety had the harbour been made; her cargo was valued at 66,000*l.*

4199. Was she in a disabled state?—She was in a disabled state in coming back from the westward; she went ashore shortly afterwards on Bally Agherton Strand, near Port Stewart.

4200. Was it on account of the heavy sea which you say was running?—Clearly and decidedly; she always made leeway until she went ashore.

4201. Did she not drop an anchor?—Not until she was going ashore.

4202. I think I understood you to say that the most dangerous winds are those from west and north-west?—Yes.

4203. Would ships not find safe shelter in Lough Foyle during west and north-west winds?—It is very difficult to enter.

4204. What is the width of the Lough from the mainland to the Tun banks?—I cannot say.

4205. Is there any other among the list of 11 vessels wrecked that would have been saved if there had been a harbour here?—Yes; the second vessel on the list, the *Strangford*, would have been saved.

4206. How was the wind when she was wrecked?—The wind was north-north-west.

4207. Was she lost in running for the harbour?—She went outside the south pier of the harbour just as she was entering it. She was not well found in ground tackle, and was afraid to take the Skerries.

4208. How do you make it out that a harbour of refuge would have saved that ship, if she was wrecked entering the harbour?—If the west sound had been closed up he would not have depended so much on his ground tackle outside the harbour, but would have gone to anchor in the Skerries.

4209. It was on account of the insufficient shelter he would have had in the Skerries that he ran to the harbour?—Yes; that is the testimony of the master himself.

4210. Can you name any others in particular?—I cannot.

4211. But you think those two would have been saved had the harbour been made?—Most undoubtedly. The information I got about the others was from the pilots.

4212. You are not able to speak of them from your own knowledge?—Quite so.

4213. (*Mr. Coode.*) Were there any lives lost?—One of the pilots can tell you.

James Campbell, Pilot, Portrush, examined.

James Campbell.

4214. (*Chairman.*) What is your name?—James Campbell.

4215. What is your occupation?—I was formerly pilot.

4216. How long were you pilot, and what is your experience at Portrush?—I was 55 years licensed pilot, and have been at sea frequently.

4217. Are the Skerries good ground for shelter and anchorage?—Very good holding ground.

4218. Would you consider the Skerries more suitable for a harbour of refuge than Loughindall or Rathlin?—I would.

4219. Suppose the harbour were made at Portrush, which sound do you consider should be closed?—Broad Sound should be kept open, because the sea comes from the north-west.

4220. What is the character of your duties as pilot? Is it simply to bring vessels into the harbour, or are you a pilot all along the coast?—All along the coast, but principally for Coleraine and Portrush; that is what I get my licence for.

4221. You stated that the Skerries afford good ground for anchorage; will you tell me the nature of the holding ground?—When we were riding in a gale, I have lifted clay on the anchor more than once or twice.

4222. Is there any difficulty in purchasing the anchor?—When the anchor has settled down, and has a good hold, it takes a good heave to get it up.

PORTRUSH.

James Campbell.

10 Sept. 1858.

Chairman.

4223. Is the anchorage generally clear of rocks?—There are no rocks in the anchorage at all.

4224. You stated that the Skerries is very much more suitable for a harbour of refuge than Loughindall; will you tell me why?—Loughindall is a very bad place for holding an anchor, as there are 5 or 6 fathoms of grass, which chokes the anchor.

4225. Were you ever in Loughindall?—Several times.

4226. How often?—As many as ten. I knew I was sometimes bound by the west, and had to go round past Loughindall, because I knew the anchorage would be choked.

4227. What is the greatest number of vessels you ever saw in Loughindall?—Sometimes eight or ten, bound west.

4228 Did you ever see a vessel drive at Loughindall?—I did.

4229. How was the wind?—North-west.

4230. Is north-west right into the anchorage?—Right into it.

4231. This vessel, which drove with the wind, went right on shore?—She went ashore.

4232. You state that the west sound should be closed, or rather that the broad sound should be kept open; what are your reasons?—Because the heavy sea that we have comes from the north-west. The sea that breaks outside is not a heavy sea; in the broad sound no heavy sea comes in all over the little islands and western sound, though dangerous winds come.

4233. (*Mr. Lindsay.*) You know the whole of this coast pretty well?—I know it pretty well.

4234. What course do you steer going into Loughindall? What is your course on entering the bay?—East-north-east; after you get to the narrow point of land at the anchorage, south-east. Ships are well protected there, so far as the land shelters them.

4235. Is the shelter at the mouth of the bay?—At Bowmore, and that is where the anchorage is choked.

4236. Is it full of grass?—It is.

4237. What is the holding ground?—I do not know whether it is clay or not.

4238. Do you know Lough Foyle?—I do.

4239. Have you been ever there?—Very often.

4240. Is there any shelter from west and north-west gales?—There is good shelter when you go up about ten miles, but no shelter anywhere below that.

4241. Where is there any shelter in Lough Foyle during westerly gales? how far up?—Nine miles from Quigley's Point; no safety below Culmone.

4242. Is there any difficulty in taking Lough Foyle during west and north-west gales?—It cannot be taken at all during ebb tides.

4243. Is it on account of the strength of the current that ships cannot take it at ebb tides?—Generally it is impossible to take it.

4244. What is its running-out speed?—Eight or nine knots in ebb.

4245. Have you ever known any vessels lost taking Lough Foyle?—I have.

4246. Could you say about how many?—I can't recollect how many.

4247. Mr. Patten gave us a list. Do you remember any of them? First, there is the *Exmouth* from London in 1843. Do you remember her loss? It was a very sad one.—I do not recollect it.

4248. There is another. Do you recollect the loss of the *Reliance* in 1851 at Portballintrae?—I do.

4249. Do you remember, was it blowing strong at the time?—Not very hard.

4250. How was the wind?—About north.

4251. How was she wrecked?—He took Bengore Head for the Bull of Rathlin.

4252. There is another sad loss, the brig *Liverpool* in 1841, near Port Stewart. Do you remember it?—I do.

4253. How was the wind?—North by east.

4254. Do you recollect any other wreck?—Yes; I recollect a schooner called the *Abbey* that drove into the rocks between Portrush and Port Stewart.

4255. Would that vessel have been saved if there had been a harbour of refuge at Portrush?—She would have been saved.

4256. How?—If there had been a harbour of refuge they would have run for it certainly.

4257. (*Capt. Washington.*) You stated you could not take Lough Foyle in a north-westerly gale. What is the reason?—The entrance is west by north. I knew a ship belonging to Derry that was in under Innistrahull Head, and though he was bound for Derry, he had to run away for Lough Larne.

4258. How far is it from Lough Foyle to Lough Larne?—Fifty miles.

4259. And he had to run 50 miles before he could get into a place of safety?—Yes.

4260. In a south-westerly gale?—Yes; and if there had been a harbour of refuge at Portrush he would have went there.

4261. How far is Innistrahull from Portrush?—About nine miles.

4262. In the case of that vessel was she wrecked?—She was not; she went on to Larne.

4263. Do you know of any other vessel that had to run away?—Several; some to the harbour at Portrush, and some to the Skerries.

4264. Even in the present state of the roadstead, do they run here?—They do in a south-westerly gale.

4265. In what wind can you get into Lough Foyle?—North and east by south; but with any westerly wind we cannot get into Lough Foyle.

4266. What are the worst winds on this coast?—North-westerly.

4267. Do north-westerly winds send in the heaviest seas?—Yes.

4268. Do you know of any vessel having been wrecked on the Tuns at the entrance of Lough Foyle?—I did. I once offered to take a ship into Lough Foyle for three pounds, or sixty shillings, and boarded her for that purpose; but the captain said he would see me three times damned first. I then left her, and in three quarters of an hour afterwards she was on the Tuns, and went to pieces. That was a long time ago.

4269. Where was she bound for?—Liverpool.

4270. Those ships that ran away to Larne, why did they not stop at Ballycastle?—That was no place at all.

4271. It is quite open?—It is; some vessels stop a tide there; but it is no place of safety, a child would not take a vessel into Ballycastle Bay.

4272. Were you ever there?—I have "dodged" a tide in it.

4273. Suppose it was made into a harbour of refuge, would it be a suitable spot?—I think they tried that before and lost their money.

4274. Oh! that was a small pier; but suppose a large pier was run out would you consider it as suitable a place for a harbour of refuge as the Skerries?—I would not think it would, there is no breakwater there.

4275. It is nine miles from Church Bay to Rathlin; does the tide run rapidly through Rathlin Sound?—Nine knots an hour.

4276. Is it rough to take a passage in an easterly gale in a flood tide?—They sometimes take that passage when they can't help it.

4277. Do vessels ever take it?—Large vessels go on the outside.

4278. Do vessels take Church Bay?—Yes; and in easterly winds they have shelter there.

4279. Have they good holding ground?—Never saw an anchor coming home.

4280. (*Mr. Coode.*) You say the Skerries roads are clear of rocks?—Never met any stony ground nor rocks.

4281. If on the plan before me I have rocks and stones shown in several parts, would you say it is correct?—Never knew of any, and no man was oftener on the Skerries.

4282. (*Chairman.*) You stated the loss of an American vessel?—Yes.

4283. Would she have been lost if you had taken charge of her?—I am sure she would not.

4284. How was the wind?—The wind was south-south-east.

4285. What was her tonnage?—700 tons.

4286. (*Capt. Washington.*) You say you think that broad sound should be left open?—Yes.

4287. Does a north-westerly gale bring the sea in by the broad sound?—No; the waves all come in by the western sound, and not at the broad sound.

4288. Are there many hold this opinion as well as yourself?—Yes.

4289. How many pilots are at Portrush?—Six.

4290. Where are they licensed for?—Coleraine and Portrush.

4291. Is that all?—Yes.

4292. What draught of water can be got into the Bann?— Nine feet over the bar at high water in spring tide.

4293. Is there a good deal of trade to Coleraine now?—Not so much since they got the harbour extended here; a great many more vessels go to Portrush than to the Bann.

4294. Where do you get your licence from?—The Customs at Coleraine.

4295. (*Chairman.*) Did I understand you to say that with a north-west wind blowing, a vessel could not go into Lough Foyle?—She could not if it was blowing a gale with an ebb tide.

4296. With a north-west wind could she come to the Skerries?—She could.

4297. If it was a flood tide could she get into Lough Foyle?—Yes, if she was able to carry as much sail.

4298. In an ebb tide how far to the northward must the wind be to take a vessel in?—She might fetch in with a north-north-west, but no farther to the westward.

Mr. HUTCHINGS, Second Master, R.N., and Chief Officer of Coast Guard, Portrush, examined.

4299. (*Chairman.*) What is your name?—Hutchings.

4300. What is your occupation?—Second master and chief officer of coast guard.

4301. How long have you been in Portrush?—Four years.

4302. Had you any previous knowledge of this district of coast?—Not any.

4303. Have there been any wrecks on this coast within those few years, and if any state the dates?—There have been three wrecks during the time I have been here.

4304. Have you had any knowledge of these wrecks previous to your coming here?—No.

4305. Is there good holding ground at the Skerries?—Very good.

4306. Do vessels at present take advantage of the Skerries as a place of safety?—There is no other place available.

4307. In your opinion which sound should be closed?—The western.

4308. Can you state the circumstance attending the wrecks which occurred within your knowledge?—I can.

4309. Do so?—The greatest wreck was that of the *George A. Hopley;* the wind was blowing a gale from north-north-west; she came through Rathlin Sound with a fresh breeze from south-east; the wind suddenly shifted to north-north-west, and blew very hard. I first saw her off Ramore Head, about a mile off shore, with a close-reefed topsail and foresail; she was then on the star-board tack, but making a great deal of leeway; about three hours afterwards, about half-past eight in the evening, she was very close to the black rock, near Port Stewart; the tide caught her there, and took her out to sea, but about half-past eleven o'clock P.M. I received notice she was ashore on Ballyagherton strand. I took the captain's deposition, and he said he attempted to wear off the Tun banks, but he got so close on he had to let go his anchors, and was taken right along the strand at Port Stewart until he struck on the beach; she became a total wreck, and lies there now.

4310. You told us of three; will you state the circumstances attending the wrecks of the other two?—The second was the *Strangford,* a small schooner bound for Derry with coals from Troon; she bore up for Portrush Harbour, and had just succeeded in getting in the harbour, but unfortunately her anchor did not hold, and she drove against the south pier; her remains are there now. With regard to the other I can scarcely call it a wreck. I rendered some assistance to her in the Skerries; she did not become a wreck, but was in distress.

4311. Does the wind often shift from south-east to north-west and blow hard?—Never saw it so strong before as I did when the *Hopley* was wrecked.

4312. Had it been blowing hard from south-east for some time?—No; it was in July, and came on very unexpectedly.

4313. Which is the heaviest weather on these coasts? From what direction does the wind come?—From north-north-west to west.

4314. How do these north-west winds commonly commence?—There is generally a heavy swell a few days before, and the glass rises suddenly; they come on occasionally from north-north-west and occasionally from west.

4315. The heaviest north-west gales do not commence at south-west and back round, but commence at west and freshen up into a gale?—Yes.

4316. Describe the nature of the holding ground at the Skerries?—Blue clay covered with from 6 to 8 inches of sand, and is quite clear of rocks.

4317. Have vessels any difficulty in purchasing their anchors?—It requires a very strong heave, in my experience, to lift an anchor.

4318. Did you ever know an instance of a vessel driving from her anchors?—Never heard of one.

4319. Did you ever hear of one parting from her anchors?—I have heard of their chains going, but I cannot say of my own knowledge, for it was not in my time.

4320. You stated that the broad sound should be kept open; would you give your reasons?—Because there is not near so much sea in a gale of wind, nor is there so much tide; no vessel would attempt the west sound in a gale of wind.

4321. Why would no vessel attempt the west sound?—On account of the heavy seas and strong tides setting through it.

4322. And therefore you are clearly of opinion, that if a breakwater be made it should be by joining Revigally Point to the small islands?—Decidedly.

4323. Blowing hard from the north-east, is there no sea sets into the anchorage through the broad sound?—No.

4324. (*Mr. Lindsay.*) You say in four years there have been three wrecks on this coast?—Only two; to the third I only rendered some assistance.

4325. One of them was the schooner to which the the harbour-master referred?—Yes.

4326. And the other is the large vessel?— Yes.

4327. Were there any lives lost?—All the lives saved.

4328. If there had been a harbour of refuge at Portrush, would that vessel have been saved?—Certainly; she would not have gone in at Port Stewart.

4329. Whydid not the captain take advantage of the present shelter?—He knew of an anchorage inside the Skerries, but did not know his way into it; he had no large plan of the place, but merely a coasting chart. He told me, had he known his way in he would have gone.

4330. If the vessel had run in would she have been saved?—Certainly.

4331. Would she have been saved equally as well

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with the present shelter as if the harbour was made?—I believe so.

4332. Do you know Lough Foyle?—I do not.

4333. Do you know Loughindall?—I do not.

4334. (*Capt. Washington.*) Do you live in sight of the Skerries?—No; I live facing the harbour.

4335. Do you see the Skerries daily?—Yes.

4336. Through which sound do the heaviest seas come in a north-west gale?—Through the western.

4337. Are you quite certain?—I am quite distinct on that point.

4338. You stated there was a strong tide running past the western entrance, I think?—The flood tides run to the north-west, in a north-west direction, through the roadstead; in the offing it is more to the westward; it sets through or across the western sound.

4339. Is it rapid?—Four or five knots.

4340. Are you able to pull against it?—No.

4341. Does it run equally strong through the broad sound?—I have not been in it.

4342. Are you quite sure the heaviest swell sets through the western sound, and not through the broad sound?—Certainly.

ALEXANDER McALLISTER, Chief Boatman, Coast Guard, Portrush, examined.

Alexander McAllister.

4343. (*Chairman.*) What is your name?—Alexander McAllister.

4344. How long have you been in the coast guard?—Twenty-seven years.

4345. How long have you known Portrush and the Skerries Roads?—Eighteen years.

4346. Do you consider a harbour of refuge necessary there?—I do.

4347. Are vessels going north about on the increase?—Five to one from what has passed out and in, even in my time. I have seen as many as six outward and one inward bound vessel pass in one afternoon.

4348. Do vessels at present take shelter in the Skerries?—They do.

4349. Is there good holding ground at the Skerries?—There is.

4350. In your opinion, which sound should be closed?—The western sound.

4351. You say you consider a harbour of refuge necessary at the Skerries; tell me why?—From the number of vessels that take shelter there; and because that, on two occasions, wrecks occurred that would not have happened if a harbour had been there, because they would have taken shelter and been saved.

4352. To what description of vessels would this harbour be of most use?—To the larger engaged in the foreign trade and the smaller vessels engaged in the coasting; it would be of use to both. I recollect three different vessels standing off for days, not able to make their own port; and if we had had a refuge harbour at the Skerries, these vessels could have taken shelter there. One of them was bound for Derry, wind west-south-west.

4353. In what direction does the wind blow hardest?—From west-north-west to north-west, and the north-west never dies in debt if it blows from south-east; it very often chops round to the north-west, particularly in squally weather.

4354. What time of the year have you the worst weather, generally speaking?—I would say that we have very coarse weather during eight months of the year, from September to the month of April.

4355. What is the largest number of vessels that you ever saw at once in the Skerries?—I have seen a considerable number of vessels there. I never counted them, but I would say I have seen so many as ten.

4356. Had all these a pretty good shelter?—They had a favourable shelter, but not to be considered a safe shelter. It is necessity that makes them avail themselves of it. I knew of one instance of a vessel from Wick, commanded by a young man of the name of Hamilton, from this port, that was forced to run for the Skerries. She got round by the east end during one of the worst gales I have seen, and rode it out there in safety.

4357. How was the wind?—The wind was northward.

4358. Does it often blow hard from the north?—Not so often as from north-west. The north-west is a particularly heavy wind.

4359. Have you heavy winds from north-east?—The winds from north-east do not rise so heavy a sea as those from north or north-north-west.

4360. (*Mr. Lindsay.*) How long is it since you knew you were to be here as a witness?—A few days ago.

4361. Did you see the list of questions?—I have not seen anything before to-day.

4362. Were you aware that this question, "Do you consider that a harbour of refuge is necessary at Portrush," would be asked you?—It was commonly understood that that would be one of the questions asked; and my opinion is that it is necessary.

4363. So you are aware, I suppose, that the principal object of a harbour of refuge is to save life and property?—These are the first two objects.

4364. Say that, had a harbour of refuge been made here 18 years ago, can you tell the Commissioners what amount of life and property would have been saved by that harbour; for you have had some days to consider the matter?—I did not think I would have been called on to answer that question.

4365. You knew you would be asked the question, "If a harbour of refuge was necessary at Portrush," and you might have known that you would be asked on what grounds you came to that conclusion?—There have been several cases of shipwreck; and if those vessels that were wrecked had been able to avail themselves of a harbour of refuge here, there would have been a great deal of life and property saved, as, for instance, in the case of the *Exmouth*.

We had this explained before by another witness.

4366. Do you know of no other vessel?—Since I came here I know of none.

4367. Do you know of no life or property that would have been saved by a harbour of refuge during the 18 years you have been on this station?—The *Charlotte* was wrecked west side of Rathlin Island, bound to Portrush, wind north-west. If a harbour of refuge had been formed here she would have availed herself of it, and been saved. It blew strong in for part of that day, and there was a heavy sea running. The pilots were not able to board her from the harbour; the consequence was she became embayed, and was wrecked off the present harbour.

4368. Do you recollect the wreck of the *Baron Haynau*?—I do.

4369. How was the wind?—The wind was not blowing a gale.

4370. Do you recollect the wreck of the *George A. Hopley*?—Yes. She could have availed herself of the anchorage at the Skerries, and if she had, she would have been saved with the anchorage as it is; but with a harbour, as proposed, she would evidently have been saved.

4371. Do you know of any lives that would have been saved during 18 years?—There were no lives lost on this part of the coast.

4372. Do you know Lough Foyle?—I never was round that quarter.

4373. Do you think that many vessels taking the north-about passage from Liverpool would avail themselves of shelter at the Skerries during strong north-west winds, when they could not make their port westward?—Undoubtedly, for I see a great number of vessels standing off and on when the wind is blowing north-west.

4374. Have you had any conversation with masters of ships taking this channel in the coasting trade?—Yes.

4375. Do they think a harbour of refuge necessary here?—They do.

4376. Is there a greater number of vessels passing in and out Channel from Liverpool and Glasgow now from what there used to be?—Five to one.

4377. (*Capt. Washington.*) Are you often afloat on the roadstead of the Skerries?—Sometimes.

4378. Once a day?—Of course not.

4379. Once a week?—I would not be so often.

4380. Once a month?—I would say I am more than that.

4381. Is it part of your duties to board vessels that arrive in the roadstead?—Not unless there are any suspicions attached to them.

4382. Do not the coast guard keep a list of vessels that arrive?—They do when they board them.

4383. You do not board every vessel that arrives in the roadstead?—Not unless they are suspicious.

4384. Have you ever pulled out through the west sound against the tide?—It is very heavy pulling with a four-oared boat.

4385. Did you ever pull out of the broad sound?—Very frequently; there is not half the tide running in at broad sound that runs in at the west sound, nor half the sea.

4386. Do you live in sight of the roadstead?—I do; and have lived there for 18 years, and it is my opinion in north-west gales a greater amount of sea comes in at the western than at the broad sound.

4387. Does the sea ever break in the inside of broad sound?—Never saw it break there, but it breaks over the small rocks.

4388. In an eastern gale is there much sea in the roadstead?—Not a very heavy sea, a vessel could ride in the Skerries in an eastern gale.

Mr. W. C. Gage, Newtownlimavady, examined.

4389. (*Chairman.*) Where is your residence?—Newtownlimavady, in the county Derry, halfway between Londonderry and Coleraine.

4390. Did you ever live here?—I did, between the years 1830 and 1836.

4391. Did you ever know of vessels going north about being detained by contrary winds?—On several occasions.

4392. Are you tolerably well acquainted with this district of the coast?—I was born here.

4393. Have you been much at sea?—No; I have been mostly engaged in mercantile pursuits, and served in Gibbs, Bright, & Co.'s office in Liverpool.

4394. Were you employed in any other way?—I was 4½ years a banker, and am now a land agent.

4395. You have no special connexion with the shipping interest?—None.

4396. Have you formed an opinion as to the necessity of a harbour of refuge at the Skerries?—It would be of the greatest advantage, looking on it as a passenger port for the north of Ireland.

4397. Do you feel yourself competent to offer an opinion with special reference to the importance of the Skerries as a harbour of refuge?—The north-about passage is more in vogue now than it was when I was in Liverpool, and it would therefore be of great advantage to have a harbour of refuge here; thus I have known a vessel, after beating about the channel, put into Cork Bay, whereas a vessel that was commanded by a master who knew the channel north-about had reached an American port as soon as the other had dropped her anchor in Cork. When Captain Davenport, master of the *Robert Napier* steamer, commanded a ship sailing from Liverpool, he told me that he always preferred a north-about channel, and that the same thing occurred to him once, that he had been to his port in America before another vessel going south-about was out of the chops of the channel.

4398. (*Mr. Lindsay.*) How do you think that the formation of a harbour of refuge at Skerries would be a convenience to the passenger trade from the north of Ireland?—Because the emigrant ships now leaving Derry and Belfast would leave this harbour.

4399. Why would emigrant ships prefer leaving this harbour to Londonderry or Belfast?—It is easy of access, railways leading here from both those places; and by leaving this harbour you would get to sea at once.

4400. Are there not railways leading to Londonderry as well?—There are, but they end at Portrush.

4401. Why should you desire that they would embark from this port?—Because vessels from Londonderry or Belfast come within eight miles of Portrush before they can lie out to go to America.

4402. They would be nearer to their destination going out from Lough Foyle than if they left from this, would they not?—I suppose they would by about four miles.

George Scott, Pilot, Portrush, examined.

4403. (*Chairman.*) What is your name?—George Scott.

4404. What is your occupation?—Licensed pilot, Portrush.

4405. How long have you been pilot?—Thirty-eight years.

4406. Are you well acquainted with the coast?—Tolerably well.

4407. How far does your licence extend?—My licence confines me to Portrush and Coleraine.

4408. But you have a good knowledge of other portions of the coast?—I have been to other places.

4409. Suppose the harbour were made here, which sound would you leave open?—I would close the western sound.

4410. Have there been any wrecks on this part of the coast of late years?—There have been no wrecks but what have been enumerated, except the *Fair Trader* that was wrecked at west side of bar, and the wreck of another small vessel that came ashore on Bangore Head, and no account could be given of her.

4411. Is it the opinion of captains and sailors that there should be a harbour here, and is it your opinion also?—It is.

4412. Would you state your reasons?—The first reason is, that a good many vessels bound to west of Ireland can't get a harbour of refuge here, and are obliged to bear up for the first harbour they can catch, say Belfast, Lough Londonderry, or Strangford, Lough Ryan, Lamlash, and Clyde on the larboard side. I have known vessels run to all of these places for want of a harbour of refuge.

4413. What are your heaviest gales?—I have seen heavy gales from the north-west and west, but the heaviest sea is from north-west.

4414. From what direction do your heaviest winds blow?—Many south-west gales are heavy, but there are heavy gales from other points. West winds are the principal ones on this part of the coast.

4415. Have you ever known it to blow hard from south-east, and then to chop suddenly round to north-west, and blow a heavy gale of wind?—I have often seen it blow strongly from south-west, and chop suddenly round to north-west.

4416. For what description of vessels do you consider this harbour would be most useful, for coasting or foreign trading vessels?—It would be useful for all kinds. I have seen foreign vessels of a large description taking shelter in the Skerries, and have seen small ones also, and I have seen several coasters and foreign vessels running by.

4417. Are you acquainted with Lough Foyle?—I have been in it.

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4418. Have you a good knowledge of it ?—I would not say I have a perfectly competent knowledge of it.

4419. Would you engage to take a vessel into it ?—I would.

4420. With the wind how far to the west would you take a vessel into Lough Foyle ?—With a flood tide and the wind at north-north-west; she might go in with an ebb tide, but I would not like to take her in.

4421. (*Mr. Lindsay.*) What position were those ships in, which you say ran for Lamlash ?—Some under Innishowen Head, some between Bengore Head and Innishowen, and some between Bengore Head and Innistrahull, bearing up.

4422. You say you have been 38 years a pilot ?—Yes.

4423. Do you know of any instances where life would have been saved if there had been a harbour such as proposed at Portrush ?—I am convinced the crew and passengers of the *Exmouth* would have availed themselves of it. He was within 1½ miles of Portrush under close-reefed topsail, and was wearing the ship; he was then on the north tack and went away westward. He then wore the ship and put the main topsail abaft for a few minutes; he lay in that position for some time, and I imagined he was wanting to run into the harbour, but she was lost. If there was a harbour of refuge, all vessels would know and take advantage of it in distress.

4424. If she had come into the roadstead would she have been saved, as you say there is good holding ground ?—I think she would have been saved, had her captain known the Skerries as well as I do.

4425. Then it is your opinion that she would have been saved with the Skerries as they are ?—It is because I have seen vessels come to anchor in all parts of the roadstead.

4426. (*Capt. Washington.*) What holding ground is there in the Skerries ?—Clay, with sand on the top.

4427. You have been in a vessel anchored there that brought up clay on her anchor ?—I have; but it requires a tolerably heavy anchor, with a breeze to sink it.

4428. Are you a pilot for Lough Foyle ?—I am not; but I went in there with a vessel.

4429. Did you ever take a vessel into Loughindall? —Never.

4430. Were you ever in Ballycastle Bay ?—I have gone into the bay to dodge the tide.

4431. How was the wind ?—It is a good place for dodging a tide if the wind is south or south-east.

4432. Did you ever come to anchor in it ?—I would not come to an anchor in Ballycastle Bay, but I have seen other vessels at anchor there.

4433. Have you had occasion to run through the channel to find a refuge ?—Once.

4434. Where did you run for ?—I went to Belfast Lough.

4435. What distance is that from Portrush ?—It is about 50 miles.

4436. If there had been a harbour of refuge at Lough Foyle, could you have brought that vessel in ? —I could not, for I was bound to Derry to get quarantine ground, and the wind was north-north-west.

4437. If the Skerries were made into a harbour of refuge, would many vessels take shelter there ?—I am sure there would; for I once saw a large Prussian ship coming in for shelter here.

4438. Do you think it would be worth asking the government for 100,000*l.* to make the Skerries into a harbour of refuge ?—If one vessel was saved, and the lives of the crew, it would be worth three times that amount; for I think one human life worth the wealth of England.

4439. (*Mr. Coode.*) Is the holding ground good next the west side ?—It is hard ground next the breakwater, and under the lee of it the bottom is gravelly.

4440. Did you ever see a vessel dragging her anchors ?— Never; but saw some parting their cables.

4441. How would you anchor a vessel in the Skerries ?—I would drop her anchor at south-east, and her moorings to the breakwater, so that she would be moored stem and stern.

4442. Is there any sea in the harbour with the wind north-east ?—A skiff could pull across the Skerries, and be completely safe.

4443. With the wind round to the east ?—Merely a jebble, nothing to hurt a ship; saw them riding out a heavy wind without injury.

4444. Did you ever see a vessel part her anchors with the wind at east ?—One.

ALEXANDER CLARKE, Pilot, Portrush, examined.

Alexander Clarke.

4445. (*Chairman.*) What is your name ?—Alexander Clarke.

4446. What is your occupation ?—Pilot, at Portrush.

4447. How long have you been pilot ?—Twenty-eight years.

4448. In your opinion, which sound of the Skerries should be closed ?—The western sound.

4449. Do you know of any wrecks that have not already been enumerated ?—Not one.

4450. Is it the opinion of captains and seamen that there should be a harbour of refuge at Portrush ? —I heard them very often speak of the necessity of having one.

4451. Have you ever been in Loughindall, and do you consider it suitable for having such a harbour ?— Never knew of any large ships going there for shelter; the water is shallow.

4452. Is Rathlin good holding ground ?—I have gone past it with gales of wind from east-south-east, and tried Church Bay, and had to run for the Skerries, for an anchor never fetches up there.

4453. What is the nature of the bottom of Church Bay ?—Spotty bottom.

4454. Is there no good holding ground there ?— There is one spot of clean sand, but if you miss that your anchor will not hold.

4455. Is it your opinion that there should be a harbour at the Skerries ?—It would be very useful for ships beating in and out channel. I have known ships beating about for eight or ten days between Rathlin and Innistrahull, without being able to get to the westward.

4456. What is the objection to Loughindall as an anchorage ?—It is not a place heavy ships run for; small ships going for the west of Ireland do go there. Large ships go into Lamlash, but never enter into Loughindall.

4457. What is the reason ?—It is bad holding ground, and the water shoals.

4458. (*Mr. Lindsay.*) What is the depth of water at Bowmore ?—Three or four fathoms.

4459. Would you have any hesitation in running for Lough Foyle during a westerly gale ?—I could not get in with that wind.

4460. Could you get in with a north-west gale ? —It would take a good working ship to go in.

4461. Have you known many vessels lost taking Lough Foyle ?—Not many; I cannot say.

4462. During your own experience as a pilot, has any vessel been lost on the Tun banks ?—I recollect one vessel, the *Jenny Campbell.*

4463. Do you remember any other vessel being lost on the Tun banks ?—No, not there; but I knew of a vessel going ashore at Greencastle with a gale of wind.

4464. Do you think many of those vessels which you saw beating off here would take shelter there ?— I do not; but it would save the crews of vessels off shore many a hard night's fatigue, and the vessels

much wear and tear, if a harbour of refuge was made at Portrush.

4465. Do you think it would offer great facilities to commerce if there was a harbour of refuge here?—I do.

4466. (*Capt. Washington.*) Did you say that ships bound to Derry go to Lamlash because they could not get into Lough Foyle?—I did; and I knew ships belonging to Derry come to Skerries, and I knew of one ship having to leave her anchorage in Lough Foyle, and was obliged to run into this harbour, and some gentlemen here know that same vessel to have been the brig *Fly*. There are very heavy gales in Lough Foyle, and there is no safety there until you get up to Quigley's Point; below that ships are in no safety in Lough Foyle.

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4467. You say that in westerly gales you cannot take Lough Foyle, and that ships at anchor inside are sometimes driven from them?—Just so; it is not a harbour of refuge until you are well up.

Captain THOMPSON, Master Mariner, examined.

4468. (*Chairman.*) What is your name?—Thompson.

4469. What is your occupation?—Master mariner.

4470. How long have you been master?—Since 1843.

4471. In what class of vessels have you chiefly commanded?—My first command was in the East India trade, in ships belonging to the Messrs. Richardson, London; after that, in a steamer, on the east coast of Scotland; then from Liverpool, in the American trade; and from Liverpool to Melbourne.

4472. Are you acquainted with the east coast of Scotland?—I traded in a small steamer of my own to all the small ports there.

4473. Have you formed an opinion as to a site for a harbour of refuge on that coast?—I have not; did not go so far up as Wick, and could form no opinion whether Banff or Peterhead would make the best harbour of refuge.

4474. Do many vessels use the north channel in preference to the south channel?—A great many.

4475. State their reasons for doing so?—The first is, that we can get into open water quicker. Another important reason is, that vessels from the Clyde for America are nearer their destination by that passage; and it is said they charge heavier dues for lights in the south channel than they do in the north. I believe they have repealed that charge, but I am not aware.

4476. What is your experience of the tides in the north channel with regard to large ships?—The tides run very rapidly, and very varied in their directions in the northern parts of the coast. About Islay we find the currents varied, both in their velocity and direction, always setting on the coast of Ireland.

4477. Would a harbour of refuge at the Skerries tend to diminish the number of wrecks on the west coast of Scotland?—I think it would. Vessels would would not then run for the only open refuge at Loughindall, if they had one down here to come to.

4478. To what class of ships would this harbour be of most service, coasting or foreign?—Both class of vessels would equally take advantage of it on account of the facilities it would afford vessels going westward. Instead of running down to the south channel, they would take refuge here. Indeed, I have been taken away myself once or twice.

4479. In endeavouring to make your passage with a well-found ship in hard weather, would you keep the sea as long as possible?—If the refuge was near, and no hope of the weather clearing, I would make for the port of safety, if I could do so without expenses.

4480. Do you think a refuge harbour made here would be useful as a port of call for ships from the Clyde and Liverpool, or vessels coming in by the north channel to wait for orders?—For orders from the Clyde or the east coast of Scotland, this would be a good place to receive them, whether they would come on or go to other places.

4481. (*Mr. Lindsay.*) By taking the north-about passage from the Clyde or Liverpool, would it be shorter than to go south-about?—From Clyde, through the north channel, certainly; but from Liverpool, it would depend on the wind. No man will beat down the English channel in the face of a south-west wind, if he knows the north channel.

Captain Thompson.

4482. Do you think that there being no place of shelter in the north, induces people to take the south channel?—Oh, certainly.

4483. As a master of a ship, of considerable experience, would you have any hesitation in running for Lough Foyle, provided the wind suited?—I cannot say what wind would suit.

4484. Suppose the wind at north-north-west?—It would not tempt me to go up, unless I could get up far enough. I was never in Lough Foyle but once or twice, and I found I would have to run a long way up, and that it would take me a long time to get down again.

4485. Did you pay much attention to Lough Foyle?—I did; and it appeared to me that the Tuns lay very much in the way, and that a ship must get close on the lights before she could shape her course up.

4486. Do you know Loughindall?—I do not.

4487. Suppose you were going out or coming in the north channel, and, looking at the chart, would you be afraid to go in to Loughindall?—I would not be afraid to do anything in safety.

4488. If there was great necessity?—I think I would do it if there was no other place.

4489. Say the anchorage was as good at Loughindall, and the shelter made equally as good as what it would be at the Skerries, which place would you have least hesitation in running for?—The Skerries, on account of the currents. I do not think the currents run strong here.

4490. Do you think a harbour of refuge is so much wanted here that the shipping interest would be content to pay a passing toll for the accommodation afforded to them?—Shippers do not like to pay more than they are doing at present; but it would be very useful.

4491. Do you think that they would get an equivalent for any tax that might be levied, provided the Government would construct and maintain this harbour by a passing toll?—I think they might through time, but not immediately; and I think underwriters would be a little easier on that account.

4492. Do you think that a harbour of refuge here would induce underwriters to lower their premiums for insurance?—If they saw by experience it would be advantageous to them, but not at first. It would induce them to take the risk with greater facility, but it would not lower their premiums at present.

4493. (*Capt. Washington.*) You said you were not in Loughindall?—I did.

4494. And that the tide runs very strong at the Runs of Islay?—Yes, and was very glad to get away once.

4495. How did you obtain your information?—More from the directions than from personal experience.

Captain JOHNSTON, Master Mariner, examined.

4496. (*Chairman.*) What is your name?—William Johnston.

4497. What is your occupation?—Master of a steamer.

4498. How long have you followed the sea?—Thirty-five years.

Captain Johnston.

4499. How long master?—Twenty-six years.

4500. Always in the same trade?—No.

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Captain Johnston.

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Chairman.

4501. How many years in the steam trade as master?—Since 1844.

4502. Previous to that, what size of a vessel did you command?—I have sailed in ships of all kinds, but it was a small ship of 136 tons burthen which I first commanded in the foreign trade.

4503. What experience have you of the north coast?—A good deal of experience.

4504. Do you consider it necessary for the security of vessels and life that there should be a harbour here?—It would be very necessary.

4505. Do you consider the Skerries the most suitable place in the north?—I do not know any place so well suited.

4506. Is the Skerries good anchorage ground?—Yes, and I have sometimes availed myself of them as a place of security.

4507. Would Ballycastle Bay be a suitable place for a harbour of refuge?—I think not.

4508. Would Lough Foyle be a suitable place?—It is not easy to get into Lough Foyle; you must have a leading wind. The tide runs strong. It would take a smart ship to beat in.

4509. Have you known many shipwrecks to take place on the north coast?—A good many, but never kept an account of them. The last I remember was an Austrian ship called the *Ann*.

4510. Would you run for Islay in a gale?—Not if I could help it. With wind at south-west ships could leave the Skerries, but not Lough Foyle.

4511. State your reasons for saying that Ballycastle Bay is not a suitable place for a harbour of refuge?—Bad outlet, and the anchorage is bad unless you make a very small harbour.

4512. Do you know Loughindall well?—Never was in it.

4513. Tell me why you consider the Skerries the most suitable place for a harbour of refuge?—It is the only place you can make between Malin and Fair Heads.

4514. Should you consider that harbour of refuge would be useful as a port of call?—It would I think.

4515. For what ships?—For ships of all classes, but principally for those engaged in the American trade from the Clyde, and for West Indiamen, which come in and go out this way.

4516. (*Mr. Lindsay.*) How long have you been master of a steamer?—Since 1844, running between London, Londonderry, and Liverpool.

4517. Do you know of many vessels lost in attempting Lough Foyle?—Not many.

4518. Do you consider the navigation dangerous?—I do. A ship will not fetch in with the wind anything to west of north-north-west.

4519. Do you think a harbour of refuge at Skerries would save life and property?—I do.

4520. Do you remember any other wrecks than the one you mentioned?—I do not.

4521. Can you see many ships beating to windward here that would have been glad to take shelter in the Skerries?—Yes.

4522. (*Capt. Washington.*) How long have you traded between Derry and Liverpool?—For the last 14 years three times a week along the northern coast.

4523. Have you known an instance of a vessel not being able to get into Lough Foyle?—Yes, and not long ago ships bound in there were obliged to go off. I have known vessels bound for Derry to lie for five weeks in Loughindall after being off the port, and could not get in. If a harbour of refuge had been here they would have availed themselves of it, because there would be no difficulty in getting in.

4524. (*Chairman.*) What number of vessels, from your own knowledge, would you be disposed to say, bound for Derry, had to go to Loughindall?—I know of one. She was off the port, but did not get into Lough Foyle, but drove up as far as the Mull of Cantyre.

4525. What was the size of this vessel?—230 tons.

4526. Did you happen to know where she was from and her cargo?—Miramichi, with timber.

4527. Can you give us any other instance of the same thing having happened?—I could not remember the time, but many vessels were obliged to go over there. I could name the *Merrimack* and the *Superior*, vessels of about 500 or 600 tons burthen, and many others; but I cannot recollect the circumstances.

4528. Did they lie there in safety?—I do not know. I never was there.

4529. (*Capt. Washington.*) What are the heaviest gales on this part of the coast?—From west, west-south-west, to north-north-west, but the heaviest sea comes from north-west.

4530. Is it against these gales that the harbour of refuge is wanted?—Yes.

4531. Could a ship get into Lough Foyle with the wind anything to the west of north-north-west?—Not except she could carry canvass.

4532. When we speak of a gale of wind do you speak of a time when she could carry canvass?—A ship could not get in except under close-reefed topsails.

4533. Are you well acquainted with this part of the coast?—I am.

4534. Are there sufficient lights for the safety of navigation?—I do not think there are. There is one wanted to light into the sound at Rathlin.

4535. Is there not one there?—Yes, but it is for the outward-bound vessels.

4536. Where would you place such a light?—On Bengore Head or Sheep Island.

4537. Are there any more lights wanted?—I do not know that there are.

4538. Is Lough Foyle well lighted?—It is; but there might be one above Magill's Point, at M'Kinney's Bank.

4539. Is the lough well buoyed?—It is, by Beresford of Derry.

Mr. Barry Duncan Gibbons, Chief Engineer of the Board of Works, Dublin, examined.

Mr. B. D. Gibbons.

4540. (*Chairman.*) You are Mr. Gibbons, and chief harbour engineer of the Board of Works?—Yes.

4541. How long have you been connected with the Board of Works?—Thirty years.

4542. How long have you been engineer?—Twelve years.

4543. Have you made an estimate of the cost of constructing a harbour of refuge as shown on this plan?—I estimated what it would cost to do the work as shown in the map before you.

4544. Have you any plan to put in evidence?—I have not.

4545. Are there any sections prepared by you?—They were given to me prepared by Mr. Hemans and Mr. Langon, and are substantially the same as those shown in the plan of the map attached to the evidence taken before the Select Committee of the House of Commons.

4546. Do you still think the estimate sufficient to complete the work?—I do.

4547. In your experience do many vessels avail themselves of harbours of refuge?—I have no local experience, but I know Kingstown Harbour, as it is under my direction, and immense numbers of vessels avail themselves of it.

4548. (*Capt. Vetch.*) Does the line marked red on the plan show the extent of the work in the proposed harbour as regards the estimate?—The work is limited to the red marks in my estimate, not to what would make it a complete roadstead.

4549. Are the stones in the vicinity of this breakwater suited for the purpose?—They are peculiarly suited for it, as they rise in large masses and are sound stones.

4550. Have you any sections of the proposed work?

—I drew sections of what I thought would be sufficient to make a rude bank of stone level with high water, and then to construct a wall like that at Holyhead.

4551. What would be the height of the work ?—Eighteen or twenty-one feet above high-water mark. I estimated for twenty one feet.

4552. How much of that would be faced with stone ?—From the low-water line, in fact as near as possible like Holyhead. I would not make it quite perpendicular. I am sure those two piers would convert this into an excellent roadstead.

4553. Would it not be more improved by extending the pier farther into the broad sound ?—That would give a larger area landlocked, and would interfere with the access.

4554. Have you provided for quays ?—I have not.

4555. You are decidedly of opinion that it would be better to close up the western sound ?—Yes ; because our worst enemies are the north-west winds, and you leave an easy access to the harbour. By shutting up the western entrance you preserve the general area of the harbour from the west winds, but by shutting up the northern entrance and leaving the western open you would make scarcely any change from its present state.

4556. Would you consider it necessary to reduce the width of the broad opening ?—By reducing the dimensions of this opening you contribute to the stillness of the water inside, and the only limit to the contraction of that would be the leaving of sufficient facility of access.

4557. Is there a heavy sea running through Broad sound ?—There is comparatively little sea rolling through this sound, but there must be some sea running.

4558. With respect to those faced stones, you propose placing above high-water mark, do you think there is a sufficient supply in the quarries ?—I think there is.

4559. Would you dress them ?—Partly, but I would leave them in a rough shape, using the best and flattest of them to unite the courses; if you use good cement you can build a good wall even with rubble stones.

4560. How long would it take to construct this breakwater ?—It would be best not to hurry the work on, but to take five or six years for doing it.

4561. Could you get lime in the vicinity ?—I do not think we have good lime here, that would have to be imported; we would use hydraulic lime prepared for similar purposes.

4562. (*Mr. Coode.*) Is the plan you estimated for attached to the Report of the Select Committee of the House of Commons ?—My estimate is made with regard to closing the western sound and filling up the spaces between the other rocks, and was based on the official plan before me, and if it is not the identical plan, the amount of work on the one I estimated for and the plan before me is substantially the same.

4563. Did you make longitudinal and transverse sections of the work ?—Surely.

4564. Then you made close calculations of the quantity of material that would be consumed ?—That is impossible, it must be an approximation ; but it was sufficiently close to make me sure that the estimate is sufficient to cover the work.

4565. What is the rate per ton at which you set down the cost of working ?—Two shillings and ninepence per cubic yard.

4566. From your experience at Kingstown you were able to estimate the quantity of material that would be consumed ?—I am satisfied that I am correct.

4567. Would you use cement below low-water line? —I would use it when I had constructed work, but you cannot be so certain of cement until the work has risen a little above high water.

4568. You would dress the first few courses ?—In quarrying, you will find that several of the stones come out with natural beds, and I would bring the others into something of that shape, so as to have them resting close together without depending on the cement.

4569. What sizes would you use in the first course of the wall ?—The largest that could be got.

4570. What weight could stones be raised for the purpose ?—About 25 tons is the maximum ; but I never made an actual work of larger stones than 10 tons.

4571. How would you set these large stones ?—From stagework.

4572. To what extent would you use stones of 25 tons weight ? I would think it must be to a limited extent ?—I would use them to the largest extent I could get them.

4573. You know something of the nature of the quarry, to what height on the wall would you carry these stones ?—I would not get them for the whole of the first course, but only for the sea face.

4574. And you think that you could obtain as many of these large stones as would carry you along for the first course next the sea ?—I am quite certain I would ; for the only limit to the weight of the stones is the power of moving them. You will find bunches of very superior stone, but not very continuous ; there could be plenty of stones got from 12 to 15 tons weight ; and by the judicious use of powder you might get stones, even 100 tons weight, out of the quarry.

4575. Were you not connected with the works of the present harbour at Portrush ?—To some extent ; there are stones there weighing 12 tons, but the appliances for moving them were of a wretched nature.

4576. Would you have any difficulty in getting the stones from the quarries ?—There is no doubt but you could bring the stones from the quarry.

4577. (*Chairman, who submitted a plan of the breakwater proposed to be made to Wick to the witness.*) Do you see that plan of Wick Bay ; what would be the effect of a sea in a heavy gale of wind, coming right into the entrance ?—I think it would make it very much disturbed inside.

4578. What would be the effect of a sea on vessels taking the harbour ?—They would likely go on either pier. Looking on this plan, it appears to me that there would necessarily be a very heavy roll of sea into the mouth of it ; it would break on either pier head, and give you broken water right across it ; and, I think, in some cases would endanger the safety of vessels against either pier head.

4579. Does your entrance at Kingstown resemble that ?—It does not.

4580. In what does it differ ?—The worst wind at Kingstown instead of coming directly into the entrance comes over the pier, and that is from the north-east. There is no analogy between this harbour at Wick and Kingstown Harbour.

4581. (*Capt. Vetch.*) Are you aware of the set and direction of the tides at Wick, and the natural influences at work there ?—I know nothing at all about it.

4582. Would your opinion of Wick in some degree alter, if you found that an east wind is not the worst wind ?—In that case my observations fall to the ground ; I spoke of it as if this was the worst wind.

4583. If you were aware that there is a tide running across the harbour at 3 or $3\frac{1}{2}$ knots an hour, would that alter your view of the case ?—It would to this extent, that such a tide running at right angles to the entrance, would have a material effect in diminishing the roll of the sea at the entrance.

4584. If you had learned that the fishermen, generally at that port 6000 in number, were satisfied and approved of that entrance, would you think their views entitled to credit ?—Perhaps it is a fault of mine, but I am not in the habit of giving much credit to the opinion of such persons. I admit I am wrong, and that the opinions of a body of people should be entitled to credit ; but I judge from the physical facts

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before me, and not upon the opinion of people who do not reason much upon things of the sort.

4585. Suppose the pier of that work brought up for 12 feet below low-water mark, would you expect there would be a percussive sea on that wall, the depth being 6 fathoms?—I have no doubt there would be a broken sea against the whole face, but I do not attach much importance to that, for the sea that would do most mischief would be that breaking on the heads.

4586. With what force might a wave come against such a breakwater?—I have seen a wave going 18 feet over a wall.

4587. Your opinion is that a greater depth of water would make it more dangerous?— No ; it would generate a higher wave, and some of the blue water would go over, but it would not do much harm.

4588. If on the pier head the waves were repelled by the breakwater and reflected, would you not expect that the same action would take place between the two piers as on the outside, and would the waves not recoil from that face?—Surely.

4589. If it recoiled from the pier heads and for some distance on each side of them, would not the wave be preserved from breaking from the sympathetic action of the waves along the shore?—The wave would break on both sides and would make disturbed water ; and if a vessel was not in the centre of the course she would strike against some of the pier heads.

4590. Do you agree with the theory of Sir Isaac Newton that a wave entering a harbour of this sort would diffuse and exhaust itself by curved lines extending from shore to shore, and that the wave so entering is lessened in height exactly in proportion to the extent of the line of that particular part of the wave?— It would expand in curved lines and extend itself to get rid of the force that gave rise to it.

4591. You would not conceive that a wave so entering would run with the same velocity as it would in the open sea?—Certainly not, for that would be supposing that no breakwater whatever exists.

4592. (*Mr. Coode.*) I asked you a question with reference to the identity of this plan, marked B G, with that on which you founded your estimate of 100,000*l.*, as given in your evidence before the Select Committee of the House of Commons in 1858 ; do you think still that that sum would suffice for the work shown by the red lines on this plan?—I do.

4593. (*Mr. Lindsay.*) Do you think that any engineer, however eminent, by having a plan brought before him of a place he never saw, and knowing nothing about the currents, nothing about the headlands, nothing about the sets of tide, and nothing about the prevailing gales of wind on that particular part of the coast,—do you think he can form an opinion as to what description of harbour would be most suitable?—If he is so thoroughly ignorant as you have described, he will know nothing; but if you show him the direction of the winds and currents it will afford him more information than he would get from a personal examination ; it is on the assumption that it is required that he gives his opinion.

4594. Then he can offer no opinion unless those points are named?—No.

4595. If he is asked for an opinion the whole of those points should be laid before him?—Certainly.

4596. (*Capt. Washington.*) You were engineer of Kingstown Harbour?—Yes.

4597. Do vessels take Kingstown Harbour in gales?—Very often.

4598. Do they ever strike against the pier?—None have struck within the last twenty-one years.

4599. Were you ever on the east coast of England?—Never.

4600. Do you know Newhaven?—I do not.

4601. Do you know that the entrance has been changed from 290 feet, and that it is now only 120 feet wide, and do you know that vessels take it in any wind?—I do not ; but a vessel might take it.

4602. Do you know Howth Head?—I have seen it.

4603. Is the entrance 500 feet wide?—I should say it is not more than 300 feet.

4604. Is it often taken by coasters?—It is.

4605. Are vessels taken frequently against the pier head?—I believe so.

4606. Then you are of opinion that a 500 feet opening is the smallest opening that should be made for a harbour of refuge?—A vessel should have at least that ; unless she was directly in the entrance she would run some danger. My mind is, that a harbour of refuge ought to be wide enough to receive any vessel in any wind.

4607. Would 500 feet be sufficient for a harbour of refuge at Wick?—Not for foreign vessels, but for coasters it is more than ample.

4608. (*Chairman.*) With reference to the troubled sea, how would that affect fishing boats?—It would affect them very seriously ; but they could take an entrance of 100 feet wide, while a ship of 200 tons burthen could not take an entrance of 500 feet wide.

4609. Do you know of any harbour having an entrance similar to Wick?—I do not know any harbour of that description having one 500 feet wide. There was some reference made to a harbour of refuge on the east coast, and a fact struck me with reference to Loughindall. Comparing the value of that as a harbour of refuge with the Skerries, I was supposing the case of a vessel obliged to bear up to the westward. We will suppose a ship bearing up for Innistrahull, and obliged to run for a harbour ; if she bears up for Loughindall she necessarily runs down on a lee shore, and she steers for it, not by sight, but by compass ; she does not see, and looking to the chart there is strong tides running north from it, and every direction across ; still she runs for it, and if she misses it she is on a dangerous lee shore. I am supposing the wind at north-north-west. If she runs for Portrush she has a guide to it ; the well-marked headlands from where she bears up at, until she reaches it. And even should she not see it she still is not on a lee shore, and the worst that can occur to her is, that she has to go down the Irish sea. If she runs for Loughindall, and does not hit it, she is on a lee shore and cannot escape. I know it is presumptuous for me to talk in this way in the presence of nautical men, but there is something in it.

Mr. William Dargan, examined.

Mr. Wm. Dargan.

4610. (*Chairman.*) Have you examined into the details of the expense of carrying out the harbour of refuge?—I have.

4611. Are you still of opinion that the sum is sufficient?—I am quite certain of it.

4612. (*Mr. Lindsay.*) Have you anything to add to what you have already stated in reference to this work?—I think everything has been said. It has capabilities for a harbour of refuge greater than any other on the coast. There is greater safety for vessels, the site is peculiarly well situated, and the materials necessary are convenient.

4613. Do you think that everything that has been said in its favour has been said?—I think so.

4614. (*Capt. Washington.*) You are a very large contractor for public works?—I am.

4615. Have you any hesitation in carrying out the work?—Not the slightest; and if you were in a condition to make the contract with me now I would accept it, and I feel I could make a good bargain of it, so far as I know.

Captain G. A. Bedford, R.N., Admiralty Surveyor, examined. PORTRUSH.

Capt. G. A. Bedford. R.N.

10 Sept. 1858.

4616. (*Chairman*). What is your occupation?—Admiralty surveyor.

4617. How long have you been in that situation?—Fourteen years.

4618. Have you been present at this inquiry?—Yes.

4619. Would you favour the Commissioners with your opinion as to whether, viewing the vicinity of Lough Foyle, a harbour of refuge is necessary at Portrush?—I quite agree with the statements of previous witnesses as to the difficulty of entering Lough Foyle with a north-west wind. A vessel running down under a north-west wind would not be able to get in with an ebb tide without being liable to be thrown on the Tuns. The worst weather is from north-west, but it might be from north-north-west and be equally as bad. If a vessel were a little to the west of Lough Swilly she would have no occasion to go into Lough Foyle. Lough Swilly is a clear entrance of three miles of deep water, and the Swilly Rocks lie so as not to interfere with the navigation of the lough. I know it was stated by Sir James Dambrain, who should have known better, that the rocks lie in the middle; but such is not the fact.

4620. State your opinion, viewing the vicinity of Lough Foyle and Lough Swilly, whether the sum of money proposed should be expended at Portrush.—I heard the evidence at this inquiry. Some one said that captains of vessels would not run for the Skerries, because they did not know their way in. It is not visible at night, but it might be made visible by a light advantageously or properly placed. When Mr. Gibbons gave his evidence of a vessel being obliged to bear up with the western winds, he might as well have assumed the winds from the north, when the objection to run on a lee shore would be considerably stronger in the case of Portrush than in that of Loughindall. If you run for Portrush, if the wind is from north or north-west, and the weather is so misty as to oblige her to keep close in here, if she miss the entrance she is lost; there is no escape. With regard to Loughindall, with the wind west or north-west blowing into the north channel, supposing her to miss, as Mr. Gibbons assumed, no captain with his senses would attempt to enter Loughindall; but he would have an opportunity to run farther, because he is not embayed, as he would be in Portrush, but would be able to pass on. The difficulty at present as to Portrush is, that it offers considerable refuge if it were better known and lighted, so that a vessel might enter it at night. I do not mean to say the danger would not be as great of becoming embayed; still I object to the closing of the western sound. Suppose it were blowing a gale of wind from west-south-west, a vessel would be unable to enter Lough Foyle; and supposing her to bear up to Skerries, it seems to me a doubt whether that vessel could enter in at the broad sound, whereas, if the western passage were left open, she could get in with all winds, a most essential point in harbours of refuge. With regard to the great objection to keep open the west sound, if the smaller islands were closed up, and a breakwater extended with a curve to the north-west, it would cover materially the west passage from the sea which sets in upon the shore, and would protect it from the heavy swell which might make the west passage dangerous. By closing up the western passage the tide setting to the east would run right across the broad sound, and with a west-south-west a vessel could scarcely enter the broad sound with an easterly running tide. My opinion is, that by making a breakwater inside of the small isles, and continuing it a little way to the north-west, would be the proper plan. I would prefer keeping open even both sounds, because a harbour of refuge should be accessible under all circumstances, and it would not be so open with the western channel closed up. The best anchorage is not on the western side, nor is it the anchorage a vessel takes. I do not conceive either that the sea setting in to the west sound would make any material sea to vessels riding under the south side of the "Big Skerries." It is too small an entrance to allow any sea to set in that would injure the roadstead. The heavy swell sets in along the line of coast, and not along the shore. The sea expends itself on the western Skerries, crosses the western sound, and breaks on the east side of Ramore Head. I would prefer the tide setting directly in or out of a harbour I was taking, and not across it. I think if the west sound were closed the bight which would be produced would in the course of time be silted up by sand, and the sea setting in to the broad sound would render the port unsafe for easy anchorage. The great desideratum is to put a light upon the Skerries rocks, that a vessel in the darkness might be able to make use of it. Suppose I were at Innistrahull, I would not run down on the coast even suppose there were a harbour of refuge at Portrush. The evidence given by nautical men seems to show that they did not make use of it because it was not known; but that might be said with respect to other places on the coast.

4621. (*Mr. Lindsay.*) After the statement you have made, and considering the object we have in view, the saving of life and property, and giving facilities to the trade and commerce of England, and looking to the harbours that now exist, do you consider that the Government would be warranted in voting 100,000*l.* for the construction of a harbour here?—It would be of great benefit if a commercial harbour was made here; but in my opinion it is not essential. If those works were carried out, it would enable them to make this a commercial port without the cost that would be incurred if the works had not been entered on. As a favourable position for a harbour of refuge it will do well enough if lighted. I have many complaints of the Irish coast with regard to lights, and the almost total neglect of the Irish ports. During my survey of the west coast I have known several vessels, being unable to get into Golla roads, bearing up for Lough Swilly and Loughindall.

4622. Then I understood your opinion to be, that you think Government, looking to the place as a harbour of refuge in the strict sense of the word, would not be warranted in laying out money to make the proposed harbour at the Skerries, but that, looking to it in a commercial point of view, you think the matter worthy of consideration. Do you mean of national advantage?—No, but merely to the commerce of this immediate district, with the port of Derry so close at hand.

4623. Then the great want, in your opinion, on this coast is more lights?—Yes.

4624. You think that something ought to be done at the Skerries?—Certainly; because by this means it would be made accessible; but if it is made a harbour of refuge, I differ with those who recommend the closing of the western sound.

4625. (*Capt. Washington.*) Are there no other lights wanted along the coast?—Their name is legion, and there is a great complaint for the taking of the light off Arranmore.

4626. When was it taken away?—It was decided to light Tory Island and Rathlin O'Birne instead of having the light on Arranmore. The light on Tory Island was exhibited in 1832, and that on Ruthlin O'Birne in 1857; the light on Arranmore was taken away at the same time that Tory Island was lighted, so that 44½ miles of dangerous coast was left without a light; but even with the light on Rathlin and Tory Island, there should be one on the salient point of Arranmore. Vessels coming from America, and being to the southward of their reckoning, and not seeing Tory Light, are in great danger of becoming embayed somewhere near Arranmore.

4627. Is Galway Bay sufficiently lighted?—It is with regard to ships going in; but the taking away

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Captain Washington.

the light from the summit of Arranmore has thrown a considerable portion of the north sound, including Killemey Bay and Greatman's Bay, the chief resort of the numerous fishing craft of Galway, into darkness; and I represented some years ago, before the change took place, that there should be some light on Straw Island, which would render Gregory's Sound available for ships to run through, and also get into Killemey Harbour. Any vessel having got so far west of Galway as the Arran Islands, and the wind veering round to westward, are obliged to run to Galway roadstead; whereas, if they had a light on Straw Island they might hold their ground in Killemey Bay. I have received several complaints from various seamen for want of this light on Straw Island,—looking to the steam communication between Galway and the United States.

4628. Is Galway Bay sufficiently lighted?—It is not.

4629. Where is the light wanted?—A light is required at the Marguerita and Black Rocks.

Captain Fraser, R.N., Admiralty Surveyor from Portrush to Dublin, examined.

Captain Fraser, R.N.

4630. (*Chairman.*) What is your occupation?—Admiralty surveyor from this to Dublin.

4631. Have you been long on the coast of Ireland?—Thirty years.

4632. Will you favour us with your opinion as to the necessity of a harbour of refuge?—Certainly; but I think it would save the time of the Commissioners when I state that, having heard the evidence of Captian Bedford, I fully concur in everything he has stated, except in one or two points connected with this locality. I think, in the first place, that the broad sound should be closed entirely, to make a complete breakwater. The broad sound should be closed up; and I consider that, without the western entrance and the eastern entrance being completely left open, vessels under no circumstances in northern gales, being obliged to bear up, would be able to avail themselves of the security it would afford. It appears to me that even in the present moderate breeze that is blowing from southward scarcely any sea comes in from the western sound, but that it is rolling very heavily through the broad sound, that is the wave that breaks along this shore. This 100,000*l.* is asked for a good object, and if even double that sum was required it is due to this coast, not only as a national work, but also to the country generally; for even was it the saving of one life, as I heard it stated to-day, it would be worth the whole sum. If the broad sound were filled in it would be a magnificent breakwater, which would afford shelter to a large amount of shipping, and I think would be very well suited as a rendezvous for ships of war in the event of this country being engaged in war. There is deep water and good holding ground; but as for blue clay, so far as we have been able to ascertain, we can find none. We have had a small steamer anchored in every direction inside the Skerries for the last day or two. We gave a large scope of cable, and a back turn, to get a good grip, but uniformly the anchor came up plashed with seaweed, and not the slightest appearance of mud. The anchor was a small one, and there may be mud; but whether or not, it does not materially affect the question. The holding ground is sufficiently good for any purpose. It is quite clear from the evidence that the Skerries in their present state do not afford sufficient shelter to save life and property, nor do I see how the harbour could ever be turned into any commercial purposes, for the sea breaks along the shore, as at this moment, though it is a south breeze. As to the west coast, or Lough Foyle, I can give no evidence, only that I perfectly agree with the opinions expressed, that from the difficulty in entering Lough Foyle it could not be made available for a harbour of refuge.

4633. Have you any information to give us with respect to Ballycastle?—The coast is very foul.

4634. Have you any idea of the best site for a harbour?—I would prefer the north-east angle of the coast if a place could be availed of near the entrance of the channel.

4635. What is your opinion with respect to Church Bay?—A good asylum might be made there, but it would be completely lost as a commercial harbour; and, if by forming the one you could combine the other, I think it would be well to do so.

4636. Is the result of your evidence, as, looking to the safety of life and property, and to facilitate commerce, that a harbour of refuge should be constructed here?—It is; that is my opinion.

4637. I understood you to say you would keep the western sound open?—Yes.

4638. Why do not heavy seas come in from the west and north-west?—They come directly on the shore even with the wind, as now, off shore; the swell that is generated outside rolls full through the broad sound.

4639. This western passage open, would ships lie in completely smooth water in safety during west and north-west gales?—I think so; there would be to a certain extent the same action in the roadstead, with the wind blowing west, as it does now, in the broad sound.

4640. Have you well considered that opinion?—I have studied it.

4641. You differ with the evidence of Mr. Gibbons and those other gentlemen who have given evidence?—I do; it is right that every facility should be given for entrance, but the swell is so great that comes through the broad sound that I do not think it should be left open. As a nautical man it would strike me that if you leave the west sound open, you must, during west and north-west winds, have a very troubled sea at the spot.

4642. Where is the best anchorage?—South of the Skerries is the best anchorage.

4643. (*Capt. Vetch.*) Can you tell us the direction of the wind yesterday?—It was from south-west.

4644. Did you observe a very heavy sea coming in the broad sound?—I did.

4645. And that it broke very heavily on the strand?—Yes; it spread itself to the west, and broke along the shore as it is doing now.

4646. The wind being from the south-west, did you observe breakers coming in from the west?—There were breakers, but no swell.

4647. Did the swell come in from the west, or through the broad sound, the wind being off shore at the time?—Certainly not.

Mr. Hoskyns, Admiralty Surveyor from Lough Foyle to Belfast, examined.

Mr. Hoskyns.

4648. (*Chairman.*) What is your occupation?—Admiralty surveyor from Lough Foyle to Belfast.

4649. How long have you been connected with this coast?—Five years.

4650. Will you state your opinion as to the necessity or advantage of having the Skerries converted into a harbour of refuge?—I explained my views in a report sent to the House of Commons in December. I still concur in those views, and have nothing further to add.

4651. What is the nature of the Skerries?—We examined it very carefully, and I never saw anything in the anchorage but sand; it is black trap rock which forms a black sand, and has the appearance of blue clay.

4652. Is it good holding ground?—It is fair enough.

4653. As to Lough Foyle, you have heard the opinions of the witnesses as to the ineligibility of it as a refuge harbour with the wind north-west?—No

harbour can be protected with the wind blowing a gale right out of it; but with a moderate gale and a flood tide a vessel could get in.

4654. How far to the northward must the wind be to enable a vessel to run in?—Nothing to the west of north-north-west, except with a flood tide and not more wind than she can carry sails for.

4655. (*Mr. Lindsay.*) The object of a harbour of refuge being to afford facilities for the safety of life and property, and for ships to take to during a heavy gale of wind, the prevailing winds along the coast considered, would you think Lough Foyle a harbour of refuge?—It could scarcely be considered a harbour of refuge.

4656. Which sound would you leave open?—I propose to leave the western sound open.

4657. (*Capt. Washington.*) Did you survey Lough Foyle?—Yes.

4658. How long were you in Lough Foyle?—A year, and had an opportunity of seeing it in all sorts of wind.

4659. You heard it stated that a vessel in a westerly gale was driven out of Lough Foyle?—I did; and suppose she must have been badly found, for, once inside the heads, Lough Foyle is a safe harbour; there is half a mile between Innistrahull Head and the Tuns.

Mr. MAGOWAN, Master Mariner, examined.

4660. (*Chairman.*) How long have you followed the sea?—Fifty years.

4661. Have you been present during this inquiry?—I received a telegraphic message from Mr. Caldwell, our agent, and left Derry and came here to give evidence.

4662. Do you concur with the evidence that has been given as to the necessity of a harbour of refuge at Portrush?—I have been 18 years a ship master on this coast, and I give it as my opinion that there is a great necessity for a harbour of refuge here. In 1841 I was commander of a coasting schooner between Liverpool and Sligo; I fell in with a heavy gale from north-west, 15 or 20 miles west of Tory Island; the ship being disabled, I was glad to run her here, but had to bear up as far as Larne; from the appearance of the Skerries Rocks on my chart I did not wish to go in, for I thought I would be too much exposed to the heavy swell coming through the broad sound. That was why I went to Larne, because I could take neither Lough Swilly, Lough Foyle, or Loughindall.

4663. How long have you been in command of a steamer?—Since 1843.

4664. You are decidedly of opinion that a harbour of refuge would be of advantage to vessels from Liverpool, the Clyde, Belfast, and the south channel?—For every vessel going north-about.

4665. (*Mr. Lindsay.*) What trade were you in?—Between Sligo and Liverpool, London and St. Petersburg, Liverpool and Rotterdam.

4666. From practical experience would you say that a harbour of refuge here would give greater facilities to commerce?—It would be the means of saving much life and property. In 1839 six vessels were lost between Innistrahull and the west end of Rathlin during a north-west gale.

4667. Would these have been saved had there been a harbour of refuge here?—Two of them were wrecked west of Rathlin, and if there had been a harbour here they might have been saved.

4668. (*Mr. Coode.*) How many lives were lost—I would say there were 30 lives lost on tha occasion.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sitting at Portrush closed.

LONDONDERRY.

Saturday, 11th September, 1858.

PRESENT:

Admiral HOPE (Chairman).

Mr. LINDSAY.
Captain WASHINGTON.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Mr. ABRAHAM HARVEY STEWART examined.

4669. (*Chairman.*) You are secretary to the Port and Harbour Commissioners?—I am.

4670. Have you any observations to offer respecting the advantages which would arise from the formation of a harbour of refuge at Portrush?—A harbour of refuge near the mouth of the Foyle would be very desirable, but I am not prepared to say that Portrush would be the proper place for constructing it.

4671. Would you state your ground for entertaining that opinion?—My ground for entertaining that opinion is from the great difficulty ships frequently meet in getting into the Foyle, with a heavy sea rolling in from the Atlantic.

4672. Have you any permanent interest in the shipping of Derry?—I have not directly; but as a servant of the Port and Harbour Commissioners, I would desire that the trade of the port should improve.

4673. You can give information as to the trade of the river?—Yes, I can.

4674. How many vessels arrive annually?—We have about 1,200 arrivals and sailings.

4675. Does this include steam ships?—Yes.

4676. How many steam ships have you?—I think about seven.

4677. Where do they trade to?—Principally to Liverpool and Glasgow.

4678. In the 1,200 sailings and arrivals, I understand the steamers are included?—Yes.

4679. What is the present revenue of the Port and Harbour Commissioners?—Last year their income was about 5,000*l.*; but the rates were altered in former years, and they have been altered this year, so that I cannot tell the sum exactly. If the present rates be levied for 12 months, and no increase take place in the trade, I would take this year's income at 8,000*l.*

4680. How is the river managed?—By the 15 Commissioners.

4681. How are they appointed?—They are elected by rated occupiers and shipowners.

4682. What improvements have been made in the river during the last ten years?—The flats have been

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Mr. A. H. Stewart.

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Chairman.

dredged, lights have been erected, and buoys stationed at several points.

4683. What sums have been expended in this way during the last 10 years?—I am not prepared off-hand to state exactly. Dredging the flats cost about 5,000*l.* the river lights some 1,500*l.*, and the improvements in buoys and beacons about 1,500*l.*

4684. How was the capital of the commissioners raised?—It was raised at first by rates on ships alone. At the present time it is raised by rates on ships and goods.

4685. Was any of the money borrowed?—Yes, a sum was borrowed on the security of the rates.

4686. What rate of interest do you pay?—Five per cent.

4687. Have you effected all the improvements by borrowing? Have you obtained any grant?—None, except from the Irish Society, who have voted us 7,000*l.*, payable in seven yearly instalments.

4688 Is this a free grant or merely a loan?—It is a free grant. The society have also given the land on which to construct the quays.

4689. What is the Irish Society?—They are the lords of the soil at Derry.

4690. Consequently they have a pecuniary interest in increasing the value of the land?—Yes.

4691. Of whom does the Irish Society consist?—It consists of merchants of London, appointed by the corporation of London.

4692. Do they form a Board?—Yes, consisting of a governor, deputy governor, and 24 assistants, with a secretary who resides in London, and an agent residing in Derry.

4693. How were they constituted?—By Royal Charter.

4694. What date?—In the reign of James the First.

4695. (*Capt. Washington.*) You said there were seven steamers connected with the port, where do they trade to?—There are three sailings weekly to Liverpool, and occasionally one every day to Glasgow. There are five sailings weekly to Glasgow at present. There are sailings to Morecambe and Belfast also.

4696. Is there a sufficiency of lights and beacons in the river?—Yes, I think so. Vessels sail out of the port at all hours.

4697. Are the lights on Innishowen Head sufficient?—Seamen say they are not well distinguished, they say they cannot well distinguish the inner from the outer light.

4698. Are they on a level?—They are nearly so.

4699. Has any accident arisen from the circumstance to your knowledge?—I don't know of any resulting from this circumstance.

4700. Could you suggest any remedy?—I have heard it stated, and I think it feasible, that if the inner light were raised, it would remedy the matter complained of.

4701. What is the extent of the quays?—They extend from the bridge downwards 2,400 feet, and 340 feet more are contracted for.

4702. Was this done at the expense of the trustees?—Yes, at the cost of 22,000*l.*, and a further sum of 3,000*l.* independent of the price of the land.

4703. The trustees had to buy up the land at a high price?—Yes.

4704. (*Capt. Vetch.*) I think you said you considered the expenditure of a sum of money for making a better entrance to the Foyle desirable, but that Portrush was not the proper position?—I am not prepared to say that.

4705. Suppose a pier were run out from Warren-point, would not that shelter vessels entering the river?—I think it would prevent the flow of the tide inwards.

4706. Is there any other place which could be occupied for sheltering vessels at the mouth of the Foyle?—I don't know of any without incurring enormous expense.

4707. But suppose 100,000*l.* were to be laid out, as is proposed, at Portrush, where would you apply it?—The expense of removing the Tun bank would be enormous. I would not give an opinion.

4708. Suppose the government gave 100,000*l.*, you do not know where you would employ it?—I do not.

4709. (*Mr. Coode.*) Is it your opinion that vessels experience great difficulty in entering the Foyle?—It depends on the state of the wind. In a south-south-west gale it is very difficult to enter; when the wind is from the north-west a vessel might get shelter.

4710. (*Mr. Lindsay.*) How much money have the Port and Harbour Commissioners borrowed?—Under 20,000*l.*

4711. Is that all?—Yes; but the compensation given to quay owners may be considered as borrowed money also.

4712. What are your liabilities altogether?—Close upon 80,000*l.*

4713. Does that include the amount allowed as compensation to quay owners?—Yes.

4714. How much more will be required to complete the works at present in progress?—About 40,000*l.*

4715. In all, you require 120,000*l.*?—Yes.

4716. To pay for which you have an income of 6,000*l.* annually?—Yes.

4717. Suppose you got money through some other channel at a rate below 5 per cent., you could offer a security of 8,000*l.* per annum?—Yes, and we could increase it to 11,000*l.* per annum if the higher rates were imposed.

4718. You hope your revenue will never be less than 8,000*l.* per annum, if the works were completed?—I expect it will exceed that sum.

4719 (*Mr. Coode.*) What increase of depth of water has been obtained by dredging the flats?—About 2 feet; there were deep pools made at various places, but the action of the paddles of the steamers has equalized the depth.

4720. Can the steamers come up to the quays at low water?— Very few of them but can.

4721. What is the depth on the flats at low water?—Eleven feet at low water at spring tides. At the quays it varies from 7 to 14 feet.

4722. Have you a graving dock or patent slip?—We have contracted for one at an expense of 18,000*l.*

4723. Is it included in the sum you say would cover all your liabilities?—Yes, I did not take any revenue from the slip, as I calculated it would only pay itself.

4724. Who are the engineers?—Messrs. Stevenson, of Edinburgh.

4725. When is the work to be completed?—In three years.

4726. Is there a great want felt for it?—Yes, vessels coming in damaged have frequently to go to the Clyde for repairs. If we had a slip they could be repaired on the spot.

4727. (*Chairman.*) Is the deepening of the flats included in the 120,000*l.*?—No, it is confined to works already in progress, to the quays and graving dock; but not to the flats.

4728. Has there been any estimate made for deepening the lough?—Yes, Messrs. Stevenson estimated it at 10,000*l.* It was a parliamentary estimate.

Mr. Alexander Lindsay examined.

Mr. A. Lindsay.

4729. (*Chairman.*) How long have you been connected with the Port of Londonderry?—For twenty years.

4730. Have you been connected with the shipping?—No; but I have had experience in the management of steamers. I have been a Port and Harbour Commissioner since the Act came into operation four years ago.

4731. You are acquainted with the object of this inquiry?—State the opinion you entertain respecting the formation of a harbour of refuge at Portrush?—I believe the opinion generally entertained here re-

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specting the making of a harbour of refuge at Portrush is, that it might interfere with the trade of Derry.

4732. Do you think it would?—I don't think it would interfere prejudicially.

4733. Do you think it would be of advantage?—I think it would generally, though in some respects it might interfere.

4734. In the case of ships making the passage north-about, do you think it would be of advantage to them?—Yes, and ships not making the passages north-about might come in if there were a harbour there. Many ships would make it and wait for orders, that now go to Queenstown and elsewhere.

4735. (*Mr. Lindsay.*) The Commissioners can increase the rates, and consequently the revenue?—Yes, if it is considered necessary they can increase the rates to 12,000*l.* without any increase of trade.

4736. If you increase the rates to the maximum you can raise your revenue to 12,000*l.*?—Yes.

4737. (*Capt. Vetch.*) Is it not generally considered that there is a difficulty in entering the harbour at certain times?—Yes; but I am no authority.

Mr. John Munn, jun., examined.

Mr. J. Munn, jun.

4738. (*Chairman.*) How long have you been connected with the port of Londonderry?—For about 25 years. I have been a Commissioner since the Act was passed.

4739. Do you concur in opinion with the gentlemen who have preceded you respecting the proposed harbour of refuge at Portrush?—The impression of the Harbour Commissioners was, that the construction of a harbour of safety at Portrush would be injurious to the trade of Derry if in passing, a toll were laid on steamers; and it was feared the advantages would not compensate from the amount they would have to pay. That was the principal difficulty in the minds of the Commissioners.

4740. If Portrush were to become a place where vessels could be easily chartered and at less insurance, besides being a place of call for vessels from the north of Europe, the United States, and Canada, would not that compensate for your objection?—My impression is, that if the toll were levied nothing could compensate for that tax.

4741. Your opinion is, that it would tell disadvantageously on the steam trade?—Yes, and the steamers carry on the principal trade of the port.

4742. But if that point were met, would you withdraw your exceptions?—I would object in any case.

4743. (*Mr. Lindsay.*) You, as representing the shipping trade of Derry, consider you would not derive sufficient advantages by the construction of a harbour of refuge if you had to pay a passing toll?—Yes, because we have competent men on board our steamers, and they don't require a harbour of refuge.

4744. But you consider a harbour of refuge desirable?—Highly desirable.

4745. But you object to the principle of a passing toll?—Yes.

4746. (*Capt. Vetch.*) If any passing toll were established, would it not be in some degree compensated by an increase in the trade of the port? Or would the trade be so small that it would give no aid to the undertaking?—It is to the principle I object.

4747. But you would give something if it were advantageous?—However great the advantage, I would oppose it on principle. I would oppose it as far as the trade of Derry is concerned.

Mr. John Mehan examined.

Mr. John Mehan.

4748. (*Chairman.*) How long have you been connected with the port of Londonderry?—I have known it for the last 20 years. I have been a Commissioner since the Act was passed.

4749. Have you anything to offer in addition to the gentlemen who have preceded you?—No; I quite agree with them in what they have stated.

Mr. Samuel Hatrick examined.

Mr. S. Hatrick.

4750. (*Chairman.*) What calling are you?—I have been a seaman for 39 years.

4751. How long have you been a shipmaster?—For 29 years.

4752. In steam or sailing vessels?—I have been mostly engaged in the foreign trade. For the first five years I was in the coasting trade.

4753. Where have your vessels traded to generally?—To the Baltic, the Black Sea, the Mediterranean, &c.

4754. Where did your ships sail from?—From Derry.

4755. Do you know Portrush?—Yes.

4756. And the Skerries?—Yes.

4757. Were you ever anchored there?—Yes. The wind was blowing from the south and west down the river, I had no difficulty in getting in. Coming to an anchor, the windlass was upset, and tore out the hawse pipes. We were obliged to slip and run for Larne.

4758. How was the wind blowing?—From the west-south-west.

4759. Did it blow hard?—Yes, and there was a very heavy sea through the west passage, so much so that the vessel would tauten the cable and then range ahead again.

4760. (*Chart handed to witness.*) Mark on the chart where you were anchored?—I was anchored just under the Great Skerry (marked in chart A,B,C). We were getting a hawser to fasten to a ring under the rock when the ship was pitched right off. It was fortunate we did not make it fast as we would have had to cut the hawser.

4761. Look at the points marked?—Yes, I see the letters, and understand them.

4762. From the sea which ran in there, and the experience you had, suppose a breakwater were built to protect the Skerries, where would you place it? Where would it stop the sea most?—I could scarcely say. The sea comes as much through the west opening as through the north.

4763. You know the Broad Sound and the West Sound?—Yes.

4764. Was the sea breaking in both?—Equally so. The sea was topping the rocks, and coming right through.

4765. Did the sea break right across the Broad Sound?—Yes.

4766. And the West?—Yes. It was fairly coming over the rocks.

4767. (*Mr. Lindsay.*) When you were obliged to slip, the wind was from west to south-south-west?—Yes.

4768. When you saw the ship heaving so, you considered she was in danger?—In imminent danger.

4769. Would a breakwater closing the West Sound or closing the North Sound make smooth water inside?—I think not. I am sure of it.

4770. How had the wind been blowing previously?—There were gales from the north-west.

4771. You attribute the heavy roll of the sea behind the Skerries to the gale from the north-west?—Yes.

4772. Did you ever run into Lough Foyle in a heavy gale?—Yes.

4773. Did you ever take it in a north-west gale?—Yes.

4774. Suppose the ship well to the westward, and caught by a north-west gale, could she come in safely?—With a strong north-west wind it is not likely.

LONDONDERRY.

Mr. S. Hatrick.

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Mr. Lindsay.

4775. You did not tell us how you entered the Skerries. How was it ?—By the west.

4776. Had you any difficulty in making them ?—No.

4777. You have been there at other times ?—Yes, but I have never taken them when it was blowing hard.

4778. (*Capt. Vetch.*) You have been frequently in the Skerries ?—Only once to anchor.

4779. At other times you have passed through them ?—Yes.

4780. Do you consider it a safe place to anchor ?—I would not anchor there again for any consideration.

4781. (*Mr. Coode.*) What caused you to take shelter there ?—The wind was blowing down the river ; and when we came off it, we put back to the Skerries, as two pilots who were on board said if we put back to Portrush the weather might moderate, and we could take the river next morning.

4782. Then you ran to the Skerries after attempting to enter the river ?—Yes.

4783. Does it occur frequently that a vessel off the mouth of the Foyle would return to the Skerries ?—Not often.

4784. What is the greatest number of vessels you have ever seen at the Skerries for shelter, at one time ?—Never more than one.

4785. (*Chairman.*) You know Loughindall ?—I was in it eight or nine times.

4786. What kind of a place is it ?—It's a middling good harbour.

4787. What kind of vessels were you in ?—I was in vessels of 400 tons. There were only two feet more water inside the harbour than the vessels were drawing. Larger vessels lay outside of the Saltpans.

4788. Is it a good holding ground for vessels ?—Very good. It is good all over the anchorage. Outside it is not so good. There is too much long grass growing there, and the vessel is liable to choke if she does not get the cable quick, and is not liable to hold.

4789. If the ship gets plenty of cable she will hold on ?—Yes. Loughindall is a very good harbour for vessels bound for the river Foyle that can't get in.

4790. Do vessels often go there when unable to make for Derry ?—Not often.

4791 Did you ever know an instance of a vessel being detained there for a long time ?—I knew of it, but it's a long time ago.

4792. What was the longest detention you have known ?—Two weeks, of any vessel from Derry that I remember.

4793. Do you know Lough Ryan ?—Yes.

4794. What kind of a harbour is it ?—Very good.

4795. Do you know Campbellton ?—I was only once in it.

4796. Do you know Lamlash ?—Yes, I know it, I was there often.

4797. Are these places well known to coasting vessels passing here ?—Quite well.

4798. Do you think it would be good for Derry and the passing trade, to have a harbour of refuge at the Skerries ?—I am very doubtful of any of the sounds when filled keeping the sea from running in, I don't think any of them would stop it.

4799. (*Mr. Lindsay.*) Considering the number of natural harbours you have got, Lough Ryan, Loughindall, Campbellton, and Lamlash, do you think a harbour of refuge necessary in this vicinity ?—If it could be made at the Skerries to keep out the sea, it would be very desirable ; but I am doubtful it would answer.

4800. Do you know any place convenient, better suited for a harbour of refuge than Portrush ?—I don't know.

4801. Does the grass grow generally in Loughindall ?—No, it is only in the outer part.

4802. (*Capt. Vetch.*) You said you had only once taken refuge in the Skerries, and never anchored but once ?—Yes.

4803. And you say you were eight or ten times in Loughindall ?—Yes.

4804. Do you consider that a pier run out from the Saltpans would be a benefit for ships ?—I am very sure it would.

4805. Would the expenses incurred by the erection of such a pier be large ?—I think not, I never saw a heavy sea at the Saltpans, and vessels can ride easily.

4806. Do vessels from America to the Clyde or Liverpool put in there ?—Oh yes. The last time I was there seven vessels were lying.

4807. What was the largest number you ever saw lying in Loughindall ?—Ten.

4808. Had you any particular difficulty in entering it in any case ?—None.

4809. (*Mr. Coode.*) You saw the grass in the outer anchorage at Loughindall ?—Yes.

4810. Did you ever bring up any of it on your anchor ?—Yes.

4811. What length was it ?—About three feet long, but it is generally longer.

4812. If you were told it grew to the length of five or six fathoms, would you believe it ?—I never saw any of that kind.

4813. What was the colour of the grass ?—It was brighter than ordinary seaweed.

4814. Is it a flat grass ?—Yes.

4815. (*Chairman.*) Do you know Lough Swilly ?—No, but I have often passed it.

4816. Are there not strong tides off Loughindall ?—Yes, but they slacken as they enter the harbour.

4817. Do they make the harbour difficult of access ?—No.

JAMES MCDAID examined.

JamesMcDaid.

4818. (*Chairman.*) What profession are you ?—I am a pilot.

4819. How long have you been a pilot ?—For 29 years.

4820. Where are you pilot for ?—Lough Foyle.

4821. Are you acquainted with the neighbouring coast ?—No, I am on the Derry station.

4822. Do you know the Skerries ?—I have not been there for the last fifteen years.

4823. Then you don't feel competent to offer any opinion as to its being suitable for a harbour of refuge ?—No.

4824. Do you know Lough Swilly ?—I never was in it.

4825. Do you know Loughindall ?—I was in it when I was young, but I have no remembrance of it.

4826. (*Chart handed to witness.*) In Lough Foyle, when it is blowing a hard gale from the north-west, point out how high you could place a ship at anchor ?—Yes, she must be under small canvass ; she would make up under Magilligan Point. If it was intended to get the ship to anchor I would take off the canvass and get as close by Carnashamra Bay as possible. When I would come up there, the vessel would go into deeper water. The bay is good holding ground.

4827. Do vessels often anchor there when the wind is from the north-west ?—Yes, especially when it is ebb tide, and when they can't work further up the lough.

4828. What depth is the water there ?—Eight or ten fathoms.

4829. How many vessels have been there at one time ?—I never saw more than one or two at anchor at once.

4830. Were the vessels driven in from stress of weather, or were they bound for the port ?—I never saw any vessels anchored except those bound for the port. I saw vessels from stress of weather come in and anchor in Moville Bay.

PHILIP MCDAID examined.

LONDONDERRY.

Philip McDaid.

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4831. (*Chairman.*) You are a pilot?—Yes.

4832. How long have you been a pilot?—Since 1836.

4833. Where are you pilot for?—For Lough Foyle.

4834. Are you pilot for the adjoining coast?—Yes, as far as the district goes.

4835. How far do you go?—As far as we can board ships outside.

4836. Do you know the Skerries?—Yes.

4837. Were you ever at anchor inside the Skerries?—No.

4838. Do you know Loughindall?—No.

4839. Do you know Lamlash?—No.

4840. Or Port Ryan?—No, I was never in it.

4841. Will a vessel enter Lough Foyle, when the wind is blowing a heavy gale from the north-west?—As long as she can carry close-reefed canvass, that is reefed topsail and reefed courses, she will.

4842. Have you seen many vessels from stress of weather in the lough during a north-west gale?—I never took particular heed to the number.

4843. What size of vessels have you seen, were they large ships?—Some of 800 tons.

4844. If you were bringing in a ship, with a gale blowing from the north-west show on the chart where you would place her at anchor?—In an ebb tide I would bring her just under Carnashamra, in water from 6 to 8 fathoms, and would anchor midway between Carnashamra and the Perch. If the wind was from the south-west I would give her any anchorage out in the Foyle where she would fetch. If there was no anchorage where the vessel would fetch, I would keep her along the land to take her off. If the wind appeared to fly into the north-west, I would reach Culdaff and Glengad, and if it appeared to come from the south, I would reach the county Antrim side of the lough.

4845. Do you know Lough Swilly?—Yes.

4846. From what you know of the place, can you say if it is easy to enter during a north-west wind?—Yes, it is.

4847. How far must the wind be up to get in?—I am not so much acquainted with the place as to be able to answer that question.

4848. (*Mr. Lindsay.*) How many vessels took refuge in the course of a year?—Large and small, about 300.

4849. Since you became pilot that would be 6,000?—There might be that many, but I kept no calculation.

4850. How many vessels have been during that time lost on the Tuns?—I know of three.

4851. How did they get on?—One got on during the night, the wind being from the north. They were not acquainted with the place, and had no pilot on board. Part of the hands was saved. The ship became a total wreck. Another case was that of a barque going out to North America. She run down to leeward, and broke close into the Tuns.

4852. How was the wind?—It was north-west and by west. The ship became a total wreck, but the hands were saved.

4853. What was the other vessel?—The brig *Tamandra* of Derry. She got on by the tide setting to leeward over the Tuns.

4854. Were the vessels light or heavily laden?—The two brigs were loaded, and the barque was light.

4855. When you say a ship would find safe anchorage in a north-west gale, you mean she would get it south of the lighthouse?—South and west of the lighthouse.

4856. Between Dunmore and Innishowen Heads, do you consider there is any anchorage a ship could take with the wind off the land?—No, I do not.

4857. Could she anchor between those points during a southerly gale?—No.

4858. In point of fact, there is no anchorage between these points?—None that I know of.

4859. A vessel must be south and south-west off the lighthouse before she obtains safe anchorage?—She must.

4860. (*Capt. Vetch.*) Do you know Warrenpoint?—Yes.

4861. Is there any shelter there?—Yes, in westwardly winds.

4862. Suppose a pier run out there, would it be any benefit with the wind from the west or the north-west?—Yes, it would be a shelter.

4863. (*Chairman.*) Have you ever heard of pilots and their boats being blown off the land and lost?—Yes.

4864. How often has this happened within your recollection?—I knew of it once or twice. We lost a boat last season.

4865. What kind of boats were they?—Large skiffs.

4866. How many of a crew do they carry?—Five, six, or seven, according to the weather.

MR. ABRAHAM HARVEY STEWART re-examined.

Mr. A. H. Stewart.

4867. (*Chairman.*) You wish to make a statement respecting these pilot boats?—Yes; with respect to the pilot boats the question of the propriety of having large vessels which could stay at sea and meet ships before coming near the harbour has been often discussed. The difficulty of keeping such vessels at sea was the reason why the present system has been continued so long.

4868. In what does the difficulty consist of keeping them at sea?—From the tremendous sea off the north-west coast, and from their having no immediate port of refuge to run for.

4869. Would you be disposed to say that a harbour of refuge at the Skerries would offer advantages for abandoning the old system?—Any place to which the boats could run under a heavy gale of wind, any harbour in this vicinity would be an advantage.

4870. If such were made, would you change the system and use decked boats?—Yes. It is desirable to have a class of large pilot boats off the coast. It would induce vessels to come north-about. Masters would come this way expecting to get a pilot boat at sea. At present they can't get one till they come to the Tun Bank.

JOHN GILLESPIE examined.

John Gillespie.

4871. (*Chairman.*) You are a pilot?—Yes, six years in April.

4872. Where are you pilot for?—For Derry.

4873. Do you know Loughindall?—I was never in it, but I could make it.

4874. Do you know Lamlash?—Yes. It is a good anchorage.

4875. Do you know Lough Ryan?—Yes, it is a fine place; but it is difficult to get into it sometimes.

4876. You know Campbellton?—Yes.

4877. Do ships often run into these places, and take refuge when coming from the west and when outward-bound?—They can take Lough Ryan or Lamlash.

4878. Do you know that they do so?—Yes, they do.

4879. Have you been in Portrush?—I have been in it four or five times.

4880. During heavy weather?—Not much.

4881. Can you form any opinion of the Skerries as an anchorage?—They are very good, but I would rather run past them, and take Lamlash or any port in the Clyde.

4882. Do you know the West and Broad Sounds?—Yes.

4883. Suppose the West Sound were closed up, would it alter your opinion of the place as an anchor-

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age ?—If the West Sound were closed up we could get in through the Broad Sound.

4884. Which would you prefer to have closed up ?—The Broad Sound.

4885. Why ?—Because it has more of a line of breakwater than the other.

4886. Suppose this were done, would it alter your opinion as to taking vessels into the Skerries ?—I can't say till I tried it.

4887. You mean to say you would rather run past and make the Clyde ?—Yes, unless I was sheltered and in safety.

4888. Are you satisfied with the description of pilot boat at present in use ?—They serve us.

4889. If others offered, would you not prefer a decked boat ?—I don't know. It's a bad coast.

4890. But if there was a harbour of refuge at the Skerries, would it not alter your opinion ? — It might.

4891. Would you think it safe to anchor there ?—If the wind were from the south-east it might, but the north-west wind is what I most dread.

4892. (*Mr. Lindsay.*) Do you consider there is any anchorage between Dunmore and Innishowen Heads ?—I don't think there is. There is Culdaff Bay ; but I would not fancy it, even with the wind off the land.

4893. Could you make the lough with a gale from the north-west and caught coming from the westward ?—If not bearing sail I would not care. With reefed top-sails and without courses I could come inside the lights, and could ride there safely. Vessels often ride there clear of the swell.

4894. (*Capt. Washington.*) With the lights bearing about north coming in, could you bring them to bear north-north-east ?—Under some circumstances I think I could.

4895. (*Capt. Vetch.*) Do you think it would be any advantage if a pier were run out from the shore ?—It would depend on the kind of pier made.

4896. Could you point out what kind would be most useful ?—I could not.

4897. (*Chairman.*) With the wind blowing hard from the north-west could you get inside the lights ?—We could get inside generally.

4898. With a flood tide what would be the result ?—It would be the same.

4899. If the wind veered to the north ?—I would lay up and come up the river.

4900. (*Capt. Washington.*) Are the Innishowen Lights all you could wish ?—They are first rate.

4901. Did you hear any fault found with them ?—Coasters say they cannot distinguish the lights. There is one now halfway down the tower, which has been lighted for the last six months.

4902. (*Chairman.*) How far from the shore do you go to pick up a ship ?—Sometimes 10 miles in good weather ; in bad weather we keep inside the buoys. We are not able to go further.

4903. What prevents you from going further ?—The boats would not live in it, they would founder.

Mr. Abraham Stewart remarked that the pilots were expected to board vessels one mile outside the Tuns.

4904. (*Mr. Lindsay.*) What draught of water will take a ship to Derry at high water of spring tides ?—With a south west wind it would take 19 feet.

4905. What is the difference between the spring and neap tides ?—From 4 to 4½ feet.

4906. Have you known vessels drawing more than 19 feet come up ?—I knew some, not many. Very few of that draught come here.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry ?

No answer.

Sitting at Londonderry closed.

BELFAST.

Monday, 13th September 1858.

PRESENT :

Admiral HOPE (Chairman).

Mr. LINDSAY.
Captain WASHINGTON.
Captain VETCH.
Mr. COODE.

Mr. EVANS, Secretary.

BELFAST.

Mr. Tottenham.

13 Sept. 1858.

Mr. Tottenham, Barrister-at-Law :—I hand in a letter which I accidentally opened, it having been addressed to my private residence ; but I found on opening it that it was directed to the Commissioners for Harbours of Refuge. It is an official letter, and I sealed it as soon as I found what it was, and I now hand it in.

The Memorial from Ballycastle, as handed in by Mr. Tottenham :—

To the Right Honourable Spencer Horatio Walpole, Secretary of State for the Home Department.

The Memorial of the undersigned Gentry, Clergy, Merchants, Traders, and other inhabitants of the town and neighbourhood of Ballycastle, in the county of Antrim,

Showeth,—

THAT Hugh Boyd, Esq., the proprietor of the town of Ballycastle, and of a considerable estate adjacent thereto, is and has been for a period of upwards of forty-four years a lunatic, and his estates have been during the whole of that time under the management of the Court of Chancery ; and that owing to this unfortunate circumstance no steps were taken to bring the peculiar advantages of the port of Ballycastle, as the site for a harbour of refuge, before the notice of the late Committee of the House of Commons.

That in consequence of the appointment of a Royal Commission for the purpose of taking evidence on the spot as to the capabilities and advantages of Portrush (amongst others) as a harbour of refuge, your Memorialists feel it incumbent upon them to place before you their reasons for believing that the Commissioners ought to receive evidence such as they are prepared to offer of the paramount advantages of Ballycastle over Portrush or any other port within the district for such a purpose.

That the port of Ballycastle is about four miles to the west of the great promontory of Fair Head, and opposite the island of Rathlin, from which it is distant about five miles ; that all ships from the Clyde, Liverpool, &c., which take the north-about passage to America pass between Ballycastle and Rathlin ; that the storms against which it is of the utmost importance to provide shelter for shipping on the north coast of the county of Antrim, are those chiefly from the north-west ; ships do not encounter these storms until after they pass Fair Head. With a harbour of refuge at Ballycastle they would ride at anchor in safety until the weather should become sufficiently moderate to enable them to pursue their voyage ; whilst they would find it all but impossible in such gales to reach Portrush, a further distance of twenty miles.

That after ships pass Rathlin Island and Ballycastle Bay they are at once in the open sea, and comparatively free from the risk of being wrecked, but, if compelled by stress of weather, they could easily return to Ballycastle for shelter, while if compelled to go to Portrush they would have to deviate from their direct course from ten to fifteen miles at the least, and would thereby incur considerable delay in prosecuting their voyage.

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That the capabilities and advantages of Ballycastle for a harbour of refuge are very great, the lofty cliffs completely sheltering the bay from all storms from the west, south-west, south, and south-east, and we might almost add, the east; most excellent anchorage and holding ground; deep water; an inexhaustible supply on the spot of materials of the very best description, consisting of whinstone, freestone, limestone, &c., all of which can be obtained for the mere cost of raising; and that there are no valuable private rights, such as exist in the present harbour of Portrush, and of which no mention was made before the Committee, to be purchased up at an extravagant price.

That Ballycastle is peculiarly well situated for the protection of the shipping trade of Scotland, Liverpool, and Belfast, and in the event of a war that a small fleet of ships of war would from that harbour be able to protect our trade along the whole northern coast of Ireland, as well as afford similar protection to the trade of the Clyde, Ardrossan being only four hours distant from Ballycastle by a first-class steamer; and that batteries upon the island of Rathlin and upon the heights of Fair Head, and the other lofty promontories adjoining, would completely protect such a harbour from the attacks of an enemy by sea.

That, in addition to the above reasons, your Memorialists beg to state, that the town of Ballycastle lies in the centre of a rich agricultural district, abounding too with mines and minerals of the most valuable description, consisting of coals (the mines of which have been partially worked for centuries), ironstone, copper pyrites, fire clay and brick clay of superior quality, sand suitable for the manufacture of glass, &c. &c.; all of which, now lying neglected for want of a harbour, would add vastly to our national wealth, and promote employment, if such a harbour was constructed; while, on the contrary, Portrush is entirely destitute of any such mineral wealth, and owes its insignificant trade to its being at present the port of the town of Coleraine; and further, that surveys and maps of a proposed railway of only nine miles in length, from Ballycastle to join that from Ballymena to Coleraine, were made some time since, and, if completed, such a railway would afford direct communication to all parts of Ireland.

Your Memorialists, for these reasons, and many others which they are prepared to give in detail before the Commissioners, urge respectfully upon your attention the claims of Ballycastle, and pray that you will be pleased to give instructions to the Royal Commissioners to hold an investigation thereon.

(*Chairman.*) Mr. Tottenham, do you appear on behalf of those who have signed this Memorial to advocate the claims of Ballycastle?

(*Mr. Tottenham.*) I do.

(*Chairman.*) And are you engaged professionally?

(*Mr. Tottenham.*) I am.

(*Chairman.*) Have you any statement, with regard to Ballycastle, which you wish to tender in addition to the Memorial read?

(*Mr. Tottenham.*) If you allow me to make a few observations I shall do so, and then proceed to hand in a list of witnesses (much less than I should have presented if I had had sufficient notice), and also the questions to be asked these witnesses by the Commissioners.

(*Chairman.*) Proceed.

(*Mr. Tottenham.*) I think it quite unnecessary to point out the geographical position of Ballycastle, as the Commissioners are fully aware of it; and a reference to the map will show at once the nature of its advantages, in point of position, over Portrush. It is very nearly the most northerly part of the county of Antrim; Fair Head is the most northerly point, and it is only a few miles off Ballycastle. Portrush, on the contrary, is a deep embayment; it is stated in the Memorial to be about 20 miles from Ballycastle, but it is not quite so much; it is only about 16 miles. If a line be drawn from Fair Head to Malin Head, which is the most northern termination of Ireland, you will find that all ships going from Clyde, Liverpool, or Belfast, by the north-about passage, keep a very considerable distance to the north of Portrush, whereas, passing through the Sound of Rathlin and Ballycastle Bay, they are not more than three miles from Ballycastle town. Portrush is distant from the imaginary line that I propose to draw, 10 miles in the nearest direction. In case a storm should take place from the north-west, catching a ship passing outside that line, it would be extremely difficult to reach Portrush. I am speaking now of vessels in the foreign trade, not of mere coasting vessels bound to Londonderry or elsewhere on the coast. For such vessels there would not be the slightest difficulty, I apprehend, to reach Ballycastle. The north-west is the favourable gale for them after they pass Rathlin Island to Malin Head, and all they would have to do would be to ride out the gale, sometimes not an easy task, but it is still easier than to bear against it; and one great advantage is that they could at discretion either resume their voyage when the wind became favourable, or, if the storm continued, they could round the promontory of Fair Head and take the south passage. One of the great objections raised by one witness (a gentleman remarkable for some little matters which I need not now introduce, Captain Johnston) at Portrush, against the Ballycastle case, was that it had a bad outlet and that the water was too deep for the construction of a breakwater. In my innocence I thought that deep water, if not very deep, was rather an advantage for a harbour of refuge, so as to take in ships of Her Majesty's Navy, and other large ships, to such a harbour. Evidence will be produced to you to show, I hope to your satisfaction, that the water does not exceed ten fathoms in depth at the extremity of the proposed breakwater. The breakwater proposed to be made has not yet been laid out by an engineer to the extent that would warrant me in bringing it before you, but a harbour and pier for merely commercial purposes was planned about a couple of years ago by a skilful engineer, at the request of the Earl of Antrim. The plan for that harbour I have here ready to produce to the Commissioners if they will allow me; but it is not so extensive as the one now proposed to be made. The materials for the formation of that harbour are very easy of access. Mr. Macartney, in his opening statement at Portrush, mentioned that the Earl of Antrim, with munificence and liberality, was perfectly willing to present to the Government the materials of the breakwater (not the pier) at Portrush. As I am informed, there are no materials for the formation of the pier—for the fine cut stone and hammered stone parts of the pier—and attending closely to Mr. Gibbon's examination, it was stated that it was likely that a pier would not be built, but only a breakwater for a harbour of refuge solely, and without any reference to commercial purposes. At Ballycastle, within a few yards of the proposed breakwater and pier, there are lofty cliffs of whinstone rising to a considerable height above the water. The breakwater can be made of rocks out of that cliff. Alexander Boyd, Esq., the brother and heir presumptive to the lunatic, and who will become entitled to the estate, authorized me to say that so far as he was concerned, the Government shall have, if it were considered right to form such a harbour at Ballycastle, or the contractor shall have the entire materials of the breakwater free of cost. Within two miles of the site of the breakwater, two miles from the shore, and with a road to it from Ballycastle, lies a sandstone quarry of unlimited extent and of the finest description of free stone. That quarry is let, under the Court of Chancery, at an insignificant rent. It is my duty to mention that fact to the Commissioners lest they should suppose it was in the possession of the owner of the manor; but I have no doubt, having had the pier before the Court of Chancery with reference to a harbour for commercial purposes, that the court would purchase up the interest of the tenant in that freestone quarry, as it is trifling and then, so far as Mr. Alexander Boyd is concerned, that freestone quarry is at the disposal of the Government. I believe within half a mile of Ballycastle exists an unlimited supply of white limestone, of the finest description. That limestone is in the tenancy and occupation of Mr. Alexander Boyd, under the courts, so that he has complete power over it. There are very extensive coal mines, as probably every one of

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the Commissioners are aware, which have been worked for centuries at Ballycastle, therefore the facilities for burning lime and smelting minerals are great. Mr. Alexander Boyd has instructed me to say that that limestone quarry shall also be placed, without any cost save that of burning the lime, at the disposal of the Commissioners. I think I shall not detain you longer on that subject, for if a pier and breakwater are to be constructed the present will be to the contractor and not to the Government, for the Government will not make it. I should observe, that Mr. Gibbon stated there was no lime at Portrush capable of being used for the breakwater, and that it will have to be imported. I do not know whether the fine limestone of Ballycastle will suit or not. I state the fact that it exists; and therefore I think I may claim for Mr. Alexander Boyd the same degree of munificent liberality which Mr. Macartney did for the Earl of Antrim. I think that Mr. Lindsay stated that on several occasions at Portrush that the objects in view in the construction of a harbour of refuge were threefold:—First, the preservation of life; second, the preservation of property; and, third, the promotion of commerce. With regard to Portrush, the harbour may, if constructed there, preserve life and property; and I entirely agree with the evidence before you, that the preservation of a single life is worth the 100,000*l.* proposed to be spent, or any other great sum. But what will it do for the promotion of commerce? And I am not now speaking in a general point of view; but of the commerce of this country. The only evidence in favour of Portrush in a commercial point of view is that of Mr. Gage. He stated at Portrush that the harbour of refuge—

(*Chairman.*) I have no wish to shorten what you have to state in favour of Ballycastle, but excuse me for saying that the object of the Commissioners is to select sites for national harbours of refuge, not with the view of promoting the commerce of particular ports.

(*Mr. Tottenham.*) Yes, you will find that in one of my letters to the Secretary of State I dwelt upon harbours of refuge as for the purpose of developing the resources of the northern parts of the county of Antrim, and thereby promoting the national wealth. I am sorry to detain you, but I think it necessary to make the statement from the fact of Ballycastle having been entirely forgotten in the House of Commons. I am now speaking of it in a national point of view. Ballycastle and its neighbourhood have an unbounded supply of minerals of the finest description, an enormous quantity of which is exported (a vast quantity of iron is exported) at present to Scotland. The iron is particularly rich. It is calcined on the spot, for it is composed of black band ironstone in courses with coal, and the stone consumes itself, and is its own fuel. I have specimens of this iron now in Belfast to show to the Commissioners in its raw and calcined state. At the present there are no means for obtaining facilities for the exportation of ironstone, except from a rough pier at the mines, about a mile from Ballycastle, on that side of Fair Head, but in rough weather no vessel can venture near it. Small vessels do go near it in smooth weather, and from that they are sent to Scotland. Now ships do take refuge in Ballycastle Bay in rough weather, but in rough weather they do not go near the pier. On Saturday I may mention that there was a ship lying in the Bay of Ballycastle which came to take in a cargo of that same iron ore, but from fear it could not go near the pier, and lay at anchor all day. If a breakwater, such as I have described, were made, it would extend half a mile from the rock called Craignascarf, which is in a direct line to the Rue Point in Rathlin Island for a quarter of a mile or rather better, and from that the direction proposed is, after you go about 500 yards in a direct line, you would then bend round to a point south of Fair Head, that would leave an immense space of water perfectly protected from every sea. I need not go into the propriety of a harbour of refuge on the northern part of the county of Antrim, and you have also evidence before you of the principal gales to which that coast is exposed, as some point from north to north-west. To the north-west and to several points east of north, Ballycastle Bay is perfectly sheltered by Rathlin. Fair Head lies due east, and every point from east to north-west is completely sheltered by lofty cliffs; to the wind from the north-east and a point to the north and north-west, therefore, it is only exposed. From the north-west gales it is perfectly sheltered. The Mull of Cantyre is only 12 miles from Fair Head, and the small space of sea between the Mull of Cantyre and Fair Head effectually prevents any rough sea in Ballycastle Bay. When a storm rages it is true it raises a rough sea, but nothing more than the wind can catch in the bay, and the second part of the pier I describe will shelter it from that, and the first 500 yards of the pier will protect it from the sea rolling in from the Atlantic and leave it quiet water in the Bay of Ballycastle. Now, when a ship goes from Liverpool and passes Fair Head, and if she is caught in a north-west storm, she can make Ballycastle Bay with the greatest facility, whereas if she were caught before she arrived before Portrush she would probably be wrecked in an attempt to make the point in a north-west gale. A ship that would be caught beyond that, nearer Malin Head, of course would have a better chance of going safely into the broad sound of Lough Foyle. And I have been informed that Ballycastle Bay contains most excellent anchorage ground, and that so lately as April last one vessel rode out, with two anchors, a gale of very great violence from the north-east in perfect safety. You will have some evidence produced of the number of wrecks that have taken place on Rathlin Island and elsewhere in that neighbourhood, without going to Portrush. At present, from the want of a harbour of refuge, vessels (a great number) do not come between Rathlin and the main land, but keep to the north of Rathlin; and the memorial was in error in the word "all" there, but was corrected in my letter to the Secretary of State, and made "many" vessels instead of "all" vessels. If a harbour of refuge were there, the direct line being from Fair Head to Malin Head, all ships bound to the North American ports would pass between Rathlin and Ballycastle, knowing that they could, in a gale, have no difficulty in getting into a safe harbour. Sometimes there is an objection to a harbour, that when ships get in they cannot get out. That is not the case with regard to Ballycastle, for with an ebb tide they can get out, no matter what wind is blowing, so that when a ship in refuge there wishes, she can go out and pursue her voyage when the wind becomes favourable. Mr. Macartney, in his statement the other day, mentioned that the first witness produced before the Committee of the House of Commons was the late Chairman of the Board of Works, Sir John Burgoyne. I rather wonder that he mentioned it. Sir John Burgoyne states—

(*Chairman.*) Mr. Tottenham, allow me to ask you if you have any detailed plans and estimates which you intend to lay before the Commissioners, for a national harbour of refuge in Ballycastle Bay?

(*Mr. Tottenham.*) I have not; I came unprepared. If I had had a fortnight's notice I would have had them, but I received the Secretary of State's answer to the letter I addressed to him only the morning of the day before I went to Portrush, which was the day before you arrived there; but would you permit me to say, if my evidence here would warrant me, to be authorized to produce to you further evidence in London, I think you will recollect that you stated so in Portrush.

(*Chairman.*) I think you will recollect that I stated at Portrush that your communication had been forwarded to me by the Secretary of State, but that it had reached me so short a time previously that I had been unable to bring it under the consideration of my fellow Commissioners. You are aware of the fact that three of them visited and inspected Bally-

castle Bay in the *Banshee;* and since the meeting in Portrush I have had an opportunity of bringing before the Commissioners your proposal for a national harbour of refuge at Ballycastle Bay. Now the resolution come to on the subject is this, that as regards position and expense of construction, the site is so entirely ineligible that it is not necessary to enter into any evidence on the subject, but I did not like to stop you, as we were anxious to hear any brief statement you might like to make. My opinion really is, however, that it has extended already beyond the length that the subject demands, and a good deal of irrelevant matter has been introduced into your speech; that is inevitable, however, not being a nautical man yourself, but to us professional men, who understand the subject, it was apparent that you introduced a good deal of extraneous matter that had nothing to do with it. Under these circumstances, we think it quite unnecessary to trouble you any further at present, or go into any evidence on the subject, but should you, on further consultation with an engineer, of such eminence as you may think proper to consult, desire to address a memorial to the Commissioners, we shall be happy to receive the memorial, with detailed plans and estimates of expense, in London.

(*Mr. Tottenham.*) Then you do not wish us to produce evidence to counteract the evidence against Ballycastle given at Portrush?

(*Chairman.*) There is nothing in what I have said to warrant the statement that the evidence heard at Portrush affected our opinion. My statement was, we professional men, qualified to judge on the subject, inspected the locality, attentively considered it, and we have come to the opinion I have announced to you.

(*Mr. Tottenham.*) My impression was that if we would be able to produce local evidence in favour of the harbour, and then if we would be able to produce in London detailed plans and specifications of the proposed breakwater and pier, you would allow me to do so.

(*Chairman.*) No; if you recollect I said that the Commissioners reserved to themselves the right of judging what evidence was or was not relevant. I distinctly reserved to the Commissioners the right of judging of the relevancy of the evidence that you would produce.

(*Mr. Tottenham.*) Then with respect to that, if you consider the plans and estimates feasible and could be carried out, I will have the trouble to bring the witnesses to London that I have here to-day.

(*Chairman.*) Under these circumstances I imagine the course is to lodge detailed plans and estimates, and we will proceed to consider them, and if it were then thought desirable to have further evidence, the evidence would be brought over to London at our expense.

(*Mr. Tottenham.*) Then with regard to the witnesses I have brought here to-day, I can only bring them back again, of course not at your expense.

(*Chairman.*) There are several officers and persons whom I summoned, and of course they will be of no expense to you, but of all others we know nothing. If you had stated to me at Portrush that you wanted those persons as material witnesses, I would have granted their expenses as well as that of the naval officers and others summoned.

Mr. Robert Corry examined.

4907. (*Chairman.*) You are a shipowner in Belfast?—Yes.

4908. How long have you been connected with the shipping interest of Belfast?—Ten years.

4909. What is the nature of the shipping with which you are connected?—Principally in the foreign trade, both in the East India and North American trades.

4910. Then have you ships going north-about?—Often.

4911. Are you aware of the objects of this inquiry?—Yes.

4912. Now would you give to the Commissioners your opinion as to the necessity or advantage of a harbour of refuge to be constructed at the Skerries?—I went round within the last month and looked at the place, and what I understood is, that in 99 cases out of every 100, our ships went outside Rathlin, and I think that there would be far more losses going in to look for a harbour of refuge than to keep out at sea.

4913. But I want to know your opinion as a shipowner, should it be decided to construct a national harbour at the Skerries?—My opinion, is, that it would be a waste of public money. The fact is, I think it would be a job to put such a harbour of refuge there.

4914. Had you ever large ships trading to the Baltic?—Yes; we do a great deal in the Baltic trade, but not with my own ships.

4915. Have you any opinion to offer as to the advantage of a national harbour of refuge on the east coast of Scotland?—I have not. It might be advantageous to have it in some place. I see by the wreck chart that there are more wrecks there than either at Rathlin or Portrush, and I find that there is not even a rocket station along all the north and west coast of Ireland till you go to the entrance of Sligo Bay.

4916. Have you any opinion as to the Isle of Man; could anything be done there which would be beneficial to the trade of Belfast in the way of refuge?—There might be in the way of steamers, but my way is to keep out at sea as much as possible.

4917. Have you read the report of the Committee of the House of Commons on the subject?—I have read a short report.

4918. Do you recollect the proposition for the improvement of Carlingford Bay and Waterford and Wexford harbours as harbours of refuge; what is your opinion as to that?—I think I recollect one was the deepening the harbour of Carlingford Bay. It might do for coasters, but I think it would be better for them to keep out to sea.

4919. (*Mr. Lindsay.*) Do you think that you have sufficient harbours of refuge already on the coast?—I do.

4920. Therefore it is your opinion that it would be wasting the public money to attempt making a harbour of refuge at Portrush Skerries?—I do.

4921. And therefore, holding that opinion, you do not think it desirable to have a harbour of refuge at Ballycastle?—I think it would be no use. It is very good for a private speculation, but not for a public work.

4922. Say that it was decided to have a harbour of refuge on that part of the coast, whether would you prefer Ballycastle Bay to the Skerries?—I think the most natural place would be the Skerries, but I think it would be more hurtful than good. It might be useful for coasters now and again, but they have Derry Lough and sea room, so that there is considerable safety.

4923. Then is it your opinion that a harbour of refuge is not necessary on any part of the coast of Ireland?—I do not speak generally, I only speak of the places I know.

4924. Then you think there are sufficient natural harbours of refuge in the north channel?—I do.

4925. You say that a harbour of refuge in the Isle of Man might be useful for steamers; would it not also be useful to sailing vessels?—Well, I am not a good enough sailor to say whether it would or not, but I think it would not be of much use.

4926. Have you any idea in your own mind of the best place in the Isle of Man?—I have not; I often heard Peel spoken of, but every one would like a harbour near his own place.

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4927. But do you think that a refuge harbour there would be of any use to foreign-going vessels ?—I think that a refuge harbour there would be of no use to foreign vessels. I do not think that it would be of great use to us.

4928. Is there not a large coasting trade in the Irish Sea ?—There is.

4929. Are they not occasionally caught in a storm, and have they not to seek for a harbour of refuge ?—Well, they have to run for natural harbours of refuge.

4930. You are aware that there is a proposal to deepen the bar at Carlingford to allow vessels to get into the natural harbour that already exists ?—I think it would be wiser to do that.

4931. You are aware that the estimate is very trifling ?—Yes.

4932. Should you think 20,000*l.* or 30,000*l.* well laid out in forming the natural harbour of Carlingford Lough into a refuge harbour for coasters ?—If useful in saving life and property of course it would be well laid out.

4933. Are you acquainted with Waterford ?—I am not.

4934. (*Capt. Vetch.*) Your vessels from America coming north about, if unable to prosecute their voyage east of Malin Head, where do they take shelter ?—I think they go out to sea, and if they could not they would come back again into the Lough.

4935. In like manner in their voyages outward, do they take refuge anywhere ?—No, never. In fact I would dismiss a master at once who would offer to go into a place like that at the Skerries.

4936. Did these vessels, going or coming, ever put into Loughindall ?—I had a large vessel put into Loughindall two years ago. The main and mizen masts were cut away. She was going to the Clyde, and could not make there.

4937. Did Lough Swilly ever serve as a place of shelter ?—I believe for small coasting vessels it does, but I never knew our large ships to go there.

4938. (*Mr. Coode.*) Did you dismiss the master of the vessel for putting into Loughindall ?—I dismissed him, but not for that circumstance.

4939. Then you think a harbour of refuge may be of use under certain circumstances ?—Yes ; natural harbours of refuge are of use.

4940. You seem to have studied the wreck chart, and you state that harbours of refuge may be of use to coasting vessels. Now do you know the proportionate number of wrecks of coasting vessels compared with those foreign-going ?—I do not. I see a great number of wrecks on the English coast, but not many in the Irish Channel.

4941. (*Chairman.*) I think you said that the vessel put into Loughindall with loss of the main and mizen masts ?—Yes.

4942. Could you furnish us with a detailed statement of the circumstances ?—Yes.

4943. (*Mr. Lindsay.*) Was it blowing a gale of wind when the ship put in there ?—Yes. I do not know how it was, but she was wanting to go to the Clyde and could not make it. It was blowing a hurricane.

4944. Did she reach the harbour without the main and mizen masts ?—They cut away the mizen mast to make her wear, and the other mast to make her ride it out.

4945. And she brought up in safe anchorage in that state in Loughindal ?—Yes.

Mr. James Barnett examined.

Mr. J. Barnett.

4946. (*Chairman.*) What is your occupation ?—I am a shipowner ; I have been connected with the shipping interest of Belfast for some 30 years.

4947. What is the nature of the shipping trade in which you are now engaged ?—They are now in the foreign trade ; but I formerly had vessels in the coasting trade.

4948. And when you had did they ply to all parts of the coast ?—Yes.

4949. Did any of your vessels go to the Isle of Man, or different parts of the coast of England ?—They have occasionally put wind-bound into the Isle of Man in stress of weather.

4950. Where do your foreign vessels trade ?—To the United States, the Mediterranean, and different other places.

4951. State any opinion you entertain of the advantage or necessity for a harbour of refuge at the Skerries ?—I have no doubt whatever but a harbour of refuge at the Skerries, on the plan furnished to me in London by Mr. Macartney, would be exceedingly advantageous to the coasting trade ; but I question very much if it will be of the slightest use to the larger vessels. It might be getting out, but in coming in it would be exceedingly advantageous to run for such a harbour as could be constructed at the Skerries.

4952. Are you aware that pilots from Lough Foyle in bad weather frequently board vessels after they have got inside of the lough, and that they have not been able to board vessels at sea ?—I am not aware of that, but I have no doubt of the fact. From the position of the lough and the position of the sea it would be very difficult for pilots to board vessels there.

4953. As a shipowner, is it your opinion that it would be of advantage to vessels proceeding round there, that the pilot vessels of Lough Foyle should be decked vessels, so that they could board vessels eight or ten miles from land, instead of not boarding them till they came inside of the Tun banks ?—It would be exceedingly advantageous to the trade, but I question if it would pay the pilotage establishment. If Portrush were constructed into a harbour of refuge it would be an advantage to have pilots at sea, but vessels coming into the channel never look for a pilot off the north coast, and there are not sufficient vessels trading to pay for such a pilotage establishment as we have here.

4954. But would you extend that statement that vessels passing do not look for a pilot to vessels under stress of weather ?—I think it would be of use if it was a foreign vessel, but none of our own vessels require it. The masters of all our own vessels are so well acquainted with the navigation of the channel as to be able to come in without pilots ; but a foreign master who had never been here before would be benefited by having pilots.

4955. Then would it alter your opinion as to the advantage to the general trade of the country of a harbour of refuge at the Skerries if I were to tell you that one reason why the pilots of Lough Foyle have not a better description of boats is, that they have no harbour that they can run into in bad weather ?—Well, you know that is a question which I have not considered.

4956. (*Mr. Lindsay.*) From your long experience as a shipowner do you think, in a national point of view, that a harbour of refuge is necessary in the north channel ?—I think that harbours of refuge are exceedingly desirable in all places along the coast, at intervals from each other, but I question if there is any place in the north channel available for the formation of a perfect and safe harbour of refuge. Ballycastle has been mentioned here. Now I think that Ballycastle would be a far easier place at which to construct a safe harbour of refuge than at the Skerries or Portrush. Ballycastle is an approachable coast ; the Skerries an iron-bound, dangerous coast, and a vessel must be in great difficulty when it would venture to come near the Skerries in a gale of wind.

4957. What are the prevailing winds there ?—West. It is west or north-west for nine months in the year, perhaps.

4958. As you seem to have formed an opinion as regards Ballycastle, have you any idea of what the

cost of forming a national harbour there would be?—Not the least; I only speak of Ballycastle and Portrush, because they were mentioned here. In Portrush, on a calm day, I have seen vessels lying so uneasy, that I have no hesitation in saying they would have broken off if a gale of wind had risen; they could not readily have kept their hold with a pair of anchors and chains.

4959. Then you object to Portrush because of the heavy rolling sea?—I do.

4960. Then is there not a heavy sea in Ballycastle Bay? — No, it is circumscribed; it is a narrow channel compared to Portrush.

4961. (*Mr. Lindsay.*) I asked that question because I was one of the three Commissioners who inspected it, and though the wind was blowing off the land, there was a very, very heavy sea rolling into the bay.

4962. (*Mr. Barnett.*) A breakwater has been constructed at Plymouth, and a pier at Kingstown Harbour, and one tenth the sum would construct a safe harbour at Ballycastle Bay.

4963. (*Mr. Lindsay.*) Have you considered what part of the bay would be best for it?—No, that is an engineering question.

4964. Being a practical man I will show you the bight of the bay, and ask your opinion. Say that a harbour of refuge was made in Ballycastle Bay, the great object would be to protect ships during the north-west gales?—Yes, from the north-west and west-south-west.

4965. They would be protected by the land to the south-west?—Yes.

4966. But it would be necessary to run out a pier so as to protect them in north-west gales?—Yes.

4967. Say that a ship was caught in a north-west gale and was obliged to run for this harbour, a harbour so constructed as to protect vessels in north-west gales, would not the ship be down on the lee shore before she could get into that harbour?—No, it does not follow that it would be down on the lee shore. If the vessel was running from sea, outside Rathlin, to escape from a north-west gale, she would have the harbour and everything connected with it before her so that there would not be any occasion to come into the lee shore. She would naturally round too wherever she came to anchor.

4968. But during a north-west gale the eastern-most part of Ballycastle Bay would be a lee shore?—It would, of necessity.

4969. Well, consequently, to get round the pier or breakwater that would be necessary to protect ships in north-west gales, she would require to run down very close to the lee shore?—Not at all, it would depend upon the room there was to enter the harbour. If you circumscribe the entrance so that it is necessary to run down on the lee shore, well; but I should say if there was a violent gale from the north-west, and captains of vessels found they could weather Fair Head, that they would run for either Campbeltown, or Belfast Lough, or Lamlash.

4970. Then, in your opinion, to make a harbour at Ballycastle Bay sufficient to protect ships in north-west winds, it would be necessary to carry a breakwater or pier a considerable length into the bay, so as to keep them sufficiently free from a lee shore in running for the proposed harbour?—Undoubtedly it would.

4971. Well, would not that considerably increase the cost?—No question but it would, and if you ask my opinion of Ballycastle and Portrush, I would say that neither would be eligible for a harbour of refuge except for the coasting trade. In all cases the coasting trade would be greatly benefited by a harbour of refuge at Portrush and one at Ballycastle; and not that they would be available in gales of wind, but that they would be available in head winds, so that when they could not work their way by sea they could run into Portrush or Ballycastle, and remain till the wind shifted.

4972. But as the main object of a great harbour of refuge constructed at the cost of the Government is to save life and property, you, I understand, think that there is no port in the north channel where such could be constructed; and, secondly, that on account of the many natural harbours that exist, it is hardly necessary—are those your views?—My view is that neither of the places that have been mooted are available for a harbour of refuge such as that you describe; they would be exceedingly useful harbours of refuge for the coasting trade, for people who are continually running along the shores might be able to take these harbours when stronger and larger ships would not be able to attempt it.

4973. Then for the convenience of the coasting trade these harbours might be useful?—Yes.

4974. Do you think a harbour of refuge useful at the Isle of Man?—I think it is exceedingly desirable, but I do not think it necessary at all round the Isle of Man. There is sea room enough.

4975. Then you do not think it necessary for the saving of life and property at the Isle of Man?—I do not think it necessary for the saving of life or property at the Isle of Man to go to very great expense with a view to that, for at the neighbourhood of the Isle of Man we seldom hear of losses of life or property. A vessel sailing past the Isle of Man in a gale of wind can take the lee side of it if she choose, and there are harbours all round the island that vessels can run into unless they are too large, but there is no place at all on the coast of Ireland that you could make a harbour of refuge equal to our own harbour here as a harbour of refuge. It is accessible from all points of the compass, and no matter whether you are on the shore or whether you let go, you are secure, you are perfectly safe.

4976. Have you good anchorage at the mouth of Belfast Lough?—Yes.

4977. Are you sheltered in all winds?—No, not from the east and south-east, but a vessel running into the harbour can take shelter, by going into Bangor Bay on the one side or under Black Head or White Head on the other, or in Carrickfergus Bay it will be perfectly safe.

4978. What water have you at low-water spring tides all the way coming up to Belfast?—I think 20 feet would be about the average. I think the deepest draught of water we can bring up to the quay is 20 feet or 20½ feet. I had a vessel come up some months ago drawing 20 feet 6 inches.

4979. Do you know Waterford or Wexford sufficient to give an opinion?—I do not. Carlingford is a desirable place for a harbour of refuge, because we have a natural harbour, and it only wants the channel deepened and widened, and I believe that a small sum would do that effectually.

4980. Then you think that the deepening and widening of Carlingford would be of advantage to the foreign as to well as the coasting trade?—Yes, to all vessels if caught in a gale of north wind, and a good harbour there would be a desirable thing.

4981. (*Capt. Washington.*) Are you acquainted with Waterford?—I am not.

4982. You are aware that a large trade passes out by the south channel?—Yes, I know the position of Waterford.

4983. You are aware that there is a natural harbour there very like that at Carlingford Lough?—I believe so.

4984. Do you think if a small sum were laid out in deepening the entrance it would be of advantage to the trade?—I think it would be advantageous, in all cases where a small sum of money would improve a natural harbour, for the Government to do that.

4985. (*Capt. Vetch.*) May I ask, Have you ever been in Douglas Harbour in the Isle of Man?—I believe I have; I was cast away on the Isle of Man about ten years since, and I visited several places then, and I believe I was in Douglas Harbour.

4986. Are you aware that sometimes, in certain winds, steam packets from Liverpool are not able to get in?—So I have heard.

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Captain Vetch.

4987. Are you aware that Douglas Harbour is sheltered on three sides, and open only to the east? —I am not aware, but I suppose that is the case.

4988. Then as that is the case, I wanted to ask you if running out a pier to protect the east side is not the proper course to take?—It would be exceedingly desirable, provided the expense would not be too great, such as Mr. Lindsay objects to at Ballycastle.

Mr. ROBERT BRIGGS, Master of a Steam Ship, examined.

Mr. Robert Briggs.

4989. (*Chairman.*) How long have you followed the sea?—I have been at sea 15 years; and I have been about seven years a master.

4990. What vessels did you principally command? —I have been in the foreign trade, but lately in the cross channel coasting trade.

4991. In what direction along the coast have your vessels been employed?—Crossing the channel from Lancashire to Belfast, and from Belfast down to Londonderry.

4992. Have you any opinion to offer to the Commissioners as to the advantage of a harbour of refuge at the Skerries?—I think it would be very desirable there should be one there. There was an instance two or three years ago in which a large American ship was lost not far from Portrush. There was also another instance of a ship being embayed to the eastward of Burford Head—both large ships in the foreign trade. Had there been a harbour of refuge at Portrush most probably both vessels would have been in safety.

4993. Have you ever been at anchor in the Skerries in bad weather?—I have been in the Skerries Roads. I have had occasion to lie there as far as two days consecutively.

4994. From what direction was the wind?—The wind was about south, having had to run back from Fair Head.

4995. And the wind being off shore, was the water smooth?—Quite.

4996. Have you ever been in the Skerries with a heavy wind from the north-west?—I have been in, but not in bad weather.

4997. Are you acquainted with the Isle of Man?— Yes.

4998. Would a harbour of refuge at Douglas be of use to the Liverpool trade?—It is very requisite indeed in the winter months. I traded to the Isle of Man for two years.

4999. Will you state the reasons on which you form that opinion?—A gale of wind from the south-east breaks heavily across the entrance against the piers, which renders it highly dangerous to take.

5000. And on what part of the Isle of Man would it be most advantageous to the shipping to have a harbour of refuge, supposing one to be made?—Well, there is so little difference between Ramsay Bay and Douglas, the distance is so short, that suppose a vessel caught in a south-east wind, say at the Bell Buoy, Liverpool, and obliged to bear up, there could be little difference in the choice, supposing that each of the sites were equally eligible, which I think they are about.

5001. (*Mr. Lindsay.*) Do you know the names of the two vessels lost in the neighbourhood of Portrush? —One was called the *Susan Hopley*, a large American ship, and the other ship was not lost, but was brought up by a steamer.

5002. What reason have you for supposing that the American ship would have been saved had there been a harbour of refuge at Portrush?—Evidently, the vessel being on a lee shore, if there had been a harbour she would have been brought up. I think if there had been a harbour of refuge, known as such, he could have caught it.

5003. Have you ever been at Loughindall Bay?— I have not; but I think that, from the examination of a previous witness, the anchorage can't be good in which a ship is obliged to cut away her masts to ride.

5004. Have you ever been in Lough Swilly?—I have not. I went down three months by land to look at it; but I never had occasion to call at it, and I never went to the entrance of it.

5005. When you say that a harbour at the Skerries or the vicinity is desirable, do you mean to apply your observations to the coasting trade, or to coasting and foreign. Would it be necessary in your opinion for all descriptions of ships?—I think if it were established it would be used by all coasting and foreign.

5006. Is it the case that a coasting vessel, bound round to the west of Ireland, and having got as far as Innishowen Head, were a wind from the west would have no shelter till she came to Larne or Campbeltown on the opposite side. Has a ship not good shelter in Lough Foyle?—Supposing she were taken short before she got to it, there would be difficulty in a ship fetching into Lough Foyle in a north-west gale. I have seen Lough Foyle that you could not take it even with a steamboat; the sea was breaking across the entrance to it so hard that it was not safe to attempt it.

5007. Would she not be safe when above the lighthouse?—No, the sea was breaking right across there from the Tun banks to the main land.

5008. You expressed an opinion that a harbour of refuge would be necessary at the Isle of Man, but you did not give a decided preference to Douglas or Ramsay Bay. Say that it was decided to have one harbour there, and that the choice rested between Ramsay Bay and Douglas, I would like to know, if in such a case as that, which point would be the most useful for saving life and property, and afford the greatest facilities to the shipping?—I would say Ramsay, because there is more room. In Douglas Bay there is not sufficient extent for a national harbour of refuge.

5009. Then your opinion is, that the harbour at the other place would be useful, but that if it were to rest between these two places (the one to have it and the other not) that you would give the preference to Ramsay Bay because there is more space?— Yes, because there is more rolling ground.

5010. (*Capt. Washington.*) Do you consider Belfast a national harbour of refuge at all times?—Yes, but there is not the shelter from the east, the same as the gentleman who last gave his evidence supposes.

5011. Where would a vessel go to under such circumstances?—By coming sufficiently up the lough she would get into safe water.

5012. In fact Belfast has the advantage of being a natural harbour accessible at all times?—Yes, and is used as such.

5013. Are you acquainted with Carlingford?— No, I am not much acquainted with the coast to the south.

5014. Nor with Waterford?—I know nothing of it further than in passing it while in the foreign trade.

5015. Did you ever go into Lough Swilly?—I did not.

5016. Had you ever occasion to run for Loughindal?—No, it is not much frequented. Coasters don't like it, it is a bad riding place; it is not a safe place. It is a very bad riding; vessels ride very heavy; but I am merely speaking from hearsay.

5017. (*Capt. Vetch.*) I think you mentioned you were trading to Douglas for two years?—Yes, for two summer seasons.

5018. And the Bay of Douglas is of considerable depth of water; there are 12 or 14 feet anchorage in the bay at time of low water?—Yes.

5019. Therefore it is accessible at all times of tide for steamers?—It is.

5020. With respect to Ramsay, are you aware if it is a dry water harbour?—Both are equally dry. I was speaking of the bay.

5021. I am speaking of the harbour of Ramsay, which consists of a river which is dry at low water, is it not?—Both harbours are equally dry within the piers at low water. You can't approach the pier at Ramsay so near as at Douglas.

5022. Yes; but you are aware that in the Bay of Douglas there are 14 feet of water?—There are; you can't get so near at Ramsay, but you can get very near the pier at low water.

5023. I think the harbour of Ramsay is defended by a pier entirely dry at low water, is it not, and you must anchor outside?—It is further off than at Douglas.

5024. And you are aware that it has no defence; it is open to the north, and east, and south, but that Douglas is sheltered on three sides?—There is almost, I think, the same shelter as at Douglas; there is a deep bay off Ramsay, and the island on three sides.

5025. (*Mr. Coode.*) You have spoken of vessels running back through the north channel, to Larne; is that common?—In the coasting trade it is.

5026. How many vessels have you known do so during a gale?—There might be from ten to twelve perhaps, or from 15 to 20, according to the length of the spell of west winds. By a sudden shift of wind that is about the amount of fleet that run back.

5027. At what point, generally, do they bear up?—Fair Head principally; they very seldom go further. If there is a wind check they are nearly sure to get it there.

5028. Then if a vessel were caught there in a west wind, would Portrush be a fair place for her?—No, there is nothing else than to go to Larne.

5029. But I think you said that vessels caught off Innishowen had run for Larne?—If they are caught in that part of the westward, which does occur.

Captain WHITE, Harbour-master of Belfast, examined.

5030. (*Chairman.*) How long have you been harbour-master of Belfast?—I have been about six years harbour-master of the port of Belfast. I commanded a steamer here 25 years since, generally through the channel.

5031. And from what period have you been at sea?—I went first in 1814, but I was frequently ashore. I could always get the command of a ship when I wanted it. I was master of a steamer for five years, and I was for five or six years master of sailing vessels.

5032. And where did the vessels trade to which you commanded?—When I was in the coasting trade the steamer ran to Belfast, Carlingford, and Wexford, and Dublin.

5033. Are you acquainted with the Isle of Man?—I am.

5034. Are you acquainted with Portrush and Lough Foyle?—I know Portrush, and I have been looking forward to it for the last 20 years as a place for an asylum harbour in the north channel, for I am an advocate for them on a large scale.

5035. When I said Portrush, I should have said the Skerries Roads; do you know them?—Yes; I have been off the Skerries Roads in a wind which was off the land, but I did not presume to go up to them. My opinion is, that if these rocks of which the Skerries are composed, were connected with the land, it would make a harbour that would be safe in all weathers.

5036. Am I to understand that you are decidedly of opinion that it would be an advantage to the coasting trade?—Not only to the coasting trade, but to the general trade, except this, that masters have got instructions from their owners not to take any harbour; but I am an advocate as an old ship-master, to take a harbour at a proper time, and the ship and cargo are safe till a proper wind sets in.

5037. Then, such being the case, would you give your opinion of the necessity for a harbour of refuge at the Isle of Man?—As to the Isle of Man, you know there is an immense trade, both by the north and south channels, to Liverpool and the ports on the channel, and vessels, if the wind be from the south and south and east and can't fetch into Liverpool, they are still in the channel. They can't get into Holyhead, and they have to lay to, or seek an asylum harbour, and the only one for them at present is Belfast Lough. Numbers of vessels seek to find shelter on the north side of the Isle of Man. I would have to disagree, however, with Captain Briggs, the last witness, who advocated Douglas or Ramsay for an asylum harbour. When a vessel wants to seek it, it is on the north shore; and you will find therefore, if you refer to your chart, that Peel is the place where an asylum harbour should be made, if made on a sufficiently large scale.

5038. Now, will you give your opinion of the necessity or advantage for improving the entrance at Carlingford Bay, and the entrance to Wexford and Waterford, not with the view of improving the ports locally, but with the view of serving as subsidiary harbours of refuge to the passing trade?—If you will look at the chart you will find from the north and south lights on to Dundrum Bay, that there is a large inlet there. Vessels are often caught, and must go ashore there, or seek a harbour, and Carlingford Lough, from what I know of it, is capable of great improvement, and I believe at small expense.

5039. Now, as to Wexford?—As to Wexford I am afraid you will never make it a harbour of refuge. There is a shifting sand there, such as that they could not cause the anchorage to remain any given depth. I understand a harbour of refuge to be a harbour that could admit vessels at any time.

5040. But if it could be made, you consider the site an eligible one, and that it would be useful to the passing trade?—I think it has been in contemplation to make a harbour round near the Saltees, near New Ross and Waterford, and then from Wexford to make a canal through for the local trade.

5041. As to Waterford; do you think that that would be a useful place for vessels at all times?—Nature has done a great deal for it, and by a little deepening it could be made a splendid harbour, and I have no doubt if it were made but it would be useful for the passing trade as a harbour of refuge, because there is nothing of the kind nearer than going up to Cork.

5042. (*Mr. Lindsay.*) The last witness said that Belfast Lough was used as a harbour of refuge; is that so?—So it is. Those vessels that come round the Isle of Man for Liverpool, if the gale continues, do not let go their anchors, and they come into Belfast Lough during the southerly gales. If head winds from the west, they could fetch round the Isle of Man, and go to Liverpool, or, during the northerly gales, if they can't get out by the north channel.

5043. Have you any idea of the number of vessels that take Belfast Bay for shelter in the year?—We do not take an account of them, only of those that come to the quays; but I have seen 150 vessels, or thereabouts, coming in for shelter. They are principally coasters from the Scotch and Cumberland coasts.

5044. The bay, however, is open to the north and east winds?—It is, but there is good anchorage. They never drive ashore with an east wind; they drive up the lough.

5045. Well, but in driving up the lough, if they were large ships would they not go ashore?—Yes, if they went very far they might, but there would not be any harm. There may be a heavy sea; but there is never such a heavy sea in the lough that a row boat can't communicate with a ship.

5046. In fact there is no scope for a sea running into Belfast Bay?—No.

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Captain White.

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Mr. Lindsay.

5047. What number of vessels enter Belfast Lough during the year?—Well, up to 6,000 vessels of all tonnage are reported at my office.

5048. What draught of water, at high-water spring tides, is in the shallowest part?—We have 20 or 21 feet, but we do not like to bring up vessels of more than 18 feet. We have 21 feet down to the light.

5049. There have been great improvements made in the harbour?—Yes.

5050. How is the harbour managed?—By Local Commissioners.

5051. How are they appointed?—There are five appointed every year. They are chosen by those in the town who pay a certain amount of rates. The Commissioners remain in office three years.

5052. What is the revenue of the Commissioners?—The Secretary can answer that better than I can.

(*Mr. Wm. Thompson*, Secretary of the Belfast Harbour Commissioners). Has the revenue been about 35,000*l.* last year?—I am ordered to furnish to the Commissioners the last annual report of the Belfast Harbour Commissioners.

5053. (*Capt. Washington to Capt. White.*) What number of vessels come up to Belfast quay in the year?—Nearly 6,000.

5054. Are there sufficient pilots for the trade of the port?—Yes. We have 21 pilots, three pilot-masters, and two mates.

5055. Do they reside in the lighthouse in the lough?—We send them there in the first instance, and they are then drafted into the pilot cutter, which is always cruising on the station off Gray Point and Carrickfergus.

5056. Do you think it is right, in any large harbour with a large traffic, to let pilots go out in open boats?—The trade would be badly attended to in such a harbour as this, if the pilots used their own boats as formerly. The custom was that formerly a man got a licence with three or four boys, and he wrought as he pleased.

5057. How long is it since the pilots were put upon the new footing?—In 1844. The superintendent of pilots at the time found the necessity of putting them upon the new footing.

5058. Is the lough sufficiently lighted, and buoyed, and deepened?—It is.

5059. At whose expense?—It was done at the expense of the Harbour Commissioners at a large cost. The pilotage dues do not cover the expense.

5060. Then the Harbour Commissioners deemed it necessary to have a pilotage establishment, even at an annual loss?—Yes. A number of the masters and mates of steamers have taken advantage of the Board of Trade Act, 1844, and got out licences.

5061. Are the pilots quite sufficient for the wants of the port?—They are.

5062. I understood you to say that you were acquainted with Waterford?—No, I said Wexford. I never was in Waterford Harbour, but I was off it, and, judging by the chart, it is capable of great improvement.

5063. You know Carlingford Bay?—Yes. I traded there with steamers.

5064. Do you think it desirable, if a breakwater could be erected there at small cost, to do so?—No doubt of it, as it is a very fine harbour.

5065. Are you acquainted with Loughindall in the Island of Islay?—I am acquainted with it on the chart; I was too near it one morning.

5066. How was that?—I thought I would get ashore.

5067. How was the wind?—It was to the west.

5068. Could you not get into the harbour?—I could not. In the first instance I was becalmed, and got into the Runs of Islay, and I was in danger of going ashore. It is a place that is likely to take a great deal of money, but it would make the finest harbour of the north channel, it lies so open to the north channel.

5069. Are you aware that many vessels take refuge there during the year?—I find that vessels coming from the Baltic report that they have been there, but they don't like it.

5070. Why?—It is an open roadstead. It is capable of great improvement.

5071. What depth of water did you say could bring ships up to Belfast quays?—We do not like to bring up more than 18 feet, but vessels drawing 20 feet have come up.

5072. Do the mail steamers sail from Belfast at all times of tides?—Yes; the Scotch mail steamer sails at eight o'clock and never detains.

5073. (*Capt. Vetch.*) With respect to the Glasgow steamers, do they always arrive at the proper time?—When they have a south-west gale they may be two hours behind it, but they never put back.

5074. Does it ever happen that when they have come into the entrance of the lough, they cannot come up from a fog?—That frequently happens, and a prudent ship-master will let go his anchor anytime in a fog.

5075. (*Chairman.*) Did you hear the question put to a former witness relative to the pilots of Lough Foyle picking up ships farther out at sea?—If you make the Skerries an asylum harbour you want no pilot no more than going into Kingstown.

5076. Do you think it an advantage to the foreign trade not acquainted with the coast, to be able to pick up pilots at sea?—No doubt of it; I have myself found the Garnock pilots inside of Rathlin Island, looking out for ships there.

5077. And what description were they, were they foreign or home?—They were foreign. In the home trade the masters are all pilots.

5078. Then you consider it an advantage, if the formation of a harbour at Portrush enabled the Lough Foyle pilots to go farther out to sea with a better description of boats?—Yes; they would be much farther out to sea if they were lying in the Skerries than they would be in Lough Foyle, and they could board vessels much farther out to sea,

5079. (*Capt. Washington.*) Are you acquainted with the Balbriggan Skerries?—I have seen it, but I have not been close to the harbour.

5080. Then you can't give an opinion as to a harbour of refuge at Balbriggan Skerries?—They want one very much there, for there is nothing from Kingstown round.

5081. What distance is that?—Some 20 miles.

5082. Do you think it necessary to place a refuge harbour every 20 miles along the coast?—No, but from the formation of the Irish Channel a great number of vessels get embayed there and can't get out.

5083. Is Kingstown used as a harbour of refuge?—It is used, but it is too small.

5084. (*Mr. Coode.*) Suppose that a harbour of refuge was made at Loughindall, would you consider the Run of Islay as any formidable objection?—No doubt of it, but it is the best place you can get on the coast, and there would be no run in the harbour if a proper breakwater were made.

5085. Then, taking the whole of that district, you are of opinion that Loughindall is the best place for it?—Yes, from the way it is situated in the north channel.

5086. Then you give the preference to it over the Skerries of Portrush and Ballycastle. Taking the whole of that part of the sea, which of the three would you prefer, supposing that only one was to be made?—I would say, that Loughindall for the general foreign trade was the best, for it might save a great number of vessels from getting ashore in the Hebrides.

5087. Do I understand you to say, that a harbour of refuge at Loughindall Bay would save

more lives than one at Portrush Skerries, or one at Ballycastle ?—I would say, that they would be both necessary; the one for a vessel before she goes in past Innistrahull, and the other when she gets into the channel. They want one somewhere near Derry Lough, and nature has done so much for Portrush that I think it should be made there.

5088. But supposing only one was to be made, which would you give the preference to ?—Well, that is a difficult question to answer, for half a dozen vessels pass Portrush looking for a harbour of refuge for one that passes Loughindall.

5089. But I presume wherever a harbour of refuge were made it would become notorious; and that being the case, which then would you give the preference to ?—I would say Loughindall.

Captain MICHAEL M'LOUGHLIN examined.

5090. (*Chairman.*) How long have you followed the sea?—I am a steamboat-master; I have been at sea 24 years, and I am now going on seven years as a master.

5091. And what vessels did you principally sail in ?—Steam vessels as master, and I have been five years out of that pilot in Lough Foyle.

5092. And where were the steamboats employed that you commanded ?—From Glasgow, Derry, Belfast, Sligo, Fleetwood and Moorecombe.

5093. You have been present during the inquiry ?—Yes.

5094. Give your opinion as to the necessity or advantage of a harbour of refuge at Portrush ?—I think it would be, in my opinion, greatly wanted.

5095. State the reasons why you think it is greatly wanted ?—I have often been there myself both days and nights beating about in a steamer, and could not call in at Portrush; and I have been at anchor for several hours in the Skerries waiting an opportunity to land cargo and passengers, and after waiting there for hours we were forced to slip and leave. And we were forced to weigh anchor on several occasions and bring a cargo and passengers to Derry from Glasgow, and the same from Derry to Glasgow again. I have had to carry a cargo from Glasgow to Derry to land at Portrush, and I could not go in with it. I might have gone into the Skerries Roads and have lain for days and nights, but then I would have missed my regular hours of sailing, therefore I took it to Derry to call at Portrush on my return to Glasgow, but the weather did not permit me to land, so I beat about for some time and I had to take it on with me to Glasgow.

5096. I understood you to say that you anchored in Skerries Roads in bad weather, is that so ?—Yes.

5097. How was the wind ?—The wind was west and north-west.

5098. Was there a heavy sea in the Skerries Roads with that wind ?—There was not a very heavy sea; I could lay in safety in the Skerries Roads and a gale from the north-west.

5099. You know the west sound and the broad sound in the Skerries Roads ?—Yes.

5100. Now, if one or other of those two could be closed by a breakwater, which would you prefer to be closed for shelter ?—I would prefer the broad sound on the Skerries side to be closed up, leaving the west end open.

5101. Will you state your reasons ?—My reason is that there is not such a long fetch from the west and north-west by having the west sound open. Having the broad sound open, the whole force of the north-west swell completely pours into it, so much so that although I am going there these last 20 years, I would not take in hand to enter the broad sound in a gale of wind. I would, at the west side, in any sort of weather, or I would on the east side.

5102. You know the Isle of Man ?—Yes.

5103. Would a harbour of refuge be useful to the passing trade of the Isle of Man ?—Indeed I think it would be much required.

5104. Where would you place it ?—My opinion would be in Ramsay Bay.

5105. State your reasons for that opinion ?—My reason is that I think there is most room in it; though both Ramsay and Peel are dry harbours.

5106. Do you know anything of Carlingford ?—No, I am not acquainted with the south side.

5107. (*Mr. Lindsay.*) When you state that a harbour of refuge would be necessary at Portrush Skerries, do you mean that it is necessary for the coasting trade and the trade of Portrush, or do you mean to apply it to the foreign trade, and useful for the saving of life and property ?—I mean, in the first place, the saving of life and property; and, in the second place, for the safety of coasting. During my five years piloting in Lough Foyle, I have seen foreign ships out at sea ten or twelve or fourteen days beating out in the channel, with the wind at the west and north-north-west, and after all that having to bear up and go into the south channel; and I have no doubt that they were not more than 15 or 20 miles nearer Belfast Lough when a calm south-east wind set in.

5108. Can you name any instance where life and property could have been saved had a harbour of refuge been at Portrush ?—In 1847 or 1848 a brig went to wreck on the Tuns, and if such a thing as a harbour of refuge had been at Portrush, I have no hesitation in saying that both life and property would have been saved. There were four lives lost.

5109. Say that it was decided to make in that vicinity one harbour of refuge, whether would you give the preference (always considering the saving of life and property, and foreign as well as coasting trade,) to a harbour at Portrush Skerries or at Loughindall ?—I would give the preference to the Skerries. I do not know the anchorage at Loughindall; but I think that the site at the Skerries would be much more likely to save life and property than at Loughindall.

5110. (*Capt. Vetch.*) Don't you consider that the Skerries, as they now stand, are, to a certain extent, a harbour of refuge ?—I do.

5111. That, in fact, the coasting trade can now obtain shelter there ?—They do. I knew of a vessel that was at Innishowen Head running in there. She was commanded by a man who knew it, and she lay, not for days, but for weeks, in safety. I have known ships for America bound from Liverpool 14 days beating from the Bull of Rathlin to Inistrahull, but were frightened at the Tuns. And at last he ran into Lough Foyle, and he was only 24 hours in when the wind shifted. If a harbour of refuge had been at Portrush, shelter would have been taken the first day. I also knew of a ship, during my time of piloting, (and I put one of the pilots in myself,) get as far up as Greencastle in Lough Foyle, slip both her anchors, and had to run to the Clyde, where if there had been anything of the kind along the coast, it would have saved them from going to the Clyde.

5112. (*Mr. Coode.*) What was the size of the vessel that ran from Greencastle to the Clyde ?—Between 600 and 700 tons. She was timber laden, bound from Quebec to Londonderry.

5113. Why did she run ?—A gale of wind came on, and she slipped her anchors and ran to Clyde, to save herself from the Tun banks.

5114. Have you come through the west sound in a gale of wind ?—I have come through it in a gale of wind from all directions.

5115. Did you notice the difference between the sea in the west sound and broad sound ?—Yes; I would not take the broad sound on any account, and I have been going there for the last 20 years.

5116. Was the difference very material as to the sea in the west sound, and that in the broad sound ?—A very material difference, and besides there was a straight run. It is not one tenth the fetch from the

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west that there is in the north-west. I went into Portrush when a mate of the same vessel that took the cargo past Portrush, and it cost our company upwards of 500*l.* to get out of it. I am now speaking of Portrush Harbour and not of the Skerries.

5117. I suppose you damaged yourselves greatly?—We did not damage ourselves a great deal. There was opposition, and we got in, and the other boat did not. Our cant rope broke, and we came athwart, and carried away the next vessel, and the next, and so on.

5118. Did you go there for shelter, or in the ordinary course of trade?—In the ordinary course of trade.

5119. What size was the vessel you speak of?—She was about 400 tons register. The *Thistle.*

5120. Then you have a decided opinion that if one or other of the sounds at Portrush Skerries were closed, it should be the broad sound, and that the west sound should be left open?—Yes.

5121. Have you come through the west sound in a gale of wind?—I have done so scores of times in gales from the west and north-west.

5122. Have you ever come out of Portrush Skerries with a gale of wind from the west?—I have, with a gale in all parts. I have been running there for seven years as master once or twice a year.

5123. (*Capt. Washington.*) You know the small Skerries?—Yes.

5124. And you know the large Skerries?—Yes.

5125. (*Chart handed to witness.*) You see the rocks marked West Skerries?—I see the little Skerries.

5126. Now, if we left both sounds open, and joined the West Skerries altogether, and made a breakwater of them, and also blocked up the passage between the Middle Skerries, would that give additional shelter?—It would not break much swell from the north-west. I do not think it would be worth doing it for the additional shelter it would afford. If the broad sound were left open, it would be very difficult to hold in the Skerries Roads.

5127. Would it not be of advantage to have upon the Skerries a small light?—It would be of great advantage.

5128. Would you have the light placed on the Ramore side or on the Skerries?—I would say on the Skerries, on the extreme west end, provided the broad sound was filled.

5129. But suppose both sounds were left open, do you not think it would be of sufficient importance as a roadstead to place a small light there?—It would be of great advantage; but I always take it at night, both coming and leaving it without a light.

5130. But you are well acquainted with the coast; do you think, for those who are not acquainted with it, that it would be of advantage to place a small light there?—It would be of great advantage.

5131. (*Capt. Vetch.*) Have you ever witnessed the fact that even in a south-west wind there was a very heavy sea breaking over the broad sound?—There has been a bad sea, but nothing compared with what it is from the west and north-west.

Mr. TIPPETT, Coast Guard Service, examined.

Mr. Tippett.

5132. (*Chairman.*) How long have you held your present appointment?—I am in the coast-guard service; I have been at Ballycastle 15 years since the 6th of April last. I am aware of the nature of the anchorage in Ballycastle Bay.

5133. Give your opinion as to the advantage generally of a harbour of refuge on the north coast of Ireland, for the passing trade, whether foreign or coasting?—I do not know very much of Portrush.

5134. But first give your opinion generally, without reference to the locality?—I think a harbour of refuge would be very advantageous, and of course I speak of the locality that I know, or about that neighbourhood.

5135. State your reasons why you think it would be of advantage to the passing trade?—Because of the number of wrecks, and the number of vessels obliged to run for some place of shelter when caught in a gale of wind.

5136. What are the winds from which you consider a harbour of refuge would be of most service in affording shelter?—From the west and north-west.

5137. From what direction is the heaviest weather and heaviest sea?—There is a very heavy sea from south to north-west. I speak now of the ground sea, from storms in the Atlantic, which is thrown in and spent on the coast. The ground sea does not extend farther east than Fair Head. I was stationed to the east of Fair Head, at Tor Head, for 12 months, and there was no ground sea there.

5138. Give your opinion to the Commissioners as to the most advantageous position for a harbour of refuge?—I think it might be made in Ballycastle Bay.

5139. State the grounds on which you come to that conclusion?—I do not know that that will be better than Portrush. When a comparison is made between two places there is very much for and against both, as there is in everything in this world. There are many advantages in Ballycastle Bay that Portrush does not possess, both in a nautical as well as a political point of view.

5140. Be good enough to state the nautical and not the political advantages of Ballycastle Bay?—It has been stated that it is available for vessels passing from east or west, all vessels from Liverpool, and all vessels from America.

5141. And are you able to offer any opinion of the nature of the construction at Ballycastle, as respects the supply of stones and the depth of water?—I am acquainted with the depth of the water. My station is from Fair Head to Kane Bawn Hard, 16 miles west of Ballycastle.

5142. What would be the depth of water into which you would have to run the breakwater to get the same area of shelter as is proposed at Portrush?—I think that nine fathoms would be the greatest depth, commencing at a point called Craignascarf.

5143. Have you any idea of the length of the breakwater?—No; but I suppose a little more than half a mile would do it.

5144. And what would be the average depth of the water?—It would commence at four to five fathoms, and increase gradually to a little more than nine fathoms at Craignascarf.

5145. Have you any opinion to offer to the Commissioners as to the pilotage question—that a harbour of refuge might enable pilots to employ a better class of boats and pick up vessels at sea?—I have no remark to offer on that subject.

5146. (*Mr. Lindsay.*) Do you know of your own knowledge that the running of a pier out to nine fathoms would give the same area of sheltered anchorage as we now have inside the Skerries?—I think not so much.

5147. Would it give half the sheltered anchorage?—Very much more than one half.

5148. Have you measured it?—No.

5149. Then how do you know it will give half as much?—I think so, by looking at it.

5150. Would you be surprised if you were told it did not give half as much?—I would not.

5151. Would you be surprised if it did not give one fourth?—I think it would give more than that.

5152. Then it is only a supposition on your part?—I do not know the Skerries.

5153. Then suppose we make such a pier as would give sufficient shelter from a north-west gale, would you run for the roadstead with a ship?—I would, and be glad to get it. I have seen many vessels which would have been glad to get it. When a vessel is discharging cargo at Ballycastle, and the wind checks round to the north west, she is obliged

to run round Fair Head, and is detained there many times three or four weeks before she can return.

5154. What is the nature of the shore on the east part of Ballycastle Bay; are there no rocks?—One half of it is rocks. There is a beach strand one and a quarter mile, and then a rough coast from that to Fair Head.

5155. You say that there is a heavy ground swell coming in there, and of course a heavy sea comes in with a north-west gale?—There would.

5156. And would you not, as an old sailor, be afraid to get on that shore?—I would not, if there was a breakwater.

5157. You would be obliged towards the shore to get shelter to leeward the pier which you propose?—Why, that would depend on the position of the vessel.

5158. Saying that you were caught to the west of Ballycastle with a gale of wind from the north-west and you found it necessary, to bear up you would consequently be obliged to run towards the south-east part of the bay, which is a lee shore?—Yes.

5159. And then to haul up till you get under the lee of the breakwater you propose?—Yes.

5160. Then would there not be very great danger in doing so?—I think not.

5161. Do you know Portrush?—I do not know it perfectly. I have been there.

5162. Then, as a sailor, and if there is to be a harbour of refuge, which would you prefer, at Portrush or Ballycastle Bay?—Some have an objection to both places.

5163. But you can't say to which the greater objection applies?—(*No answer.*)

5164. Do you think, as a servant of the Crown, that the Government would be warranted in spending a large sum of public money in the construction of a harbour of refuge at Ballycastle, with the view of saving life and property?—There is not sufficient trade there at present to warrant that.

5165. I ask it upon national grounds?—Well, I think so.

5166. Do you think that, on national grounds, Government would be warranted in spending 100,000*l.*?—I do; and 200,000*l.*

5167. Do you think Government would be justified in spending 300,000*l.*?—I am not an engineer, and I don't know what such a pier would cost; but I think that Government would be justified in laying out a great deal of money in saving life and property, for vessels that were taken short in a north-west wind in the channel.

5168. Now, you said there were objections to both places; in the first place would you let us hear your objections to Ballycastle as a site for a harbour of refuge?—Well, there are certainly not so many objections to Ballycastle as to Portrush.

5169. But I want to know your objections to Ballycastle as a harbour of refuge?

After a long pause without an answer Mr. Lindsay resumed.

5170. I asked that, because you volunteered the statement. If you are not prepared to answer the question, I will put it in an easier form. What are the advantages of Ballycastle over Portrush?—It would be more sheltered.

5171. How more sheltered, is there any shelter now at all in Ballycastle Bay from a north-west gale?—At present there is not; but there would be if there was a breakwater.

5172. But with the same expenditure of money would not the Skerries be as well sheltered as Ballycastle Bay?—It would not.

5173. That is a supposition on your part, is it not?—It is; I have seen a plan of filling up the Skerries, which appears to be good.

5174. Then your opinion is that better shelter could be obtained in Ballycastle Bay than at Portrush for a less sum of money?—It is.

5175. And that is one reason why you give the preference to Ballycastle Bay?—Yes.

5176. Then, if it were proved that that does not exist, that preference of yours would fall to the ground?—Oh, certainly.

5177. Would you state some other reasons why you give the preference to Ballycastle over Portrush?—Because it is better situated as to the channel.

5178. And how?—Why, it is better situated as to its position being more easterly; it is nearer the other channel; it is nearer the Glasgow side.

5179. What other channel?—It is nearer the channel which we are now in; that is another reason why I prefer it.

5180. Now, suppose a ship caught in a north-west gale between Fair Head and Malin Head, do you think she would reach Ballycastle with much greater facility than Portrush?—I don't know that she could. I don't think she could.

Captain JOHN CAMPBELL examined.

5181. (*Chairman.*) What is your occupation?—I am master of a steamer at present; I have been 17 years at sea, and 7 years a master.

5182. In what trade have the vessels in which you have been employed been chiefly engaged?—The American, West India, and Mediterranean trade.

5183. Have you been present at this inquiry?—Yes.

5184. Give your opinion to the Commissioners as to the advantage or necessity of a harbour of refuge at Portrush?—I agree with the harbour at Portrush.

5185. State the grounds on which you come to that opinion?—I have often put back, when I could not take Derry Lough; and I was obliged to run into Belfast Lough going to the Baltic.

5186. What kind of a place is Lough Larne?—It is a small place; and one would be required to be well acquainted with it. I thought it better to run for Belfast Lough.

5187. Have you ever been anchored in the Skerries Roads in bad weather?—No. If there had been a harbour there I would not have run to Belfast Lough, nor yet would I if I could have taken Derry Lough.

5188. Detail to the Commissioners the reason why you could not take Derry Lough?—It was blowing such a heavy sea upon the Tuns, right across.

5189. How was the wind?—About north-west, and the sea was running nearly the same.

5190. Do I understand that the sea was running nearly north-west?—We were running down with a wind which was north-west, expecting to take Derry Lough, but we could not haul up again; we could not take sufficient canvas to get into the lough.

5191. And so you brought up in Belfast Lough, being afraid to try Derry Lough?—Yes, after beating down as far as Barra Head.

5192. Do I understand you distinctly to say that the sea was breaking right across from the Tuns to the opposite shore?—As near as possible. You could not make out the channel; you could not make out the buoys going in.

5193. Are you acquainted with the Isle of Man?—Yes.

5194. Have you any opinion as to the advantage of a harbour of refuge there to the passing trade; if so, state it?—I would speak in favour of Ramsay Bay.

5195. And why?—For space to be able to turn your ship, which you could not do at Douglas nor Peel. Neither at Douglas nor Peel you can't turn your ships in the harbour, you are obliged to back out.

5196. But suppose a harbour of refuge to be made at both places, giving ample room to turn the ship, have you any preference to state for one over the other, with the view to the facility given at either in bad weather?—I think Ramsay is more sheltered

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Chairman.

in more points. In fact it is the only place you have to go to when you are bound either to Liverpool or Belfast.

5197. But suppose a harbour to be constructed, equally well sheltered, I want to know if you have any preference for Ramsay over Douglas in point of situation? — I would still speak in favour of Ramsay.

5198. Do you know Wexford or Waterford?—I do not know them as a coaster; I know the Dublin Skerries.

5199. Are there any facilities there for a harbour of refuge?—I do not think it is required, as they are so near Kingstown.

5200. Do you know Carlingford?—No.

5201. (*Mr. Lindsay.*) Do you know Loughindall?—No.

5202. Looking at the site of it—what do you say? Whether, do you think a harbour at Loughindall or at the Skerries would be the greatest protection to life and property, and afford the greatest facilities to commerce?—I do not think anything at all of Loughindall, for it is so far out that I would fetch windward except I had a disabled ship.

Captain JOHN M'CLANE examined.

Captain John M'Clane.

5203. (*Chairman.*) What is your occupation?—I was 29 years and 6 months at sea, in all capacities connected with the mercantile marine, before I resigned; but I was only three years master before I got charge of the Sailors' Home. I have been five years at home on the 29th October.

5204. In what direction did your vessel trade?—I served my time from Troon to Dublin, and made 31 voyages in that direction; and after that I made 31 voyages from Belfast, north and south, in the foreign trade. I traded to the United States and our own colonies.

5205. Do you know the Skerries of Portrush?—I never was inside of the anchorage; but I would have been glad if I had been there often. When we were as far as Inistrahull we were obliged to put back to Belfast Lough while the wind continued; we were obliged to bear up in a fine able ship.

5206. You are well acquainted with the trade here, I suppose?—Yes.

5207. Does it often happen to ships that they have to put back when they are as far as Inistrahull?—We have known them to be further to the westward, though I never was.

5208. Does it happen to many vessels to be put back?—I have known a considerable deal in winter time—in the fall of the year; and very few of the masters that I have been acquainted with since 1830 ever inclined to run for such a place as Loughindall. They are not acqainted with the coast nor with the run of tides, therefore it is with reluctance if ever they take such a place.

5209. How many vessels have you known in Belfast Lough at a time, which have put back from stress of weather from the north channel?—I could not decide upon that point; but it is looked upon as a ready access going from north to south. I think the great run of our wind-bounders is bound south, but we have had many bound north.

5210. Do you know Loughindall?—Yes; I sailed 18 months out of it.

5211. What kind of a place is it to run to?—The shallowest part is 13 feet low spring ebbs; but the anchorage is from 3 to 4 and 4½ fathoms, and a flood tide with a south-east wind is the worst to contend against; but the anchorage is excellent good; it could not be better.

5212. And is it easy of access?—I should think so. Owing to the shore laid down on the chart, it causes strangers to be doubtful, but it is easy with a wind from the west-north-west to the south-south-east to bear in.

5213. And is it much resorted to by the coasting trade?—Very much.

5214. And by the foreign trade?—There are but few large vessels, and I think it is owing to the position on which it is shown on the chart, and probably owing to the book of directions not giving the same quantity of water as is found in it, a circumstance which we have long felt in Belfast and its trade.

5215. Do you know Larne Lough as a harbour of refuge?—I have heard of as many as 110 vessels being in Larne Lough at the time salt was manufactured there—before the duty was taken off salt.

5216. (*Mr. Lindsay.*) Do you think if Larne Lough were better known it would be more frequented by large ships?—I think so, since a light has been put upon the larboard and another upon the port end going in, and a buoy on the west side. A vessel will make greater freedom on account of the maiden light and the buoy on the Hunters' Rock. The anchorage is good.

5217. What description of ground?—Clay; and another advantage is, that if a man gets taken short and loses his anchors he can have them replaced.

5218. And can ships get shelter there in all winds?—Yes.

5219. At what depth of water?—At from three to four fathoms; but most vessels take the Cutter's Road or Yellow Stone, on the Island Maga side.

Captain DAVID PATTON examined.

Captain David Patton.

5220. (*Chairman.*) What is your occupation?—I have been at sea 25 years. I am a shipmaster for 19 years. I was first in the West Indian trade, and latterly in the American trade, coming in both channels.

5221. Are you acquainted with the Skerries Roads?—I can't say that I am perfectly acquainted with them.

5222. What is your opinion as to the necessity or advantage of a harbour of refuge in that district of coast to vessels bound foreign?—From my own experience, in sailing from Derry, Belfast, and Liverpool, I don't think that there is anything of the kind required at the Skerries, and I have gone both channels.

5223. Are you acquainted with Carlingford Bay?—I am, a little.

5224. Do you know Wexford or Waterford?—I don't know Wexford, but I have been in Waterford.

5225. Do you think it would be of advantage to have those harbours so improved, that vessels from Liverpool could take advantage of it in bad weather?—Well, having Kingstown to run for, it would be an intricate place to run for Wexford. I think it would be better to run to Kingstown than to take the risk of Wexford.

5226. What kind of ships did you command?—From 148 tons up to 1,500 tons.

5227. As a general rule, in a well found ship, would you prefer keeping the sea to making a harbour of refuge in bad weather?—If I thought I could make a passage I would.

5228. But viewing the tear and wear of the vessel, and perhaps the damage to the cargo, that would arise from bad weather, would you consider it your interest to keep your ship at sea, or to take shelter and wait for a fair wind and moderate weather?—Most decidedly, I would say take the harbour to save the wear and tear and the cargo.

5229. Do you think a harbour such as we describe on the north coast of Ireland would be useful as a port of call for ships belonging to the Clyde and Liverpool?—I say that there is excellent anchorage in Derry Lough. Portrush town is a bad place to

lay in, but a large ship running from the west, if it could not take Derry Lough, I think would be better to take Belfast Lough where there is no risk.

5230. Are you acquainted with the Isle of Man?—I am not very much; I never sailed to the Baltic; I know nothing of the east coast of England; I only know London.

5231. (*Mr. Lindsay.*) Is it your opinion, when a ship encounters a heavy gale in the channel, and she can't make headway against it, that it is far more to the advantage of the owner that she should take a harbour of refuge, if she could conveniently enter?—Not with a large ship, as long as she was able to keep at sea.

5232. Say that you met a westerly gale when you were to the westward of Rathlin, and that you found you could make no progress after beating about for two days, do you think it would be more for the interest of the owner of that ship for you to take a harbour of refuge, if there was one conveniently situated, than it would be to keep firing away?—I think it would be to the advantage of the owner and for the benefit of myself and crew to take Belfast Lough, and my reason is, that if the wind should shift to the east I would have room to run out.

5233. But it would be a run back for a long way?—Well, but eight or nine hours of east wind would take it up.

5234. Well, suppose there was a safe harbour at the Skerries, where you could get good anchorage, would you still in that case go into Belfast Lough?—I would rather not go so far back, but I would be sooner under way, and if I got an east wind I would soon pull up.

5235. Then you do not think that it would be any great advantage to your employers to have such a harbour?—I think that it is necessary to have such a harbour at Portrush, as I frequently could not make any progress thereabouts.

5236. Do you know Loughindall?—I do; I have been in it frequently.

5237. Looking at it from all points, the facilities to commerce, one of them being a harbour of refuge to prevent the necessity of beating to windward when you are making no progress, and looking to the saving of life and property, whether do you think a harbour of refuge would be of most service at Portrush or at Loughindall?—A great deal of money would require to be expended at Portrush, but Loughindall is a natural harbour, and you could run in there at any time.

5238. But say a sum of money, like 100,000*l.*, were expended at Portrush and at Loughindall, to make each a harbour of refuge, which do you think, in a nautical point of view, would be the best, Portrush or Loughindall?—At Portrush certainly, as we have very little intercourse with Loughindall, being out of the channel; all our intercourse is to the southward.

5239. (*Chairman.*) What kind of a place is Lough Larne? Is it a place where a large ship can run for in bad weather?—No; a small coaster, drawing from eight to eleven feet at most, may run for it. Eight feet is the most, and no vessel drawing ten feet need attempt it. A ship might anchor in the bay, but she might as well be out in the channel.

5240. (*Mr. Lindsay.*) Have you been in Lough Larne?—I have.

5241. I understood from the last witness that ships could find shelter in it from all winds in three to four fathoms. Is that the case?—No, it is not the case.

Mr. Alexander M'Bride examined.

5242. (*Chairman.*) What is your occupation?—I have been a seafaring man for 18 years, and now I am a general speculator.

5243. Do you know Portrush?—Yes, I am well acquainted with it.

5244. Have you ever been at anchor there in bad weather?—Yes, once in the Skerries Roads. The wind was from the north, and we rode a gale of three days at the back of the Big Skerries. She was a coaster.

5245. Do you think there should be a harbour of refuge there?—I think it is necessary to have a harbour of refuge there. The spray broke over us; but we would have rode in safety if there had been a harbour of refuge there.

5246. Do you know the Isle of Man?—Yes; I have been in Derby Haven in bad weather.

5247. Is there any site in the island which you would select as a harbour of refuge?—Well, there are two sites, going round the south channel, that is, the Calf of Man, and Castleton would be the first port and most convenient, and going round the north, Ramsay Bay is the best.

5248. Is Ramsay Bay more convenient than Douglas Bay?—Yes, it is central, and the other two points come nearer the channel.

5249. (*Mr. Lindsay.*) Where do you live?—I live in Ballycastle.

5250. You said you were a general speculator; tell me what you speculate in?—I deal in grain.

5251. How would you like to speculate in a harbour of refuge at Portrush?—I offered to subscribe myself 50*l.* to it, as a harbour for commercial purposes.

5252. What advantage has it as a natural harbour of refuge?—It has a good bottom of clay and a good entrance.

5253. As a national harbour of refuge would you give the preference to Ballycastle over Portrush?—Being a native, of course I would give the preference to Ballycastle Bay; the coast is more clear in Ballycastle Bay, and the holding ground is better.

5254. Are there any other advantages which Ballycastle possesses?—It is landlocked by the cliffs from all winds, but from the north-west, round to the north-east.

5255. What length of pier, in your opinion, would be necessary to run out to afford good shelter in a north-west gale?—I have been out with the engineers sounding and making lines for the pier there. It has first to be taken from the shore 120 feet, then there is a natural rock continuing that 76 feet long, having 19 feet water along its whole length at high water, and never less than 16 feet; and then, by extending that rock for a quarter of a mile, and then curve it and go south and by east, it would enclose a large space of water; say, three quarters of a mile from the shore, and half a mile the other way.

5256. What length of pier altogether would be necessary from this rock?—We thought if we extended it 150 feet from the rock, that that would accommodate from 14 to 16 vessels, and they would lie at 14 feet to 27 feet in high and low water. We were sounding for a local harbour two years ago, and we were sounding also for the large harbour. A quarter of a mile from the point of this rock was our view, and then to turn it up for rather better than another furlong.

5257. And what area of sheltered anchorage at three fathoms would that give?—The lowest water at the point of the old pier is 12 feet. I could not say the area of ground it would make, but it would throw the north-west swell up to the Colliery Bay. We have often a north-west swell there when we have no wind.

5258. Then you did not make any estimate of the space there would be for vessels at an anchorage of 3 to 4 fathoms?—No.

5259. There is a heavy swell there in a gale?—Yes, and where there is not wind there is.

5260. And considering the swell, would it not be dangerous with that swell rolling on to a lee shore?—There is a natural rock a mile distant from the shore; and they would turn a kind of breakwater to the south-

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east, but we consider it would not be dangerous, as we have eddy tides, nine hours flood and three hours ebb. The eddy tides extend to a mile into the bay, and we have a variation of tides in the bay towards the shore in the west. There would be least half a mile open from the projected breakwater for vessels to come in.

5261. And in entering between them in a north-west gale, would you not say that the heavy swell would catch a vessel broadside on ?—I think not ; a vessel coming into the piers would come in smooth water.

5262. From what you describe, it strikes me it would take her broadside on ?—No, the breakwater is so that she could put up canvass and round it.

5263. (*Capt. Washington.*) Do you know the Carrickbannon Rock ?—Yes, it lies to the north-north-west about a mile.

5264. Is it a dangerous rock ?—It is tolerably ; but it is suggested to blow it up.

5265. Does it show at low water ?—It does. I have stood upon it ; it is a peak of limestone ; it lies in the open sound, three miles towards Rathlin.

5266. Is not that the reason why vessels keep out of Ballycastle Bay ?—No, the north channel is the widest, and that is the inducement.

5267. Is that rock marked ?—No, a man gave up the contract he had to do so about 18 months ago. He is named Gillespie.

5268. Is it marked to prevent a vessel running upon it ?—No ; but it is seen nearly always, for a little break in the water nearly distinguishes it. I have been in Loughindall also.

5269. How often ?—Repeatedly. I was in it last summer was a year for nearly a week.

5270. Is it good anchorage ?—Anything that is good is far up, opposite the town of Bowmore.

5271. How many vessels were lying there ?—I never saw more than three or four. There is a ridge of sunken rocks just along the anchorage that runs a considerable way into the bay, and to escape them you have to take the north shore opposite very close.

5272. Did you ever know any vessels wrecked upon them ?—Yes ; a large vessel was ashore last year and remains there; I don't know her name. I saw a vessel driven from her anchor there with a south-west wind, and the sea runs as far up as Port Charlotte, where there is a little creek, and then it becomes safe. I know that Ballycastle is more eligible than Loughindall, for Islay is a very barren place, and it is not much resorted to by shipping for produce. I hand in a list of casualties at the places I have mentioned

Mr. W. Thompson, Secretary to Belfast Harbour Board, examined.

Mr. W. Thompson.

5273. (*Mr. Lindsay.*) You heard the question I asked the harbour-master ; now in continuation of that I would ask you what is the present revenue of the Board ?—Last year it was 36,900*l.*, and it is increasing every year.

5274. How is your harbour maintained ?—By dues upon shipping and goods.

5275. Have you ever received any aid from Government or from any other source ?—No.

5276. Then all the money expended in the improvement of the port has been obtained from your own resources ?—It was all borrowed. We had money borrowed from the Board of Works, but it was so clogged that we had to return it.

5277. At what rate did they advance it ?—I do not recollect. It was repaid again, to enable the Board to borrow from private individuals.

5278. And why ?—Because they would not give enough.

5279. Were there any other unusual conditions ?—Not that I recollect. It was simply that they would not lend enough, and they would not allow money to be borrowed from private individuals or from any other channel while the Harbour Board was in their debt. When the loan was repaid, the money was borrowed from private individuals to complete the works.

5280. (*Capt. Washington.*) Can you state what amount was laid out in harbour improvements ?—I can't tell exactly without the returns, but it was upwards of 500,000*l.*

5281. Had you any contribution from Government towards that ? — None whatever. The whole was laid out of the borrowed money, or from the revenue derived from the port.

5282. Is there every facility for repairing ships at Belfast ?—Yes, there are two graving docks and a patent slip.

5283. And sufficient length of quays for the purposes of the trade of the port ?—Yes ; at present there are very good sheds on the quays. I now hand in returns from the commencement of the harbour in 1786 till the present time.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry ?

No answer.

Sitting at Belfast closed.

ARDGLASS.

Tuesday, 14th September 1858.

At a Sitting held at the residence of George Beauclerc, Esq.,

PRESENT :

Admiral Hope (Chairman).

Mr. Lindsay.
Captain Vetch.
Mr. Coode.
Mr. Evans, Secretary.

ARDGLASS.

14 Sept. 1858.

10 A.M.—Resolved, That the Commissioners are prepared to view the harbour of Ardglass, and to accept any memorial or other document which the parties concerned may tender with a view to its restoration.

Commissioners visited harbour and quays, with the damaged pier.

Noon.—Commissioners returned, and received from Mr. Beauclerc the under-mentioned documents :—

Act of Parliament 7 & 8 Geo. 4. chap. 69.
Copy of a Report of Capt. Denham and Mr. Rendel, recommending the restoration of Ardglass Harbour.

ARDGLASS.

14 Sept. 1858.

Petitions to House of Commons :—
(1.) From inhabitants of Arklow.
(2.) From inhabitants of St. Ives and other places in Cornwall.
(3.) From inhabitants of Penzance.
(4.) From fishermen of the Isle of Man.
(5.) From fishermen of Cornwall.
(6.) List of wrecks.
(7.) Petition from Douglas, Isle of Man.
(8.) Ditto from Newry, Ardglass, &c.
Abstract of an Address for rendering Ardglass port a safety harbour (pamphlet by G. Beauclerc, Esq.)
Mr. Ogilvie's title to certain dues for Ardglass.

GEORGE BEAUCLERC, Esq., of Ardglass, examined.

G. Beauclerc, Esq.

5284. (*Mr. Lindsay.*) Was it the case that Mr. Ogilvie gave up his manorial rights and dues as concerned the harbour; and in consideration thereof that the Government would undertake to make and maintain the harbour of Ardglass?—It was so.

Mr. HUGHES, Harbour Master, examined.

Mr. Hughes.

5285. When was the first breach in the breakwater made?—In October 1838.

5286. Was notice soon after given to Board of Works?—Yes.

5287. When did the Board of Works send to examine it?—In about nine months afterwards.

5288. And when did the final destruction of the pier take place?—At the time the Board of Works was working on the damages—perhaps two months after they came down.

5289. What was it brought the Board of Works down?—Various applications were made.

5290. How many applications were made?—Several.

5291. And did the Board of Works pay attention?—None, till a second and more dangerous breach was made.

5292. Is the harbour better or worse than in its early state before the money was expended on it?—It is in a far worse state now.

5293. (*Mr. Coode.*) Do you think the steps taken by the officer of the Board of Works were judicious, when he did come?—No, quite the contrary; because he sapped out the foundation on the seaward side. We warned him he was wrong, because the first winter gale would fill up all and knock down the pier.

5294. In what season of the year did this take place?—Winter.

5295. To what extent was this sap of the foundation carried?—Thirty feet.

5296. With what object was the sap made?—Made with a view to filling up with timber.

5297. Do you believe that this sap or excavation was the cause of the pier being overturned?—No doubt of it.

5298. (*Chairman.*) How long have you been resident at Ardglass?—39 years. I am a native of Inch, near Downpatrick. Have been harbour-master 13 years. Occupation before, schoolmaster and teacher of navigation, and surveyor. At sea in early life eight years.

(*Mr. Beauclerc in reply to Mr. Coode.*) The harbour-master collects the dues.

(*Chairman to Mr. Beauclerc.*) Will you forward to the Commissioners any documents which may bear on the case, and which may not be before them?—I will.

After the foregoing evidence it was notified that the Commissioners have resolved not to entertain any proposition for the larger scheme of making Ardglass a national harbour of refuge.

Sitting at Ardglass closed.

CARLINGFORD BAY,

OFF ROSTREVOR.

Tuesday, 14th September 1858.

PRESENT:

Admiral HOPE (Chairman).

Mr. LINDSAY.
Captain WASHINGTON.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Mr. JOHN RAMSAY, C.E., examined.

CARLINGFORD BAY.

Mr. John Ramsay,

14 Sept. 1858.

5299. (*Chairman.*) How long have you been acquainted with the Bay of Carlingford?—I have known it for the last 23 years.

5300. Proceed to offer to the Commissioners your reasons for believing in the practicability of removing the bar at the entrance of the Bay of Carlingford, as a means of making it as available as possible for a refuge harbour.—I may hand in my report to the committee of the Navigation Company, which I made after examining the bar, with the map and the details of the several borings I made upon it as my answer.

5301. To what do you attribute the formation of the bar?—I think it is a natural formation that never was deepened, nor had it ever less water upon it than at present. I do not attribute its formation to deposit such as usually forms on bars and anything in the way of rocks.

5302. (*Capt. Vetch.*) Have you satisfied yourself, by the number of borings made, that there might be no rock or other hard substances in other places?—I took them without choice or selection of the spot, having previously made a chart of the bar and arranged the places on it intended to be bored. I found I succeeded in making the borings at these places. The borings were made with an augur without difficulty and without shifting the augur, which shows that nothing in the shape of rock exists. All rocks lie at an angle, and even supposing it to exist in layers, it would be hardly possible to get a rock so open that the augur would go straight down.

5303. Did you come to any rock in any place?—I did not find any.

5304. How many borings did you make?—I made 15 or 16 of them.

5305. Then you infer that having made 15 borings

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Captain Vetch.

without finding a rock, you are fully justified in stating that it is clear ground?—Just so. Would you allow me to mention that on Cranfield Point, which appears to be at the shore a mass of solid rock, that I went ashore, and turned over several large stones, and found clay underneath; and it appears to me that the new channel discovered by Mr. Hoskeyns, which runs farther away to the south, separates the line of rock from the clay; that the line of rock is from where the present light stands and Ballagan Point, and that the new channel separates the clay from the rock.

Show us which is the new channel on this map.

Witness pointed out the channel.

5306. What was the nature of the stones you got on the bar? Were they like any of the rocks in the vicinity?—They were round boulder stones, tossed about in the tide, and seemed a good deal honey-combed. They were limestone.

5307. Have you ever made any computation of the quantity of cubic yards that would be necessary to dredge out?—I did. I also made a section of the bar, which if you will allow me I will hand in (paper marked) I calculated from that section, by Sir John Macneill's tables, and found the quantity to be 338,822 cubic yards, the channel being between 500 and 600 feet wide. I started the bottom at 500 feet, and sloped upwards to 600 feet; and I estimated it at 1*s.* 6*d.* the cubic yard to 25,412*l.* In taking 1*s.* 6*d.* as the figure, I have a good margin, as I have frequently had done dredging for the Navigation Company during the last 23 years, at 3*d.* per cubic yard.

5308. Then I understand you to say that 25,000*l.* would accomplish what is now required to make the entrance available?—I think so.

5309. In what period of time could it be accomplished?—I suppose in about three years. I have lifted with the Navigation Company's dredge one thousand tons per day; but I took it at 500 tons, allowing for the bad weather, and knowing that we could not work more than four or five months in the year. At that rate, three years would do this work.

5310. (*Mr. Coode.*) You spoke of large stones existing on the bar; did you raise any of them?—I did. They were not very large.

5311. What was their size in cubic feet; what was their weight?—They weighed not more than four or five cwt.

5312. Have you been able, from the clearness of the water, to see the nature of the surface of the bottom?—In my report I stated that some days the water was so clear that I distinctly saw the bottom of the bar, and on sinking a boat hook and plunging it I found the water got muddy, which gave the idea that the bottom was clay, and induced me to commence boring.

5313. Then do you apprehend that the stones you grappled and raised were as large as any now on the bar?—I think some were larger and some smaller.

5314. Was there much shingle on the surface?—Yes. There seemed to be a good deal, and stones and sea wrack growing in abundance; I saw it distinctly on the bottom. My report states that the borings were 18 to 20 feet, taking low water as the data. It was at low water we did the operation.

5315. Then, with regard to the dredgings done at 3*d.* per cubic yard, in what depth of water were they made?—From 9 feet to 20 feet.

5316. What was the average depth?—It was at tide works we did the dredging.

5317. What was the mean depth of the material dredged at 3*d.* per cubic yard?—We began to dredge in the river at high water in 18 to 20 feet, and we dredged till it was only 9 feet, when we left off. In the canal at Newry we began again at 11 feet and terminated at 19 and 20 feet.

5318. Were the stones on Cranfield Point smaller than those you found on the bar?—They seemed to be boulders in each case. The idea was, that the shore being covered so closely with stones, like the face of a rock, that it was a solid rock, and therefore to prove that the borings made were clay, I went and turned over several of the stones, and made excavations under them and dug up clay.

5319. I see a place, when you approach within the bar, marked "New England," is that a rock?—I believe it is, but I have no specific knowledge of that whatever. It is surrounded with very deep water, and I apprehend there would not be much difficulty in removing it.

5320. Then with regard to the tenacity of the material which you bored on the bar, do you imagine it is of the same character as that which you dredged in the upper part of the navigation?—I would not say that. It is stiffer decidedly; but I lately did dredge the solid rock, only it was of a loose nature.

5321. Have you any samples of the materials you raised?—No; I am sorry to say, that although I kept some for a length of time, they were not carefully preserved of late.

5322. Have any borings been made since 1835?—Not that I am aware of. I went on the bar in 1853, and as I had an augur with me and was on board the steam tug, I penetrated a few inches and brought up clay, but I did not go down any depth.

5323. Have you had occasion to take soundings at the bar, just within and without it?—In the line of the bar I have done so.

5324. Did you find any variation in the depth?—None whatever; I found the same to-day as I did in the year 1835.

5325. You think, from your knowledge of the locality, and the prevailing winds and the sea, that the period you have named would be ample to complete the work?—I should say so.

5326. You have no doubt either as to the time allowed, or the sufficiency of the sum?—I have not. I think the sum stated is a very fair one.

5327. Can you speak as to the precise set of the flood or ebb tide in the Lough?—I can't speak particularly.

5328. (*Mr. Lindsay.*) I know nothing about engineering, but as a practical man I want information. Are you quite satisfied in your own mind that the bottom soil of the bar consists of clay?—I am quite satisfied of it. The impression was so strong in my mind, and the circumstances connected with it so clear in my recollection, that I have not the slightest hesitation. Upon one occasion, while taking a boring, I was anxious to try if I could make to the rock, and I had gone down a good depth when the flood tide came upon me, and as we were not able to pull out the augur, we left it till the next tide (for 24 hours), and then we had very great difficulty in getting it out of the bar.

5329. And your remarks apply to the whole depth of the channel proposed to be cut?—I should say so.

5330. As you have estimated the work at 25,000*l.*, at what depth of water do you propose to cut?—Twenty feet deep, and between 500 and 600 feet in width.

5331. What would be the length of the narrowest part of the channel?—The length of the channel is from 2,600 to 2,700 feet.

5332. And for 25,000*l.* you would cut it 20 feet deep at low water mark, spring tides?—Yes.

5333. Now, does the cost of deepening increase with the depth?—It does.

5334. That is, the cost of cutting from 16 feet to 20 feet would be considerably less than cutting from 20 feet to 24 feet?—Yes. As the bar forms a sort of a cone, the average length at 20 feet deep would not exceed 1,500, whereas if the depth be increased from 20 to 24 feet, the length would be 2,500 to 2,600 feet, and the quantity to be dredged would be increased, and the expense also in the same proportion.

5335. Have you turned over in your mind the cost of a channel, such as that proposed, so as to give a depth of 24 feet at low water spring tides?—I have not.

5336. Could you give a rough estimate of what it

would cost extra, so as to give four fathoms water at low water spring tides?—It would be nearly 12,000*l.* to 15,000*l.* more.

5337. Then for an outlay of 40,000*l.* we would obtain a depth of four fathoms at low water spring tides?—Yes.

5338. What depth of water is now on the bar at low water spring tides?—From eight to nine feet.

5339. Well then, you made your calculation at 18*d.* the cubic yard, and you stated that you had contracts with the Navigation Company at 3*d.* per cubic yard in cutting it nine feet low water and twenty feet high water; how is there the great difference between 3*d.* and 18*d.*, just six times?—There are two reasons for that. I want to show that the estimate I made gave a fair sum for doing the work. The next thing that makes it so much larger is in consequence of the great difficulties to be contended with at the bar. We have no tides nor storms to contend with at Newry. While at Newry we can work nine months the year round, and you could only work four or five months at the bar.

5340. Yes, but as you would only pay your hands while they were employed why make such a difference as six times?—Because contract work is much dearer than that done by an engineer. In my calculation I conceived they would do it by contract, and that was the reason why I put in so large a sum.

5341. But as an engineer would you always put in such a large margin for profits?—I would.

5342. Then a contractor's must be a very profitable business. Do you know the area of good anchorage water over four fathoms here?—I believe the anchorage is very good. I always hear that, but during my residence in Newry I have heard of vessels dragging, but I have never heard of them losing their anchors. I hear it is good holding ground.

5343. Have you ever heard of a vessel, when once she got inside, drifting from her anchors?—I have not.

5344. (*Capt. Washington.*) You have not told us where you purpose taking the stuff that you dredge?—I purpose taking it to deep water, and dropping it from barges.

5345. What plant do you require?—It would require a steam dredge of from 25 to 30 horse-power, and one steam tug and three barges, which would be used for the purpose of towing away into deep water the barges as they were filled, and also to bring them back again, and perhaps even to take a vessel in tow.

5346. (*Capt. Vetch.*) In addition to dredging out the channel, have you other works to propose for the better securing of the interests of the harbour?—I would suppose that the present lights would appear well circumstanced, but I think that it would require good buoys outside, although if the channel were made in the direction of the present lights, I do not think that is at all necessary.

5347. Then you propose only beacons and lights?—I think so.

5348. (*Mr. Coode.*) Have you consulted a nautical man as to the sufficiency of the width of the channel. 500 feet wide by half a mile long?—No, I have not.

5349. (*Mr. Lindsay.*) You have told me roughly what it would cost to have the channel deepened to 24 feet at low water, spring tides, and to the width of 500 feet. It strikes me, as a sailor, that 500 feet is a narrow pass for a ship in distress seeking for a harbour of refuge. Do I understand you to mean that 500 feet is the surface width of the channel?—The bottom is 500 feet; the surface 600 feet.

5350. Now, could you roughly give me an estimate of about what it would cost to make a channel of 1,000 feet wide and 24 feet deep?—It would be very nearly double that.

5351. Then, for a sum of 80,000*l.* you would have a channel 1,000 feet broad and 4 fathoms deep?—I should say so.

Captain LEONARD WATSON examined.

5352. (*Chairman.*) What is your occupation?—I am Lloyd's agent and surveyor for the registry of shipping, and harbour-master. I have been sailing in this port since 1812.

5353. You heard the description given of the bar by Mr. Ramsay?—I did.

5354. Do you concur in the correctness of that description?—In a great measure.

5355. Do you differ from it?—As a seafaring man I would be inclined to have a greater width in the entrance, and have it eighteen to twenty-two feet at low water spring tides.

5356. But it is more as to the character of the bar I want to know?—For many years previous to the boring, as far back as 1825, I frequently drifted down and sounded on the bar, and I can bear out his (Mr. Ramsay's) remarks as to the quality of the stones; they are round boulder stones.

5357. I suppose you know the bar; is there any difference in it in point of depth?—Not the least.

5358. (*Mr. Lindsay.*) During your long experience here, have any vessels been driven from their anchors?—Once; in 1839, a vessel was at anchor in Warrenspoint Roads, the wind was from west-north-west, but she merely dragged along her chains, and received no damage. It was a perfect hurricane.

5359. The south-east and the south winds affect vessels here?—Generally a heavy sea rolls in from the south-east over the bar.

5360. Well, but does a heavy sea tumble into the usual anchorage?—It is a very trifling sea. I scarcely know of a solitary vessel that dragged her chains in the usual anchorage, if the tackle was good, during the last forty years.

5361. What area of anchorage have you above four fathoms?—Above the Greenore Point there is a flat that extends across from the Black Rock.

5362. I mean, what is the acreage of anchorage, in water from four fathoms upwards?—It would require a little consideration; but I would say in round numbers 1,000 at least.

5363. Well, now, as an old sailor, would you think that a channel 600 feet wide would be sufficient?—Certainly not.

5364. Would you not think that to make a proper harbour of refuge, so that ships of all sizes might enter at all times, that there should be a channel of 1,000 feet in width?—I should say so.

5365. Do many ships take it for a harbour of refuge now?—No, not a great number. I refer to my report to Captain Washington, and also to my report to Lloyd's, from 1832 till 1858.

5366. Ships do not come here for shelter to any extent?—No; they are afraid of the bar, and very naturally. If they were convinced that the channel was deepened, the vessels bound down the channel from Liverpool, and meeting with heavy south-west gales, I am of opinion, would bear up for Carlingford, having so good landmarks as the mountains on each side.

5367. What dues are charged on vessels taking shelter?—They are charged a guinea each, if they do not belong to the port. Lord Claremont is the proprietor now, and it was formerly the Marquis of Anglesey. It is a manorial right granted by King James.

5368. And is he bound to do anything in return for the dues?—No, nothing of any consequence.

5369. Is he not bound to maintain the buoys and beacons in an efficient state?—No; I was appointed by the late Marquis of Anglesey in 1828, and Colonel Armstrong, his Irish agent, informed me I must be very cautious in erecting buoys and beacons, or making any changes.

5370. I asked the question, because there seemed

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to me to be very few buoys and beacons, and a great many shoals.—There are no funds to erect them.

5371. Well, that is the reason why I asked the question if the lord of the manor, in return for the right of levying dues upon ships frequenting the harbour, is not bound to do something in return. Now, are you sure, that with this money which he levies upon ships, he is not bound to maintain the buoys and beacons?—I pay double the rent to Lord Claremont for the right of levying the dues that I did to the late Marquis of Anglesey.

5372. Then you pay rent for it?—I do.

5373. And what do you do in return?—I have but little funds to lay out.

5374. But if you rent it you are supposed to do something for it?—I keep up the present buoys and beacons.

5375. Now do you think there are sufficient buoys and beacons?—They certainly are not of the magnitude they should be; I have not funds to erect buoys sufficient for such a bay.

5376. What dues do you collect annually?—About 80*l.*; but I can't exactly tell you at present.

5377. What do you annually expend to maintain the buoys. Do you expend it all?—Oh no; from 25*l.* to 30*l.* is all.

5378. Then you get 60*l.* a year for collecting it?—No. There are two men to pay who assist me. They get the one-third of the anchorage dues, and that leaves me very little for my trouble.

5379. What rent do you pay his lordship?—I pay him 40*l.* a year.

5380. So that he is a clear gainer of 40*l.* a year, for which he does nothing?—Quite so.

5381. How many buoys have you from the lower one up to the beacons?—Seven buoys and purchases.

5382. Then one-fifth of the shoals are not buoyed nor beaconed?—When I got the appointment in 1828, there were scarcely a purchase or buoy in the Lough.

5383. But are there not dangerous shoals in the Bay?—I can't say that there are; vessels do not often meet with an accident in the bar.

5384. Are there no dangerous shoals in the bay that ought to be marked?—I do not think there is any danger.

5385. Do you not call a shoal dangerous? I come into the bay and see all smooth; I see nothing to mark a shoal, which has only two feet of water upon it; do you mean to say that somebody is not at fault?—Somebody is at fault, but I am not. But from my knowledge of it, I have not heard of any accident happening upon it.

5386. But do you not think that besides the dangers of the bar, vessels do not come in because there are not sufficient marks to warn them of the dangers within the bay?—I am certainly not aware of that.

5387. (*Capt. Washington.*) What number of vessels arrive in Carlingford Lough annually?—I can't say at present, large and small.

5388. Does any one keep a register of such arrivals?—Yes; the Custom House.

5389. But that is only of loaded vessels; is there any account of all vessels making use of Carlingford Lough as a refuge harbour?—I think not; but I think I could make out a correct list and furnish it to you.

5390. Have you any particular account of the wrecks?—I have a return of the wrecks from 1832 till 1858. I refer to the return I sent to Captain Washington. (*Handed in.*)

5391. You said a width of 600 feet was not sufficient entrance to the Lough?—I did, in my opinion.

5392. Are you largely acquainted with the piers and harbours of the coast of Ireland?—Not further than Newcastle and Armalong.

(*The witness then handed in a letter to the late Secretary of Lloyd's, in* 1839.)

5393. Are you acquainted with Sunderland or Newcastle?—No; I was not in Sunderland since the piers were completed.

5394. Do you know the width of the entrance of the Tyne at Shields?—No. I have not been there since 1816; but I should say the width was about half a mile, so far as my recollection goes. You asked me a question, gentlemen, relative to the depth of water north of Greenore Point, across the channel. There are about two fathoms water across there. That is the shallowest part over our bar, and where we are now at anchor. It is a clear flat across.

5395. (*Mr. Coode.*) Do you mean between Greenore Point and Earl Point?—To the north and west of Greenore Point.

5396. Is that the greatest depth of water at spring tides?—It is farther up, two miles off Greenore Point.

5397. Do you think it desirable that a greater depth of water should be obtained on the New England Rock?—I never heard of an accident upon it.

5398. Might it not be in the way, if the channel were improved, and a vessel attempted to enter in a dark night?—I think it necessary to remove that rock.

5399. And Videl Rock?—I can't speak so much of it. I know its situation is near Greenore Point and Watson's Rock, farther up.

5400. Neither Videl Rock nor the New England Rocks are buoyed or marked by perches. Do you not think they should be marked with buoys?—I do not know of an accident at them, for vessels can't proceed over the bar, either in or out, unless they have water over these rocks; but I think if the channel were deepened, the water over Videl and New England Rocks should also be deepened, and over any other shoals whatsoever.

Mr. Hoskyn, R.N., examined.

Mr. Hoskyn, R.N.

5401. (*Chairman.*) Do you know Carlingford Bay?—I am well acquainted with Carlingford Bay for a year and a half.

5402. Now, supposing the bar deepened as proposed, are you of opinion that the anchorage inside would form a sufficient harbour of refuge in point of shelter?—Yes.

5403. What wind blows directly into the bay?—The south-east.

5404. Have you seen it in a heavy gale of wind; and is the water smooth?—A vessel with good ground tackle should ride it out. It is sheltered from the rough sea.

5405. But it is not a sea to prevent a boat crossing, except under very peculiar circumstances?—It is not.

5406. What, in the rough, is the area of sheltered anchorage, speaking of it above Greenore Point?—About 300 acres.

5407. That is free from any danger whatever?—Yes.

5408. (*Mr. Lindsay.*) What depth of water is in those 300 acres at low-water spring tides?—From 6 to 12 fathoms; and above Greenore Point there are about 700 acres of anchorage.

5409. Would ships be sufficiently protected in the 300 acres in a heavy gale?—I think they would be well protected from the south-east winds and west gales. A boat could cross over.

5410. Could a boat land from a ship in a south-east gale?—She could land at Cranfield Point. A boat could pull away from a ship in safety.

5411. Do you think the shoals sufficiently buoyed and beaconed?—I do not.

5412. Do you think that is one reason which prevents ships coming in there?—I do not know; but they do not come in when they might. There are no buoys nor beacons to speak of in the Lough; but Captain Watson gave the true reason why there were no accidents, that vessels don't come in. If it were deepened you would have casualties immediately, unless it were buoyed and beaconed.

5413. Then, if the proposed channel were cut, it would be absolutely necessary to buoy and beacon every shoal before a vessel could come in?—Quite so.

5414. From your experience along the coast do you know of any place in this vicinity or along the coast here, where a better harbour of refuge might be made at as small a cost?—I do not know of any other place.

5415. Do you know anything of your own knowledge of the description of the ground on the bar?—I do not; I never bored the bar.

5416. With regard to the stones which Mr. Ramsay described as of moderate size, are you aware, of your own knowledge, that they are so?—I am not; but from a surface examination I think some of them are very long, as long as a boat; 22 feet or 23 feet long. I discovered that by feeling them with a long iron-pointed pole.

5417. They may be embedded so as to be stones or rocks of enormous size for aught you know?—I have not bored it, but I have seen the surface. I state this from probing it in one particular spot.

5418. Is it in that spot they propose to cut through?—Yes; the cut would come across that.

5419. Then, from your experience in such matters, you think it would be desirable to have surveys and borings made again?—I think that borings and sections would be the way to settle that point. There is abundance of clay at Cranfield Point, and the large stones are on the surface, where the clay and rocks intersect each other.

5420. Now, speaking to you as a sailor of experience, say that the channel were cut as proposed, would you have any hesitation in running for it in a heavy south-east gale?—Not without a good channel.

5421. Would you consider the proposed width of 500 or 600 feet sufficient?—I do not think it would. A bad steering ship in an ebb tide would veer a good deal; and that would not be great space in the channel.

5422. From your practical experience, do you think there should be a greater width?—I think there should be more than at Kingstown where there are no tides; but here you might have to steer for half a mile against them.

5423. Do you think, where there is a tide, the width between the piers should be more considerable?—I do not refer to the sea so much as to the tides. If a ship be hard to steer against such a tide as we have, for a quarter of a mile, she would be ashore if there were only 500 or 600 feet of channel. There is a very bad sea here in a south-east gale.

5424. Do you consider the sea so coarse at such times that it is dangerous for a ship to run in during a south-east gale and ebb tide?—Not if there was a sufficient depth of water.

5425. What sand would there be on the bar now at low water?—If the wind is to the eastward it is smooth by Helly Hunter's Rock.

5426. Say if there were a channel made 24 feet deep at low water spring tides, would a vessel run for it in a heavy gale at low water if she drew 20 feet?—I think a vessel drawing 20 feet of water might, but it would be easy for a vessel to keep off for an hour or two till flood tides.

5427. (*Capt. Washington.*) Did you make the Admiralty survey of Carlingford Bay up to Newry?—Yes.

5428. And you are thoroughly acquainted with every bar and shoal laid down in it?—Yes.

5429. During the course of that survey did you find no little difference on that bar?—We found a deep channel not in the old surveys. A ship could draw 18 feet water through it; at this moment there is 18 feet water in Carlingford Lough channel at low water and spring tides.

5430. Could a steamer take it?—A steamer at any tide could take it, but it is not buoyed nor beaconed. I erected temporary beacons to point it out, and I believe they are there still.

5431. Does it rest with the local authorities or the Ballast Board of Dublin to buoy such a channel?—I do not know; but I believe the local authorities.

5432. Can you repeat the names of the shoals that have not beacons that ought to have them?—Yes; one is necessary at the Sears, a buoy and perch at Haulbowline and New England rock, a large purchase on Sheep Rock, and we want a buoy on the rocks off Greenore Point. There are two bad rocks off it; and also a large buoy is wanted on the large Sound and Earl rocks, and a buoy is wanted on Stalker's Rock. There are two buoys wanted at the Flats at Carlingford, and two on the Flats on Killowen; and it is almost necessary to have a light on Black Rock to enable vessels to come up there at night in safety near Warren Point.

5433. There is nothing to light, even steamers, up to Warren Point?—No; there is no pier, but there is a quay there. There would be no difficulty in placing a light there, but the better position is on the Black Rock as you approach the anchorage at Warren Point.

5434. Is the bar sheltered from the winds from outlying shoals and rocks?—The Helly Hunter Rocks protect it from the east winds.

5435. Tell the limits to which it is protected and exposed?—It is perfectly exposed from the east-south-east round to south-by-west; and the Helly Hunter Shoal breaks the sea from it in some degree, and in the east gales the water is tolerable on the bar, but for seven points on the compass it is exposed.

5436. Would the tides set fairly through the proposed cuts?—I think so, if made in the direction of the channel shown on the plan. The tides set from the south-west when they pass the lighthouse, and through the deep water channel to some extent. That is the natural course for the tides to follow the channel, and if a deep cut were made in that direction it would have the ebb tide fairly through it.

5437. Do you know the entrance to the Thames or to Liverpool?—I am not intimately acquainted with them; and I don't know that their entrance does not exceed 600 feet.

5438. Supposing the channel dredged to 20 feet low water spring tides, and that 600 feet was the width of the surface at that time, at one hour of flow could you tell me what the width of the channel would be?—In the first hour there would not be over a rise of six inches; in the second hour there would be a foot. After the first quarter flood it rises 6 inches in 10 minutes, or 3 feet in the hour.

5439. Could you, from any of your plans, draw out a diagram, showing how the channel increases in width at one hour and two hours' flow, &c.?—Yes.

5440. Suppose there were 600 feet channel at low water, at every hour, up till the depth was 20 feet, would not the extent of channel of that depth be much greater than at first?—Yes.

5441. Then, except at low water it would be more than 600 feet, and would rapidly widen?—Yes; and if it were clay it would be deepened by the tide running through it.

5442. You spoke of the rock you found; have you any reason to believe it was fixed in the earth?—No; but supposing it was a boulder, a few pounds of powder would soon blast it. I have known of rocks of 80 tons raised.

5443. (*Capt. Vetch.*) The entrance to the Lough is exposed to only seven points of the compass. Suppose now the channel were dredged and buoys and beacons put down, would there be any difficulty to vessels on these seven points finding their way in?—No; there would be no lights required.

5444. I say, suppose the channel to be dredged, as detailed by the engineer, and buoyed and lighted as you have suggested, there would be no difficulty in vessels from those seven points finding their way into the harbour for shelter?—No.

5445. They would have a certain course, in which it would be of advantage to them. And, in fact, it would be a complete harbour of refuge to passing vessels with the wind on shore?—Yes. I think it very desirable that the New England Rock should

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be removed or lowered, so as not to be in the way of passing ships coming in; to buoy it would not be sufficient.. I might add that it would be necessary to buoy that rock off Greenore Point. If that rock was removed vessels might run up to the very far end for shelter.

5446. (*Mr. Coode.*) Can you give the name of that rock?—I believe it is generally known as Helpin's Rock.

5447. You stated that you had seen a large stone, about the size of a jolly boat; can you put in evidence, as nearly as possible, the position of that boulder?—(*Witness pointed it out on the chart.*)

5448. Have you ever taken observations as to the direction of the tide in the centre of the line of the proposed channel?—No; but you will see from the course of the tides that they turn through it.

5449. From your knowledge of the state of the tides here, can you state that the tides will run fairly through it?—I think if a channel were formed it would. A great portion of the ebb tide runs now through the 18 feet channel, and the velocity of the tide over the site of the proposed channel is somewhere about three knots an hour at the south end, and four knots at the inner side. I found no other large stones, and so far as I know that was quite an exceptional case; but it is almost impossible from a surface examination to say what the bottom of the bar is.

5450. (*Chairman.*) Would you point out to me on the chart where this 18 feet channel is?—(*The witness pointed out the channel.*)

5451. How long has that channel been known?—I do not think it was known before the spring of 1857.

5452. And it is much too circuitous to be of any service for a harbour of refuge purpose?—Yes, it is.

5453. Have you any knowledge of the coast in the vicinity of the bay?—Yes.

5454. Is the entrance easily made in thick weather?—It is.

5455. Have you considered the question of lighting, supposing this cut to be made?—Yes. It would be necessary to place leading lights, and there would be no difficulty in doing so.

5456. (*Capt. Washington.*) You are acquainted with the north-east part of Ireland; is there any place in which lights are wanted?—Yes; there is a lighthouse built at the entrance to Lough Strangford; I think it should have a light; it is very much frequented. There is also a lighthouse on Angus Rock, and as it is covered, vessels have great difficulty in going in without the light.

5457. Whose duty is it to light it? The tower was built by the Ballast Board of Dublin, and also all round the coast, except the immediate harbour lights. Do you know if it was represented that it was not lighted?—I believe it has been. I think a light is very much called for in Rathlin Sound. There is a light on the island, but it does not show towards the sound at all; it shows to the Carrickvaughan rocks, and steamers coming up the channel do not see it.

5458. Where would you have such a light placed; on Sheep Island or Rue Point, to the south of Rathlin?—Sheep Island would be probably the better position for it.

5459. Is the Carrickvaughan rock dangerous?—It is; it is uncovered in low water, and the tide sets directly towards it.

5460. Is it in the immediate approach to Ballycastle harbour?—Yes.

5461. Is there any other light necessary?—I do not think of any others at present. It was suggested that a light would be most useful on McKinney Bank, in Lough Foyle, and a pile light might be placed there with very great advantage, and there would be no difficulty in doing it.

5462. Otherwise, Lough Foyle is well lighted?—Yes.

5463. Coming to Carlingford Bay. Is it not the practice to carry away lime from between the lighthouse and Killagan Point?—It was the practice, but they are now prevented. That place is for shelter. It is my opinion it should not be carried away, and that if it is removed, my opinion is that the removal should be stopped.

5464. Who has the power to stop it?—I believe the Admiralty have the power, but no local authority have any power in the matter.

(*Mr. Wm. Kirk, M.P.*) It would be well to put upon your notes that all the boulder stones which stud the bar are covered with luxuriant sea-vegetation tangles, many of which are as thick as a stick, being two inches in diameter.

(*Mr.. Hoskyn.*) I know it is the case; so much so, that you can't see the stones on the bar for it.

(*Chairman.*) Before I close the proceedings I want to know if any gentleman present wishes to offer any remark, or tender evidence to the Commissioners in addition to what we have heard? Is there any point bearing upon the subject we have not noticed?

(*Mr. Kirk, M.P.*) I have a very favourite scheme upon the subject. I can't call it evidence; it is simply evidence of a suggestive character, and I will only make a very brief observation. I think that if some of the hulks that are in dock at Chatham and Sheerness were brought to our harbour, and some of the convicts put on board, they might remove the bar to any width or depth without any additional cost to the public. That is my scheme. They could be usefully employed here; and a very limited number of sailors and marines could keep them safely, while their labour, now unproductive to the country, would then be of essential service.

Sitting at Carlingford Bay closed.

DOUGLAS,

ISLE OF MAN.

Friday, 17th September 1858.

PRESENT:

Mr. LINDSAY, in the Chair.

Captain WASHINGTON.
Captain VETCH.

Mr. COODE.
Mr. EVANS, Secretary.

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(*Mr. Lindsay.*) I may state that our object here as Commissioners is to examine and inspect for ourselves your harbours. As you are aware, we have already a large amount of information bearing upon them, and therefore it will not be necessary to go into details to any great extent; but, as we take Douglas first, if any gentleman on the part of Douglas has any information to add, or anything to state which may have arisen since the evidence in this Blue Book was taken, we shall be much obliged to him if he will now state his case.

Mr. THOMAS GARRETT examined.

5465. (*Mr. Lindsay.*) What is your occupation?—Nothing at present; a gentleman, I suppose.

5466. Do you appear on the part of the Local Commissioners?—No; on the part of the inhabitants of the town.

(*Mr. Lindsay.*) If you please, we should prefer hearing some one on the part of the Local Commissioners first, and after that, we will hear evidence on the part of the town.

Mr. RICHARD QUIRK examined.

5467. (*Mr. Lindsay.*) You are, I believe, the Receiver General?—I am.

5468. You appear, I understand, on the part of the Local Harbour Commissioners in this place. Have you any statement to make on the part of those gentlemen, or any information to render which the Commissioners do not already possess. If so, we shall be very glad to hear it now?—Mr. Chairman and Gentlemen, various representations have been made by the Local Commissioners to the Treasury at different times as to the bad state of the harbours of the island. These representations, at the recommendation of the Governor, at length obtained attention, and in 1853 an Act of Parliament passed putting funds in the possession of the Treasury, and giving the direction of the works to the Tynwald Court. The Commissioners of Harbours were instructed by the Treasury to procure plans of the various improvements required, and in consequence they engaged Mr. Walker of London, who prepared a Report. Mr. Walker, I should say, visited the island twice, and had one year two assistants here. He had been here before, and was perfectly well acquainted with the harbours. The result was, that plans were sent in to the Tynwald Court, and they are the plans which I now beg leave to bring before you.

5469. Are these the plans?—Yes. (*The plans were handed in.*) The plans were recommended by the Tynwald Court, and for the most part approved by the Lords of the Admiralty.

5470. Is this the plan to which you are now referring?—Yes; this is the plan with regard to Douglas. It was sent up to the Admiralty, and approved in many respects, but in many others approbation has been withheld.

5471. Will you leave this plan, or a copy of it, with us?—Certainly.

5472. Then we will mark the plan A, and it is in reference to plan A that you are now speaking. Just go on with your statement. You say this plan was submitted and approved of by the Admiralty?—No; partially approved of.

5473. Will you state what are the objections which the Admiralty have to it?—If you will allow me, I will state the objections. The lieutenant-governor sent me copies of letters transmitted to him by the Lords of the Admiralty, containing their objections as to Douglas.

5474. Just state what those objections were on the part of the Admiralty?—They were six in number. Perhaps I had better read them:—"1st. The pier to be "provided on the seaward side with a parapet rising "to 7 feet above the proposed platform, or 17 feet "above high-water mark of spring tides. 2d. The "upright walling of the pier to rise in courses of "masonry from 12 feet below low-water mark, on "both sides. 3d. The rubble base not to rise above "10 feet below low-water mark. 4th. The end of "the pier to be carried up in steps, to admit of "further extension. 5th. The basement course to "be of stone, and not cement. 6th. The width "of the platform to be increased seven feet at least." These were the six points upon which it was thought necessary to remark and object to.

5475. These were the six objections which the Admiralty raised to the proposed plan?—Yes.

5476. Have you an estimate of the cost of this plan of breakwater?—There was only a certain sum which could be expended.

5477. But had you an estimate?—The estimate was according to the money to be expended. Mr. Walker suggested the greatest length of pier which he thought could be constructed for the money.

5478. What is the length of pier shown here?—540 feet, on that plan.

5479. Did Mr. Walker give you an estimate of what that 540 feet pier would cost?—He did to the Government.

5480. Do you know what that sum was?—32,000*l.*

5481. The 540 to 550 feet would have cost 32,000*l.*?—Yes.

5482. Is this pier, as shown here, part merely of a large scheme to be carried out hereafter?—Decidedly it was intended to be so.

5483. Then do I understand the Admiralty prevent you expending 32,000*l.* on the pier as proposed, unless you make such alterations as will meet the objections raised?—I think the pier on that plan is according to the directions of the Admiralty. Mr. Walker's first draft was to 27 feet low water, but this plan terminates at 29 feet low water, according to the directions of the Admiralty.

5484. What was the estimate of the original pier which was to extend out to 27 feet at low water?—I think 28,000*l.* That is, the inward line on the plan.

5485. Would such a pier as that, ending at 27 feet low water, have satisfied the wants of the port?—I very much doubt it.

5486. Is that on account of its not being of sufficient length to protect the mouth of the harbour?—On account of its confining the bay too much.

5487. What do you mean by confining the bay too much? Do you mean giving too small an area of water?—Just so.

5488. Then do I understand you to state, on the part of the local commissioners, that to be sufficient to protect the bay you ought to run out a pier from Douglas Head, or one of a different form from this?—Undoubtedly the outer line is more desirable.

5489. Have you considered the cost of a pier carried from the outer head?—The funds which we have at our disposal, unless amalgamated with a larger sum, would go a very small way to the construction of a pier running out from Douglas Head.

5490. I beg your pardon; repeat your answer.—It would go a very small way towards making a pier to Douglas Head.

5491. What prevents you from meeting the objections which have been raised by the Admiralty,—the objections which you have read. What prevents the Local Commissioners from complying with the suggestions made by the Admiralty?—The deciding what works shall be made is with the Tynwald Court. The head of the Tynwald Court is the governor, and he has written a letter upon the subject, which I beg to read.

5492. Will you give us the substance?—He had a communication from the Tynwald Court, and he recommended the waiting until the result of this Royal Commission was known. The Local Commissioners were directed to hold all works over until the result of your deliberations was known.

5493. What is the date of that letter?—The 4th of August.

5494. Will you read the letter?—It is addressed to me.

5495. Who do you say it is from?—From the governor.

"Government House,
"SIR, 4th August 1858.

"I enclose, for the information of the Commissioners of Harbours, copies of two letters from the Secretary of the Admiralty, of 25th June and 26th July, in reference to the plans for the proposed

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works in the harbour, and I also return the plans for Douglas, Ramsey, and Peel, the two latter having the assent of the Board of Admiralty affixed to them; and I would call the attention of the Commissioners especially to the observations made by the Admiralty with reference to the construction of the breakwater at Peel, to which I would recommend that the attention of the engineer should be directed.

"I inclose also a letter from the Secretary of the Treasury, of the 3d instant, from which you will see it is the intention of the Government to introduce a Bill into Parliament next session to provide the necessary powers to borrow money for the works, and that it is proposed that the commencement of these works should be postponed, to see the result as affecting Douglas of a Royal Commission on Harbours of Refuge about to be issued, and I have to inform you that the Tynwald Court have assented to the arrangement.

"I trust, however, that early next spring the Commissioners will be in a position to proceed with the works.

"I am, Sir,
"Your obedient servant,
(Signed) "CHARLES HOPE."

5496. That refers more particularly to the harbour of Peel, does it not?—It refers to the whole of the works until your decision is known, whether certain works can be blended with our own.

5497. Have you any proposal to make to us on the part of the Harbour Commissioners?—The Harbour Commissioners are but the executive of the Treasury, and the Tynwald Court to carry out instructions. I would be loath to give any opinion upon works upon which there are so many gentlemen more competent to speak than myself.

5498. Of course you have had notice of our visit and are aware of our object in coming. Have you, on the part of the Harbour Commissioners, any proposal to make to us; that is to say, have you any proposal to make with regard to the harbour of Douglas?—As to the plan, I think that drawing not extended seaward enough. Supposing the Commissioners are obliged to fall on their own resources, of course they cannot go so far.

5499. Then you think that even out to 29 feet at low water, is not sufficient to protect your harbour?—Even that is not sufficient. It would be a prospective benefit to the public at large, if it were further extended.

5500. That is to say, you desire to have it further extended to sea, but you have no funds?—That is so.

5501. That is the case; and if the Government intend this pier to be carried out, the Government must aid you with funds for the construction of it?—Yes.

5502. (*Capt. Vetch.*) This plan which you have now laid on the table, is the plan prepared by Mr. Walker, and approved of by the Admiralty. The Admiralty have no objection to the plan; as regards the sections they have objections, but not in any degree to the plan. Is that the case?—Yes.

5503. This is the plan that was proposed to the Admiralty, of which Mr. Walker made the drawing, and which the Island authorities transmitted to the Admiralty for approval. The Admiralty have approved of the plan as far as it goes, but the Admiralty have objected to the sections of the work. I ask you whether that is the case or not?—Yes; it is here in the copy of Mr. Corry's letter.

5504. I think the sum which the Court of Tynwald propose to expend on this pier is 32,000*l.*?—Yes, 32,000*l.*

5505. And I think I observed, from the proceedings of the Committee on Harbours of Refuge, a proposition was there made that a further sum of 40,000*l.* should be devoted by the Government, if approved of by the Commissioners, for its extension?—I am aware of that.

5506. (*Mr. Lindsay.*) Have you any other information to give to the Commissioners in regard to Douglas, which we do not already possess?—The improvement of Douglas Harbour has been the subject of communications and publications for many many years.

5507. Then you have no further information beyond what we already possess?—If you will permit me for a moment to go back to former times, Sir John Rennie had an important plan for a breakwater.

5508. I think we have already Sir J. Rennie's plan in evidence?—The Commissioners of Harbours cannot act here.

5509. We have the whole of that already, Mr. Quirk.—The local Commissioners sent the then high bailiff to Liverpool, to get the consent of the shipowners to Sir J. Rennie's plan. They held a meeting at the Chamber of Commerce, and decided that the plan was too small for a breakwater, and they sent over their own surveyor, Captain Denham, who suggested a larger plan.

5510. Was there any estimate given of the cost of Sir J. Rennie's plan, which, as I understand, was a breakwater with entrances on each side of it?—I think it was 30,000*l.*

5511. What acreage of water above 3 fathoms would that have given?—I think he speaks of 40 acres.

5512. Forty acres of 3 fathoms and upwards?—I think so.

5513. Have you any other suggestion to make in regard to Douglas?—Nothing; but I wish to press on the Commissioners that the improvement of the harbour is no novel subject. Two memorials were sent to the Treasury at different periods, and I beg the attention of the Commissioners to the last few lines of this one. I have the pleasure of quoting Captain Washington.

5514. Then, Mr. Quirke, you lodge a copy of this memorial?—If you please, and this is another.

5515. Do you desire to lodge it also?—If you please.

5516. (*Capt. Washington.*) On reference to the published statement, you wish to correct what you have said as to the cost and space of Sir J. Rennie's plan?—I do.

5517. Was it not 45 acres and 216,652*l.*?—Yes.

5518. That was Mr. Rennie's estimate in 1835?—Yes.

5519. Was there any earlier plan, prior to that of Sir J. Rennie's?—Yes.

5520. Can you tell me the earliest plan, I mean for enclosing the whole bay, not for your own little harbour, but for the whole bay?—The next was by Captain Denham.

5521. But none before Sir J. Rennie?—There was Sir W. Hilary's, in 1826.

5522. Sir W. Hilary, a resident here, proposed to enclose the whole bay?—No; merely a breakwater.

5523. Have you put in that plan?—I can give it.

5524. Had Sir W. Hilary been long a resident in Douglas?—I should think for 30 years.

5525. Should you think he was fully acquainted with the wants of the place?—Yes; that is of the wants 32 years ago.

5526. As far back as 1826 it was the desire of Douglas to have a larger harbour than at present?—Yes.

5527. Was nothing done on Sir W. Hilary's plan?—Nothing.

5528. Then 9 years later either the Tynwald Court or the Harbour Commissioners applied to Sir J. Rennie?—In 1835 the Commissioners invited Sir J. Rennie to the island.

5529. The Tynwald Court had nothing to do with that?—The Tynwald Court were only empowered in 1853.

5530. Did the Harbour Commissioners represent the feeling of the authorities and the public?—I have no doubt of it.

5531. Then again in 1835 it was the wish of the public to have a large plan for enclosing Douglas Bay?—Yes, or to make a harbour of refuge here.

5532. Why was that plan not carried out?—Want of support, want of means.

5533. For want of funds it fell to the ground?—Yes; it fell to the ground because our friends in the Town Trust of Liverpool then got changed.

5534. Just so. What was the next plan proposed after Sir J. Rennie's?—I think Mr. Timperley's, our engineer.

5535. Can you show a copy of that plan? was it larger?—It was merely an extension from the head, similar to Mr. Walker's proposal.

5536. What was the next proposal after Sir J. Rennie's?—Mr. Timperley's, our resident engineer.

5537. In what year?—In 1846.

5538. In 1846 Mr. Timperley proposed another plan. You said something of Mr. Denham, when was that?—In 1834 or 1835.

5539. Sir J. Rennie made one plan, and then Mr. Denham another?—No; they were two in the same year, Sir J. Rennie's and Mr. Denham's.

5540. Which was the larger?—Mr. Denham's was considerably larger.

5541. Then you began with a small plan. Sir J. Rennie increased it still larger. Mr. Denham increased it larger still. Now what was the next plan?—Mr. Timperley's was the last.

5542. Was it larger or less in area than the former?—Considerably less.

5543. Was Mr. Timperley limited by the funds at his disposal in preparing that plan?—Oh yes.

5544. Then that is no proof that a small plan only was necessary, but merely that means only allowed him to design a small plan?—Yes; and I believe Mr. Walker was confined in the same manner.

5545. Have you a copy of Captain Denham's plan?—No, I have not.

5546. Does it exist anywhere?—It is drawn in pencil on Sir J. Rennie's plan.

5547. Did Captain Denham ever do more than draw it in pencil over Sir J. Rennie's plan?—I do not know whether he did it.

5548. Did he write any report?—Yes.

5549. Was it ever printed?—Yes; I have it in print.

5550. Do you know whether a copy of that report was presented to the Tidal Harbour Commission of 1845?—I do not think it was asked for.

5551. Can you furnish this Commission with a copy of Captain Denham's report?—Yes.

5552. That plan enclosed the largest space. Was that generally approved of?—Yes; the merchants of Liverpool said that Sir J. Rennie's plan was too small; they wrote to the Chairman of the Harbour Commissioners, my predecessor, to that effect, and the reply was, that Douglas Bay was large enough, and they could take as much water as they liked.

5553. Was it proposed that the shipowners should contribute to make a harbour of refuge?—I do not think that was put before them.

5554. Did they express a strong opinion in favour of it at a public meeting?—Yes, I have the papers here.

5555. Is there any doubt on your own mind, as representing the authorities and the public here, that a large harbour in Douglas Bay is desirable?—I think so.

5556. Do you believe it would be the means of saving life?—I do think so.

5557. And preventing the loss of property?—And preventing the loss of property.

5558. (*Mr. Coode.*) The sheltered area, according to Sir J. Rennie's plan, was to be 45 acres. Can you tell us what are the maximum and minimum depths over those 45 acres?—From 31 feet to 6 feet, perhaps.

5559. Do you commence at the 6 feet line?—Yes.

5560. Is not the calculation up to low water?—Yes, up to low water.

5561. (*Mr. Lindsay.*) One question more, does the memorial from the merchants of Liverpool refer to the necessity of a harbour of refuge in the Isle of Man, or does it specifically refer to Douglas?—It refers specifically to Douglas.

5562. If a pier were carried out 800 or 850 feet in length would that satisfy the Harbour Commissioners?—What plan do you mean.

5563. The plan lodged. Would a pier carried out 800 or 850 feet from the Two-Gun Battery satisfy the Harbour Commissioners?—I very much doubt if it would.

5564. Why so?—Even if that plan were adopted you would require a greater extension than 800 feet.

5565. Then I understand that an extension from 550 to 850 feet would not sufficiently protect the harbour?—I beg your pardon, I did not follow the question.

5566. I ask if a pier of 850 feet in length were run out from the Two-Gun Battery Point, would that sufficiently protect the harbour?—It would protect the harbour sufficiently.

5567. Would the Harbour Commissioners be satisfied with a pier run out to the extent I have named, or do I understand you to say they would not be satisfied?—If that work were adopted with a view to extension, perhaps they would.

5568. With a view to further extension beyond 850 feet?—Mr. Timperley, our engineer, proposed 200 yards at first, when I wrote to him at Glasgow, where he was with the Glasgow Trustees, to give me an estimate, he sent me word that 300 yards would be necessary.

5569. That is 900 feet. Is it also the view of the Harbour Commissioners that a pier of 900 feet from the Battery Point would be necessary?—It was the suggestion of our engineer. I do not know whether the Commissioners expressed any opinion on that point.

5570. But are you prepared to express any opinion on the part of the Harbour Commissioners with regard to it?—Our object was to look to the inner harbour which was in a very disturbed state for years. It was so much complained of for many years that our desire was for any means for the protection of the harbour. We were glad of anything to protect it. But of late years vessels have grown so in size that we want a larger area.

5571. Do I understand that if a pier were extended to 850 feet from the Two-Gun Battery Point, there would not be sufficient area for the local trade, and it would not afford sufficient protection to the harbour?—It would afford sufficient protection to the harbour, but as a defence to vessels I think it would be too short.

5572. What do you mean by a defence to vessels; do you mean vessels seeking shelter in the bay?—Yes, vessels coming to the roadstead. It was quite gratuitous on the part of Mr. Timperley to suggest 300 yards; I told him he had better keep to his original proposition; we should be very glad to get an instalment.

5573. (*Capt. Vetch.*) Do you happen to be aware, Mr. Quirk, that the line which was proposed and approved of from the Two-Gun Battery by the Court of Tynwald is the same that was proposed to extend on to 1,100 feet, and into 32 feet of water, by the Admiralty?—I am not aware of any proposition of that kind.

5574. And that the only limitation to a smaller extent, as here shown, was owing to the want of funds to carry it out in its entirety, viz., to the distance of 1,100 feet?—May I ask whether that was the proposition from the Admiralty?

5575. Yes, it was.—I am not aware of the existence of such a plan.

5576. (*Mr. Lindsay.*) Have you anything to state to the Commissioners which they do not already know with regard to the other harbours of the island?—Nothing further that I am aware of.

5577. Have you anything on the part of the har-

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bour Commissioners to state as to Ramsey, Peel, Port Erin, or Castletown ?—I think the plan for Ramsey very well to enable them to land passengers.

5578. To what plan do you refer ?—To the extension of Ramsey pier.

5579. Have you the plan of the proposed extension of Ramsey pier ?—Yes ; it is here.

5580. Is this the plan (*produced*) ?—Yes ; that is the plan.

5581. You will send us a copy of this plan, and we will mark it B ?—Certainly.

5582. The plan proposes an extension of the north pier ?—Yes.

5583. In what direction will it run ?—It is on the plan about south-east.

5584. To what length will it be extended ?—230 yards.

5585. Will the whole pier be 230 yards, or the extension ?—Yes ; the extension.

5586. Is there any estimate of the cost of the proposed extension ? — Mr. Walker estimated it at 7,000*l.*

5587. We shall hear the Committee from Ramsey. Have you anything to say as to Port Erin ?—It would make a very good asylum for the herring fleet.

5588. Have you any suggestions to offer with regard to it ?—None, except that I am quite sure it would be a very valuable work if means could be found for it.

5589. As applicable to the fishing trade or the general trade ?—I should say the fishing trade entirely. We have about 300 boats of our own, 300 from the south of England, and about 150 carriers to the English market.

5590. Then I understand there are about 300 Manx boats. How many strange boats frequent the island? —About 300 more.

5591. Then, in the season, there are about 600 boats fishing in the different harbours of the island ? —Yes.

5592. Is there much loss of life among those boats? —No, not loss of life, but of property.

5593. Have you known any case of loss during the last 10 years of the fishing boats ?—There are very few cases, they always watch for the weather ; but they are surprised sometimes, and are lost.

5594. Has there been a large loss of property in the fishing boats ? Have many fishing boats been lost of those frequenting or belonging to the island ? —Not many ; occasionally accidents take place, but they are generally on their guard.

5595-6. Does that arise from the men exercising great prudence and caution, avoiding proceeding to sea, when the weather is threatening, or how ?— They are better found, better sailors, the boats are better, and there are fewer accidents. But they are kept in harbour when they ought to be fishing, for want of being afloat. That always is the difficulty ; they are kept in harbour when they ought to be afloat.

5597. Do you mean that on account of there not being a place of shelter to run for in a gale of wind, they are afraid of putting to sea ?—Yes ; they are afraid of putting to sea.

5598. But is it not the case, that if there comes a south-east gale they can find shelter in one harbour, and if a north-east gale in another harbour, and that those two harbours are not far apart ?—Yes.

5599. Is that the case ?—Yes.

5600. Is that one reason why so few boats are lost? —Very probably so.

5601. Then why do you think a harbour of refuge so very necessary for fishing boats ?—On account of their being able to remain always afloat, and having the opportunity to put to sea if the weather moderates.

5602. Then it is more necessary to facilitate the fishing trade than to protect life and property ?—It would give facilities to the fishing trade.

5603. Then you think it more necessary for that purpose than for saving life and property ?—So far, I do ; because in 1847 a near relative of mine got an account of the earnings of the fishing boats for that year, and it was 80,000*l.* clear gain, allowing for everything ; that was in 1846.

5604. (*Capt. Washington.*) That was not the value of the whole fish taken ?—No ; a balance was struck.

5605. The fishermen really gained and pocketed a sum of 80,000*l.* ?—Yes ; that was the profit.

5606. Have you ever heard the fishermen say they would contribute towards making a fishery harbour? —I have heard of it.

5607. Do you know, of your own knowledge, that they will ?—I am not that side of the island, but I saw a subscription list to the extent of 810*l.*

5608. At one port, or more than one ?—At one port, Port Erin.

5609. The fishermen would contribute above 800*l.*? —They would.

5610. To return once more to Douglas Bay, do I understand you to say, the feeling of the authorities and public here is, and has been for the last 30 years, that a harbour of refuge is required in Douglas Bay? —Yes.

5611. And nothing but a want of means has prevented its being carried out ?—Nothing but a want of means.

5612. Have the plans of the different engineers ever been exhibited, that the sailors might have an opportunity of expressing their opinion upon them? —I remember when Sir J. Rennie's plan came in, I put out advertisements asking the public to inspect it. There never had been an engineer in the island before. That was in 1835. The plans were very nicely done, and I was proud to show them. We invited the public by advertisement, and a good many came.

5613. The plan has two entrances, one to the north and one to the south. Was that plan generally approved of by seafaring men ?—There was no objection raised. They deferred a good deal to the authority of Sir J. Rennie—that it must be right.

5614. Have you any masters of ships sailing out of Douglas ?—Yes.

5615. If they were caught in a gale of wind, and had to take the harbour, they would not ask Sir J. Rennie's opinion, I suppose ?—I should think not.

5616. I should think not, either. Then you cannot tell the Commissioners whether one or two entrances would be considered best ?—Not of my own knowledge. I am quite sure Sir J. Rennie's plan, which is open to south-east gales, is wrong. I think that is wrong.

5617. Probably there will be some seafaring men, pilots, who will give us their opinion ; so I need not trouble you.

5618. (*Mr. Coode.*) You said you saw a subscription list at Port Erin, to the amount of 800*l.* Was that a proposal to contribute annually, or to put down that sum at once ?—It was a subscription of a certain sum.

5619. Do you remember the greatest amount per boat, down in the list?—I can scarcely speak to that.

(*Mr. Lindsay.*) We will not trouble you any further, Mr. Quirk. We are much obliged for the evidence which you have given us.

Mr. Edward Quayle examined.

Mr. E. Quayle.

5620. (*Mr. Lindsay.*) What are you ? — Master mariner.

5621. How long have you been master of a ship ? —I have been 25 years master of a steamer.

5622. Where do you belong to ?—To Douglas.

5623. Where has your steamer been trading ?— To Liverpool.

5624. You have been trading between Douglas and Liverpool ?—Yes.

5625. Are you so employed at the present time?—Yes.

5626. What are the heaviest winds that blow into Douglas; which give the heaviest sea?—South-east winds.

5627. Are you often prevented from landing your passengers?—Yes.

5628. How often in the course of the season have you not been able to land your passengers?—I should say three or four times a year.

5629. Do I understand that three or four times a year you could not even lower boats, but have been obliged to put to sea until the weather moderated?—At least until the water was such that we were able to make for the harbour.

5630. Have you had any accidents in landing passengers?—None.

5631. None of your boats have ever been swamped?—No.

5632. Having great experience as a practical man, look at this plan A, and tell me, do you think a pier going to that length would afford sufficient protection?—It would protect the harbour quite sufficiently, but leave very little room if there were large ships and a number of small vessels wanting to come into the bay.

5633. But would it leave room enough for vessels frequenting this place?—I do not think it would.

5634. Not even for local traders?—It might for the local traders; but there are a great many colliers passing.

5635. But it would leave no room for ships seeking shelter?—No, not in that way.

5636. Say this pier were carried out 850 feet, what then?—Then it would leave too little room still.

5637. Do I understand you to mean that it would leave too little room to the north for ships to get into the harbour?—Yes.

5638. During your long experience on this coast have you known of many shipwrecks and loss of life?—I have known of a great many.

5639. Can you state any case where, in your opinion, a harbour of refuge would have been the means of saving life and property?—I have been the means of saving many lives myself.

5640. But do you know any particular case of ships or lives being lost which would have been saved by a harbour of refuge?—There was the *St. George* steam packet lost on St. Mary's rock, that was in 1830; and the *Vigilant* cutter was lost on St. Mary's Rock.

5641. Were any lives lost?—No.

5642. Would a harbour of refuge have saved those vessels?—No doubt of it.

5643. How was the wind?—South-east.

5644. A strong gale from the south-east?—Yes. We had one of our packets, at the time the *St. George* was lost, in the bay, but steam was up, and we went to sea.

5645. Supposing there was to be only one harbour of refuge to the island, and considering the passing trade to Liverpool or the Clyde, at what point of the island do you think a harbour of refuge would afford the greatest facilities to shipping, and be the best means of preserving life and property?—If you extended a breakwater in Douglas Bay out from the outer head, I think it would afford sufficient room for passing vessels.

5646. Speaking of the passing trade, and trade generally, do you think Douglas the best site for a harbour of refuge?—There is no such place to Holyhead.

5647. For the passing trade, would you think it the best point?—I should not think it quite as extensive as it ought to be.

5648. But as to the site?—The site is very good, because vessels can get out of Douglas Bay with any wind, except south-east.

5649. You think that as a site it is as good as any other in the island?—Yes.

5650. Then your objection is to the limited space?—Yes.

5651. Have you seen the plan of Sir J. Rennie's breakwater? What do you think of it?—I think it a very bad plan.

5652. State your reasons?—It is open to the worst point, and there would be a heavy sea.

5653. Then the heaviest sea sets round Douglas Point?—There is a heavy swell when the wind is south-south-west.

5654. What are the heaviest seas in the bay?—When the wind is south-east or south-south-east. When it is more to the east it is not such a "fetch."

5655. Then you object to Sir J. Rennie's plan because one entrance is open to the south-east swell?—Just so.

5656. And you think that whatever is done, we ought to continne the pier from Douglas Point or Battery Point, and that the passage should be to the north?—Decidedly so.

5657. (*Capt. Washington.*) I think you said you have run into Douglas Bay frequently with the wind blowing hard?—Yes.

5658. Did the steamer which you commanded carry the mails?—Yes.

5659. And there were no means of landing the mails at low water?—Not any.

5660. Neither mails nor passengers?—Neither.

5661. Is that the case now?—Frequently. I think you, Captain Washington, on one occasion were with me.

5662. I am sorry to say I was, and I had the pleasure of rolling about in Douglas Bay for six hours; but that was twelve years ago. Do you mean to say the same state of things exists now?—Yes. Not long ago, the boat with the mails was detained five days, and could not get out to sea.

5663. Why so?—Because there was a wind on the shore blowing a gale of wind. That was this spring.

5664. The mails, and of course all the passengers, were detained five days in the harbour, and could not get out?—Yes.

5665. Do you know how long the steam packets are in going from Liverpool to New York?—They sometimes go in ten days.

5666. Well, then, it appears that this important island, the Isle of Man, with its capital of Douglas, within how many miles of England?—Seventy-five.

5667. Within seventy-five miles of England, has its passengers and mails detained as long as it would take to go half way across the Atlantic?—Yes, or to go to Newfoundland.

5668. Why the island might as well be at Newfoundland?—Just as well.

5669. Surely that is a bad state of things?—Very bad.

5670. What is the remedy?—There is no remedy unless the Government give us a breakwater.

5671. A breakwater to shelter the harbour?—To shelter the harbour.

5672. Have any wrecks ever occurred in the bay?—Oh yes.

5673. The two you have mentioned?—Yes; and I went out myself in my vessel to save a crew,—that was 17 or 18 years ago.

5674. I hope you got the medal from the Life-boat Institution?—I got one from Lloyd's.

5675. That is still better; but do you know of no other wrecks?—There have been a great many.

5676. Within the last few years?—There was one on the rocks last Tuesday morning.

5677. Wrecked?—I do not know whether she was wrecked.

5678. How was the wind?—South-east.

5679. Blowing hard?—No.

5680. What was her name?—The *Lord Nelson*, I believe.

5681. Within the last few years do you know of no other vessels?—I have seen fishing boats on St. Mary's rocks.

5682. We will come to fishing boats afterwards, Have you known of men being drowned in Douglas Bay within the last four years?—Not that I am aware of.

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Mr. E. Quayle.

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Captain Washington.

5683. Within the last 10 years?—Not unless some of the boatmen tumbled over the quay.

5684. Is it a common practice for the boatmen to tumble over the quay?—Sometimes they do when half-seas over.

5685. Are the piers lighted?—Yes.

5686. And kept clear. Is there nothing on them to trip a person up?—No.

5687. Do you happen to know that some shoal water runs off to the east of St. Mary's rocks?—Yes.

5688. Then do you think it necessary to run off a a pier from those rocks?—It would be better.

5689. Because you said you would close the south-east entrance, and enter from the north?—Yes.

5690. But there is some very shoal water to the north?—I think there is sufficient water.

5691. Do you think the pier from St. Mary's rocks better than from Conister rock?—I think it better.

5692. What distances?—I should think 300 yards.

5693. Are you acquainted with any of the pier harbours about England?—No.

5694. Three hundred yards is a good deal?—Perhaps not so much,—200 yards.

5695. Do you believe that if such a breakwater were erected many vessels would take advantage of it?—I believe so.

5696. Do you think a breakwater on the east or on the west side would be more generally useful to ships?—On the east side.

5697. Why?—Because there is more traffic. The traffic is principally on the east side.

5698. Do you know what is the greatest number of vessels you ever saw at anchor in Douglas Bay?—I think I have seen about 20.

5699. Then in a south-east gale, where, if they could not come here, would they go?—They would keep to sea, or off the Calf of Man.

5700. Is there not a very rapid tide off the Calf of Man?—Yes.

5701. Then it is not a good place to round in a gale of wind?—No.

5702. You are in the Liverpool trade, and have not had occasion to go round?—No; I never had.

5703. Are you acquainted with Langness Point?—Yes.

5704. Do you ever get near it in crossing over to Liverpool?—No; we generally keep our course more to the northward and eastward.

5705. Did you ever hear of sailing vessels getting on Langness Point?—Yes.

5706. Is it of frequent occurrence?—I heard the other day of one.

5707. Is there any light?—Yes, in the fishing season.

5708. Who puts it up?—It is lighted by the Harbour Commissioners, and placed on Fort Island.

5709. Where is that?—At the east end of Langness.

5710. There is a light at Derby Haven; is that what you mean?—Yes.

5711. But you don't call Derby Haven Langness Point?—It is part of it.

5712. But when you said there was a light on Langness, I thought you meant there was a light to prevent vessels going on the ness near?—Near the mouth of Castle Bay.

5713. Well, is there any light there?—No.

5714. Any beacon or buoy to warn off that point?—There is a landmark. The *Racehorse* was lost off that point.

5715. What was the *Racehorse*?—A sloop of war.

5716. How long ago?—Twenty-two years ago.

5717. Were many lives lost?—Yes.

5718. How many?—I don't know. Many of the crew and officers, as they were going out in boats.

5719. Then since a sloop of war was wrecked on Skerrans Rock has any vessel since that time been wrecked on that point?—I have not heard of any.

3720. Is there anything to warn vessels off that point in a fog?—There is nothing on the Skerrans.

5721. Does the tide run rapidly off that point?—Yes.

5722. Can you see the light from Castletown?—You cannot.

5723. Have you not Port St. Mary Light?—Yes.

5724. How far off have you seen that?—Seven miles in clear weather. Going to Belfast I have seen Port St. Mary Light frequently.

5725. (*Capt. Vetch.*) I think you say the heaviest sea in Douglas Bay is when the wind blows from the south-east?—Yes.

5726. Does it beat strongly on the outer head?—Very heavy sometimes.

5727. Have you ever seen the spray go over the lighthouse?—Yes.

5728. And green water?—I have seen green water go up to the base of it.

5729. There is great tumult, and a heavy sea?—Yes, a very heavy sea.

5730. (*Mr. Coode.*) You said the *Lord Nelson* got on the rocks last Tuesday morning?—Yes.

5731. Would a harbour of refuge have prevented that?—I should think so.

5732. What were the circumstances of that casualty?—I do not know. I was in the bay. It was blowing a smartish breeze from the south-east.

5733. Do you know whether the *Lord Nelson* had been lying in the bay?—I dare say she had.

5734. Would a harbour of refuge have enabled the mail steamer, which was detained five days, to get to sea?—Decidedly so.

5735. Was there a heavy sea at the harbour's entrance which prevented her getting out?—Yes; we could not get her round.

5736. If you could have got clear, you would not have hesitated to make the passage?—I should not.

5737. Then it was solely in consequence of the sea just off the harbour's mouth that you could not put out?—Precisely so.

5738. (*Mr. Lindsay.*) One question more. Can you tell me, whether ships leaving Liverpool, and taking the north channel, go to the east of the Isle of Man or to the westward?—To the westward.

5739. Always to the westward?—Yes.

5740. By returns which we have, we find that by far the largest number of wrecks are on the east side of the island. Can you account for that?—Because there is the greatest traffic on that side.

5741. Do you mean the greatest traffic with regard to the coasting trade?—Yes, with regard to the coasting trade.

5742. Have you any suggestion which you would like to offer to the Commissioners in regard to a harbour of refuge?—The only thing I can suggest would be the largest plan, Captain Denham's plan.

5743. You prefer that plan because it is the largest?—Yes.

5744. Because it would give the greatest area of shelter?—Yes.

(*Mr. Lindsay.*) We will not trouble you any further. We are much obliged to you for your evidence.

Mr. Robert Gellings examined.

Mr. Robert Gellings.

5745. (*Mr. Lindsay.*) What are you?—Assistant harbour-master.

5746. Have you anything to state to the Commissioners with regard to the necessity of a harbour of refuge at this particular site of Douglas?—Yes; there is one required.

5747. Do you think it is required for the passing trade as well as the home trade?—Yes.

5748. Are there many ships which put into the roadstead now for shelter?—Yes, a great number.

5749. How many at one time have you seen?—Taking the fishing boats?

5750. No, excluding the fishing boats?—I have seen 20 and 30.

5751. Any large ships?—Coasters and schooners, not very large.

5752. How many fishing boats have you belonging to the island?—About 300.

5753. Have you any strange boats as well?—About 200 come from the West of England.

5754. Then there are 500 boats. How many belong to Douglas?—There are very few belonging to Douglas; they come from other parts of the island.

5755. How many boats fish out of Douglas?—I do not think any boats belonging to Douglas.

5756. How many bring in fish?—About 200 or 300.

5757. Have you known any accidents with those boats?—Sometimes.

5758. Tell us when?—The fleet was lost about seventy years ago.

5759. Has there been no loss of life more recent than that among the boats frequenting Douglas?—Not many.

5760. Is your harbour dry at low water?—Yes, at spring tides.

5761. Have you anything further to add?—Captain Wilson lost his boat's crew at the mouth of the harbour.

5762. Was that during a heavy gale of wind?—Yes, coming in.

5763. Was the crew all lost?—Yes, I think so.

5764. What other ship do you know of?—The *City of Glasgow* steam packet was lost.

5765. How long ago?—About thirty years ago.

5766. Were any lives lost?—I think not; but they were taken ashore naked.

5767. Was she trading here?—She called here.

5768. Then if there had been a harbour of refuge that vessel would have been saved?—Yes.

5769. Would a pier from the Two-Gun Battery of 550 feet sufficiently protect your harbour?—I think it would be entirely too small.

5770. Would any increased security be given to the present piers if such a breakwater were made?—It would break the water.

5771. Which is the heaviest sea?—South-east.

5772. Then, during the heaviest sea which now breaks in right over the pier,—and the spray I am informed even goes over the top of your lighthouse,—the proposed pier would protect the harbour, would it not, during those gales?—Yes; but the east wind is a very heavy gale, though not quite so heavy a sea.

5773. Is there a heavy sea when the wind blows from the east?—When it is blowing hard.

5774. Would not the proposed pier protect the harbour during an easterly gale?—No, it would not.

5775. Would it have that effect if extended to 800 feet?—There would still be running with an east wind.

5776. Do I understand you to say that if the pier were carried out to the extent of 800 feet, the sea would still run into your harbour during a gale from the east?—Yes.

5777. Have you any suggestion to make as to a breakwater which shall afford shelter to your own trade, protect your harbour, and afford accommodation for the passing trade also?—A harbour of refuge, you mean?

5778. Yes; have you any suggestion to offer?—I think it should be a breakwater from the Big Head lighthouse running east-north-east.

5779. You think a breakwater running from Douglas Point east-north-east would do?—Yes; running past Conister's Rock.

5780. Running from Douglas Point in the direction of Conister's Rock?—No; in this direction east-north-east.

5781. What length of pier would that require?—I suppose that would require 600 or 700 yards.

5782. Do I understand you to say that nothing short of a pier of 600 yards in the direction you name would afford sufficient shelter in the harbour, give the desired accommodation to the local trade, and to a certain extent to the passing trade?—No, I think not.

5783. Nothing short of that would be sufficient?—No, I think not.

5784. Saying that such a pier as this on the plan (A) were run out from the Two-Gun Battery, would the steamboats be able to land their passengers there at all times in smooth water?—Yes, they might.

5785. Would steamers lay alongside it in safety?—Yes, I think so in the bight; still there is no road from the town there at present.

5786. Could not that be easily remedied?—You must cross the harbour.

5787. But there is a bridge, I understand, across the harbour?—Yes.

5788. What distance would it be from the bridge to the pier—to the inner part of the pier?—Well on to a mile. It would be more than a mile.

5789. Have you measured it; are you sure it would be more than a mile?—I think it would.

5790. Is there no road part of the way?—Yes, to Fort Anne.

5791. What length of road would be necessary to complete the connection between the present road and the pier?—About half a mile. It would require a sea wall as well.

5792. Are you aware of any difficulties beyond the expense, of which you cannot speak?—It is all private property.

5793. Do you not think that the parties interested, if it were for the public good to make the road, would come forward readily?—I can't tell.

5794. (*Capt. Washington.*) You are assistant harbour-master?—Yes.

5795. Is there a harbour-master besides you?—Yes; John Clegg.

5796. Is he here to-day?—I don't know; he was not brought up to the sea.

5797. How long were you at sea?—Near 30 years.

5798. In what trade?—Betwixt here and Liverpool, generally.

5799. In a steamer or a sailing vessel?—In a sailing vessel.

5800. Have you often been round the Calf of Man?—Yes, I have; often.

5801. Are there good lights on it?—Yes.

5802. Is there a good light on Douglas Head?—Yes.

5803. By whom is it kept?—By the harbour authorities.

5804. Do you know at what expense?—I am not certain as to the expense of it. About 140*l.*

5805. Have you ever been in the lantern?—Yes.

5806. How is it lit?—By reflectors.

5807. Has it ever gone out?—I never heard of it.

5808. Have you a light at the pier head?—Yes.

5809. Is it a tide light or all night?—All night.

5810. Do steamers come in at night?—Yes.

5811. If a steamer arrive at half-ebb, can it come in?—No; there is too little water.

5812. How long would she have to wait?—About six hours.

5813. Has it occurred often, within your knowledge, that a steamer has had to wait?—Yes, very often.

5814. Do freshets come down your harbour very often?—Not very often.

5815. Do you scour out the harbour?—Yes.

5816. Is there any mud in the harbour?—Yes; high up.

5817. Do you take any means to remove that mud?—Yes; it is removed by a flat.

5818. What is done with it?—Country farmers sometimes draw it away for manure.

5819. Is it useful for manure?—I believe so.

5820. Do they pay anything for it?—Nothing, I believe; it is quite useless.

5821. Which is it, useful or useless?—I believe it is quite useless.

DOUGLAS.

Mr. Robert Gellings.

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Captain Washington.

5822. If you don't understand don't answer. Are any complaints made of mud in the harbour preventing ships taking up berths ?—Yes.

5823. Do you do anything to remedy that ?—Not much. We have done a little. The flat is ready.

5824. Is your quay clear. Are there no blocks of timber on it—no herring casks ?—At the present time there are a few going by the packet.

5825. No boiler plates ?—Yes ; landed from the packet.

5826. Is the south quay under your charge ?—Yes.

5827. Do you know that more than half of it is at the present moment blocked up with boiler plates and blocks of timber ?—The gasworks are making alterations.

5828. Have you occasion to go up to Fort Anne ?—Yes.

5829. Do you know that at a sharp corner there are 10 boiler plates projecting into the road ?—The gas works are making alterations.

5830. As you are harbour master I only ask if you know these things. To return to the refuge, where do you think the entrance should be ?—To the eastward of Conister.

5831. Do you know that there is shoal water to the eastward of Conister ?—Yes, close over, but there is a good bay.

5832. Do you know any instance in which life would have been saved by a breakwater in Douglas Bay ?—I cannot tell the time, but several lives have been lost.

5833. In your recollection ?—Yes.

5834. Can you state where ?—On Douglas beach.

5835. It is distinctly your opinion that a larger harbour would be better for shipping ?—Yes.

5836. And you believe it would be resorted to by many shipping ?—Yes.

5837. (*Mr. Coode.*) You think that a large space is required in Douglas Bay, to afford proper shelter ?—Yes.

5838. Supposing there were a larger space at Ramsay, should you have any objections to offer to the construction of a harbour there ?—I cannot say.

5839. Can you tell us to what port the largest number of fishing boats belongs ?—I think to Peel.

5840. Can you tell us how many ?—I cannot say how many to Peel, but 300 to the Isle of Man.

5841. You say none belong to Douglas ?—I think not any.

5842. Can you tell us how it is there are so many sailing from Peel and none from Douglas ?—I am not prepared to speak as to the cause of that.

5843. Do you not know that the fishing commences there ?—Yes.

5844. (*Mr. Lindsay.*) Have you any further information which you desire to give to the Commissioners with regard to this harbour of refuge ?—No, nothing more.

5845. (*Capt. Washington.*) Do the fishing boats occasionally fish from Douglas ?—Yes.

5846. To what number ?—There are 200 here now.

5847. Where do they come to ?—To the upper part of the harbour.

5848. Have you room for them ?—We have not sufficient room. The harbour is quite blocked up at times.

5849. If the mud were removed would there be more space ?—More water, but not more space.

5850. Are the fishing boats prevented going out sometimes ?—Sometimes the weather is bad when the tide is in the harbour, and when it moderates they cannot get out, and they lose their fishing. If there were a breakwater they could be always out.

5851. Do they lose much money by being kept out of a night's fishing ?—Oh yes.

5852. What is the value of a night's fishing to those 200 boats ?—I cannot tell.

(*Mr. Lindsay.*) We will not trouble you any more.

Mr. Henry Gill examined.

Mr. H. Gill.

5853. (*Mr. Lindsay.*) What is your occupation ?—I have been to sea for 30 years ; I am a shipmaster, at present retired.

5854. Do you reside at Douglas ?—I have resided here for 45 years.

5855. How long since did you retire from the sea ?—18 years.

5856. In what trade were you employed ?—In the foreign trade out of Liverpool.

5857. How long were you in command of a ship ?—22 years.

5858. To what ports chiefly did you trade ?—To Newfoundland, North America, West Indies, the Brazils, and the East Indies.

5859. What is your opinion with regard to the necessity of a harbour of refuge for the Isle of Man ?—I think it would be of essential service, not for our own local purposes alone, but for the general trade of the surrounding ports.

5860. State you reasons why you think it would be of general service ?—Vessels leaving Liverpool with the wind south-east, which chops round to the south-west, and comes on to blow, have to put back to Liverpool, and run the risk of going on the Liverpool banks, whereby many lives are lost. But if there were a harbour of refuge on the Isle of Man, they would put in and wait for better weather.

5861. Does the wind very often chop round as you describe ?—Yes, very often.

5862. Looking to the general trade ; looking to the question of a harbour refuge in its proper sense, that is to say, to be a benefit to all ships, what site do you, in your opinion, consider the best for a harbour of refuge ?—I should say from Douglas Head, according to Captain Denham's plans. Nothing can be better than that in my opinion.

5863. Would you think it necessary, as a harbour of refuge, that the pier should be extended?—Not for general purposes ; it might be necessary for a fleet of men-of-war, but for trading purposes I think Captain Denham's would be sufficient.

5864. You think that nothing less than that would be sufficient ?—No.

5865. Have you any idea of the cost ?—No ; that is a thing which I have never estimated.

5866. Say that a harbour of refuge could be made in another part of the island, that would afford an equal area of shelter at one half the cost ; presuming that such a harbour could be formed at Port Erin or Ramsay Bay, affording equal shelter to that proposed by Captain Denham, and capable of being constructed at half the cost, would you say, as a gentleman of considerable experience, that the site ought to be at Douglas ?—I should say that it ought to be at Douglas, because we have stone on the spot.

5867. Suppose it was half the cost, and afforded equal shelter ?—I would prefer Douglas.

5868. Do I understand you to say, you prefer Douglas because a harbour of refuge at Douglas would be likely to tend to save more lives and property than a harbour at any other part of the island ?—I think it would.

5869. Is that your reason ?—It is.

5870. You alluded to vessels from Liverpool, what passage do vessels leaving Liverpool take ; to the east or the westward of the Isle of Man ?—They pass round the Calf.

5871. Then if a harbour of refuge were constructed at Douglas, that would not be in the track of ships leaving Liverpool and taking the north channel ?—No ; but if they were caught in a gale of wind Douglas would be on their lee.

5872. That is, if the wind shifted suddenly and they could not get round the Calf, they would then have Douglas to run for ?—Yes.

5873. Do you know anything of Port Erin?—I have seen it. I have been there.

5874. Bearing always in view that I am now asking questions as to a harbour of refuge in a national point of view, do you think that site not so good a site as Douglas?—Not at all.

5875. State your reason?—My reason is, because ships coming from Liverpool do not come that side at all.

5876. Going where to?—Bound down St. George's Channel.

5877. Is there any other reason?—No other reason. Where one ship passes there, there are 20 pass this side. Of course a harbour of refuge would be of great service to trade on that side of the island.

5878. I am speaking on the presumption that there would be only one harbour of refuge; what do you say to Ramsay?—Ramsay is very good as a roadstead.

5879. Better than Douglas?—It is more convenient and easier of access.

5880. As you know about this bay, and are a nautical man, do you see this plan?—Yes, I see it.

5881. Do you think a pier such as that, if extended out to 800 feet would be of much service to ships passing?—There would not be sufficient space for large ships.

5882. Not sufficient space?—Not half space enough.

5883. Speaking as if you were in command of a ship of 500 tons?—I would not take it.

5884. Do I understand you to say that if a pier were run out from the Battery Point to the extent of 850 feet, and you were caught in a south-east gale, in command of a ship of 500 tons, you would not take such a harbour?—If there were no other resource I would.

5885. Would you think there was great danger?—Yes, with a ship of 500 tons.

5886. Then if you could keep to sea you would prefer to keep to sea?—Yes, I would.

5887. How, in case there were a breakwater from Douglas Head?—There would be sufficient space then to bring up in.

5888. Then your objection to a pier from Battery Point is twofold; first, that there is not sufficient space, and second, that it runs in the line of the best anchorage in the bay?—Yes.

5889. If a pier were carried out from Douglas Head and properly constructed, you would have no hesitation then in running with a 500 ton ship for the roadstead of Douglas?—None whatever.

5890. In the heaviest gale?—Yes, in the heaviest gale.

5891. And you would not think there was any unusual risk in doing so?—No more than running for any other port of refuge.

5892. Would a pier from Battery Point be sufficient for the local trade and vessels frequenting the bay?—It might for some time, but during the fishing season there would not be sufficient space there.

5893. But if it were carried 850 feet out, would there not be sufficient space for the local trade?—I think not; when all the fishing fleet were there the passage would be blocked up, steamers would be obstructed, and there would be no room for windbound ships.

5894. Then you could not call it a harbour of refuge?—No. It would shelter the present harbour, but as a general harbour of refuge it would not be the thing at all.

5895. (*Capt. Washington.*) I think I understood you to say that a pier as proposed in Mr. J. Walker's plan marked A to run off the Two-Gun Battery would run right through the best anchorage in Douglas Bay?—Yes.

5896. Therefore you are of opinion that any breakwater to be constructed should be carried much further out?—It would be much better, and of more general service.

5897. Would you recommend one or two entrances into such a harbour?—I think one would be sufficient.

5898. Where would you place that entrance?—According to Captain Denham's plan, to the north-east.

5899. Does the north-east send in a very heavy swell?—No; south-east.

5900. Is it the south-east or the south-west which sends the heaviest swell into Douglas Bay?—It is sheltered from the south-west. It is the south-east.

5901. Yes, but the heaviest swell?—The south-east.

5902. We are speaking of Douglas Bay, not of the tidal harbour in Douglas Bay. Which wind causes the greatest swell?—Within the head a south-east wind, but without the head a south-west wind.

5903. You have said, I believe, that the greater part of the coasting traffic passes on the east side of the island?—Yes.

5904. Have you seen what is called the wreck chart of the Isle of Man?—I think I have.

5905. Will you take that chart into your hand? (*Chart handed to witness.*) You will observe that it is a chart purporting to show all the wrecks which have occurred during 25 years?—Are the wrecks marked here?

5906. In black dots. Each black dot denotes a wreck.—I do not know that I have seen it before.

5907. Do you understand now you see it?—Yes.

5908. Do you notice that on the west side 17 black dots only appear in 25 years, and on the east side 123 black dots appear?—Yes.

5909. To what do you attribute that very much greater number of wrecks on the east side to what there are on the west side?—It is because almost all the vessels from Liverpool pass on the east side, and they are sheltered if ever they go near the west side.

5910. Where are the vessels bound to which go on the east side?—The coasters generally pass round the Point of Ayr; for Belfast and Derry they generally go round the Calf, though sometimes they take the north route.

5911. Of what is the traffic made up?—Vessels from Liverpool principally, and in the coal trade.

5912. Did you ever hear a desire expressed in Liverpool for a harbour of refuge in the Isle of Man?—Yes.

5913. I think you have said you would prefer Captain Denham's plan?—Yes.

5914. Who sent him to make a plan?—I was not here at the time.

5915. Did the trustees of the port of Liverpool?—I believe it was the dock trust and the merchants.

5916. And they paid all the expenses?—I do not know. He was their surveyor.

5917. And people who employ men generally pay them their expenses?—I should think so.

5918. Is not that an indication of the feeling of the merchants of Liverpool, that they send their own surveyor over here to plan a port of refuge?—I should think so.

5919. Have you ever known any great detention occur at Douglas—that steamers could not get to sea or land their mails and passengers for want of shelter?—Last March our steamer could not get out for five days. She could not wind in the harbour for the heavy sea; whereas, if there were a breakwater outside, she could have gone to sea.

5920. So that the swell was not so great, but that a well-found steamer could have put out?—A steamer could have gone out.

5921. The detention was solely attributable to the defects of the existing harbour and want of shelter?—Yes.

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5922. In that wreck chart is there any statement of the loss of life in the 25 years?—Yes. "The "dots represent the number of wrecks which have "occurred between 1821 and 1846, as per printed "Return. 144 wrecks; 172 lives lost; value of "property estimated at 250,000*l*."

5923. (*Mr. Lindsay.*) From your long residence here do you remember many cases where boats coming here could not land their passengers?—Frequently.

5924. Do you remember any particular case with regard to the Whitehaven boat?—There was one case which occurred lately.

5925. Will you state to the Commissioners what the particulars of that case were?—I only know the boat came in at night. It was supposed she had anchored in the bay, and she drifted out to sea. The passengers thought she was still in the bay, and went off to her into a boat, and they got drifted out to sea also.

5926. Were the boats saved?—The steamer went out, and picked them up.

5927. Were they safely embarked with all their luggage?—I believe they threw over their luggage to save the boat from swamping.

5928. Then they were in great peril?—Yes, they were.

5929. Do you remember the loss of the *Bell*?—Yes; I saw that.

5930. State the particulars.—She was wrecked on the Calf of Man, along the rocks.

5931. What was the size of the vessel?—Of 200 tons.

5932. How long ago was it?—In 1848 or 1849.

5933. Did she become a total wreck?—No.

5934. Were the crew saved?—Yes.

5935. Was the cargo saved?—She was in ballast.

5936. Was she got off?—She was floated off with puncheons.

5937. How was the wind?—From south-west at the time, or about south.

5938. Would a harbour of refuge have saved that vessel, and prevented her going on the rocks?—No doubt about it.

5939. Have you any information you would like to give which has not been elicited by the questions?—I have no information to give, only that I am confident a harbour of refuge in Douglas would be the saving of many lives and much property. A vessel leaving Liverpool, if she has not fetched Holyhead or got round the Calf of Man when a gale springs up, where is she to go to? Vessels so situated must turn back again, and they are frequently lost on Liverpool banks; whereas, if there were a harbour at Douglas, they could take it.

We will not trouble you any further. We are much obliged to you for your evidence.

Mr. Edward Moore examined.

Mr. E. Moore.

5940. (*Mr. Lindsay.*) What is your occupation?—Secretary and agent to the Isle of Man Steam Packet Company.

5941. How long have you been secretary?—Above twenty-eight years.

5942. How many boats do the company own?—Four, at present.

5943. Where do the boats trade to?—Almost entirely between Liverpool and Douglas.

5944. How often do your boats sail?—In summer time, generally eight to nine times a week; and in winter, three to five times a week.

5945. How many passengers land and embark in the course of a year? Have you any return?—I have. I took a copy from the book this morning. It is for last year, 1857. Over-sea passengers, by the company's boats, 89,643.

5946. Was that number conveyed by your own company?—By our own boats. This is taken from our books. During the four months of the year, June, July, August, and September, the proportion of the 89,643 was 75,766.

5947. Passengers landed?—Landed and embarked.

5948. Do you know the number of passengers who land and embark at Douglas in the course of a year?—I have no idea. Probably, by other means of conveyance to the island, 10,000 more than we bring; say 55,000 or 60,000.

5949. Do 55,000 or 60,000 persons land annually at Douglas?—No, but principally at Douglas. There is the Whitehaven packet, to Ramsay and Castletown.

5950. How many other boats trade to Douglas?—None. From Whitehaven there is a boat which trades from Whitehaven to Dublin, and calls at Douglas for passengers. There are no other steamers belonging to the port.

5951. Have you often known those boats unable to proceed to sea on account of the risk?—On many occasions. It is impossible to round a boat in Douglas Harbour in a south-east gale, even a moderate gale, and I have seen boats injured in attempting it. The boats now are so much larger than were formerly used that the risk is much increased.

5952. Are the passengers unable to land?—That frequently takes place. In all cases at half ebb and half flood with an on-shore wind.

5953. Have you known many passengers prevented embarking on account of the risk and danger of being obliged to embark in small boats in the bay?—That must often occur.

5954. Have you known inconvenience arise to passsengers from having to embark in small boats in the bay?—Very frequently. I have known boats leave the bay without mails or passengers, being obliged to escape for safety.

5955. And losses have been sustained by parties not being able to get to Liverpool by such and such times?—Yes, to a considerable extent.

5956. If there were a pier in the bay, so that passengers could embark at all times, do you think that the intercourse between this island and England would be greatly increased?—Yes; but more is required. We want to land passengers at low water without small boats.

5957. But if a pier were so constructed that passengers could land and embark without the necessity of going into small boats, do you think the traffic would materially increase in passengers?—I have no doubt of it.

5958. Would such a pier as that which is proposed in plan A meet the object in view?—Do you propose landing on the pier?

5959. Yes.—It would be a serious inconvenience to have to go round such a distance into the town.

5960. But if a road were made?—It would still be inconvenient.

5961. But if there were no inconvenience. Do you think the inconvenience of driving that distance anything like the inconvenience of being obliged to land and embark in small boats?—I think a majority of the passengers would prefer the small boats.

5962. Even if there were a good road?—Yes. It would be a very serious inconvenience to have to come that distance.

5963. Even if there were cabs?—But all passengers cannot afford cabs.

5964. It is very right to speak of the poor people, because those are the people to be considered in the first place; but what greater distance would they have to walk from the proposed than they now have to walk from the existing pier?—I do not think one in twenty would prefer going round the road to going in small boats; because fear is the only thing which prevents persons going in small boats, and in fine weather there is no fear.

5965. You think the risk of embarking in small boats has not so much effect as the fear?—I think so.

because in twenty-eight years I have embarked an immense number of persons in boats without accident. I have often known a boatfull get a good ducking at the pier head with an on-shore wind, but nothing serious.

5966. Then, as far as regards the safety of passengers, you do not think a pier necessary?—I think that to cause smooth water to be at the pier head for embarking and landing passengers more essential; because many time we cannot land and embark our passengers with an on-shore wind. We cannot do so at spring tides. There was a little jetty placed at the Pollock rocks by the Harbour Commissioners to obviate the inconvenience. At low-water spring tides passengers still land and embark at this jetty, which is a very inconvenient road into the town, clambering over the rocks.

5967. From the tenor of your evidence am I to understand that such a pier as is proposed from the Two-Gun Battery is not of any moment?—I think it would be of essential benefit to the company.

5968. In what way?—In the protection of their boats during on-shore winds, when they are frequently obliged to go to sea for safety.

5969. Speaking as regards passengers and the public, do you think such a pier as that would afford very great accommodation?—Yes, so far as the accommodation of passengers, decidedly.

5970. You think it would afford great accommodation?—Yes, decidedly.

5971. Have you any plan to suggest which would afford greater accommodation at all states of the tide?—According to my views there was a plan of a pile pier running out from the pier head to eleven feet of water at low tide, which would be better. The plan was furnished by our engineer, and he surveyed and found the ground adapted for deep driving of piles.

5972. To carry it on from the stone pier?—He proposed stone as far as low water, and then a wooden jetty.

5973. We have been told that not only does the spray go over the pier, but over the top of the lighthouse. Do you think it possible to erect any wooden construction which could stand the shock of the sea?—From what I hear of the Mayport pier, there is a much heavier sea on that pier. Though a rough sea, ours is not a very swelling sea, which perhaps would be the case in a more open situation.

5974. In the event of such a pier being made, could you always land and embark passengers?—I do not think it would be above ten or twelve times a year that we could not. South-easterly gales are few and far between.

5975. Could you in all other gales, except a south-easterly gale, land and embark passengers?—Yes, in all other gales, and even in an easterly gale, because the pile pier would protect the vessel inside.

5976. Then passengers would be able to land at all times of tide, and you could land and embark your passengers in all winds except a south-easterly gale?—Decidedly.

5977. Then am I to understand that, considering the safety of boats and passengers, you think such a pier as that would suit you better than a pier from the Two-Gun Battery?—I believe it would be more beneficial to the interests of the town of Douglas and the Isle of Man to have that pile pier without a breakwater than to have a breakwater without a pile pier.

5978. Just so. That is the substance of your evidence?—I have heard the late Captain Gill, a captain who was in our employ for about 20 years, always set his face against this plan of a pier from the Two-Gun Battery. He said it would completely destroy the bay, because it would be running into the best anchorage of the bay.

5979. (*Capt. Washington.*) What number of steamers arrive at and sail from Douglas every week?—We sail six a week, and generally three extra boats. In summer we average eight a week.

5980. Eight sailing and eight arrivals?—Yes.

5981. Is there any other company?—The Whitehaven Company. Their boat comes once a week, and goes on to Dublin.

5982. How often do they touch at Douglas?—Once a week. Then we often have pleasure trips round the island.

5983. As often as once a week?—Yes, as often as six times a week, according to the state of the weather.

5984. Might we take the steam traffic to be ten arrivals and ten sailings a week?—Yes, in summer time.

5985. And in winter?—Four perhaps a week, I should think.

5986. Including the mails?—Yes, including the mails. I put down the mails at three a week, and the Whitehaven boats at two a week.

5987. And those are the steamers which convey the 89,000 passengers?—They are the same boats as have conveyed the mails for nearly 28 years.

5988. Have there been many detentions in embarking mails and passengers, or landing them?—Yes, they have occurred very frequently, and more so in winter than in summer. I know on one occasion we dare not run for Douglas Bay, we went the other side and landed the mails at Port Erin. The return mails were sent across to Port Erin, and the vessel never came to Douglas at all that trip.

5989. And the only remedy for that is a breakwater in the bay?—I think so. One of sufficient extent that those who come after us may be satisfied with it.

5990. (*Mr. Lindsay.*) Following up some of the questions, and speaking to you as the representative of the Isle of Man Steamboat Company trading here, you stated that for the purposes of your company you would rather have a continuation of the present pier to a pier from the Two-Gun Battery. I want to know whether, with the same objects in view, you would prefer it to such a breakwater?—As to the pier running from the inner or outer side, the effect is the same, as far as the company is concerned, except that the enclosed space is much smaller with the pier running from the inner than if it runs from the outer side.

5991. All points considered, you state it as your opinion that a continuation of the present pier is the best?—And protection of it besides.

5992. You would require a breakwater also?—That would make it complete.

5993. But if it were a question of a breakwater, as shown in plan A, or the continuation of the present pier, which do you think would suit your purposes best—which would you choose between?—I myself would choose the pier rather than a breakwater without it. You might have a road round, but still it would be very inconvenient to have it.

5994. Could you land at all times on the pier from the Two-Gun Battery?—Oh yes.

5995. (*Capt. Washington.*) How far out would the pile pier be carried?—To 11 feet of water at low-water spring tides.

5996. To enable you to land passengers at all times?—Yes.

5997. Do you know the length that would require?—There have been plans.

5998. Such a plan is not recommended by the Tynwald Court?—I believe the Admiralty objected, but not the Tynwald Court. The Government greatly advocates it.

5999. What would be its length?—Its length would be 600 feet.

6000. Do you know the estimate of the cost?—6,000*l.*

6001. And you think it worth that sum?—I think so to the company, if they could afford to do it.

6002. You consider a landing pier of that kind for passengers to Douglas absolutely necessary?—I do think it decidedly necessary.

6003. (*Mr. Coode.*) Supposing a breakwater were made according to the plan A, with facilities for landing,

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and a road to the town, should you think a pile jetty still necessary ?—With bad weather the road would be preferable ; but if you take the ordinary weather during the summer, the greatest majority of passengers would prefer the jetty.

6004. During bad weather they would prefer the road?—Yes, as it would obviate the necessity of small boats. There is a great objection to small boats.

6005. The pier would obviate the necessity of using small boats ?—Decidedly.

6006. Then a road and breakwater would meet that objection?—Yes ; except the inconvenience of landing so far from the town.

(*Mr. Lindsay.*) We will not trouble you, Mr. Gill, any further.

Mr. Thomas Garrett examined.

Mr. T. Garrett.

6007. (*Mr. Lindsay.*) What is your occupation ?—Gentleman.

6008. You are not engaged in business ?—No.

6009. Are you a resident at Douglas ?—Yes.

6010. Have you been long a resident here ?—All my life.

6011. Are you a holder of property or land ?—I am owner of house property in the town.

6012. Is this question of a harbour of refuge one to which you have given attention?—I have given it some little attention.

6013. The Commissioners will be very glad to hear any points of information which you can give them. As their time is limited, you will confine yourself as much as possible to that information which they do not already possess. As you are aware, they have a large amount of information bearing on the subject, but still, we shall be happy to hear any suggestions which can be offered. —Upon hearing that the Commissioners were coming to the island a public meeting was convened by the high bailiff, and a committee appointed, of which I was a member, to communicate to the Commissioners. They have drawn up a letter to the Commissioners, which I shall be glad to read.

6014. As you have been kind enough to give each Commissioner a copy of that letter, and I presume it is your desire to lodge it, perhaps you had better call attention to the leading points in it?—I think the people of the town will be more satisfied if it is read throughout.

6015. We are anxious to meet the wishes of the town. If that is their wish we will hear it ?—This is the letter :—

" Gentlemen,—At a public meeting of the inhabitants of the town of Douglas, held on the 7th instant, convened by public advertisement, and presided over by the high bailiff, we were appointed a committee to confer and communicate with you on the advantages of an asylum harbour being established in Douglas Bay.

" The serious inconvenience and loss to the shipping and mercantile community of this kingdom occasioned by the want of a harbour of refuge in the centre of the Irish Sea, of such a depth of water that the largest vessel could take refuge therein from storms with all winds, and at all times of the tide, is universally felt and acknowledged.

" In the opposite ports of Lancashire, Cumberland, and the south ports of Scotland, although one-third of the commercial shipping is registered, and that about 20,000 vessels, with an aggregate of 3,000,000 registered tonnage pass the coast of this island annually, there is not a harbour north of Holyhead to the Firth of Clyde which can afford shelter to a vessel in distress at low water, or at half-tide, except Liverpool, and that port can only be taken by certain winds.

" The port of Douglas, although a dry harbour, has, since the abolition of the dues on vessels entering the harbours of this island, become a resort for a large and increasing amount of shipping seeking shelter in tempestuous weather ; and we feel considerable confidence in stating that, with a comparatively small outlay, its bay is capable of such improvements as would render it the most complete and secure national harbour of refuge, and wherein are eligible situations for the erection of dockyards and graving docks, which no doubt would be wanted for the repairs of shipping having sustained damage off the coasts ; and there are springs of excellent water, capable of supplying the largest fleet, close to the shore.

" The amount of shipping entering the harbours of the Isle of Man since the abolition of the dues on vessels has increased from 90,000 in 1844, to 218,000 in 1854 ; in addition to which an increasing number of vessels seek shelter in its bays and along the coast.

" The whole of Douglas Head being an entire mass of rock, rising to a considerable height, it would only be needful in the construction of a breakwater, as the stones were quarried, to roll them into the sea ; and larger stones, of any weight, for facing the breakwater, are to be procured close to the sea, a few miles distant.

" The Isle of Man fisheries appear as yet to have been very inadequately estimated as a nursery for British seamen. Making harbours along its coast, accessible at all times of the tide, would assist in obviating the inconvenience to which the British Government is frequently exposed in the procuring of seamen for the navy. At present many thousands of pounds are annually lost to the nation by there being no harbour along the coast of this island accessible at low water, whereto the fishing fleet may resort in case of being overtaken by tempestuous weather. The coasts of this island are frequented by fishing boats from Cornwall, Torbay, and several ports in Ireland and Scotland, which, with the Manx boats, make a total of upwards of 1,000 in number engaged in the fishery. The value of the 600 Manx boats and nets amount to upwards of 80,000*l*., which produce about a 100,000*l*. per year, and are manned by about 4,000 men and boys ; so that there are on this coast more than 6,000 men and boys engaged in fishing, besides a large number in the carriage of salt from England, and fish to the opposite ports, whence it is transferred to the large towns of Manchester, Birmingham, Sheffield, &c., &c.

" Placed as the Isle of Man is in the centre of the three kingdoms, the importance of its relative situation in a naval point of view appears to have been lost sight of. It is worthy the grave consideration of the government to anticipate the possibility of this island, in the event of war, being made use of by the enemy. The establishment of a harbour of refuge in Douglas Bay, wherein a fleet of Her Majesty's navy might lie with safety, ready at any time of the tide to repel an attack of an enemy on this or the opposite coasts, would prevent such occurrences as took place in former wars, when the enterprising French commander 'Thurot,' and the daring adventurer 'Paul Jones,' caused much alarm in these seas ; and during the revolutionary war in which we lost the United States of America, their cruisers captured several valuable vessels not many miles distant from this coast. Capt. Washington, R.N., in his letter to the Secretary of the Treasury, dated Woolwich, 4th December, 1850, recommends 'a breakwater in Douglas Bay, to ensure a place of landing and embarkation at all times of the tide for Her Majesty's mails, for troops, and for coaling a war steamer, in case of need, a point of some consideration to a channel where, on both sides, all are tidal harbours.'

" By the establishment of a harbour of a refuge on the coast of this island, it would become not only, as the Tidal Harbour Commissioners term it, the 'beacon of the Irish Sea,' but it might also become the citadel of the Irish Sea.

" On referring to the report on a proposed asylum harbour in Douglas Bay, of Captain H. M. Denham, R.N., addressed to the Secretary of the Liverpool Dock Trustees, dated Liverpool, 31st October, 1850, we find that he states—

"'I satisfied myself that Douglas Bay, in point of locality, capacity of water, surface, area, natural features, and freedom from contiguous danger, is a fit position for forming a safety harbour, as a central refuge for vessels navigating the Irish Sea. A less enclosure than I suggest, would not, in my opinion, give Liverpool that proportion of refuge space for her shipping interest, which the port ought to have in prospect.'

"Sir John Rennie, F.R.S., in his report on an asylum harbour in Douglas Bay, addressed to his Excellency the Lieut.-Governor of this island, dated London, 2nd April, 1835, states :—'That there is no low-water harbour of any magnitude between Holyhead and the Firth of Clyde, except the packet harbour of Whitehaven and Port Patrick, a distance of upwards of 300 miles on the east side of the channel, from whence it arises that vessels outward bound from Liverpool when prevented from continuing their voyage by strong westerly winds, are driven back, and are compelled to beat about the channel during long nights and stormy weather, at the imminent risk of shipwreck. The large fleets of colliers from Whitehaven, Workington, and the coast adjacent, from 70 to 100 and upwards of which sometimes leave those ports at one tide, and by which Dublin and a large portion of Ireland are supplied with coal, experience similar difficulties in their voyages, and frequently suffer shipwreck for want of a proper port of refuge to run to in event of need. Upon a careful consideration of the chart of the Irish Channel, and more particularly with reference to the important port of Liverpool, it plainly appears that the Isle of Man occupies the most central position, and lies, as it were, in the main track of all vessels proceeding from and returning to Liverpool by the north entrance to the Irish Channel, as well as the immense intercourse by steam between Scotland, Ireland, and England, and of the extensive fleet of colliers and other vessels, from Whitehaven, Workington, Allonby, Maryport, and the towns on the Solway Firth, to Dublin, Drogheda, Newry, Belfast, and the adjacent coasts. The island moreover is easily accessible, particularly on the east side, in consequence of there being plenty of water close to the shore, with good holding ground for anchorage, and no sunken shoals and rocks; so that during the prevalence of westerly winds, vessels usually take shelter under the lee of the island until they are enabled to proceed on their voyage.

"Douglas being the centre and the most populous part of the island, and in other respects possessing the advantages above mentioned, appears on the whole extremely well adapted for an asylum harbour.

"'View the question in this light and that the whole shipping interest of the Irish channel is concerned, I scarcely think that accommodation for less than 150 or 200 vessels of all classes at low-water would suffice.'

"In the examination at the port of Fleetwood, on the 14th October 1845, before R. Godson, Esq., Q.C., M.P. and Captain Washington, R.N., the harbour master of that port, Capt. Head, who had been 34 years at sea, in almost every trade, stated :—'I should think that if a harbour of refuge is to be formed, that Douglas Bay in the Isle of Man would be the best. Great Ormshead would be objectionable, because vessels could not get out at all during north and north-west winds. Douglas Bay would be better than any part of the coast of Ireland. Had often talked the subject over with pilots in Liverpool, and they were of the same opinion.'

"Captain A. McNeilage examined. 'Thinks a harbour of refuge most wanted in Douglas Bay.'

"Sir Charles Lushington, Judge of the Admiralty Court, at a banquet at the Trinity House, presided over by His Royal Highness the Prince Consort on the 3rd July last, stated, 'It is not of British vessels we speak every day, but our ports, especially the port of Liverpool, are so thronged with vessels from every port in the world, and especially from the United States of America, that I speak the truth when I say, that within the last two months of my time one-half of it has been engaged upon foreign vessels. From the very mouth of the Mersey down to the coast of Ireland—there it is, I regret to say, that we have had some of the most unfortunate collisions and the greatest loss of life.'

"In the evidence taken before you at Glasgow within the last few days, Mr. Hugh Tennant, who had been for 20 years accustomed to yachting, stated:—'He thought there should be a harbour of refuge at the Isle of Man. He had been frequently at the Isle of Man, but could get no place there to put in with safety. In certain winds Douglas was very much exposed. For large ships the north-east coast of Ireland and the Isle of Man were the most desirable for harbours of refuge.'

"Captain Crawford stated, he had been captain about 30 years. He was 20 years in command of steamers between Glasgow and Liverpool. 'On the north and east coasts of Ireland he does not know any place requiring a harbour of refuge. He thinks, Douglas, Isle of Man, requires one, owing to its facility to vessels generally. He thinks harbours of refuge would be of considerable advantage. He was 23 years going three times a-week, or between 2,000 and 3,000 times, along the Liverpool and Glasgow course, and he thinks a harbour at the Isle would be a safe refuge for many vessels to Liverpool in adverse winds, but it would be most useful to outward-bound vessels.'

"We have carefully examined the various plans for proposed breakwaters in Douglas Bay, as ordered to be printed by the Honourable House of Commons, 5th August 1851, together with those subsequently proposed by Mr. Walker and Captain Vetch, R.E., and we consider Mr. Walker's plan not so well adapted for the requirements of the port. The space enclosed by Captain Vetch's plan would be so occupied by vessels seeking shelter, that it also would be inadequate for a general harbour of refuge. And the space being so occupied, we fear that the free egress and ingress of the several steamboats belonging to and frequenting the port would be prevented. A large portion of the best anchorage of the bay would be occupied by a breakwater so placed. Our opinion is confirmed by the foregoing representations of the several competent persons named, that nothing less than the proposed amount of water space by Captain Denham would meet the present requirements.

"We, therefore, are of opinion, that extending a breakwater from Douglas Head Lighthouse on a north-easterly direction would be the most suitable, and most economical in the erection.

"The inconvenience of the delay which has already taken place in erecting a breakwater in Douglas Bay, has often been apparent in the landing of the annually increasing thousands of the manufacturing and rural population of Great Britain, who resort to this port as their favourite watering place, many of whom are often in peril in passing to and from the steam-packets in this bay, in small boats, and it not unfrequently happens that on the arrival of the mail steam-packets they are obliged to stand out again to sea, with goods, passengers, and the mails, from inability to land them.

"During the spring of this present year the mail packet was prevented getting out of port, owing to the boisterous state of the sea at the pier for *five* days.

"So far back as March 1846, the Tidal Harbour Commissioners report 'That everything that care and skill can suggest as to lights, beacons, and improvements of the harbours of this island would be well bestowed, and tend to prevent the recurrence of the numerous wrecks that have taken place around its shores. (See also a letter from the Lords of the Admiralty to the Secretary of the Treasury, 23rd October 1850,) and that marked neglect prevails throughout, and the evils of irresponsible self-elect authority but too manifest.' Yet nothing has been

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Mr. T. Garrett.

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Mr. Lindsay.

done by the British Government to remedy the many grievances of which the shipping interest of this island have to complain.

"We have the honour to be, Gentlemen,
Your obedient Servants,
THOMAS GARRETT.
WM. HENRY CUBBIN.
HENRY GILL, Shipowner and late Shipmaster.
CHARLES CALEY, Merchant.
JOHN KERMODE, Commander of the Steamship *Tynwald.*
EDW. QUAYLE, Commander of the Steamship *Douglas.*

"To Her Majesty's Commissioners on Harbours of Refuge."

6016. You desire to lodge that letter in evidence?—Yes.

6017. Do we understand that this letter was adopted at a public meeting of the inhabitants of Douglas?—No; it is presented to you by the committee appointed at a public meeting of the inhabitants of Douglas.

6018. Well, that is the same thing. Do I understand that this letter contains the views of the majority of the people of Douglas?—I should think nine-tenths of them.

6019. Then the views of nine-tenths of the people of Douglas, as they appear to have adopted the plan of Sir J. Rennie, are, that they require space enough to accommodate not less than 200 vessels?—They are in favour of either Captain Denham's or Sir J. Rennie's plan.

6020. Sir J. Rennie states in his report, that if a harbour of refuge is constructed well, it ought to be one to accommodate 200 vessels at low water?—Yes.

6021. And that plan the people of Douglas think ought to be adopted?—We are not bound to any particular plan, so that the pier commences at the outer head.

6022. Have the people of Douglas considered the cost?—I do not think it is the business of the people of Douglas to consider the cost, when it is to be for a general harbour of refuge.

6023. But when the people of Douglas desire to draw from the Exchequer money for the construction of a harbour of refuge, they ought to have some idea of what they will require to construct what they want?—We are taking the matters in a different light. The people of Douglas consider they are entitled to some consideration as remitting so much annually to the British Government, that some amount should be laid out for the accommodation of the country, and that the island should not be neglected as it has been since 1803 or 1804.

6024. Tell me in what way Douglas has been neglected more than any other place in Her Majesty's dominions?—I do not think there is any proper representation. The island is in such a position that it is not represented in the local government. There is no communication with the British Government, and any business to be done goes solely through the government officials.

6025. Have you not a representative in your governor?—He is appointed by the British Government, and official representations go through him.

6026. They go through him exactly in the same way as if he were a Member of Parliament?—It may be so, but it is not so effective.

6027. Then that is the only grievance of the Isle of Man, that it has not a representative in Parliament?—That is one grievance.

6028. What grievances have you to complain of greater than many other ports might complain of? Have you been more hardly dealt with?—We complain first, that we are not represented at the Board of Commissioners.

6029. But that is not a question which affects the Imperial Government. I wish to know what grievances you have against the Imperial Government. Have they attended to your interests less than they have attended to those of other parts?—I do not know what they have done in other countries, but I know they have pocketed the money of this country and never returned us any.

6030. What money?—The surplus revenue of the country, after paying all the expenditure. That is a great grievance. They have not laid it out on our harbours, and when we want money we have to mortgage our harbour funds.

6031. Do I understand you to say that the balance of revenue over expenditure goes to the Treasury?—Yes.

6032. And is swallowed up in the one great fund?—Yes.

6033. And you do not receive any equivalent?—None.

6034. No equivalent for the money which the Imperial Treasury derives from you?—None that I know of.

6035. (*Capt. Washington.*) I think you said the Treasury returns none of the funds?—Not for harbour purposes.

6036. From where do the funds for the Harbour Trust arise?—Out of the revenue, 2,300*l.* was set apart, which has been mortgaged more than once; a certain portion is set apart for the redemption of that mortgage.

6037. Do you know how that sum of 2,300*l.* was decided upon?—In 1844, the British Government proposed to bring in a Bill to alter the custom laws of the island. At that time dues were charged on goods and vessels going into the ports of the island. On the return of the Receiver General's accounts that balance was appropriated to the maintenance of harbours—the balance of 2,300*l.*; but on further examination, it turned out to be 2,500*l.*, and that sum of 2,300*l.* was entered in the Act of 1844, and remains so at present.

6038. Just so. All harbour dues are given for the use of harbours. So, correctly speaking, that is not a portion of revenue. Can you tell us how the harbours of England are supported?—Under local management by local dues.

6039. Then the Isle of Man harbours are placed exactly in the same position as the harbours on the coast of England in that respect?—They were, but they are not now.

6040. Do you mean that the dues would have increased?—They would.

6041. It was the intention to make the harbour free for all vessels. Do you not think that measure very beneficial to the island?—Very great benefit.

6042. Are you not aware that heavy dues deter vessels from entering harbours?—Yes.

6043. I believe it has affected Bristol so much that from being a first class port, it has fallen to a sixth class port?—Yes.

6044. So the Isle of Man is saved from that?—Yes.

6045. (*Capt. Vetch.*) I should like to know what parts of the Isle of Man have the greatest reason to complain?—In a great measure, the whole island has to complain that the Commissioners of Harbours are not popularly elected. For instance, here is one complaint. It was a recommendation of the Tidal Commissioners, that a bell buoy should be erected on Langness, it has not been done. If the persons elected Harbour Commissioners were interested in shipping it would be done. I find at Ramsey, a gentleman living in the country elected, instead of a merchant, or some one interested in a port.

(*Capt. Washington.*) I submit that this body, the Harbour Commissioners, do all they can, and I submit that we should not enter into trifling details as to the management of harbours.

(*Mr. Lindsay.*) We are sorry to curtail in any way the expression of views on the part of the people of Douglas, but as we are here for one object, I and my brother Commissioners think we should not go

beyond that object. The matter into which we are now entering is in their opinion, and I must say I agree with them, irrelevant, and we cannot receive any further evidence of that kind. There unfortunately seems to be a difference of opinion among the people as to local management.

6046. (*To witness.*) Can you speak on the part of the inhabitants with regard to the proposed harbour of refuge. It is on that point we want evidence?—I am quite aware of that, but I was asked questions about our grievances.

6047. We cannot, as Commissioners, enter on the question of local grievances. We are come upon national objects. As far as the national object of a harbour of refuge, can you, on the part of the inhabitants of Douglas, give any opinion as to the pier proposed to be run out from the Two-Gun Battery?—I have no opinion individually further than that I have heard from captains of vessels they think it very injurious, as it would fill up the best anchorage of the bay.

6048. Do I understand that it is your own opinion, and the opinion you have learnt from various masters of ships, that this pier, if carried out, would do more injury than good?—Certainly. It is the opinion I have heard expressed by several captains of vessels.

6049. Is it their opinion that if anything is to be done for Douglas Bay in the shape of a harbour of refuge that it must be upon a plan somewhat enlarged, or on that proposed by Captain Denham?—Yes. They all think it should commence at Douglas Head Lighthouse in a north-east direction.

6050. As far as regards the local trade, would such a pier as this from the Two-Gun Battery be more convenient, all points considered, to the people of Douglas, and more to the public advantage than the extension of the present pier, upon which we have heard an opinion expressed by Mr. Moore?—All have expressed their opinion that it would be more convenient for the passenger and shipping trade of the island to have a breakwater, leaving out of the question at present the landing stage.

6051. I am speaking as between a pier from the 2-gun battery and the extension of the present pier, so far as the convenience of persons landing and embarking is concerned. Are you able to speak as to that?—I think they would prefer a breakwater.

6052. If it rested between a pier from the Two-Gun Battery to the extent of 800 feet, regard being had to the convenience of the people of Douglas and the public frequenting the island, which would they prefer?—I think they would prefer a landing pier from the pier head.

6053. (*Capt. Vetch.*) Are you aware of the fact that the Committee of the Court of Tynwald brought into notice the subject of this pier projecting from the Two-Gun Battery, that they put the case before two captains of steam packets trading to Liverpool, and that one preferred the line shown on the plan, and the other preferred a line inside of it?—I am not aware of that, but the view entertained altogether was to meet the funds which were available. That was the object in sanctioning those plans at all.

6054. (*Mr. Coode.*) You have stated, that an expression of opinion was obtained from some masters, at a meeting lately held. State what number were present?—I think half-a-dozen—more than half-a-dozen, besides sailors.

6055. How many altogether?—From 25 to 30.

6056. All seafaring men?—Yes.

6057. Were they unanimous in the expression of their opinion?—They were all unanimous.

6058. (*Capt. Washington.*) In this very able statement which you have read to the Commissioners, do we understand you to say that all the committee concurred in it?—Yes; all in the island.

6059. Was it read to the public or confined to the committee?—Confined to the committee.

6060. Have you any doubt that it does represent the opinion of the public?—Not the least.

6061. (*Mr. Lindsay.*) We will not trouble you any further. We are much obliged to you.

Mr. Robert Marshall examined.

6062. (*Mr Lindsay.*) You see this plan, marked A?—Yes.

6063. Are you the owner of property somewhere situated at Fort Anne?—Yes.

6064. What extent of property do you hold?—The whole of the right of this road.

6065. The whole of the right of road?—From the small beach.

6066. Is it called the small beach?—It is. The beach outside the gate, opposite Fort Anne.

6067. Should a pier be made from the Two-Gun Battery, would it be necessary to make a road from the point to the quay?—Yes.

6068. In order to connect it with the present road, would you, as an owner of property, have any objection to the road being made?—Not any.

6069. None whatever?—None whatever.

6070. What facilities would you give?—I would give the whole of my property on the same terms as the other owners: if they would give theirs, I would give mine.

6071. Say now that people were exorbitant in their demands, what would you do?—I cannot say what I should do.

6072. Then you mean to say—— ?—That if other people would give the ground, I would do the same.

6073. But would you not be disposed to set an example?—Yes, I would.

6074. You would give the ground free of any charge?—Yes, I would.

6075. Then the difficulties which have been stated in making the road, as far as the proprietors are concerned, are more imaginary than real, at least so far as you are concerned?—It is all imagination. The proprietor, before I got it, made application for a pier, and at the time he proposed to give the land.

6076. And as far as the other proprietors are concerned, you think that no obstacles would be thrown in the way?—Not any.

6077. Is there any part of the shore to the Two-Gun Battery belonging to the Government?—I am not aware of that.

6078. (*Capt. Washington.*) Do you know to whom the land belongs?—I do.

6079. You do?—Mr. Goldie.

6080. Is he resident here?—Yes.

6081. Does he own the whole of the point?—The whole of it.

6082. And Douglas Head also?—And Douglas Head also.

6083. Do you anticipate any difficulties in obtaining possession of the land for such a purpose, if it were wished?—I should hope not.

6084. (*Mr. Coode.*) Are you owner of the foreshore all through, from Fort Anne to the battery?—Yes.

6085. For the whole distance?—Yes.

6086. Does your property extend eastward of the battery?—No.

6087. What is its eastward boundary: is it the battery?—No, it does not go so far as the battery.

6088. How far does it stop short of it?—It stops short at the property of Mr. Edwards.

6089. What proportion of the foreshore between Fort Anne and the battery do you own: do you own half?—About 100 yards, and all extending this way to the pier on the south quay.

6090. Do I understand that you only own 100 yards eastward of Fort Anne?—I do; and then you go on the rocks.

6091. You own 100 yards eastward, and all the way to the westward until you join the road?—Yes.

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6092. Who is the owner of the property between your boundary to the east, and the battery ?—Mr. Edwards, Mr. Quirk, and Mr. Goldie.

6093. Three proprietors: can you speak as to their readiness to assist ?—I do not think to make the road.

6094. How much would they give ?—You would take the rocks.

6095. To whom do the rocks belong ?—That is a question for the Government to decide.

6096. Are you speaking of rocks above high water or below ?—Above high water.

Mr. QUIRK re-examined.

Mr. Quirk.

6097. (*Capt. Washington.*) Do you know whether the War Office has made over to the Harbour Commissioners a portion of the battery such as Mr. Walker recommended for the proposed work ?—That is so.

Mr. ARTHUR BISTABLE examined.

Mr. Arthur Bistable.

6098. (*Mr. Lindsay.*) What is your occupation ?—I am an Irish barrister.

6099. Then you are here on a visit ?—I am residing here for my health.

6100. Have you any information to give us as to a harbour of refuge ?—In the month of July last my wife was going to Dublin, and she was going by the Whitehaven boat ; I accompanied to see her on board. I think it is a question both of a harbour of refuge and of gross negligence on the part of the captain of the *Queen*. I have some knowledge of sailing, and I never saw a boat so entirely mismanaged.

6101. Confine yourself to the harbour, any information on that subject we shall be happy to receive ?—The *Queen* was advertised to sail at 11 o'clock at night. It was on a Wednesday evening in the month of July last, and she came in to her time. There were two boats to take out the passengers. They were very large boats, and there were only two men to each. On that evening the boat fired her gun. We went out. I believe the *Queen* was not at anchor, but was just outside the harbour. There was an off-shore wind. We came out from the harbour in the two boats. The *Queen* drifted outwards. We arrived within hail of the *Queen*, and she told us to stand off. There were about 29 people in the boat. The boat become perfectly unmanageable in which we were, and was drifting out to sea from half-past eleven until five in the morning. It was such a night as I shall never forget. We were drenched to the skin. The boat became so unmanageable that about 20 bales of luggage were thrown overboard, including valuable plate, and the loss of the passengers was very great. The captain of the *Queen* came in very quietly, and anchored in the harbour, and left the boats out at sea from half-past eleven until half-past two.

6102. The substance of your evidence is to this effect, that you consider your lives were placed in great jeopardy by being obliged to go out in boats to embark in stormy weather ?—And that in the middle of the summer—in July. Several people experienced great loss from the luggage being thrown overboard, and I am quite satisfied there should be some sort of pier or harbour of refuge, into which boats could come and have smooth water.

JOSEPH HOGG examined.

Joseph Hogg.

6103. (*Mr. Lindsay.*) What are you ?—Boatman and pilot.

6104. How long have you been a pilot ?—About seven years.

6105. Are you a pilot out of the harbour of Douglas ?—Yes.

6106. Does your knowledge of the harbours of the island extend beyond Douglas ; do you ever pilot ships to other places ?—We never go to other places, but I am acquainted with all the harbours of the island.

6107. You are a pilot for the port of Douglas ?—Yes.

6108. And what have you to state to the Commissioners, any information which they do not already possess ?—I should say that if a breakwater were run out east-north-east from Douglas Head it would be of great service.

6109. Of great service in saving life and property ?—Yes, I have known vessels have their bottoms knocked out during a south-east wind.

6110. During your seven years' experience as pilot have you known of any loss of life or property which might have been avoided by such a harbour as you suggest ?—Yes.

6111. State any instance ?—A flat went ashore.

6112. Were any lives lost ?—We rendered all the assistance we could, and we got the crew out by lines.

6113. Speaking to you as a practical man, would such a harbour as this—a pier carried out from the Two-Gun Battery be of any service ?—It would not be of as much service as if it were carried from the big head.

6114. Would it afford shelter during south east gales to all boats and vessels usually frequenting this place ?—I do not think it would.

6115. You do not think it would even afford shelter to the local trade ?—I think not, but if it were carried from the big head, further out, it would afford shelter to all, and give good anchorage inside it.

6116. It is your opinion as a pilot that if it were carried from Douglas Head it would afford shelter to all the local trade, and do I understand you to say to the passing trade ?—Yes, when ships could not get round the Calf or return to Liverpool, they might have shelter inside.

6117. Speaking to you as a pilot ; say a pier were carried out 800 feet from the Two-Gun Battery, would you hesitate to run for the anchorage behind it with a 500 ton ship in a strong south-east gale ?—Yes.

6118. Take your time and consider. Say a pier were carried out from the Two-Gun Battery 800 feet, and you were in the channel, between Conister and that point, would you, if in a ship of 500 tons, caught in a strong south-east gale outside, be afraid to take this harbour ?—No, I would not.

6119. Do you think you would be running any unusual risk ?—No, I think there would be good anchorage inside.

6120. You think it would afford good and safe anchorage ?—Yes, but not so good as the other.

6121. What was the largest ship you ever saw anchored in Douglas Bay ?—I think the *Hastings* was the largest.

6122. What was the *Hastings* ?—A 60-gun ship I think.

6123. Do you know her draught of water ?—I think 24 feet.

6124. What was the largest merchant ship you ever saw anchored in Douglas Bay ?—I have seen one inside the head drawing 22 feet of water.

6125. Where from ?—Greenock or Glasgow.

6126. What brought her there ?—Some spars were gone, and she was short of water.

6127. She came to seek shelter ?—Yes.

6128. Have you known other vessels seek the shelter of the bay ?—Yes, but not so large.

6129. What tonnage ?—About 400 tons.

6130. And about 17 feet draught of water ?—Yes.

6131. Is the holding ground good ?—Yes.

6132. Is it better on the port side or bow ?—There is good clay in the centre part of the bay.

6133. Does it extend over all the bay ?—No.

6134. What part of the bay ?—From Douglas Head abreast of Conister.

6135. From Douglas Head to abreast of Conister is clay and good holding ground ?—Yes.

6136. (*Mr. Coode.*) Is it a matter of common occurrence that vessels caught with south-west gales run back to Liverpool ?—Yes, very frequently.

6137. Have you ever counted the number of vessels at one time in Douglas Bay ?—I recollect 28. I think there were 300 sail off one Monday, 12 went ashore.

6138. You say there were 300 sail off the bay, one Monday ?—Yes, the principal part of them ran back.

6139. Do you know how far they got back ?—We saw them about 12 o'clock at night.

6140. But where ?—They had to heave-to about half channel and the following morning about three o'clock they bore away across to Liverpool again.

6141. But where were you ?—Somewhere abreast of Langness.

6142. All these vessels were bound to the southward ?—We cannot say that all were bound south, but the greater number were.

6143. If there had been a harbour of refuge here you would have had the greater number put in ?—I have no doubt the greater number would.

6144. Can you give us any idea of the number of lives lost ?—I cannot, I know a good many were lost.

6145. Can you tell us in what year that occurred ?—28 or 29 years ago, turn September.

6146. It was in the month of September ?—It was in the latter end of September I know. We were bound in the river three weeks before.

6147. And you feel little doubt they would have put into Douglas Bay, if there had been a good harbour here ?—I do.

6148. Do you know whether any vessels foundered ?—One Welsh schooner foundered astern of us.

6149. How many lives lost in her ?—I think three. A lad clung to a small boat, and was picked up.

6150. (*Capt. Washington.*) Do you know any occasions when the Whitehaven packet could not land passengers or take them up at Douglas ?—I do.

6151. More than a dozen times ?—Yes, more than a dozen times. No later than last night at half-past twelve she fired her gun, but could not come in, or send in.

6152. Where did she go to ?—I do not know, she went out to sea.

6153. Is that a matter of frequent occurrence ?—There is great risk of landing passengers in a south-east wind.

6154. Was the wind south-east last night ?—It was.

Mr. William Callister examined.

6155. (*Mr. Lindsay.*) You are, I understand, one of the Harbour Commissioners ?—I am.

6156. And you appear here on the part of the people of Ramsey ?—Not specially in that capacity, for each of the Commissioners is a Commissioner for the whole island, but we are distributed over the island, some residing in one part, and some in the other.

6157. Can you state what views the people of Ramsey have with regard to the necessity of a harbour of refuge ?—As a matter of course they entertain but one opinion, that if there is to be a harbour of refuge for national purposes, Ramsey Bay is infinitely the best for that.

6158. Can you give to the Commissioners the reasons why they consider Ramsey Bay the best ?—First, because the bay itself is the most extensive in the whole island. Secondly, because it is on the direct line of the traffic between the Clyde and the Mersey, which is considerable. Thirdly, because all the reasons which Captain Gill has given in favour of Douglas apply with equal force, as to a harbour of refuge for national purposes, to Ramsey. The same facilities exist for its construction there as at Douglas, viz., Manghold Head consisting entirely of rock.

6159. When you say facilities, do you mean an equal space of sheltered water at the same cost as at Douglas ?—I am not prepared to speak to that point.

6160. On the part of the people of Ramsey, have you any suggestion to offer as to the preferable site for this harbour of refuge ?—Running in from a point to the westward of Maughold Head, and extending across the bay.

6161. To what length ?—Half a mile at least. There is no danger in Ramsey Bay of trenching on the ground for anchorage. You can go any length in that direction, say a couple of miles.

6162. Say a pier were constructed running for half a mile as you suggest, what extent of sheltered anchorage would that give of three fathoms and upwards ?—I am not prepared to state that, but speaking off-book I should say 100 acres.

6163. Have the people of Ramsay ever had any estimate of the cost ?—Not that I am aware of.

6164. (*Mr Coode.*) I think you said no estimate was ever made. Has there ever been any plan or design ?—Not such a one as that of which I have been speaking. Mr. Gibson, a very large shipbuilder, designed something at the present harbour, but it was not accessible at all times of the tide.

6165. Exactly. But there has been no plan for a harbour of refuge ?—None that I ever heard of. I may be volunteering a statement, but if only a moderate amount is to be expended I must candidly say I think Douglas is the point where that moderate amount would be best expended, more than at any other place.

6166. (*Mr. Lindsay.*) Take the purely imaginary sum of 80,000*l.*, is it your opinion that 80,000*l.* could be better expended at Douglas for national purposes, bearing in mind the saving of life and property and the facilities of trade than at any other part of the island ?—I am not prepared to answer in the affirmative if it is to be so large a sum as 80,000*l.*

6167. Take 50,000*l.* ? — Then I should say for 40,000*l.* or 50,000*l.* greater advantage would accrue from its expenditure at Douglas.

6168. You think there would be more advantage from its being spent in Douglas than any other part ?—I should say so decidedly.

6169. (*Capt. Washington.*) You are a General Harbour Commissioner ?—I am.

6170. Are any complaints made of the accommodation at Port Erin ?—Do you mean any application for a harbour of refuge?

6171. Well ; looking at the number of vessels congregated there, is it not very desirable a harbour should be constructed ?—Yes, very desirable.

6172. Have the Commissioners any funds ?—None.

6173. Is there the same request at Peel ?—Yes.

6174. Is a breakwater proposed at Peel ?—Yes, and about to be carried out.

6175. To what extent ?—200 yards.

6176. Is it sufficient for the wants of the fishermen ?—I understand from the local commissioners that if carried out it will be sufficient.

6176*a*. The local commissioners have funds for that ?—Provided the works at Douglas do not absorb too much of our funds.

6177. As one of the General Harbour Commissioners, you would be willing to devote as large a sum as possible for a breakwater in Douglas Bay ?—Yes, taking into consideration the fair and reasonable wants of the other ports.

6178. (*Mr. Coode.*) I think I understood you to say, that if it were a question of a large harbour of refuge you would prefer Ramsey Bay ?—If the Government are prepared to spend a quarter of a million,

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Mr. W. Callister.

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there is no comparison in the advantages of Ramsey Bay and Douglas Bay as a site for a harbour of refuge.

6179. Then the matter turns on the extent necessary?—Rather on the extent of money than the extent of accommodation.

6180. If a large harbour is necessary you prefer Ramsey, if a small harbour you prefer Douglas?—Yes, decidedly.

Mr. Robert John Moore examined.

6181. (*Mr. Lindsay.*) What is your occupation?—High Bailiff of the town of Peel.

6182. Then do I understand you as coming here to represent the views of the people of Peel?—I do.

6183. We shall be much obliged for any suggestions which you can offer?—I do not come here to represent the people of Peel to suggest or propose that Peel should have a harbour of refuge in a comprehensive sense of the term. We are not in a position to suggest such a thing as that; but I do ask for a harbour of protection for the fishing fleet. As long ago as the year 1790 or 1792 a suggestion was made then, in the time of the late Duke of Argyll, to run out a pier or breakwater from the Horse Point in a somewhat easterly direction. Subsequently our surveyor, Mr. Timperley, proposed a breakwater in a very similar direction, I think, extending 500 feet east of the Castle Rock. In the year 1845 the people of Peel in a body sent up a memorial praying that a breakwater in a very similar direction should be erected; and in 1856, when Mr. Walker came down to examine the different harbours of the island, we represented then the advantages which would accrue from a breakwater in the same direction. Mr. Walker, however, I believe, looked at the matter in a pecuniary point of view, and considered that a large expenditure should be made at Douglas, and recommended the expenditure of 2,000*l.* in internal improvements at Peel. Those internal improvements would not give us any protection or any safety, or any harbour into which vessels could come at low water. Mr. Walker's plans for Peel I objected to, and upon the appointment of a committee of the Tynwald Court I represented those objections to them. I should say, before I come to that, that Mr. Walker's plans were objected to by the Admiralty, shortly after 1856, perhaps about 1857, and a more comprehensive plan was suggested by Captain Vetch, adopting, to a very great extent, the different lines of breakwater which had been suggested in 1792, in 1840, and in 1845. He suggested that the breakwater should run nearly due east to the extent of 600 feet. That plan was submitted to a committee of the Legislature; we gave evidence of the great requirements of Peel, and the advantages to be derived from that plan. The consequence was, that a committee was appointed by the Tynwald Court, and they recommended the adoption of the plan proposed by Captain Vetch. The means arising from the insular funds being limited, the committee recommended the expenditure of 6,000*l.* toward that work. Since Mr. Walker has prepared his estimates we find that 6,000*l.* will not complete, or anything like complete, that great work, which, by the bye, has been sanctioned and approved not only by the insular legislature, by the Tynwald Court, but has lately been, within the last two months, approved and sanctioned by the Admiralty. We find by the estimate that the expenditure will far exceed 6,000*l.*, and that it will only serve to carry out the breakwater to the extent of 300 feet, so that, although we are in a position to commence our work, and we hope it will be commenced next year, the work can only be carried out to the extent of half what is proposed, and what is absolutely necessary. Therefore I suggest and move, on the part of the inhabitants of Peel, that this Commission, if they have the power, should grant us an increased sum to complete that work which has been proposed and sanctioned by the Admiralty. I am not prepared at this minute to say the exact amount which will be necessary to complete that work, but I will take it in this way:—I am perfectly aware that the expense per foot is much greater after the first 300 feet, because the work is then in deep water; but if the first 300 feet cost 6,000*l.*, I say the remaining 300 feet would cost a half more, or 9,000*l.* or 10,000*l.*, and I do not think too extravagant a sum to ask at the hands of Government to complete what is in fact a harbour of refuge for the fishing fleet. I think 10,000*l.*, in addition to the sum already awarded, will give that accommodation which the extent of the fishing gives us a right to ask. The 6,000*l.* is taken out of insular funds. When the insular funds give 6,000*l.* I do not think it is too much to ask the Imperial Government to give a greater sum. The advantages of the breakwater are obvious; it will afford us shelter for our vessels; it will protect the harbour from every wind, because at present Peel harbour is exposed to winds from the north-west and north. If the breakwater is carried across as proposed, there will be ample shelter not only for the fishing fleet of the island, but for all the fishing boats which frequent it.

6184. How many boats belong to Peel?—I should say that the number of fishing boats which exclusively belong to Peel amount to 150.

6185. How many fish usually in the season from Peel?—600. There are boats from the east coast of Scotland, Ireland, and England.

6186. Has any large loss of life occurred among the fishermen?—Not in my recollection among the fishermen, but great damage to the fishing boats. When the boats are obliged to run into the harbour there is great damage arising from the confined space within; but the great loss we sustain is, that during the time of high water, if the weather is any way unfavourable, the boats remain inside the harbour, and when it clears cannot get to sea. They thus lose the night's fishing, whereas, if the boats could lie at anchor, they would be always able to get to sea.

6187. You desire a harbour of refuge at Peel for the fishing boats more on account of the great facilities to the fishermen than for the protection of life and property?—To property it would be a great protection. I am happy to say that few lives are lost among the fishermen.

6188. Such a harbour would enable them to get to sea at times when they cannot get now?—Yes.

6189. Consequently they would make more money. Now, as in a pecuniary point of view they would gain very considerably by the construction of such a harbour as that, do you think they would object to an annual payment?—I am not prepared to say; harbours being free is a great advantage.

6190. But the advantage of such a harbour being so great, do you not think that the owner of each boat would be willing to pay two guineas per annum?—I cannot say.

6191. (*Capt. Vetch.*) Within your knowledge, of the fisheries does it sometimes happen that, with every prospect of good fishing from the port of Peel, the weather becomes threatening, and the fishermen dare not venture out, by there not being a safe shelter to run to, whereby they lose a night's fishing?—Frequently.

6192. Tell us the amount that the fishing is calculated to yield on a good night?—I am not in a position to state, but there are witnesses prepared with statistics to lay before the Commissioners.

6193. (*Mr. Lindsay.*) Representing as you do the views of the people of Peel, have you heard them express any opinion as to the best site for a national harbour of refuge?—I believe the general opinion to be, that if there is to be a general harbour of refuge Douglas is the best place.

6194. (*Mr. Coode.*) You said that 150 boats belong exclusively to Peel?—Yes.

6195. Can you tell us the next greatest number which belongs to another port?—I should say Port St. Mary.

6196. Can you tell us how many?—I do not know.

Mr. Robert Curran examined.

6197. (*Mr. Lindsay.*) What is your occupation?—Manufacturer and also shipowner.

6198. Are you resident at Peel?—I am.

6199. Have you anything to state with reference to a national harbour of refuge?—No.

6200. Then what have you to state as to a harbour of refuge at Peel?—I can give a few particulars as to the fishing fleet. There belong approximately to Peel 130 boats, to other ports of the island 100; boats from the coast of Cornwall, St. Ives, and Penzance, 150; from Irish ports, 150; from Scotch ports 50; from Cumberland ports, 20; total, 600 sail. They are manned by about seven men each, 4,200 men, and I suppose there are 2,000 hands employed in bringing fish and carrying it from the fishing stations to the different markets. We have not sufficient space in the harbour to shelter 600 boats in Peel, but we frequently have 400 sail in the harbour, and in this way a very great loss is sustained by the fishermen in consequence of there being no harbour of protection to which they can go and sail out at all times of tide. I will give an instance which frequently occurs. Suppose it is a stormy morning, a north-west wind, and a heavy sea on. At twelve o'clock there is every appearance of very bad weather; the crews consult, and they think it safer to run into the harbour than to put to sea, that is, if it is a north-west wind, which is a very bad wind at Peel. To escape that the boats all run for the harbour, and by half-tide ebb most of the vessels are aground. Suppose, as is frequently the case in a summer breeze, the wind abates, two or three of the lower tiers of boats which are not yet aground get out, and come in next morning well fished, some with 10, 20, or even 50 maize of herrings. I have made a careful calculation, and, speaking approximately, the loss sustained must exceed 5,000*l.*, which is a serious loss to a class of men who cannot afford it. For the size of the boats our fleet generally cannot be exceeded; there may be larger boats, but there are none better equipped with nets and gear. I am an owner myself, and I think I am speaking for the people of Peel generally when I say that if a breakwater were built we would double the number of our boats to-morrow. I am satisfied it would remunerate me, and I think every one at Peel would say the same. I have consulted with a good many, and that is unanimously their opinion.

6201. You say that if a breakwater, such as is proposed by Captain Vetch, were constructed, the gains of the fishing boats would be increased 5,000*l.* a year?—At the least.

6202. Do you think the Peel fishermen would have any objection to subscribe annually?—For an annual subscription I do not know. Many would give subscriptions.

6203. As their gains would be increased 5,000*l.* a year, do you think it would be hard to call upon them to pay 500*l.* a year?—I suppose not, but I am not sure what they think upon the subject.

6204. If they would gain 5,000*l.* a year, and pay even 1,000*l.* a year, out of it, there would still be an actual gain of 4,000*l.* a year would there not?—I am certain that if a sum were necessary to complete the works, provided they were only commenced, 500*l.* or 1,000*l.* would be raised.

6205. (*Capt. Washington.*) Do you know whether any of the men are enrolled in the coast volunteers?—Several.

6206. A large number?—I think a very considerable number.

6207. (*Mr. Coode.*) For what period does fishing continue off Peel?—Fishing commences the 1st of June and ends the middle of October.

6208. Does the loss apply while fishing from Peel alone?—From Peel alone.

6209. Do you think there is a proportionate loss at the other ports of the island?—Proportionate there may be, but I cannot speak so well as to them.

6210. But you do not see why it should not be so?—No; but at Peel, being the largest loss, it is much more severely felt.

6211. For what period does the fishing continue off Port St. Mary?—The fishing from Peel and Port St. Mary continue the same time; but on the west side of the island, off Douglas, it does not continue more than three or four weeks.

Mr. John Gill examined.

6212. (*Mr. Lindsay.*) What is your occupation?—Master mariner I have been.

6213. Do you reside at Peel?—Yes.

6214. How long have you been master of a ship?—Twenty-two years.

6215. What size vessels do you command now?—I do not command any now, I am retired.

6216. Say there was to be only one national harbour in the Isle of Man, a harbour suitable to receive vessels of all sizes, at what point of the island would such a harbour tend most to save life and property?—I think Douglas a very good place; central like.

6217. Do you think it better than Port St. Mary, Port Erin, or Peel?—There is more water in Douglas than Peel.

6218. Then, as a master of considerable experience, you think Douglas would be the best site?—Yes.

6219. Can you speak of the necessity for a harbour for the fishing boats at Peel?—There is a great necessity for it.

6220. Do you mean for saving life or facilitating trade?—A good many lives have been lost latterly on the coast.

6221. Do you know of any lives being lost among the fishermen?—No; but a good deal of property is damaged.

6222. Then your observation goes to show that there would be more facilities to the fishermen to go to sea?—Yes; and safety for the boats.

6223. Have you had any conversation with the fishermen upon the subject?—Yes; with a good many.

6224. Did you hear that they were ready to subscribe some small sum?—I did not hear them say anything about that.

6225. (*Capt. Washington.*) You say there is great want of harbour accommodation at Peel?—The harbour is too small.

6226. No safety for the fishing boats?—No.

6227. Then why do they come to that spot?—It is the general fishing place.

6228. Is the fishing better?—From Peel to the Calf the fishing is very good.

6229. And Peel is most convenient?—Yes.

6230. (*Mr. Coode.*) Do you know what was the loss of life in trading vessels last year?—Thirty lives at least.

6231. Would that have been avoided by a harbour of refuge?—If there had been a harbour of refuge the vessels would have made for it.

6232. Can you give us a list of those vessels, and the circumstances attendant on their loss?—There was the *Fleece* for one.

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6233. How many lives lost in that case?—I do not know. There was the *Mary Horton*; thirty persons lost and four saved.

6234. Where were they lost?—Between Derby Point and Glen William.

6235. Between Derby Point to the south and what point?—Glen William to the north, near Kirkmichael.

6236. What distance might it be between those points?—About eleven miles, I should think.

6237. Then, within eleven miles thirty lives were lost last year?—Yes.

6238. Were they lost during one and the same gale?—No.

6239. Can you give the direction of the wind in the gales when the vessels were lost?—The *Fleece* in a gale from south-west; the *Mary Horton*, south-east; and the *Duke of Richmond*, west-north-west.

6240. You say one vessel was lost in a south-east wind; that is an off-shore wind?—Yes.

6241. How do you account for that vessel being lost?—We cannot say, unless she capsized.

6242. Then a harbour of refuge would not have saved her?—Her head was to the north; perhaps she was waiting for water. If there had been a harbour of refuge she might have made in at one stretch.

6243. Can you speak of any other case of loss of life?—At Peel, some years back, there was a good many.

6244. Can you furnish the particulars of any other cases?—No, I cannot.

Mr. Moore re-examined.

Mr. Moore.

6245. (*Mr. Lindsay.*) As none of the fishermen are present, can you ascertain their views with regard to a harbour at Peel, whether they are willing to pay two guineas annually, or thereabouts, if the Government are prepared to add to the 6,000*l.*, the sum necessary to complete such a harbour as that you have suggested? Will you ascertain the views of the fishermen and furnish a return to the Secretary of the Commission?—The only difficulty I see is how you will enforce payment from other vessels.

6246. You are not to direct their views as to how it is to be collected, but ascertain the feelings of your own fishermen whether they are willing to pay that sum?—I will, and furnish the information as soon as possible.

6247. (*Mr. Coode.*) Can you furnish the Commissioners with a statement of the wrecks which have occurred during the last four or five years in the vicinity of Peel, the direction of the wind, the number of lives lost, and any circumstances which will throw light on the cause of wrecks?—I will. At present I am not in a position to state.

6248. (*Capt. Washington.*) I should like you to extend that to the whole island, in continuation of the returns which were made twelve years ago?—I will do what I can.

Mr. William Milner examined.

Mr. W. Milner.

6249. (*Mr. Lindsay.*) You appear, to a certain extent, on the part of the inhabitants of Port Erin?—I have been in the habit of visiting Port Erin every summer for several years past, and I take great interest in the poor men who are suffering a great deal for want of accommodation. From the frequent conversations which I have had with them, I am almost deputed to speak on their behalf. Port Erin is situated between St. Mary and Peel; it is the best port for fishing. There is nothing there but a fine expansive bay, and the erection of a breakwater, such as has been suggested by Captain Vetch, at a cost of 15,000*l.*, would afford ample protection. It would afford protection to the whole fleet, and at the same time to the coasting vessels. Three witnesses have been deputed by the whole fleet to say that they are prepared to pay 2*l.* a boat every season for the accommodation which they would receive until such a sum is reimbursed as the Government will advance. These poor men would be very glad if a like boon were accorded of getting a pier, but that would be of rather less advantage than the breakwater, and they will gladly refund such portion of the expenditure as the Commissioners or the Government determine it would be fair to ask from them.

6250. As I understand you have, very much to your credit, taken great interest in the welfare of the fishermen, more especially in the immediate neighbourhood of Port Erin, do you think that the fishermen are able from their earnings to pay two guineas a year towards the construction and maintenance of such a harbour?—My present conviction is, that not only are they able, but very willing and sufficiently honest to carry out the proposal they have made. Some of the old men say they would guarantee a contribution of five per cent.

6251. You think the facilities for making money would be so greatly increased that there would be no difficulty in their contributing annually a fee of two guineas?—My impression is that their gains would be so large that they could pay 2*l.* or 5*l.*, as offered, or 5*l.* a boat until the work was paid for.

6252. How many boats are there belonging to Port Erin?—I believe there are very few belonging to Port Erin. It is a very poor fishing village.

6253. How many boats frequent the port?—I have seen from 400 to 500 assemble in the bay.

6254. You have seen 400 to 500 boats anchored in Port Erin?—But these boats belong mostly to Douglas, Port St. Mary, and Peel, and include the Cornish, Irish, and Scotch boats. I have three men here whom I have selected as very respectable men, whose word may be taken if you will please to examine them.

6255. (*Capt. Washington.*) Is this liberal offer only from the Manx boats or from the Scotch and Irish vessels also?—I believe it is understood that all boats using the port shall pay that contribution.

6256. Is it within your knowledge that boats do pay in Scotland for harbours?—I have heard that they offered to do so, but I did not know that they did.

6257. Do you not know that the fishing boats at Wick have to pay 2*l.* a year?—I have heard something to that effect.

6258. (*Mr. Lindsay.*) Have you ever considered the question of Port Erin as a site for a national harbour of refuge?—I have felt very deeply interested in Port Erin, and I have made a great many inquiries. I find that the American steamers pass down the North Channel, and a great many vessels to Belfast and the north of Ireland. I have been at Port Erin five weeks last year, and I was there three months this year, and during those periods I saw a great number of vessels pass frequently and constantly to and fro, so that vessels come and use that channel to a great extent, and from my knowledge of the coast to St. Mary and Peel, I say the coast is exceeding dangerous. There is no shelter if a vessel is driven in, excepting at Port Erin.

6259. Do you know any instance of any wreck?—I have heard of several instances, the *Wilhelmina* was wrecked and a number of lives lost. I do not know how many, 10 or 12 were washed on shore. Vessels have gone down; a vessel went down in 1850; it was a fishing boat; she was swamped trying to get into port St. Mary; 120 maize of herrings were lost and the poor men belonging to her lost every shilling in the world.

Edward Farquhar examined.

E. Farquhar.

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6260. (*Mr. Lindsay.*) Do you belong to Port Erin ?—Yes, I was born there.

6261. How long have you been a fisherman ?—40 years.

6262. Say that there was to be one harbour of refuge and only one in this island, at what part of the island, as far as the safety of the fishing boats is concerned, would you put it ?—I think Port Erin the nearest place to the best fishing ground during the season.

6263. Is that the reason why you should prefer the site of Port Erin to any other ?—Yes.

6264. Is there any other reason ?—We are more exposed than any other port, we have to go round the Calf, and it is a very dangerous run.

6265. Have you known any lives lost for want of a place to run to ?—I was one night put ashore with 4 other boats.

6266. How long was that ago ?—10 years ago.

6267. Were all 5 boats lost ?—They were broken to pieces.

6268. Any lives lost ?—One.

6269. It would not be so much a harbour then for saving life as saving property and giving greater facilities to the fishermen ?—We lose a great deal by being kept in port.

6270. You lose a good deal by not having a harbour ?—Yes.

6271. The herring fishery is now coming to a close, is it not ?—Yes.

6272. You have had 3 months since the beginning of June. How many times have you not been able to put to sea for want of such a harbour ?—For two or three weeks we were only two nights out.

6273. Owing to stormy weather you were afraid to go round the Calf ?—Yes.

6274. If you had had a harbour here, would you then be afraid of putting to sea in stormy weather ?—We should have shot every night ; we should have known where to run to for safety.

6275. As a fisherman of long standing would you pay 2*l.* towards such a harbour every year ?—I have heard that before.

6276. You think you would be a considerable gainer by it ?—I should be quite willing myself.

6277. How about others ?—That is not known to me.

6278. But do you say they are willing ?—They said so before.

6279. (*Mr. Coode.*) What do you consider a fair average of a night's fishing ?—We reckon it from 10*l.* to 60*l.* or 70*l.*

6280. I suppose a take of 60*l.* or 70*l.* does not occur very often ?—Not very often, some of the boats have that and some none ; you may take it at 9*l.* or 10*l.* in a general way.

6281. Do I understand you to say that during those 2 or 3 weeks you would have been out every night if there had been good shelter under your lee ?—Yes.

6282. And the best takes of fish you reckon during unsettled weather ?—It is often the case.

6283. Is it the rule that you get more fish during unsettled than during fine weather ?—Yes.

6284. Is there any peculiar facility for getting to the fishing ground from Port Erin, do you get out easier ?—Yes ; because at low water, at Port St. Mary, it runs to the eastward, and we cannot run against it, but at Port Erin it runs to the westward and we can get out.

6285. Where is the fish chiefly landed which is caught on the west side of the island ?—At Port St. Mary.

6286. Why is it taken there ?—Because there is more shelter there.

6287. Have you ever spoken to the fishermen from the Irish, Scotch, and Cornish coasts, as to whether they would pay towards a harbour ?—No.

6288. You have not spoken to them ?—No.

6289. Have you known instances of wrecks at Port Erin where any lives have been lost ?—Yes.

6290. Do you remember any instance to give to the Commissioners ?—I remember the *Wilhelmina*.

6291. How long ago was that ?—Some years. I do not know how many.

6292. Is the holding ground good off Port Erin ?—Yes, very good.

6293. What does it consist of ?—Of sand on the top and stiff clay under.

6294. What is the thickness of the sand ?—Only a few inches. I have seen many a cable break, but never an anchor give way.

6295. (*Mr. Lindsay.*) We will not trouble you any further; we are much obliged for the information you have given us.

John Waterson examined.

John Waterson.

6296. (*Mr. Lindsay.*) What are you ?—A fisherman.

6297. How long have you been a fisherman ?—54 years.

6298. And do you reside at Port Erin ?—Yes,

6299. Did you hear the evidence given by Milner ? Yes.

6300. Do you agree generally in what he says ?—Yes.

6301. You will gladly subscribe annually ?—Yes, I will.

6302. Have you spoken to other fishermen ?—No, I have not.

6303. How many boats belong to Port Erin ?—They all belong to Port St. Mary.

6304. But what I want to know is, how many owners of boats live at Port Erin ?—A good many live there.

6305. Are there 20 boats belonging to the place ?—I cannot say.

6306. Do you know any case of your boats being swamped or lost ?—Yes, I was going out of Erin Bay when one boat was lost.

6307. If you had a harbour ?—If we had a harbour we should many times run a good chance of running round the Calf.

6308. If you had a good harbour, that boats could take at any time, would those boats have been saved ?—Yes, they would.

6309. Do you know of any boats being lost in the bay at Port Erin ?—I have seen them put ashore.

6310. On rocks ?—On rocks and a sandy beach.

6311. Do you remember any loss of life ?—No, not at Port Erin ; about the place, but not in the bay itself.

We will not trouble you any further.

John Waterson, jun., examined.

John Waterson, jun.

6312. (*Mr. Lindsay.*) What are you ; are you master of a fishing boat ?—Yes.

6313. Where does your boat belong to ?—The owner lives at Port St. Mary.

6314. Where does the boat sail from ?—Port Erin.

6315. Are you the master of the boat ?—Yes.

6316. Do you know of any boats in the immediate neighbourhood of Port Erin being swamped ?—Not in my time, but I saw a boat broke in Port Erin.

6317. Had there been a harbour would it have been saved ?—Yes.

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John Waterson, jun.

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Mr. Lindsay.

6318. Have you seen vessels take shelter in Port Erin bay?—Yes.

6319. Of what size?—Schooners and smacks.

6320. How many have you seen in the bay at once?—Seven at a time.

6321. Coasting vessels?—Yes.

6322. Have you seen any large ships there?—The largest ships have been brigs and schooners.

6323. Have you often been unable to put to sea in your boat?—Yes.

6324. What does it arise from, does it arise from your being afraid to put to sea, having no place to run back for?—Yes.

6325. Would you be willing to pay 2*l.* 2*s.* a year towards the harbour?—Yes.

6326. Have you had any talk upon the matter with other fishermen?—No.

6327. You think, if you were to pay 2*l.* 2*s.* a year, you would be a gainer by so doing?—Yes.

6328. (*Capt. Washington.*) As we may consider Port St. Mary and Port Erin the same, what accommodation is there for the fishing boats at these places?—There is no accommodation at Port Erin.

6329. What at Port St. Mary?—There is a quay, but we cannot take it of a dark night.

6330. Do any rocks lay off it?—Yes.

6331. Have you any buoys or beacons on it?—Yes.

6332. Is there any one you can mention which requires a beacon?—Yes, one.

6333. What is it called?—It is called Carrick.

6334. (*Capt. Vetch.*) Can you not get in at all times to Port St. Mary?—When the water is in.

6335. But when the tide is out?—No.

6336. But if there were a pier at Port Erin it would be used by all the boats frequenting Port St. Mary?—Yes, it would.

Mr. John Sainsbury examined.

Mr. J. Sainsbury.

6337. (*Mr. Lindsay.*) What is your occupation?—A farmer.

6337 *a*. Do you take any interest in the fishing boats?—Yes.

6337 *b*. Have you given any attention to the harbour of Port Erin?—Yes.

6337 *c*. What seems to be the general feeling?—They seem agreeable to pay 2*l.* per annum.

6337 *d*. How many have you spoken to?—I cannot say the number.

6337 *e*. Fifty?—No.

6337 *f*. Forty?—No. I should think about 30.

6337 *g*. And they seemed all agreeable?—Yes.

6337 *h*. Do you think it worth their while?—Yes, they would be well paid.

6337 *i*. And that was their feeling?—Yes.

6337 *k*. (*Mr. Coode.*) Have you any connection with the fishing trade in any way?—Not much, at present.

Mr. Alexander Sutherland examined.

Mr. A. Sutherland.

6338. (*Mr. Lindsay.*) What office do you fill?—An office in the Board of Fisheries, Scotland.

6339. (*Capt. Washington.*) Can you hand in a return of fishing boats respectively belonging to the Isle of Man?—I can name it to you.

6340. Can you name them briefly at once?—There is about 120 belonging to Peel of large fishing boats, about 95 to Port St. Mary, and seven to Ramsay. These are all the large fishing boats belonging to the island.

6341. None to Douglas?—None.

6342. Of small boats, how many?—I cannot tell.

6343. Can you furnish the number of boats, the number of men, and the value of the fishery? Do you not make such a return to the Fishery Board?—Yes.

6344. Was it published last year?—Yes, but it was not circulated as formerly.

6345. (*Mr. Coode.*) Does the period of fishing continue as long on the east side as on the west?—It commences generally at Peel first; within a week after that it commences at Port St. Mary. The boats belonging to Peel generally go out first; the Port St. Mary boats very soon follow to the fishing ground, and the united fleets fish off the Calf or off Peel, as they find the fish, and at the latter end of the season a part of the fleet come round to Douglas, and sometimes the whole.

6346. Should you say, as a rule, that the period of fishing is longer on one side of the island than the other?—Do you refer to Douglas.

6347. I speak of Douglas as compared with Peel?—There is no comparison.

6348. It is longer on the west than on the east side?—It is longer from the Calf to Peel; even during the period that a part of the fleet is at Douglas, some are still fishing on the Peel side, and the fishing continues for four months.

6349. How long is there good fishing on the Peel side?—Nearly the whole of those four months.

6350. During only a portion of the four months there is good fishing on the Douglas side?—Perhaps three weeks on an average.

6351. Then, in short, the fishing season extends over four months on the west side of the island, to three weeks on the east?—Yes.

6352. (*Capt. Washington.*) Do you happen to know the value of all the boats employed in the island?—I make a calculation annually.

6353. Can you tell us how much they were worth in 1846 and how much in 1857?—I can ascertain.

6354. Will you at your leisure furnish such a return to the Secretary of the Commission?—Yes.

The witness withdrew.

(*Mr. Lindsay.*) Is there any other gentleman who desires to offer any evidence with regard to the subject of the present inquiry either from Douglas or any other port in the island.

Mr. John Thomas Clucas examined.

Mr. J. T. Clucas.

6355. (*Mr. Lindsay.*) What is your occupation?—I am an advocate.

6356. Where do you reside?—I reside within a mile and a quarter of Port St. Mary and a mile of Port Erin.

6357. State to the Commissioners what you wish to express.—I very often see the fishermen, and they complain of the want of protection at Port Erin; and they say they could get a third more fish if there were a pier there. The fishing begins off Peel. The greater part of the boats belong to Peel, and the remainder to Port St. Mary. The fish, for the most part, is taken off the Calf lights. It commences from the 14th to the 20th of June, and continues up to the beginning of September, when they get fish on the Douglas side. Part of the fleet go on to Douglas, and the rest remain on the west side. Some years ago complaints were made of the want of shelter. Some meetings were held, and the fishermen offered subscription. All the masters in Port St. Mary offered to subscribe 5*l.* each. I saw the masters of about thirty boats. Some said they would give 3*l.*; all said they would give 2*l.*, not 2*l.* per annum, but 2*l.* In that way 800*l.* or 900*l.* was subscribed last year; there was a very large meeting, and it was proposed that they should pay an annual sum. The fishermen engaged to pay 2*l.* a year.

6358. How many attended that meeting?—Several hundreds.

6359. And they unanimously agreed to pay 2*l.*?—

There was no dissenting voice, and they said they would pay annually besides their subscription. They intended to take it out of their first earnings. The takings of a boat are generally divided into sixteen or seventeen shares, seven of which go to the boat. It was to be taken out of the first earnings, and some of the men said they would give a subscription of 5*s.*, 10*s.*, and 1*l.* The Manx fishermen want shelter, and to be able to leave at all times of tide to get to the fishing ground. A deep-water harbour would be of great use at Port Erin.

Mr. CHARLES STEARN examined.

6360. (*Mr. Lindsay.*) What is your occupation?—Master mariner.

6361. How long have you been master mariner?—Eleven years.

6362. Where do you trade?—Round the three kingdoms.

6363. In the coasting trade?—The coasting trade and sometimes the French trade.

6364. Speaking of a national harbour of refuge, what site on this island would you prefer?—I should say the south side.

6365. Do you mean Douglas Bay?—Yes.

6366. All things considered, do you think the site of Douglas Bay better than any other?—Yes.

6367. What part of Douglas Bay would you prefer?—That part which is now exposed.

6368. I understand you object then to the line from the Two-Gun Battery?—Yes.

6369. Do you consider that because it goes through the best anchorage it would do more harm than good?—It would do good to the harbour but not to the roadstead.

6370. What size ship are you master of now?—130 tons.

6371. Would you hesitate running into Douglas Bay in a heavy south-east gale?—Not the least.

6372. Then how do you make out that the pier would injure the anchorage?—Because we should not have room.

6373. There would be danger of collisions from crowding?—Yes, there would not be room.

Mr. THOMAS QUALTROUGH examined.

6374. (*Mr. Lindsay.*) What is your occupation?—Harbour master of Port St. Mary.

6375. Were you ever at sea?—Not except a little in the fishing way.

6376. How long have you been harbour master?—Four years. I was assistant harbour master four years before that.

6377. With regard to a great harbour of refuge, you have heard the witnesses. Now, what part of the island would you recommend?—According to the evidence I would recommend the south side.

6378. Do you mean Douglas Bay?—To the Calf of Man.

6379. Would you give the preference to Douglas Bay over Port Erin?—It would be good for the coasting trade, but Port Erin is too small; Douglas is better.

6380. Is the port of which you are harbour master very short of accommodation for the fishing boats?—Yes; and two-thirds of the fish taken on the coast are brought into the bay—40,000 maize out of 50,000. There are about 120 boats belonging to Port St. Mary, coasters as well as fishing boats.

6381. How many fishing boats?—Eighty-five.

6382. Are the fishing boats oftener at Port St. Mary than elsewhere?—Sometimes they are off Peel and sometimes off Port St. Mary, as the shoals vary according to the tides. Our harbour is much exposed. I have known several vessels get ashore in our bay.

6383. How many fishing vessels have you seen at one time in the bay?—I have known as many as 500 sail in the bay.

6384. (*Capt. Washington.*) At what time of tide can the fishing-boats come in?—About half-tide.

6385. And at neap tide you have not half accommodation?—No, there is not.

6386. You say there are wrecks: what are they owing to?—Want of protection to protect the bay. The bay is quite exposed to east winds.

6387. Are there no rocks in the bay?—Yes.

6388. Are they marked by beacons or buoys?—Some are. About a mile from the point there is the Skerrick rock.

6389. Is there not a light on Skerrick?—Yes.

6390. Is the light a good one?—No.

6391. What does it consist of?—A common silver reflector. It is not on the new principle.

6392. What is the expense of keeping up that light?—The light-keeper has four guineas. As to the oil, I cannot say.

6393. Would it be very expensive to have a better light?—No.

6394. How far can the light be seen?—From two to six miles.

6395. If the light were improved, do you think it would be the means of keeping vessels off Langness Point?—Yes, I have no doubt that our bay is very hard to make. There must be another light to guide them in.

6396. Notwithstanding these difficulties, the largest number of fishing-vessels do resort to Port St. Mary?—Yes, and some of the boats would give 5*l.* a boat towards a breakwater on the Point.

Mr. JAMES KIRMODE examined.

6397. (*Mr. Lindsay.*) What is your occupation?—Coaster.

6398. Are you master of a coasting vessel?—Yes.

6399. How long have you been master of a coasting vessel?—About twenty years.

6400. To what ports do you trade?—All the channel ports.

6401. Have you turned over in your mind the necessity of a harbour of refuge?—It is very necessary.

6402. From your experience, what point would be the best to select for the purpose?—Derby Haven would do very well.

6403. Do you think Derby Haven better than Douglas Bay?—To me it would.

6404. Is not the ground rather foul?—No.

6405. Is there good anchorage there?—Pretty fair.

6406. Good holding ground?—Yes.

6407. Do you think Port Erin would be more suitable?—Yes.

6408. Do you think either Derby Haven or Port Erin more suitable than Douglas Bay for foreign merchants?—Yes.

6409. Will you state your reasons?—It would be better for getting round the Calf.

6410. Any other reasons?—Nothing particular.

6411. (*Mr. Coode.*) Where do you belong to?—I belong to Port St. Mary.

6412. And you think Port St. Mary or Derby Haven preferable to Douglas Bay?—Yes.

6413. What do you think of Ramsay Bay?—It is a very good bay.

6414. You do not think it so convenient as Derby Haven or Port St. Mary?—Not to get round the Calf.

6415. (*Mr. Lindsay.*) What have you to say to a breakwater at Port St. Mary Point?—You propose to run a breakwater as far as low-water mark on the west side of the bay.

DOUGLAS.

Mr. J. Kirmode.

17 Sept. 1858.

Mr. Lindsay.

6416. Yes. Would that make Port St. Mary a good harbour of refuge ?—Yes.

6417. Would it be as good as Derby Haven?—They would be able to get out at all times.

6418. Do I understand you to say, speaking of a general harbour of refuge, that if a breakwater were run out from Port St. Mary Point, it would be better than from Douglas Head ?—I do not speak of a harbour of refuge as regard to that.

6419. You speak only of the fishing boats ?—Yes

6420. You do not think Port St. Mary so suitable as Derby Haven or Douglas Bay ?—A breakwater there would be of great value to the fishing and coasting trade.

6421. It would afford shelter not only for fishing boats but for coasters ?—Yes.

6422. Would it afford shelter in all winds ?—Yes, in all winds.

Mr. John Hudson examined.

Mr John Hudson.

6423. (*Mr Lindsay.*) What is your occupation ?—Master mariner.

6424. How long have you been a master mariner ?—Twenty-two years.

6425. In what trade are you employed ?—In the fish trade.

6426. What are we to understand by that ?—In the fishing.

6427. Where do you trade from ?—Port St. Mary.

6428. You heard what was said about a pier run out from Port St. Mary to a breakwater on the Point?—Yes.

6429. If such a breakwater were carried out, would it afford protection to the fishing-boats and the usual sort of coasters ?—Yes, for vessels up to 300 or 400 tons.

6430. Would it shelter vessels of from 300 to 400 tons ?—Except the wind was south-east and by south they would be sheltered.

6431. Has any injury occurred to the bay of Port St. Mary by the taking away the stones ?—Yes ; during the last fifteen years it was gone to the bad by shipping away the stones.

6432. Do you think the injury will be a great deal more if they take away more stones ?—Depend on that. It will get worse every year.

6433. You are convinced in your own mind that the taking away the stones from the south-west point towards the lime kilns has caused great injury to the shelter ?—We find it every year worse, and every man connected with the fish trade knows it as well as I do.

6434. You consider it worse now than it used to be ?—Yes.

6435. Was it better twenty-three or twenty-five years ago ?—With a rough wind from the south-west, no.

6436. Is there shelter at low water ?—None, if the wind goes due south.

6437. But if the wind is from the south-west, is there shelter at low water ?—There is, but if it veers one point we are done.

6438. If it blows hard can you run into the harbour ?—Yes ; sometimes 500 boats do so.

6439. If there were a jetty on the point, would that give protection ?—Of course, in all winds.

6440. Would there be any occasion then for the fishing fleet to lie out all night in heavy seas and great storms ?—None at all.

The witness withdrew.

Mr. W. F. Moore, the Harbour Commissioner for Douglas, said :—I should be very sorry if, in striving to get a large scheme, we should lose the smaller one, and I sincerely trust the Commissioners will allow us, if possible, to make a beginning in some way.

Sittings at the Isle of Man closed.

LIVERPOOL.

Saturday, 18th September 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Sulivan.
Mr. Lindsay.	Mr. Coode.
Captain Vetch.	Mr. Evans, Secretary.

LIVERPOOL.

18 Sept. 1858.

(*Chairman.*) Is the Chairman of the Mercantile Marine Association present ?

(*Mr. Thompson.*) I attend as the Secretary. The association is composed of 800 masters connected with this port, and I, as their representative, have to ask you to adjourn for a day or two in consequence of the short notice. There are several masters present connected with the coasting trade, who wish to be examined, and who will be away on Monday, and we can bring further evidence on Monday or Tuesday.

What is your name ?

Edward James Thompson.

Prior to calling any evidence, Mr. Thompson, would you wish on the part of the association to make any remarks on the subject of our inquiry ?

The only remark which I can make is, that it appears to the association that this is not a shipowners' question only, but a question affecting life. The principal reason that this association wishes to bring evidence before the Commissioners is, that it considers it to be not merely a shipowners' question, but a question affecting the lives of masters, officers, and seamen. For that reason only it intends to bring evidence before you.

Who is your first witness ?

Captain M'Arthur, one of the oldest steamship captains from Liverpool.

Mr. John M'Arthur examined.

Mr. J. M'Arthur.

6441. (*Chairman.*) What is your name ?—John M'Arthur.

6442. And what is your occupation at present ?—At present? Not any at present.

6443. Have you been a seafaring man, and, if so, state for what time ?—I have been a seafaring man since 1818.

6444. In what trade were the vessels you commanded principally employed ?—Principally the coasting trade.

6445. For how many years were you a master ?—From 1832 in large steamers, large coasting steamers, prior to that in smaller ones.

6446. Did the vessels you commanded sail out of Liverpool ?—Yes.

6447. Have you any opinion to offer to the Commissioners as to the necessity or advantage of a harbour of refuge on the north coast of Ireland ?—Yes.

6448. Will you state that opinion ?—The Skerries of Port Rush is a very excellent harbour for vessels windbound.

6449. Have you ever been at anchor in the Skerries Roads ?—I never came to anchor, but I sailed to Port Rush for four years.

6450. Then you are well acquainted with the roadstead ?—Yes.

6451. Have you seen it in bad weather ?—I have lain there since.

6452. Have you ever steamed from it in bad weather ?—I have.

6453. Often ?—Once a week, twice a week.

6454. In bad weather ?—To and from. Yes, in all weathers.

6455. Have you steamed from it often in bad weather ?—I cannot positively say the number of times in bad weather, but we sailed once a week regularly from each end.

6456. Now tell me, with a heavy north-west wind where does the heaviest sea set in, at west sound or broad sound ?—At the east end, from Bangor Head to the east end of the Skerries.

6457. Do you know the broad sound of Skerries by that name ?—That is the sound from Moorhill, I presume, you mean.

6458. Do you know the west sound ?—I do.

6459. Well, in a heavy north-west gale is there a heavy sea setting through west sound ?—Not through the west sound, but across it.

6460. What is the name of the other sound ?—I do not know that it has any particular name.

6461. But you know the sound ?—Yes.

6462. In which does the heaviest sea set in a heavy gale ?—There is between the islands a heavy sea setting in, but I do not know that it is a sound at all.

6463. You stated that the Skerries is the place where you are desirous to have a harbour of refuge. I want to know your reasons ?—Particularly for the north channel.

6464. Why ?—Particularly for the north channel, going north-about.

6465. But why for the north channel? You can give me the reason why ?—Vessels are more apt to be taken with bad weather in the north channel, and would be glad to take refuge in such a harbour.

6466. Do you know the Isle of Man ?—Yes, I do, a little.

6467. Give me your opinion, if you have any, as to the advantage of a harbour of refuge at the Isle of Man for the Liverpool trade going north-about ?—Ramsey Bay, in all winds, is the only anchorage I know of.

6468. (*Sir F. Smith.*) How many ships have you commanded altogether ?—Well, a good many.

6469. In what year were you in command of ships ?—In '32, '33, '34, '35, '36.

6470. Can you give us the tonnage of those vessels which you commanded ?—I do not think there were any under 300.

6471. None under 300 tons, but over that tonnage ?—No, I think not, with the exception of one, which was over that.

6472. To what part of the world did you trade ?—From Liverpool to Glasgow, and Liverpool to the north of Ireland, and from Glasgow to Belfast.

6473. Did it ever happen to you to be wrecked ?—Never.

6474. Did you ever in the course of your voyage encounter such adverse and violent winds as to make you desirous to run for a harbour of refuge if one had existed ?—I have had occasion.

6475. And in those voyages where would you have desired to have a harbour of refuge ? In the course of your voyages what are the various points in which harbours of refuge would have induced you to run for them ?—I never had occasion to run for one but Lough Ryan.

6476. That is the only occasion ?—And to Ramsey Bay.

6477. That is not quite an answer to my question. I asked you whether in the course of your various voyages it has so happened that had there been harbours of refuge you would have run for them ?—Well, certainly, if taken in the north channel I would certainly run for one of the Skerries.

6478. Then, in point of fact, it has hardly ever happened to you that you wanted a harbour of refuge ?—Not often.

6479. Are you aware whether vessels leave port with the crew in a state unfit for navigation ?—No, I cannot say.

6480. Has it ever happened to you to have a crew in that state ?—No, never.

6481. Then you are not of opinion that casualties occur in leaving port through the state of the crew ?—No.

6482. (*Mr. Lindsay.*) Do you say, from your experience as a shipmaster, that you consider a harbour of refuge necessary in the north channel ?—I think it would be very useful; and, from the cases of wrecks I have seen in the north channel, close to Port Rush.

6483. And do I understand you consider the Skerries the best point for such a harbour ?—I do not see any other.

6484. During what winds do you consider a harbour of refuge of most advantage ?—It is of great advantage with all winds.

6485. But some are more dangerous than others ?—A north-east might; but still it is smooth water inside the Skerries.

6486. The north-east you consider the most dangerous wind ?—I do.

6487. Were you ever in Lough Foyle ?—Yes.

6488. Is it not a good harbour ?—Very excellent harbour.

6489. And a capital shelter from north-east gales ?—Yes.

6490. What distance from the Skerries ?—Not a very great distance.

6491. What distance to the westward of it ?—About sixteen miles.

6492. Have you ever been in Lough Laughan ?—Yes.

6493. Have you good shelter there in north-east winds ?—Excellent.

6494. What distance is that from the Skerries ?—About thirty miles.

6495. To the eastward ?—South and east.

6496. Well, then, twenty-six miles to the west and thirty miles to the east, are two capital harbours already made to hand, where ships can find shelter during the most dangerous wind ?—Yes.

6497. That being the case, do you think it worth while to spend the public money to create a harbour of refuge at the Skerries ? Do you think it necessary for saving life and property ?—I still think it is.

6498. Have you ever been in Loughindall ?—Never.

6499. You cannot speak as to the anchorage ?—No.

6500. You traded in a steamer between Liverpool and Glasgow ?—Yes.

6501. You often passed the Isle of Man ?—Frequently.

6502. Considering Ramsey Bay a natural harbour, do you consider a harbour of refuge at the Isle of Man necessary ?—I cannot speak as to any other part of the Isle of Man myself.

6503. But supposing you have a good harbour there, do you still think Ramsey the best site for a harbour of refuge ?—It can be made a very good harbour, and I think it is the best site.

LIVERPOOL.

Mr. J. M'Arthur.

18 Sept. 1858.

Mr. Lindsay.

6504. Say that a good site could be found at Douglas and Port Erin, which would you prefer, Douglas, Port Erin, or Ramsey; that is, at which of these points do you think a harbour would be of most advantage, a harbour of refuge, which you could take in all winds ?—Ramsey.

6505. You still think Ramsey would be the best point. You think Ramsey would afford greater facilities to shipping, and save more life and property, than at any other point ?—Yes.

6506. What is your reason for thinking so?—There is good holding ground.

6507. But supposing the holding ground were as good at other places. I am speaking of the site. What reason have you for thinking it is the best position for such a harbour ?—It seems more sheltered by the point.

6508. Supposing it were equally well sheltered at other places ?—I cannot speak so well as to other places.

6509. But say the shelter is equally good at other places, are you still of opinion that Ramsey is the best position ?—I am still of opinion that Ramsey is the best position.

6510. Can you state the reason ? Is it because more ships pass that particular point ?—No, they do not.

6511. Then what is your reason ?—There would be more room to work into the harbour. The Bahama Bank is outside, with a light on it, and there is plenty of room to tack into Ramsay Harbour by sailing ships. As to steamers, they can steam in with all ease.

6512. Do you know anything about the east coast of Scotland ?—Not much.

6513. Or the Bristol Channel ?—Yes, I have been up the Bristol Channel, but I do not know much of it.

6514. Or the north coast of England ?—No.

6515. (*Capt. Sulivan.*) You say you require a harbour on the north coast for outward-bound sailing ships particularly ?—And for inward-bound sailing ships too, with a north-east wind, when they cannot get up.

6516. North-east for inward, and west and north-west for outward-bound ships ?—Yes.

6517. Is there not good anchorage in Lough Foyle ?—After you are inside there is.

6518. But under the head. You are sheltered directly you are inside the head, are you not ?—Past the lighthouse.

6519. And with a north-east wind it is a fair wind to run up ?—Yes.

6520. And a fair wind out would be a fair wind for Liverpool ?—Yes, a west wind.

6521. North-west and south it would be. Then, with a harbour so near as Lough Foyle, I should like to hear your reasons for laying out money at Port Rush, with such a fine harbour for all these winds so near ?—It is a very fine harbour.

6522. Then on what grounds do you urge the necessity of having another harbour at Port Rush, when there is already a harbour which affords all the refuge which is necessary for that trade ?—Near these rocks vessels have been taken on a lee shore that could not make Lough Foyle at any price. There has been loss of life and property at Port Stuart. If it had been known there was a harbour as the Skerries is at present, no doubt, if published as such, those masters would have made for it.

6523. Then why did they not run for Lough Foyle ?—They were too far to leeward, but they might have reached out, and come in the east end of the Skerries or the west end of it.

6524. The difference, you know, is only 10 miles between the two ?—Vessels within 10 miles can fetch one and cannot the other. Loss of canvass is one thing which may affect it.

6525. Then, for vessels within those 10 miles, you would have a harbour of refuge. Do you think you would be justified in spending a large sum of money there when, 10 miles to the westward, there is already a good harbour ?—That is not for me to say.

6526. As to Ramsey, is it sheltered from the south round to the north by the west ?—Yes.

6527. Then it is only vessels outward bound from Liverpool that could ever take refuge in Ramsey Bay ?—I do not know.

6528. Then a wind that they could take shelter from they are already sheltered from. Is not that so ?—Yes.

6529. If a wind came from a quarter to make them exposed it would be a fair wind to go on, would it not ?—It would.

(*Mr. Thompson.*) Captain M'Arthur has commanded entirely steamboats, on which account he has not had to go into harbours of refuge or to seek shelter.

Mr. ARCHIBALD M'DARMAID examined.

Mr. Archibald M'Darmaid.

6530. (*Chairman.*) What is your occupation ?—Steamboat master.

6531. How long have you been a master ?—Since 1825.

6532. Since 1825 ?—1845, I mean.

6533. And how long have you been at sea ?—20 years; from that to 22 years.

6534. And in what direction have the vessels chiefly sailed that you have commanded ?—On the Irish coast; the west of Ireland.

6535. Have you any opinion to offer to the Commissioners as to the necessity or advantage of a harbour of refuge on the north coast of Ireland ?—The only place I know of is the Skerries, on the west coast of Ireland, that could be made. The Skerries is the only place that I know of that a harbour could be made properly for the safety of vessels.

6536. But state your reason for wishing to have one there at all.—That is a place where a harbour would be of very great use to vessels north the channel going out. I know they can take there when they cannot take Lough Foyle. Lough Foyle entrance is very narrow with banks; not very easily taken by strangers when they can take this either from the west or east.

6537. Do you know Loughindall ?—I have been there once or twice.

6538. But you do not know much about it ?—No.

6539. Have you been through the Skerries in bad weather ?—Yes, I have been in very bad weather, once with a steamer.

6540. And frequently ?—Yes.

6541. You know the entrance which is called the broad sound ?—Yes, I do.

6542. And you know the entrance which is called the west sound ?—Yes.

6543. In a heavy gale from the north-west through which of these entrances does the heaviest sea run ?—Through the west ground.

6544. Through the west ground ?—Yes, through the north-west wind.

6545. Through the west, and not through the broad sound. In the west sound is the heaviest sea ?—I consider so, because the north-west wind breaks off the end of the Skerries, and breaks the sea more than it does through the west sound.

6546. You have told me that you know the two entrances to the Skerries road; that which is called the west sound, and that which is called the broad sound. Now the question I ask you is this: Through which of those two entrances, in a heavy north-west gale, does the greatest sea run ?—Through the west from the north-west.

6547. Through the west sound or the broad sound ?—Through the west sound.

6548. Therefore, supposing a harbour of refuge was to be made at the Skerries Roads, which of the

two sounds would you shut up by preference?—I would shut up the west sound.

6549. You would shut up the west sound?—Certainly.

6550. Have you ever been at anchor in the Skerries roads in heavy weather?—Never.

6551. Do you know anything of the Isle of Man?—A little.

6552. Do you think a harbour of refuge is required at the Isle of Man for the Liverpool trade?—I do not see that there is any use for it there.

6553. You do not see any use for it?—No.

6554. (*Sir F. Smith.*) Where have you traded?—To Londonderry, Glasgow, and Sligo.

6555. Never to America?—No, never.

6556. Did you ever go the south passage from Liverpool round the south of Ireland?—No, never.

6557. Did you ever take the north passage?—Always either round the Calf of Man or round the Point of Ayr.

6558. Have you ever found the necessity of a harbour of refuge?—I have many times put into harbour, and if there had been a harbour of refuge in the way I should have been very glad to put into it.

6559. Are you of opinion that harbours of refuge are desirable for the safety of life?—Certainly.

6560. Supposing you had the public money at your disposal for that purpose, where would you apply that money?—In the Skerries Road, certainly.

6561. Is there no other point in the voyage from Liverpool to the north of Ireland, where a harbour of refuge is required?—A harbour is required at many places; but I consider a harbour there enough for the vessels which frequent it.

6562. You tell us harbours of refuge are required in many places. Will you specify where they are required?—When it blows a gale of wind, we generally go into some harbour, if we can manage it, such as Ramsey, which I have been obliged to do sometimes.

6563. Perhaps it will not give you too much trouble to describe the voyage of a ship leaving Liverpool, and encountering bad weather in any point. Tell us where, on meeting with foul weather, you would like a harbour?—It depends entirely on the wind, where it blows.

6564. I will leave that to you. If you will state the wind, and the difficulty, and the remedy, I shall be much obliged to you. Supposing you were sailing from London with a fair wind, and were taken with an adverse wind at any point of the voyage, specify where a harbour of refuge would be useful?—I consider the Skerries the best place, because they are more exposed.

6565. But going to the north of Ireland, your voyage is nearly over there?—Yes.

6566. For instance, is not a harbour of refuge required at Dundrum Bay?—I do not know much of Dundrum Bay.

6567. But you have navigated round the north of Ireland many years?—Yes.

6568. But you have never been in Dundrum Bay?—Never.

6569. Do you know anything of Ardglass?—No.

6570. Have you ever been into Lough Foyle?—Yes.

6571. What do you think of that as a harbour of refuge?—I think a good deal of it; but the entrance is very bad.

6572. Bad, in what wind?—No heavy vessel can get into Lough Foyle in a heavy westerly wind.

6573. You say that in the Isle of Man no harbour of refuge is necessary?—I do say so, according to my experience.

6574. If you met with a strong adverse wind, would you bear up for Lough Foyle to come back again, or would you try for a harbour of refuge in the Isle of Man?—I know very little, I say, about the Isle of Man. I cannot say.

6575. (*Mr. Lindsay.*) Had you any conversation with any one before you came here to give evidence?—No.

6576. Was there no one who invited you to come?—No person, except our agent, Mr. Johnson.

6577. The agent for your steamer?—Yes.

6578. Did he state on what you were to give evidence?—No.

6579. Did he state simply you were to come and give evidence as to a harbour of refuge in the north channel?—Yes.

6580. He did not point out to you where?—No.

6581. He left it to your free will?—Yes.

6582. You heard the question I put to Captain M'Arthur. Looking, as I say, to those winds, which are the most dangerous? Considering that you have a natural harbour to the west, and another to the east, do you really think we would be justified in recommending the expenditure of a large sum of public money to make a harbour at the Skerries?—Yes; certainly, I would.

6583. In your great experience can you mention any ships or lives which would have been saved if there had been a harbour of refuge at the Skerries?—I have heard of a good many lost down there between the Skerries and Bangor Head; and I am positive sure if there were a harbour it would prevent their going ashore.

6584. Can you mention one ship that a harbour of refuge there would have saved?—I cannot name any ship.

6585. You can not name any one ship. Do you know anything about the north-east coast of England?—Very little.

6586. Nor the east coast of Scotland?—I have been there sometimes.

6587. Have you ever traded there with a vessel?—Yes.

6588. Which do you think the best site, Wick, Peterhead, or Fraserburgh?—Wick would be a better place than Peterhead.

6589. For what reason?—Peterhead is more exposed to the north-east.

6590. But is an equally good harbour, if it could be made, is it not?—I have never been in at Peterhead.

6591. But presuming that an equally good harbour could be made, at what point do you think a harbour of refuge would be of most value?—I think Fraserburgh the best of any of them.

6592. For what reason?—Because there is more room to go into it.

6593. Any other reason?—No; I think not. I have never been into either of the places, only passing. I do not know much about it.

6594. Then you can not speak much one way or the other?—No.

6595. (*Capt. Washington.*) I think you said you knew the east coast of Ireland?—The north-west coast only.

6596. Are you acquainted with St. John's light?—Yes.

6597. Near Dundrum Bay?—No; I have never been there.

6598. Then you never heard of a great many wrecks in the bay?—Yes.

6599. You know nothing of how those wrecks occurred?—Ten years ago they put a light on the point.

6600. Do you know of no wreck?—There have been a good many.

6601. (*Capt. Sulivan.*) Your experience has been entirely in steamers?—Yes.

6602. You have had no experience in sailing ships?—No.

6603. Then your experience does not enable you to speak as to advantages for sailing ships?—No; I have never been much in sailing vessels.

6604. Do you know how far Lough Foyle can be entered in north-west gales? Whether it can be easily entered in north-west gales?—It can be entered perfectly easy at north-west.

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6605. What are the winds for which you consider a harbour most needed?—North-east is the worst wind for Lough Foyle.

6606. For ships on that coast?—North-east is the worst.

6607. Do you consider north-west a bad wind?—North-west is not so bad as north-east.

6608. With north-west, if she stands out, she cannot be caught on a lee shore?—No.

6609. But if she were to windward far enough, she could fetch into Port Rush, and it is a fair wind for Lough Foyle?—Yes.

6610. If a ship were in danger with a north-west wind she could reach into Lough Foyle?—I should say so, if far enough to windward.

6611. And with west winds?—West and south-west cannot get in.

6612. But that is comparatively an off-shore wind, is it not?—But there is certainly the danger of a lee shore.

6613. Can a ship be in danger of going on shore through stress of weather, however bad it may blow off Lough Foyle with a west or south-west wind?—Certainly not.

6614. Then it must be north-west or north-east alone in which a ship is in any danger?—Yes.

The witness withdrew.

Mr. George Roach examined.

Mr. George Roach.

6615. (*Chairman.*) What is your occupation?—Master mariner.

6616. How long have you been a master?—From 28 to 30 years.

6617. And how long have you been at sea?—40 years.

6618. What description of vessel have you chiefly commanded?—Sailing ships.

6619. And in what direction have you sailed?—North and South America, and the Brazils.

6620. And what size ships have you generally commanded?—From 300 to 1,200 tons.

6621. Will you state to the Commissioners your opinion as to the necessity or advantage of so improving the harbour of Carlingford as to make it available as a subsidiary harbour of refuge for ships bound south out of Liverpool?—All that is required is deepening the bar.

6622. What sort of anchorage is there?—The anchorage without is blue clay. There is plenty of shelter inside. All that is required is deepening the bar.

6623. I am perfectly aware of the excellence of the bay of Carlingford, if the channel is dredged through the bar, but will you have the goodness to state your reasons why you wish a good harbour for shipping there?—There is no other place between Kingstown and Belfast. If that bar were open at all times of tide it would prevent ships going to Dundalk Bay, Drogheda, or Dundrum Bay; any ship could then always go, if there were sufficient water off that port, and could go at any time of tide. I have known ships lost close to the bar on that account; they could not keep off it until there was sufficient water.

6624. Have you any knowledge of Lough Strangford?—No.

6625. Have you any opinion to offer to the Commissioners as to the advantage of improving the harbours of Waterford and Wexford with the same view?—I should think Waterford harbour for deepening much preferable to Wexford, because the approaches are much easier; I consider that the approaches to Wexford are very difficult.

6626. Are you acquainted with Wexford?—No, I have not been in the port.

6627. Are you acquainted with Waterford?—Nothing more than passing by.

6628. Would you consider that if Waterford were made available as a harbour of refuge it would supersede doing anything at Wexford with the same view?—I should think it would.

6629. As respects a harbour of refuge somewhere in the neighbourhood of the Land's End, do you think there is any necessity for that for the Liverpool trade?—I should think not, for the Liverpool trade especially.

6630. Have you ever taken the passage north-about to America?—Frequently.

6631. And have you any opinion as to the necessity or advantage of a harbour of refuge on the north coast of Ireland?—The Skerries would be an excellent place for a harbour of refuge, I should suppose for that channel.

6632. For what description of vessels do you think it would be useful as a harbour of refuge, for coasting vessels or the foreign trade?—I think for both.

6633. Do you think the Skerries a roadstead which a large ship of 1,200 tons would willingly go near in bad weather if she could help it?—I am not acquainted with the roadstead.

6634. Do you think the coast in that vicinity a coast which a vessel would be willing to go near in bad weather?—Not if she could help it, but she might be forced to take it. If she had lost canvas any harbour there would be very necessary.

6635. Therefore, on account of accidents arising from stress of weather, it would be very useful?—I should suppose so.

6636. As a general rule in bad weather, in a large well-found ship, would you rather run for a harbour of refuge, or try and keep the sea and make your passage?—If the ship were well found I should prefer to keep the sea to running for any harbour.

6637. Amongst men in your mode of life is there any feeling as to credit or discredit in taking refuge in harbours in bad weather, instead of keeping the sea and trying to make a passage?—A good deal depends on the ship,—the way she is found, the way she is manned.

6638. But with a well-found ship and a decent crew would you ever do it if you could help it, having regard to your character as a seaman?—I would not put in unless something occurred. If all worked well, and the ship was in good trim, I should not bear up.

6639. Now will you view the question in this light,—might it not be more to the advantage of your owner that you should bear up rather than keep thrashing about at sea and expose the cargo and ship to wear and tear?—A good deal would depend on circumstances; if it were in the depth of winter, and a good harbour close to, I do not say but it would be very proper to take it; on the other hand, perhaps you might expect every moment a change of wind. A good deal depends on the time of trial; if I found the ship straining and labouring, and a chance of damaging the cargo, then I think it very right to bear up and take a harbour.

6640. And in such a case therefore the interests of your owner would be benefited by your taking a harbour of refuge?—Certainly, in cases of this sort.

6641. As respects a port of call, would any harbour of refuge be of use to the Liverpool trade on the north coast of Ireland, for ships to call and wait for orders?—Where?

6642. On the north coast of Ireland, for ships to call and wait for orders?—Yes, I should think it would.

6643. You think it might?—Yes.

6644. Is it at all the practice for American ships—the timber-laden ships homeward bound—to put into a port to wait for orders?—Yes, very often.

6645. What ports do they frequently use for that purpose?—Cork or Falmouth.

6646. And if you had a good harbour of refuge on the north coast of Scotland, do you think they would use that in preference to Cork or Falmouth?—They might reach that port when they could not reach

Cork or Falmouth. I have been glad to come in when I could not reach Cork.

6647. Have you ever been to the Baltic ?—No.

6648. (*Sir F. Smith.*) Taking the outward passage to America, what state of circumstances would induce you to give the preference to the north over the south passage ?—Bound for North America, if the wind were either south, south-west, or south-south-east, I should take the north channel.

6649. And would you more frequently if a harbour of refuge were on the north coast ?—Yes.

6650. That would induce you ?—It would.

6651. Have you ever seen a wreck chart of the Admiralty, showing the number of wrecks ?—No.

6652. It appears from this wreck chart that in those 5 years a great many casualties, collisions, and wrecks have occurred off Liverpool, can you at all account for that number. Upwards of 30 vessels appear to have been wrecked off Liverpool. To what do you ascribe that ?—There are great number of vessels frequenting Liverpool and the Channel from different parts; a great number meet off Liverpool and the Isle of Man.

6653. Do you imagine that those casualties arise from bad navigation or the bad state of the crews. (*The wreck chart was put into the hands of the witness.*) That is in the course of 5 years. Looking at that chart—the Admiralty wreck chart—you will see that a great many casualties occurred off Liverpool, and carrying your eye on to the north of Ireland, in the neighbourhood of the Skerries, you will find only 3 or 4 occurred there in the same space of time. To what do you attribute it ?—The greater number of vessels leaving Liverpool.

6654. The greater portion of the vessels leaving Liverpool do not take the north passage ?—No, I should think not, because more are bound south.

6655. You do not know the east coast of Scotland or England ?—No.

6656. Do you know more of the Isle of Man ?—No.

6657. Supposing you were going north about, and had not reached the passage going round to the Skerries, and were met by adverse winds, is there any port on the east coast of Ireland or the Isle of Man you would desire to make ?— The Skerries is the best place I should think for a harbour of refuge.

6658. What do you think of Carlingford ?— I thought you meant the north passage entirely.

6659. I take the whole passage. At what points would you desire a harbour, supposing there was no limitation ?—Carlingford I should say was the first place, and then a harbour in the Skerries after that.

6660. Supposing a vessel going south about met with adverse winds, say a south gale of wind, are there any points south of Liverpool where you would be disposed to seek for a harbour of refuge ?—Waterford would be the best port I should think for incoming ships.

6661. Have you ever been into Waterford ?— I have never been in it, but I have passed it.

6662. Has it ever occurred that a harbour of refuge would be useful to you there ?—It has been so.

6663. Have you any opinion to give as to Holyhead Harbour for the purposes of trade ?—No.

6664. Do you think that under any circumstances it would be useful to Liverpool ?—No.

6665. Have you ever been through the Pentland Firth ?—I have.

6666. Do you consider that a dangerous navigation ?—In clear weather, I think not.

6667. Does any state of wind or tide make a set through east or west ?—It is many years ago that I went. I have only been through once. I cannot give any opinion.

6668. Do you know anything of the Firth of Forth ?—No.

6669. Are you aware of instructions being given by the shipowners to commanders of vessels to keep the sea in all weathers ?—I never had such instructions.

6670. You think it would hardly be a fair instruction to give ?—There is a difference of opinion on that.

6671. As a question of life ? As regards property, the shipowner can keep himself harmless by insuring his vessel; but looking at it only as a question of humanity, and putting it to you in that light, is it a proper or fair thing to tie the hands of the commander, and render it impossible for him to go into harbour ?—I think that a discretionary power ought to be placed in the master.

6672. Has it ever occurred to you that wrecks have occurred off Liverpool by the crews going out in a bad state of discipline ?—I have frequently known instances of ships going to sea with their crews in a bad state; but I have never known of any bad effects.

6673. It has been given in evidence that collisions and wrecks have occurred very frequently from the crew being in a state of intoxication. Has that ever happened, to your knowledge, in the port of Liverpool ?—I have known instances, but I cannot mention any particular case where the vessel has met with any accident.

6674. (*Mr. Lindsay.*) You speak strongly in favour of Carlingford as a harbour of refuge ?—Yes.

6675. Arising from the fact that there is no shelter between Kingstown and Belfast, can you mention any instance in which, if there had been a harbour of refuge at Carlingford, vessels would have been saved ?—I recollect some time ago a very fine vessel, the *John Stump*, I think, from Calcutta, went ashore, trying to keep off with sprit sails; but she could not keep off. If there had been sufficient water she would have gone in.

6676. How was the wind ?—South-east.

6677. Blowing right on the coast ?—Yes.

6678. Were any lives lost ?—Yes.

6679. And that ship, you can speak of your own knowledge, would have been saved if there had been a harbour at Carlingford. Do you know any other instance ?—Yes; the *Myrtle*.

6680. How was the wind ?—The same way. She went ashore near the same place.

6681. Could she have fetched in ?—Yes, if there had been sufficient water.

6682. (*Capt. Sulivan.*) You consider Carlingford more in the line of vessels going south than vessels going north ?—I consider it suited both for north and south.

6683. Vessels going to the north would pass round the Isle of Man ?—Yes.

6684. Would they, with the wind south or south-east, go round the Isle of Man ?—Yes.

6685. And it would be a fair wind for that passage ?—Yes.

6686. Then only a north or north-west wind would stop them ?—And Carlingford would be a weather shore, and they could not run in.

6687. And Carlingford to be a lee shore would apply to vessels going south ?—Yes.

6688. For sailing vessels, do you consider a harbour of refuge should be one that they could go into with a leading wind ?—Yes.

6689. And that few ships disabled can work to windward ?—Yes.

6690. They cannot haul round, and work into a harbour ?—No.

6691. Therefore Holyhead, with a southerly gale, is very difficult for Liverpool ships to enter ?—Yes.

6692. In gales of wind which would make Holyhead almost impossible to enter, would not Carlingford be a dead lee shore, and a fair wind into it ?—Yes.

6993. Supposing for south winds ships use Carlingford, is it not also very desirable that they should have a fair wind out ?—Anything taking west would bring out of Carlingford.

6694. If you go into Carlingford with a south

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wind, and the ship wants to go on her voyage, a west or north-westerly wind would be a fair wind?—Yes.

6695. And a leading wind out?—Yes.

6696. A fair wind in and a leading wind out are of great importance in a harbour of refuge, are they not?—Yes.

6697. The same would apply to Waterford. A south-east gale with homeward-bound ships, and a south-west or south with outward-bound ships, would be winds which would make Waterford available?—Yes.

6698. That also is a port you could run for with a disabled ship?—Yes.

6699. And in all dangerous winds?—Yes.

6700. And have a leading wind when you wanted to sail?—Yes, outwards.

6701. Or a west wind if bound up channel?—Yes.

6702. You say you would endeavour to keep the sea. In endeavouring to round the Tuskar is not a ship often in great danger, being caught by an adverse wind?—Yes.

6703. Generally speaking, it is not often that a merchant ship is so well found that she can thrash off a lee shore?—Yes.

6704. Then would it not be desirable that a vessel caught off a lee shore west of the Tuskar should go into Waterford rather than risk losing her sails or masts?—Yes, ships bound out.

6705. As to keeping the sea bound out with southerly gales, would there not be great danger, unless she were remarkably well found, trying to thrash off the south coast of Ireland?—Of course, if she could not fetch off the coast, Waterford would be most desirable to go into.

6706. Then, for the safety of the crew and the welfare of the ship, it would be desirable under those circumstances to go into such a port as Waterford?—Yes.

6707. Going north about, what are the dangerous winds in which you would like to make use of Port Rush?—North-east, I should say. A north-east wind blows into Port Rush.

6708. No man outward bound would go in in a north-east wind. That would be a fair wind out, would it not?—Yes.

6709. For outward-bound ships what would be the dangerous wind?—North-west.

6710. And north, I suppose, caught in the bay with sails gone?—North-north-west would do that.

6711. In any of those winds could ships run off to Lough Foyle?—I know it is a difficult harbour to go into for strangers. I know by my chart that it is not a good port to run for with a large ship.

6712. I am speaking of a fair wind?—Not for a stranger. It might do for people acquainted with it.

6713. (*A chart of the Skerries being shown to witness.*) You see the red lines blocking the harbour against west and north-west gales. Judging from the width of the passage to the east, in a north-east gale would it be safe to run, and to bring up with no more protection than those rocks afford?—I am not acquainted enough with the place to give an opinion of that.

6714. Supposing a wind blowing in the direction of that arrow, do you think any seaman in a large ship with a heavy sea would run into that place as a harbour of refuge, or that he could find shelter enough to make it a harbonr of refuge to him, trusting to those rocks to protect him?—I should think that a very heavy sea would set in there.

(*A chart of the Irish channel was put into the hands of the witness.*)

6715. You see that 10 miles to leeward of Port Rush is Lough Foyle. Into which would you take a heavy ship, if disabled, by preference, into Port Rush or up Lough Foyle?—I would take Port Rush in preference, because I could work in.

6716. But the danger?—I would not run for rocks like those.

6717. Would you rather drift out to sea than take either?—If the wind would allow it, I should prefer to go out to sea to take either.

6718. Have you ever been in Carlingford yourself?—Yes.

6719. Do you know anything about it inside?—I know it very well.

6720. Would you run right up if you had lost your anchors?—Yes.

6721. You think it a fit place to beach inside or run into the mud?—I would run right into the mud there.

Mr. Wallis M'Clennan, Master Mariner, examined.

Mr. Wallis M'Clennan.

6722. (*Chairman.*) What is your occupation?—Master mariner.

6723. And how long have you been at sea?—16 years.

6724. And how many years a master?—Seven years.

6725. In what trade have the vessels which you have commanded been chiefly employed?—Chiefly in the west coast and the North American trade.

6726. And therefore sailing vessels?—Sailing vessels.

6727. And you have been in the habit of taking the passage north-about?—I have been twice through that passage.

6728. Do you know Carlingford?—I have never been there, but I know its position.

6729. Knowing the situation of Carlingford, do you think that a harbour of refuge there would be of any use to the Liverpool trade, bound south-east?—I think not.

6730. You have heard the evidence of the previous witness?—I heard his evidence.

6731. State your reasons for differing from him?—Might I be allowed the chart? (*Chart put into the hands of witness.*) Carlingford, I think, is too close to Liverpool for a harbour of refuge. Generally vessels when they start wait until they see promising weather, and I think Carlingford too close to be of any very great deal of utility. I consider a harbour further along the coast would be much more useful.

6732. Then what have you to say to Waterford? Do you think that of any use?—I think it would be of a great deal more service that distance from Liverpool from what Carlingford would be.

6733. (*Sir F. Smith.*) Have you navigated the sea on the east coast of Scotland?—No.

6734. Nor of England?—I have been round, but I have not been in the habit of navigating that coast at all.

6735. Where have you generally traded?—Chiefly to Liverpool from the south coast, and from the Mediterranean. For the first few years I was mate of a steamer, and lately I have traded from various ports to Liverpool.

6736. You generally go to the southward?—Yes, to the southward.

6737. Has it ever happened to you to require a harbour of refuge on the coast of Cornwall?—No, it has never happened to me.

6738. Has it ever happened to you to require one on the coast of Ireland in the course of any of your voyages?—No, it has not.

6739. What size vessel have you generally commanded?—My present vessel, the *Star*, one of 700 tons, is the largest.

6740. She is a sailing vessel?—She is.

6741. Have you ever been by the north coast of Ireland?—I have been twice.

6742. Are there any circumstances of wind or weather which would make you prefer the north passage to the south?—There is one circumstance for which I prefer the south channel. The channel is wider

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and the currents are not so strong as in the north channel.

6743. Then if there were a harbour of refuge at the Skerries that would not tempt you to take that line, going to America ?—No, not at all.

6744. You would still keep the southern coast ?—Yes.

6745. You prefer Waterford to Carlingford ?—Yes.

6746. But supposing you were going to Belfast, you would rather have refuge there than go back to Liverpool ?—I should be pleased at such a thing if I were in the Belfast trade.

6747. Looking only to the saving of life, are there any points on the coast of England, Scotland, or Ireland, that you would recommend, either from your own knowledge or from conversing with seafaring men, where you would desire to establish harbours of refuge, looking to the safety of life alone ?—I think a port, to the west of Tuskar, would be of great service.

6748. Have you any knowledge of the Bristol Channel ?—I have a slight knowledge of it.

6749. You have a slight knowledge of it ?—Yes.

6750. Are there any ports there necessary for the saving of life ?—Not that I am acquainted with.

6751. You have never been into Padstow or St. Ives ?—I have passed close beside Padstow. It has a bad entrance, and is considered a bad harbour for strangers.

6752. Do you think it necessary ?—No vessels can run up and get shelter off Lundy.

6753. Have you ever commanded ships the owner of which has required you to keep the sea, and keep out of harbour, irrespective of life ?—Never.

6754. (*Capt. Sulivan.*) Do you know Port Rush ?—I know the locality of it, but I have never been there.

6755. Look at that chart. You see where the proposed breakwater is marked. You see that the rocks protect ships from the west and north and north-west. Supposing it were blowing a gale from the north-east, do you think that the captain of a deep-laden ship would run for and attempt to bring up in that place ?—I think not. I would not do it myself.

6756. You see that to leeward of that point, with a north-east wind, is Lough Foyle, and the Skerries are a little to the east of it, very close to it. With a north-east wind, judging of the Skerries by the sea you saw there, if you had to run in a disabled ship in a heavy sea, which would you run for, up Lough Foyle, or try to bring up in the open space between the Skerries ? Having seen the chart of the Skerries proposed harbour, would you with a north-east wind run for Lough Foyle, or bring up in the open space under the rocks ?—I would run up Lough Foyle.

Mr. JOHN GARSON examined.

Mr. John Garson.

6757. (*Chairman.*) You wish to make some statement relative to the Skerries ?—A great deal of interest has been taken in this inquiry in Dublin, Dundalk, and Drogheda, as far as Clogher Head. I do not speak for Dundalk, because I am more for Carlingford ; but persons in Dublin, and on the coast immediately adjacent, think a harbour very important at the Skerries. Having regard to the wreck chart, and the number of casualties which have occurred there every winter during easterly gales ; looking to the large coasting trade to Cumberland and across ; remembering that Drogheda, having a large coasting trade, is in easterly gales an unsafe port, owing to the bar ; and also having regard to the loss of life among foreign-going ships from Liverpool, many of which I could name—the *Chatham*,—a large loss of life by her and many others, there is a strong desire that a harbour should be made at the Skerries, but not to compete with a great harbour north of Clogher Head. It is very desirable to have a harbour there ; and I may add, that every facility will be given for the formation of a harbour by Mr. J. H. Hamilton, one of the members for the county ; and I may also state, that a large number of persons connected with the coasting trade are waiting at Dublin, and expecting to give evidence there, if they have an opportunity.

You are to understand that the communication which we have received on the subject of Drogheda has brought the Dublin Skerries under the distinct consideration of the Commissioners ; that on their arrival in London, after their tour of inspection, when they come to deliberate on the sites which shall be selected for harbours of refuge, the Dublin Skerries will be considered ; and that, in the opinion of the Commissioners, they have sufficient evidence on which to base their judgment. But should you on Monday think it necessary to tender any further evidence, they will be happy to receive it, though they think it unnecessary to go to Dublin or Drogheda.

(*Mr. Garson.*) I understand that, whether you are against the Skerries or for it, you think you have had sufficient evidence. In case the parties who are interested with me see fit to send a number of documents properly authenticated, is it too late to send them on without offering them to you publicly ?

(*Chairman.*) If the documentary evidence of which you speak be ready on Monday, your best course will be to tender it in evidence ; but should it not be ready on Monday, we will receive it in London as a memorial, to suit your convenience.

(*Mr. Garson.*) It is in Dublin.

(*Chairman.*) Precisely. We will therefore receive it in London.

Monday, 20th September 1858.

PRESENT :

Admiral HOPE (Chairman.).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain SULIVAN.
Mr. EVANS, Secretary.

Mr. WILLIAM DAWSON examined.

Mr. William Dawson.

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6758. (*Chairman.*) What is your occupation ?—Commercial purely ; I have been in connection with ships all my life.

6759. Will you be kind enough to state shortly the substance of this memorial ?—The substance of that memorial is this—it would take me about ten minutes to read it, but I can, of course, say, that in the year 1851, I was in close communication with Mr. Thomas Vough of London, who took out patents for protecting ships by means of a breakwater. I have a model here, which is in detail, of Plymouth breakwater, and my object is to get this breakwater made in Canada for the English commercial community, and if that can be obtained with great rapidity, I should say let us get through Russia in the Baltic, as I have named in that memorial.

6760. Your memorial will be brought under the consideration of the Commissioners, and if upon consultation any further information respecting it is required, you will be informed. You have stated in

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the memorial what your address is?—Yes, and the name of my solicitor, who will act for me in any case.

6761. Then we will not detain you any longer. —Do you require the log to which special reference is made in the memorial?

6762. I suppose you wish the log returned?—Yes.

6763. But the memorial we may keep?—Yes, it is the object of that.

Chairman.

Mr. Arthur Hawkins examined.

Mr. Arthur Hawkins.

6764. (*Chairman.*) What is your name?—Arthur Hawkins.

6765. And what is your occupation?—Master mariner.

6766. How long have you been at sea?—About 25 years.

6767. How long a master?—About 17 years.

6768. And as to the vessels which you have commanded, in what trade have they been chiefly employed, and have they been steamers or sailing vessels?—I have always been master of sailing vessels, and have traded principally to North America and the States.

6769. Give us your opinion, if you have any, as to the necessity or advantage of a harbour of refuge on the north coast of Ireland for the Liverpool trade?—I think a harbour of refuge in the north channel very desirable. Ships bound out would go that way, which do not now, and return that way, which they do not now.

6770. Be kind enough to speak louder.—I say a harbour of refuge would be very desirable in the north channel, as many ships would go that way in preference to taking the south channel, and return that way in preference to taking the south channel.

6771. You are acquainted with Lough Foyle, I suppose?—I have been in it.

6772. Are you acquainted with Loughindall, Port Ryan, Campbeltown, and Lamlash?—I have been in the last mentioned, Campbeltown I have not.

6773. Port Ryan?—No.

6774. Whilst all these ports which I have named exist, and are very good harbours of refuge, still you think an additional one on the north coast of Ireland would be advantageous?—I do.

6775. And where would you be disposed to recommend it to be placed?—I think about Port Rush or the Skerries would be a very desirable place.

6776. Are you acquainted with the Skerries?—I have been in the harbour of Port Rush.

6777. What size have the vessels been which you have commanded?—From 500 to 1,000 and 1,100 tons.

6778. Now, for vessels of that description, would it be chiefly with a view to accidents arising from stress of weather that you would wish to have a harbour of refuge?—Certainly; I have spent many unhappy nights in that channel, where there was no harbour of refuge to take, if I had wished to take it.

6779. Have you ever been glad to run back to Belfast Bay, or any of the harbours I have mentioned, through stress of weather?—You might be obliged to run for the south channel, or the Firth of Clyde, or Belfast, supposing you met adverse winds.

6780. But have you ever been obliged to bear up?—I have not.

6781. How many voyages have you made through the north channel?—About fifteen or twenty voyages.

6782. Have you ever been caught in bad weather in the north channel, homeward bound?—Yes, in very bad weather.

6783. And in such a case would a harbour at the Skerries have been of service to you?—I have not the least doubt that it would.

6784. You have not the least doubt that it would. Now, viewing the question of a harbour of refuge at the Skerries, do you think it would be used as a place of call for ships? Do you think it would be so used by the Liverpool trade?—I do not know.

6785. As a place of call for orders?—It might be a very good place, especially for ships bound up the Clyde and the east side of Scotland. It might shorten the passage considerably.

6786. Have you any opinion as to the advantage or necessity of a harbour of refuge down near the Land's End, for the Liverpool trade?—No, I have not.

6787. You cannot speak as to that?—No.

6788. Have you any opinion to offer as to improving the harbours of Carlingford, Wexford, and Waterford, on the east coast of Ireland, so as to make them subsidiary harbours of refuge?—I should say, as to the harbour of Waterford, it would be a very excellent harbour of refuge if the water were deeper, and also the harbour of Carlingford.

6789. And do you think they would be of great use to the shipping working down the south channel in bad weather?—I do.

6790. As to the Isle of Man, what do you say about that?—I cannot say anything at all about the Isle of Man.

6791. Nothing?—I have never been in any part of it.

6792. (*Sir F. Smith.*) Do you think harbours of refuge are at all required for the safety of the mariner?—Undoubtedly I do.

6793. You think them quite necessary for the saving of life?—Many a good ship is lost for want of a harbour of refuge.

6794. Having looked at the whole circle of the island, in what positions has it occurred to you, as an intelligent mariner, that harbours of refuge should be formed, independent of the course which you yourself have taken?—I do not know any other positions which I should recommend, beside those mentioned.

6795. You know nothing of the east coast of England?—No.

6796. Have you ever been to the Baltic?—I have, but I have always taken the course by the islands.

6797. Did you find any difficulty in navigating the Pentland Firth?—Sometimes it is a very dangerous passage; all the year round it is so during gales of wind, but especially in the winter season.

6798. Would you avoid it, if possible?—I very often went outside altogether, by Fair Island passage.

6799. Do you know any parts of the Orkneys?—I have been in Stromness.

6800. What is your opinion of Stromness?—That is a very good harbour.

6801. You are strongly of opinion that a harbour of refuge is desirable at the Skerries?—Yes.

6802. Are there no ports near which would answer the purpose in an emergency?—There is Lough Foyle, but it is not so easy taking, especially in the night time.

6803. In what wind is it difficult to take Lough Foyle?—Winds from the west and west-north-west and south-west.

6804. Is it the heavy sea running which makes it difficult, or is it the line of entrance?—You cannot take it with those winds.

6805. In the winds in which you want refuge, you cannot take Lough Foyle?—Not well, and especially in the night time.

6806. And you would be able, under the same circumstances, to take a harbour of refuge at the Skerries?—I should suppose so.

6807. You have no doubt of it?—I have no doubt of it.

6808. Have you ever put into any of the eastern ports of the coast of Ireland, as you were going to the Baltic?—I have been to Belfast.

6809. What do you think of Belfast?—Belfast Lough is a very excellent harbour.

6810. What do you think of Carlingford?—I have never been in Carlingford.

6811. Nor Dundrum Bay?—No.

6812. Have you ever been to Milford Haven?—No.

6813. You know nothing of the Bristol Channel?—No.

6814. Nor the ports near the Land's End?—No, I have never been to any port there.

6815. What is the largest size vessel which you have ever commanded?—1,100 tons.

6816. Have you ever been nearly wrecked in the course of your voyages?—I have been frequently in danger, but never nearly wrecked.

6817. In what position were you in danger?—Getting on a lee shore.

6818. What place was it, and what voyage?—I was once taken in a gale of wind in the north channel, coming from North America. I had to reduce the ship to a close-reefed main topsail, at the same time my main yard was badly sprung.

6819. You were disabled?—I was, and I was obliged to drift to sea.

6820. If you had not been disabled, should you have run to some port?—Not at all.

6821. Having been in a disabled ship, you think harbours of refuge desirable?—Yes.

6822. Very desirable?—Yes.

6823. Where would you be disposed to place them?—I was at the Skerries at that time.

6824. In fact the Skerries were to leeward of you?—Yes.

6825. You could not have taken Lough Foyle?—No, I think not, for the wind was from the south-west.

6826. Is that the only instance in which you have been in great peril?—The only one I can note at the present time.

6827. During 20 years at sea?—Not so much—17 years.

6828. Well, during 17 years a harbour of refuge would have been of great value to you once only?—I have been in such a position that a harbour of refuge would have been very desirable if there had been one.

6829. Where?—Coming from the Baltic and caught in heavy gales of wind, I have been liable to be drifted down on the Islands off Scotland.

6830. Is there much drift by that north channel?—A great deal, I should say.

6831. Did you ever see a wreck chart by any chance? If you look at that wreck chart (*the chart was handed to the witness,*) and the position in question, you will find very little of wreck or casualty, and almost everywhere else you will find there has been a great deal. Those black marks indicate vessels wrecked, and the crosses vessels in collision; and if you look near the Skerries you will find little indication of damage done there; and the inference to be drawn, is either that there is very little traffic, or that with much traffic very little harm arose. Must not that be so?—I suppose the dangers of the channel cause a great many ships to avoid it.

6832. And you have no doubt, that if a harbour of refuge were made at the Skerries that passage would be more used?—I believe so.

6833. And you believe that its use would be of great advantage to the commerce of this country?—Yes, I believe so.

6834. (*Mr. Lindsay.*) Which are the most dangerous winds in the north channel?—Winds from north-east round to south-east, and even round to south-west.

6835. Then you recommend the construction of a harbour at the Skerries or Port Rush. Say that if a harbour were made there, would you run for it in a north-east gale?—Not in a north-east gale.

6836. Then it would be of no advantage in the most dangerous wind?—If bound out I got a north-west wind round to north-east, of course I would run for that.

6837. From the north-west round to north-east; but would you have a shelter at Port Rush or the Skerries in a north-east gale?—I should suppose so if the harbour were properly constructed. It would be no use unless the harbour was constructed to give shelter for these winds.

6838. You would not take that harbour in a north-east gale, when it blows right into it?—Suppose I could not keep my ship off?

6839. Would you consider there was anything for you but certain destruction if you ran for that harbour in a north-east gale?—I might find shelter there, and not elsewhere.

6840. Would you find any shelter there in a north-east gale? Look at the chart. Look at it carefully, and tell me whether you would find any shelter there in a north-east gale? (*A chart was placed in the hands of the witness.*)—I should say that shelter might be found there.

6841. How can shelter be found there? See here. This is the mainland. This is the Skerries' roadstead. There is the north-east, and a gale from that point would blow right into the bottom of the bay. How can you say, you could find any shelter there?—Would you not rather take that, than go on the rocks?

6842. Would you, as a prudent master, run for that harbour in a north-east gale?—I would, to try to save the ship.

6843. Do you think there would be any chance of saving the ship with a north-east gale blowing right into the bay, and a heavy sea tumbling into it?—I consider it as safe to go into as to run ashore on the rocks.

6844. Would you consider that would be safe anchorage in a north-east gale?—I do not doubt that it would if properly constructed. It would be just the same as Holyhead harbour with a gale of wind from the north.

6845. (*Capt. Sulivan.*) You said that when your ship was damaged you would have gone into port if you could?—Had there been a harbour.

6846. The wind was south-west?—Yes.

6847. Look at that chart, and tell me whether, with a south-west wind, that is not as safe a place now as if any amount of money were expended upon it. Tell me, if you can, in what way would any amount expended add to the security of that harbour in a south-west wind?—As to what amount of money it would take I do not know.

6848. A south-west wind is right off the land, is it not?—Yes.

6849. Then no works to seaward can add to its security?—No.

6850. Then why, if it gives perfect security with a south-west wind, did you not use it?—The harbour of Port Rush?

6851. No, inside the Skerries. I think you have mistaken the whole of the evidence. We are not talking of the inner harbour of Portrush, but of the whole of Skerries Bay. Now, with a south-west wind, is it not just as good a shelter as if all those rocks were built on and made a breakwater?—It would not be safe to run in there at night with a large ship drawing 22 feet of water.

6852. If a breakwater were built all over those rocks would it be any more safe?—I should think so.

6853. With a south-west wind?—If it is a safe harbour it would be safer.

6854. With a south-west wind?—With a south-west wind, I do not know that it would make it any better.

6855. Exactly; but you spoke of a south-west wind. The Skerries could not have been under your lee. It must have been dead to windward?—No, I was off the island.

6856. Look at the chart. Then you must have been dead to leeward, and had to work up to the weather shore?—At the time I was taken in a gale of wind I was out here (*pointing to the spot in the chart*). Here are the Skerries.

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6857. From the point of Rathlin dead to windward ?—But the wind might have been more to the south.

6858. But that would have brought it more off shore, would it not ?—No.

6859. Would you have a harbour of refuge on the weather shore for a gale of wind off land ?—No ; I do not contend for that, not for winds off shore but for other winds.

6860. Then it does not apply to the case which you were speaking of ?—It might have applied, I might have taken the Skerries.

6861. How, by working to windward ?—Not at all ; I could have run down to it.

6862. How, with a north-east gale ? This island would be the same, whether a breakwater were upon it or not ; why will not ships go in and anchor now ; there would be no more protection if a breakwater were completed ; can you tell me that ?—I do not know.

6863. Do you think any person would run into a bay open to the north-east in a north-east gale, because a breakwater had been built to close the west side of that bay ?—No ; a ship would only run for a harbour of refuge if the master considered it to be a safe harbour.

6864. I ask you to look at the plan and, as a seaman accustomed to see a chart, tell me, does not the rock afford as much protection as if a breakwater were built ?—I do not know.

6865. (*Sir F. Smith.*) How many openings are there now into that bay ?—Into what bay ?

6866. The bay of the Skerries. How many openings are there existing at this moment ?—There are a great many openings among the rocks.

6867. Principal openings for vessels to go in?—Only two that a ship would take.

6868. It has been a question discussed before this Commission as to which of the two openings should be closed, the greater or less ;—which, as a seaman, would you recommend to be closed, and which to be left open ?—I should say the one on the north side.

6869. You would leave that open ?—Yes.

6870. Have you ever been there in a heavy gale of wind and seen the effect from the sea ?—No, I have not.

6871. In proposing that this bay should be made a harbour of refuge, do you contemplate that anything more would be done than to fill up that space between the rocks with a breakwater ?—No.

6872. Do you contemplate anything beyond that ?—I do not contemplate anything as to the fashion of the harbour. I suppose a safe harbour would be formed. I do not know how it would be drawn out.

6873. You give no opinion as to forming a harbour, but you go the length to say that a proper harbour, closed to the principal dangerous winds, is what you desire ?—Yes.

6874. Then I apprehend you would wish that security should be given against north-easterly winds ?—Security against any winds which would be dangerous on the coast.

6875. There must be some opening into the port; where would you leave that opening. Perhaps you have not considered that ?—No, I have not.

Mr. Samuel Robert Graves examined.

Mr. Samuel Robert Graves.

6876. (*Chairman.*) You are chairman of the Shipowners' Association ?—I am.

7877. How long have you been connected with the shipping interest of Liverpool ?—About twelve years.

6878. You are acquainted with the subject of our inquiry ?—I am.

6879. Have you read the Report of the Committee of the House of Commons upon the subject ?—I have.

6880. Will you now state to the Commissioners your opinion generally as to the necessity or advantage of harbours of refuge ?—Do you mean generally or in our own channel ?

6881. I say generally, because, as you have read the Report of the Committee of the House of Commons, I should be glad to have your opinion first, generally, of any of the districts named in the report. —It was quite impossible to read that report without coming to the conclusion that harbours of refuge would greatly tend to the preservation of life, especially on the eastern coast of England.

6882. As respects the preservation of property, what would you be disposed to say ?—I think that property also would be saved to a considerable extent,—that it would tend to the greater security of property.

6883. And are you of opinion that the greater security of property would tend to lower the rate of insurance ?—Undoubtedly.

6884. As respects the advantage of these harbours of refuge as ports of call to shipping, for the purpose of taking orders, have you formed any opinion on that subject ?—They would answer as later ports of call ; but I cannot conceive that they would be used as ports of call for taking orders generally. It is not so much to inward-bound ships that harbours of refuge would be useful as to the outward-bound ships.

6885. Are you personally acquainted with the north-east coast of Scotland, from the Firth of Forth to the Pentland Firth ?—Except so far as travelling on the coast, not sufficiently to speak with authority.

6886. Can you give any opinion as to the best site for a harbour of refuge in that district ?—I should decline to offer an opinion on that subject.

6887. Have you been at Wick ?—No ; not so far north.

6888. As respects the north coast of Ireland, you are aware that in the report of the Committee of the House of Commons, the Skerries roads are named as a site for a harbour of refuge. Should you consider the establishment of a harbour of refuge there decidedly advantageous to the Liverpool trade ?—I think if a harbour of refuge could be formed there at a moderate cost, and easy of access at all times, it would induce many masters, especially those who are engaged in the North American trade, to take the north passage, in the spring of the year more particularly. The distance would be shorter by some 500 or 600 miles.

6889. Then, as respects the improvement of the harbour of Carlingford Bay, Wexford, and Waterford, so as to make them subsidiary harbours of refuge, do you think that would be of decided advantage to the Liverpool trade bound south ?—I would suggest that, in order to give you the best information as regards the precise spots which shipowners deem most advisable for the interests of trade should be made the sites of harbours of refuge, after you have received the evidence by the inquiries which you are now holding, that evidence should be submitted to the association with which I am connected and other leading associations. With that information, and their own experience of their wants, they would be able then to give a much better opinion than I can hope to do. The subject has been very briefly considered. It is a very large question ; and we have no wish to recommend any expenditure which might be useless. I would request that, before you report, we should be favoured with the minutes of evidence taken by you. On those minutes, and with the experience to which I have referred, we might give an opinion which would be of some use to you. At the same time I shall be very glad to answer any question.

(*Chairman.*) I shall not fail to bring your suggestion under the notice of the Commissioners.

6890. (*Sir F. Smith.*) Of course the public journals will give you the evidence almost as complete as our minutes, and no doubt the evidence which will appear in the public journals will be discussed by the various societies to which you allude ?—Quite so.

6891. It will be open to any society to make any suggestion they think proper to the Commissioners.—The object of my remark was, that I consider it would be wrong, without giving the matter more mature consideration than we have yet given it, to prejudge the claim of any particular locality as the best site for a harbour of refuge.

6892. I think you mentioned that you had read the report of the Committee of the House of Commons?—Yes.

6893. I presume you have read some of the evidence?—Yes.

6894. Were you induced to do so by the interest which you take in the subject?—I was.

6895. I suppose you are not the only person of authority who has been induced to read it?—I cannot judge for others. The Blue Book is very voluminous. Blue Books do not usually attract much attention.

6896. That is very true; but a question connected with life, I am sure, in Liverpool, would always be well looked into. A question, also, connected with commerce would, I presume, excite vast interest here. The general subject must have excited attention before it was ever intended to send out a Commission.—It has not up to the present time; but now that it has been brought so prominently before us by your visiting here, will receive more careful consideration.

6897. I am very glad to hear some good will come of it, and perhaps you will be more likely hereafter to give more valuable evidence than at the present moment?—Not evidence as regards the opinion of experienced ship-masters; but if you wish for the opinion of the ship-owners of Liverpool to assist you in your report, it would be necessary to consider more maturely the subject, and to read up the evidence which has been given, and will be given, before we commit ourselves to any particular sites. For my own part, I would rather leave it to the opinion of practical navigators, who have all their lives been up and down the channel.

6898. I presume some are here to-day?—I presume so. Some were examined before the Committee of the House of Commons.

6899. Can you give any idea of the aggregate tonnage which leaves Liverpool?—I have it, but I have not brought it with me. I can furnish it to you.

6900. Is it the habit of the great ship-owners of Liverpool to insure their vessels?—It is.

6901. I presume you are of opinion, indeed you said so, that the cost of insurance would be diminished if harbours of refuge generally were established where they are required?—That would be the tendency.

6902. Do you imagine that the great ship-owners would object to contribute something, in addition to any supply by Government, towards forming them?—I do. I think they would object to the construction of harbours of refuge for the saving of life, if they are to be taxed.

6903. You think that the construction of harbours of refuge for the saving of life a national and not a commercial question?—I think mainly so; both lights and harbours of refuge.

6904. But as far as regards the saving of property and the reduction of premiums of insurance, those are special advantages to the shipowners, are they not?—I take it that the saving of property also is a national question. From the miscellaneous character of all British shipping, including Her Majesty's ships and the packet ships, they are indirectly just as much the property of the nation as the lives of subjects.

6905. No doubt, to a certain degree?—Yes, to a certain degree.

6906. Then you think harbours of refuge quite a national object, and that no passing tolls should be enacted?—None whatever.

6907. Are you aware whether it is the practice of any great shipowners to give directions to their masters to avoid running into port under any circumstances?—I am not aware. I speak for myself. In the experience of 10 years I have known instances of outward-bound ships finding it necessary to seek a harbour of refuge.

6908. Any homeward-bound?—None, except disabled vessels or vessels calling for orders.

6909. And are you aware of any of those disabled ships being wrecked in consequence of the want of a harbour of refuge? Can you supply the Commissioners with any cases which bear strictly and clearly upon the necessity of harbours of refuge?—I think I can give one.

6910. It is not a matter of curious questioning, but to elicit an important fact.—I can name one. That is the case of the American ship, the *Columbus*. She was unable to weather Canabeg lightship, and made for Waterford harbour. When she got in she was afraid to run for want of water. It ended in her going ashore, and a loss of 50,000*l*. If there had been sufficient water in Waterford she would have run up and been saved.

6911. Is that the only case which comes within your memory?—That is one. If I taxed my memory I dare say I could remember others.

A return of such cases would be very desirable.

6912. (*Chairman.*) Are you able to furnish such a return?—I can; but I should not wish it to be supposed that wrecks in the channel arise from the want of harbours of refuge. They do not to any extent. The majority of Liverpool ships are well found and need no harbour of refuge? The master of a well found ship will prefer to keep round channel as long as he can, but a great number of ill found and disabled vessels, from week to week and month to month, would find harbours of refuge decidedly desirable.

6913. (*Sir F. Smith.*) Then you are inclined to ascribe a great proportion of the wrecks marked on the wreck chart to vessels being badly found rather than to the want of harbours of refuge?—Not so much to vessels being badly found as to other causes. I look upon it the primary cause arises from the imperfect knowledge of tides and currents. Imperfect knowledge of tides and currents, neglect of the lead, and a bad look out, are the three chief causes of wrecks.

6914. Do you think that casualties have arisen in any degree from the want of sobriety in the crews leaving ports?—I have not, within my own knowledge, known instances which would warrant me in stating that.

6915. (*Mr. Lindsay.*) Have you had a meeting of the Shipowners' Society before you attended here to give evidence?—I called a meeting of the committee to ascertain their views and general principles.

6916. Then on general principles you speak the views of the association?—I do.

6917. You have read the report of the Committee of the House of Commons, I understood you to say?—Yes.

6918. By that report you see that in the last 5 years there has been an annual loss of life of 830 persons, and an annual loss of property, amounting to about a million and a half. The object which this Commission has in view is to see if they cannot in some way mitigate those fearful losses and reduce the heavy casualties along the coasts. To what extent do you think that harbours of refuge properly placed would tend to reduce the loss of life and property. Have you turned that over in your mind?—That is a very difficult question to answer.

6919. Would it to a large extent?—I think one of the greatest advantages of harbours of refuge would be to mitigate the evils of collisions. I think our losses in our channel arise more from collisions than any other cause, and I think many masters, rather than risk themselves to the perils of collision, would be glad if they had the opportunity of using harbours of refuge, without any expense of going in, until the gale was over, to avoid the possibility of collision.

LIVERPOOL.

Mr. Samuel Robrt Graves.

20 Sept. 1858.

Capt. Sulivan.

6920. You said that, in your opinion, larger loss took place from ignorance on the part of masters, want of attention to the lead, and not keeping a good look out, than to ships being ill-found. Are there not other causes which tend to these great losses, as well as the system of lights and disorganisation of crews; because, as our main object is to see if we cannot reduce this lamentable loss of life and the great loss of property, can you suggest anything to be done in that respect besides harbours of refuge? Have you anything to say as to lights?—I have always felt that when possible a fair-way light, 30 or 40 miles off land, is a most valuable light. I say, if it were practicable.

6921. You think it best to light the fair way instead of the dangers?—If we had to begin *de novo* I would advocate that. I should not advocate any change at present, but I think a more uniform system of buoying harbours would be advantageous, greater uniformity of coast and harbour lights would be an advantage. I am afraid that this new system which has been laid down by the Admiralty to come into operation in October will materially tend to increase loss of life in the channel, unless some efforts are made to induce all nations to adopt the same. At present there is one system in the Baltic which is quite opposite to ours; other marine nations, the Americans, for example, have a system of their own, and all meeting in the channel, I am afraid it will lead to very great confusion.

6922. With regard to the expenditure of money on harbours of refuge, is it your opinion that good would arise if part of the money were spent in buoying and lighting the natural harbours, making them easier of access than they now are?—I think it would be exceedingly useful.

6923. There are many harbours not lighted or buoyed now, consequently ships in distress are afraid to run for them?—What you suggest would be very valuable, more especially for the smaller craft frequenting our channel.

6924. Do you think they are more required for smaller craft than for larger vessels?—I think they are. With the exception of disabled ships, it is the smaller craft which do require them, and when a ship is disabled she is glad to take them.

6925. You are Chairman of the Local Marine Board. I should like to know whether the working of that Act has had any bearing on the safety of life and property. Has it tended to improve the condition of masters and mates?—I think it has to a great extent.

6926. Do you think the shipping offices have been of much benefit to seamen. Have they raised their character?—I think seamen have partaken of the improvement of all classes—that they are a more sober and more temperate class than they were formerly. I cannot say that I attribute it altogether to shipping offices. The shipping offices have to a great extent put down crimping. In this town it has been put down, but I am afraid they are not as skilful navigators as they were when the apprenticeship system was in operation.

6927. Is it not the case that a large amount of life and property is lost owing to the disgraceful state of the crew immediately after they proceed to sea?—I do not know that it arises so much from the disorderly state of the crew. The system is for the crew to go on board ship at the pier head, everything is new to them, and no doubt in the first 24 hours they are not so well up to the working of the ship as in 48 hours.

6928. Can you suggest any improvement in that respect? Has it struck you that any improvement can be made?—I think the doing away advances would be the most effectual means of stopping it.

6929. That is one means—is there any other?—I think the greater encouragement of sailors' homes would tend to moralise the men.

6930. After seamen are shipped at the offices do you experience much difficulty in getting them on board their ships?—We did experience that difficulty' but owing to the present arrangement—a large staff with an effective head—we do not experience the same difficulty we did some years ago.

6931. Then it is the duty of your officers to see the crew on board their ship after they are engaged?—It is.

6932. Was not that their duty previously?—It was their duty previously, but we had not the amount of staff necessary to do it.

6933. You had not sufficient to carry it out?—We had not sufficient to carry it out.

6934. In a word, is it the opinion of the Shipowners' Association of Liverpool that harbours of refuge are necessary or are desirable. Is it the opinion of the Shipowners' Association of Liverpool that harbours of refuge are necessary, or simply that they would be desirable?—The opinion of the Committee of the Association is that harbours of refuge would be desirable—speaking of our own locality.

6935. Speaking also of your own locality, the feeling is that harbours of refuge are not so desirable to them as shipowners to lead them to say that rather than be without them they would pay a passing toll for their maintenance. Do you understand that? Do they consider that harbours of refuge are desirable, but not to the extent that would lead them to agree to a passing toll for their construction and maintenance?—We are already suffering under what we consider too severe taxation, more than our neighbours, who are competing with us, and we steadily oppose anything in the shape of a passing toll, however desirous we might be of aiding in the construction of such harbours as would save property.

6936. Then, in substance, you think that if harbours of refuge are to be made, it is a national object, for the national good, for the benefit of the nation at large, and therefore they ought to be constructed and maintained solely at the cost of the nation. That is the opinion of the Shipowners' Association?—Quite so; and I do not think it admits of any other point of view at the present day than that.

6937. (*Capt. Sulivan.*) In the case of the English colliery coast the dangers of wreck are far greater at present than is necessary, according to the average loss, are they not?—They are.

6938. Supposing the premiums of insurance on the English colliery coast to be 10 per cent. annually, if half those wrecks were saved by harbours of refuge the premiums would be reduced one half in the course of time, would they not?—They would.

6939. And a number of lives would be saved in addition to the property saved, would they not?—Of course there would.

6940. And the shipowners as a body suffer some loss more than the insurance—they are not always fully insured?—They are not always fully insured.

6941. Then what objection would they make to pay half the premium which they pay to the underwriters to harbours of refuge if they save them from loss and save life as well, instead of merely receiving a certain per centage when loss has occurred?—If the shipowner received the difference of insurance which would accrue from harbours of refuge there is no reason why the ships in that particular locality should not be taxed; but it might so happen, and I am afraid it would happen, that competition would give the public the advantage of the reduction, and not the shipowner. therefore I would urge that it is more a national than a shipowners' question.

6942. Then why does competition not act in the same way at present. If you consider the dues to harbours of refuge as a case of premium, it is the same with premiums of insurance. Is it not exactly a similar case to insurance, with one exception, that one repays you after loss, the other prevents loss?—I do not quite see the point of view in which you wish me to see it.

6943. If harbours of refuge reduced premiums one half, and if half the present premiums of insurance were paid to harbours of refuge, would not that be

paying for the safety of property, with this difference, that you would save life and property instead of being repaid only for the loss of property?—I should look at that as paying to the Government with one hand and receiving it with the other—merely giving to the Government what would otherwise accrue to the public.

6944. But if you save paying to the underwriters or to a club in which your vessel is insured, and secure the safety of your vessel and crew by paying to harbours of refuge, is it not precisely the same thing?—You are supposing that a vessel is always trading between two ports?

6945. I am. I told you the east coast of England. I told you a collier running regularly between Newcastle and London, and supposing a harbour of refuge available at all times of tide, and all weathers, where the dangerous part of the coast is, and where wrecks now occur, prevented half those wrecks, whether it would not be better for the shipowner to pay a proportion of what he now pays for insurance to harbours of refuge, which would save life as well as property?—That would not be a passing toll then.

6946. Oh yes. I am speaking as if half the amount of premiums of insurance were paid in the shape of a passing toll at every voyage?—But, as a Liverpool shipowner, I should derive no advantage from the harbour you are now alluding to.

6947. I am alluding only to vessels which pass that harbour in their voyage, a harbour with depth of water sufficient to make it available at all times of tide?—Vessels running on that coast are liable to another competition, and that is the railroad, which renders it important that the ship should carry her cargo at the lowest possible price, and I cannot but think that if the premiums of insurance were reduced one half, the whole saving would go into the hands of the public, not into the hands of the shipowner, and I think the shipowner would rather pay it in the shape of reduction of freights than as a tax upon his vessel.

6948. But if on the average half the losses were saved, then does it make any difference whether the shipowner pays to the insurance club or to the harbour, if one is equally effective as the other in preventing loss; is it not another means of insurance?—I cannot see it in the light in which you wish to put it; one is a prospective good, the other is a positive good.

6949. Upon what principle would you rather pay five per cent. to insure for half the danger now existing, than pay five per cent. to harbours of refuge, which would save the whole loss, both of life and property?—There is something so obnoxious in the shape of a passing toll, that I should prefer to pay the underwriters rather than allow my ships to be taxed. In the present day we are open to competition, our neighbours are free from taxation, while we are suffering many burdens; but upon the broad principle, that everything should be free in the shape of shipping, I object to a passing toll.

6950. Then why do you insure your vessel?—I should be a very imprudent man if I were not to insure.

6951. Supposing the whole of the vessels now lost were saved by harbours of refuge, if you got the same safety for your vessels by paying towards them, and paying the same amount as you now do for insurance, you would not be the loser, would you?—If your premises were right I should agree with you, but, with every respect, they are quite wrong. You are now putting to me as a Liverpool shipowner the question of saving a ship in our channel, and upon a voyage of 12,000 miles you are only taking the risk of getting out of the haven; I think it is quite irrelevant to speak of avoiding one insurance by having a harbour of refuge or two in the channel.

6952. You were asked the question with respect to passing tolls generally, and the principle which applies almost directly to the east coast of England. I distinctly began by putting the question of an English collier ship passing in her voyages to and from harbours of refuge, and the question had no bearing at all on a case of a Liverpool ship, therefore the questions directly following you did not understand?—Oh yes, I quite understood.

6953. I think that if harbours of refuge at the same cost as premiums of insurance save property and save life in addition, the shipowner is better off than if he loses a ship and the money is recovered by him from the underwriters?—I stated early in my evidence that harbours of refuge tended to some extent to the preservation of life—to some extent I say, and not to the same extent to the preservation of property.

6954. And the premiums of insurance are only affected in the ratio of the saving of property?—The premiums of insurance are regulated by the reduction of the risk on the voyage which the underwriters may suppose harbours of refuge have afforded.

6955. But in saving that per-centage of property, you would also be saving life. That you allow. Then why would the merchant object to pay the same amount for the safety of his vessels with the addition of the saving of life that he would pay for insurance to recover only the money after his vessel was lost. That may be a point clear to mercantile men, but I cannot understand it?—Perhaps the best answer, rather than to argue, is to say that our premises are not at all the same. We look at passing tolls as so obnoxious in principle that we should very much prefer not having harbours of refuge if they are to be at the expense of the shipping interest of the country.

6956. Was it not the case that most of the harbours for which passing tolls were paid, had not depth of water enough for large ships?—That made the impost more objectionable.

6957. Do you not think that the objection to passing tolls would have been very much weakened if all the harbours had water available for large ships, at all times of tide?—I do not think it would.

6958. You were speaking of losses caused by neglecting the use of the lead?—Yes.

6959. Therefore, if there were greater facilities for using the lead in merchant ships it would tend to the saving of property?—I think it would.

6960. Are you aware that there has been for many years a simple contrivance, by which casts of the lead in short depths can be taken without the vessel heaving to?—I am.

6961. Are you aware whether merchants generally supply their ships with that apparatus?—You are not now speaking of the revolving lead.

6962. Oh no, the common lead for using without bringing to?—I think the better class do, but I should say the majority of ships are without them.

6963. Do you not think it would be much fairer to the masters, who suffer for the want of it, if owners of ships were to supply it, the cost of such a lead being only 1*l.* or 2*l.*?—I think any shipowner who was asked by his master to give him one of those leads would do it at once.

6964. What proportion of the ships with which you are acquainted have anything besides the deep sea lead and line?—I do not know the particular instruments which each master has, but we generally judge by the intelligence of the men that they have all they require.

6965. Is each master obliged to buy his instruments himself?—Sometimes he is, but sometimes he is not.

6966. Do you know any instance of a master being supplied with the simplest mode of sounding without heaving the ship to?—Yes, I do.

6967. But not generally?—A very large proportion of the vessels coming here are foreign shipping, at least a half; but of the vessels sailing out of Liverpool, most of them are supplied with all the modern appliances for ascertaining the depth of water, temperature, &c.

6968. Then has it never struck you as extraordinary, that in all the cases of loss into which the Board

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of Trade have inquired from a Peninsular and Oriental steam ship down to the smallest coaster, there was never one in which such means of sounding were provided ?—I am very much surprised to hear it.

6969. It has never struck you in looking to these inquiries ?—No, it has not.

6970. You spoke as to bringing on a more uniform system ?—I have observed going in and out of harbours each has its own system as regards colour. One is red and white, another red and black—some green. Now I think if buoys were uniformly one colour on the starboard and another colour on the port side, it would be useful in entering harbours. I think the Scotch system differs from the Irish.

6971. I think the Scotch system is similar to the Liverpool—black and red ?—Yes, black and red.

6972. Have you ever heard any objections made to having two dark colours ?—I do not wish to advocate black and red.

6973. I merely mentioned it, because it has been objected that when two such dark colours are selected they are very likely to be mistaken. Now, speaking of seamen being crimped, if you were told that the system was still in existence, that the English seamen were very much in the hands of the crimps, and that there was a difficulty to break through it, do you think that would be incorrect ?—From information which I receive from week to week, as to the working of the system of shipping offices, I find that the deserters are reduced to almost a nominal number, that is, of seamen once boarding ships and not leaving with the vessels, I think it is checked a great deal with regard to British vessels. Of course, seamen are not followed when paid off, and we do not know into whose hands they get ; but I speak more particularly of the shipping of seamen.

6974. (*Sir F. Smith.*) Is it left to the master of a vessel to decide whether to take the north or south passage, or does the owner prescribe the course to America ?—Generally, I should say, it is left to the discretion of the master.

6975. Have you any reason to suppose that the north passage would be more frequently taken if there were a harbour of refuge on the north coast of Ireland ?—No, except that I fancy the knowledge that there was a harbour in the narrow waters between the two channels, that a vessel could go easily into and out of, would give greater confidence to the master, instead of knowing, as he does now, that if he meets with wind from the north or west, he must put back or go into Belfast Lough.

6976. Has it ever come under discussion among you, whether a harbour of refuge is necessary at the Land's End ?—No.

6977. Nor in the Bristol Channel ?—Nor in the Bristol Channel.

6978. (*Mr. Lindsay.*) I think I understood you to say that the primary object of harbours of refuge was the saving of life ?—Yes, the saving of life.

6979. Then you mean not merely the lives of the crews in ships, but the lives of all passengers going foreign or going along the coast, which now amount to a very great number annually. I presume you include every one going on the sea ?—Of course.

6980. Would you not consider it unjust in the extreme to tax one class of the community to save the lives of the whole ? Would it not be fair, if the whole are interested, as almost the whole are, occasionally obliged to go from port to port, if not to foreign stations ; would it not be just that they should pay as well as the shipowners ?—Certainly ; I am quite of opinion it would be most unjust to tax one class only.

6981. You think that for constructions in which all are interested all should contribute ?—In point of fact the interest which the shipowner has in the question is so small that too much reliance should not be placed on it. The public generally are more interested in this question than the shipowner.

6982. You consider the primary object the saving of life ?—Just so.

6983. As to the saving of insurance, if harbours of refuge led to a reduction of premiums to some extent is not the competition between the English and foreign shipowners so very great that the public would also gain in that respect ? Would not the consequence be, that if premiums of insurance were reduced, freights would also be reduced, and the public would consequently gain the full amount of reduction ?—I endeavoured to state so in my answers to Captain Sulivan.

6984. I want it more clearly.—I am quite sure the shipowner will not gain in the slightest degree. The competition is such, that if the shipowner saved 5 per cent., it would go directly into the hands of the public in the shape of reduction of freight.

6985. Do not various nations light their own shores ? Does not America ?—America does.

6986. Does France ?—France does.

6987. Do you not think it the duty of highly civilized nations to light their own shores and warn strangers of danger ?—The same principle which applies to harbours of refuge applies to lights. If they are for the public good and used by every class, they should be paid for by the community.

6988. You would also include the benefit of foreigners frequenting our shores ?—Yes, it is a great benefit.

6989. A great benefit to the world at large and to all having connection with England ?—That I say as my own opinion, not as the opinion of the association.

6990. (*Chairman.*) You are probably aware that the chief defence of the country, as respects the navy, must be drawn from its maritime population ?—I am.

6991. And that that maritime population bears a very small proportion to the population from which the army is recruited ?—Quite so.

6992. Therefore, it necessarily follows that the proportion of men drawn from the maritime population for the defence of the country must be very much larger than that drawn for the army ?—Pro rata.

6993. Pro rata ?—Quite so.

6994. And therefore that this burden of personal service, whether voluntary or to a certain extent compulsory, falls far more severely on the seafaring population than on the remainder of the population of the country ?—It does.

6995. Do you consider that forms a claim upon the country for something in the shape of protection to their lives and property, which should be granted to them, and to those connected with them, free of all expense whatever ?—Looking at it in a national point of view, I think it does give them a claim for greater protection.

6996. And therefore that is a substantial reason why no passing tolls should be collected from them ? —It might make one reason, but I should not base my conclusions altogether on that. We have been looking more to the direct question, and not so much to the point of view in which you have now put it.

6997. You are probably aware that Wick is a great rendezvous for fishermen on the north coast of Scotland ?—Yes.

6998. Should you consider that these fishermen, amounting to 6,000 or 7,000, who for a period of twelve weeks annually go out to the fishing grounds every night, have also some claim on the country for protection to their lives and property upon the same ground as that which I have just stated ?—I should almost have said more so.

6999. And do you consider that the mercantile and commercial men of this port, which is the second port of the kingdom, would object to see a considerable expenditure in the north of Scotland for that especial purpose ?—I should hardly like to commit the great error of a great expenditure at one place, with the harbours which we have seen constructed, and which are of little value. I think we should rather encourage a moderate expenditure generally diffused than any large work for particular localities.

7000. (*Capt. Sulivan.*) I wish to ask one question with respect to America. You say that America does not charge for lights. Have you any harbour tolls in America which makes up for the tax paid for lights in this country?—I do not think there is any charge of the same nature. They have local harbour charges, but no general tax for the support of lights.

7001. For instance, take a sailing ship of 1,000 tons, what taxation has she to pay in New York?—I shall be very glad to furnish you with that.

7002. I wish it particularly.—I shall be very happy to furnish you with the expenses of ships in foreign ports.

7003. The same with regard to France. Do you know any port in France where a vessel does not pay very heavy dues, much more than the charge at Liverpool? I am unable to answer the question, but I shall be very glad to furnish the Commissioners with information on these or on any other points on which they may desire information.

Mr. Charles Langton examined.

Mr. Charles Langton.

7004. (*Chairman.*) What is your occupation?—I am an insurance broker.

7005. How long have you been connected with the port of Liverpool?—Between ten and eleven years.

7006. Have you turned your attention at all to this question of harbours of refuge?—We have had the question before our association incidentally on the occasion of an application for the support of the association from Wick. It was either Wick or Aberdeen, I forget which. They requested our co-operation, but we took no steps beyond giving publicity to the memorial which they wished to be signed.

7007. Can you afford to the Commissioners any opinion as to how the question is viewed by the underwriters of Liverpool?—Generally, I think they consider it would be very advantageous to the protection of their interests, and likewise for the protection of life and property. Naturally, what protects life and property would be a protection to the interests of an underwriter.

7008. And do you think that the establishment of a harbour of refuge, say on the north coast of Ireland, would have any marked effect on the rate of insurance in Liverpool?—Perhaps not immediately; it would be very difficult to say what effect harbours of refuge would have on premiums of insurance. They are already very low, and I do not think, in the way business is carried on, harbours of refuge would have the effect in the same measure as is thought by many.

7009. Have you underwritten ships returning from the Baltic late in the year?—Yes.

7010. Now how do you think a harbour of refuge in the neighbourhood of Wick would affect the Baltic trade homeward bound to Liverpool?—You will hardly expect me to say whether Wick or Aberdeen is the better port. We are not very competent to deal with a subject of that kind; therefore the general feeling which we have is that we consider it would be advantageous, and we observe it is very necessary in the fall of the year that there should be some safe place there for homeward bound ships from the Baltic.

7011. (*Sir F. Smith.*) Have you by any chance examined the Admiralty wreck chart from 1852 to 1856 inclusive?—I cannot say that I have examined it closely.

7012. Will you just cast your eye over it? You will perceive that the chart shows for five years the losses from various causes, and the collisions which have happened on the coast; having looked at that chart, and having been connected with the business of an underwriter at Liverpool for ten years, I think you say?—Yes.

7013. Have you, of your own knowledge, any information to offer as respects any wrecks which have happened during that period on the coast of England?—I have naturally, in the course of my business, become acquainted with vessels wrecked in which I have been a sufferer myself. By this chart I clearly observe that a large proportion of wrecks occur on the east coast. That arises, I suppose, principally from the nature of the trade.

7014. There is a total want of a harbour of refuge?—I believe so.

7015. Have you insured for that coast?—No, chiefly here.

7016. You have confined your business chiefly to the trade from Liverpool?—We do not confine our business to any particular place, but the trade from this port is that which comes particularly under our notice.

7017. Should you make any difference in insurance to vessels going north about or south about from Liverpool to America?—No.

7018. None whatever?—No.

7019. Should you consider it desirable to have a harbour of refuge on the north coast of Ireland, say at the Skerries?—I cannot state whether the Skerries or any other place would be most desirable. I have heard Mr. Graves' evidence, which I think, in the main, agrees with the common impression, and certainly as far as his evidence as regards ships leaving this port.

7020. Do you, as an underwriter, consider that a great proportion of the losses arises from the state in which crews are embarked and leave port?—We have suffered from that cause, and I think it was one of the causes to which they ascribe the loss of the *Tayleur*. She left at once, but now all the passenger ships remain, I believe, in the river a day or two rather as a safeguard.

7021. The Commissioners heard in another part of their inquiry, and at another port, that masters of ships were desired by the owners to make the voyage and avoid all ports. Would that circumstance, if it came to your knowledge, induce you to put a higher premium on the ship if you insured?—No, I do not think so. It would never probably reach the ears of an underwriter, and all prudent underwriters consider the owners of the vessels and the masters in them. It is a common saying "you very often vouch the master instead of the ship."

7022. You say that you have had several losses in ten years?—Yes.

7023. Where they on the coast of England, Ireland, and Scotland?—On all.

7024. On our own coast?—Off one port on the coast of Ireland mainly; a great number in the St. George's channel.

7025. What part?—The Blackwater bank has been very fatal to us here, in losses of both life and property; and I may mention that in the year 1855, a sub-committee was appointed of our association, for the purpose of considering the lights in the channel, more especially in reference to lights on the Blackwater bank and Sand Badrig.

7026. Supposing it were left to a committee of underwriters, and you as chairman of that committee, to select points on the west of Ireland for harbours of refuge, where the greatest amount of property and life might be saved, what point should you indicate as being most desirable to form such a harbour?—I think I may state just as a general impression that the Blackwater and Arklow banks have been those most dangerous to vessels leaving this port; and to vessels coming in, perhaps Cardigan and Caernarvon bays.

7027. There have been many wrecks in Caernarvon Bay?—The wrecks have mostly taken place, I think, close in under the Stack, in thick weather very often.

7028. Do you hold the opinion that the Consolidated Fund should be the only fund from which money should be drawn for the construction of these harbours of refuge?—Perhaps that is a question not

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for me to discuss. I would rather not enter into that subject if it is agreeable to you.

7029. You have no expectation that harbours of refuge would reduce premiums?—I am not sure that they would much influence premiums of insurance.

7030. Not essentially?—No, because premiums are so low; it would be a long time before there would be any effect produced.

7031. May I ask whether the great majority of losses are on our own coast or foreign coasts, or on the intermediate passage?—I cannot answer that question.

7032. Can you get the information?—I might up to a certain extent, but I am not sure that you could not get it from your own records already complete, from which the wreck chart is framed.

7033. (*Mr. Lindsay.*) Are you a shipowner also?—I am partly, but I have no management of ships.

7034. Only an owner to a small extent?—Only to a small extent.

7035. You are therefore the more likely to give an impartial opinion. Now tell me whether the tax for harbours of refuge ought to be borne by the Consolidated Fund or by the shipowners?—I do not think my opinion will carry very much weight, and I feel I am not very competent to give an opinion.

7036. I think, Mr. Langton, it would carry weight, and therefore I ask the question.—On the whole, I am inclined to think it should be a national undertaking, and that the public indirectly would get the benefit of it.

7037. Reference was made to the Pentland Firth. I want your opinion on one point, because it is a question upon which there is considerable difference in the evidence. Do you charge extra premiums of insurance on ships going through the Pentland Firth?—No.

7038. Do you insure many ships going to the Baltic?—At one time there was a great trade from here, but now it goes chiefly to the eastward. There is less insurance from the east coast, and a saving of time in the voyage.

7039. You have had severe losses by ships getting on the Blackwater bank; do you know what was the state of the weather?—Very often in fine weather.

7040. Clear weather?—Yes, clear weather.

7041. Was it in making the land?—No, outward-bound vessels.

7042. Is it the state of the current? Can you account for it all?—From information, I fancy it is the state of the current, and perhaps some other causes—insufficient care on the part of shipmasters, neglect of the lead, and other things.

7043. Do you think a harbour of refuge would tend in any way to prevent such losses as those to which you have been referring?—For outward bound vessels, it is rather a point of seamanship—rather a point for sailors—but I do not know any great advantage from a harbour of refuge in that immediate locality.

7044. What is your opinion of the lighting of St. George's Channel; do you think the north channel sufficiently lighted?—In 1855 we entered into this subject—our committee did—upon the application for support from gentlemen who wished a light to be placed on Sand Badrig. It was brought before Parliament, and memorials were sent to have a light. The representations were so strong, that we went into that at the time, and took the evidence of many seafaring men at this port, and of Lieutenant Lord, and of Captain Rarey, who is connected with the Cunard boats, and the evidence of the whole of those gentlemen tended to show that no alteration was desirable up channel. We considered the question of a fair-way light. Mr. Herbert was down at the time, and it was made the subject of a memorial to the Board of Trade, who laid it before the Trinity Board, and I hold in my hand the answer from the Board of Trade, who thought it undesirable and rather impracticable.

7045. You have no objection to the lighting, then?—No, we tried to get a light on the Blackwater Bank, which has since been put up. We memorialised the Ballast Board of Dublin; and there is one point which strikes me, and perhaps, as I shall have no other opportunity, you will allow me to state, that we think another light in Cardigan Bay, somewhere out between the Bishops and Bardsey, would be desirable. It is a distance of about sixty miles, and those whom we have consulted deem that rather an extreme distance, more particularly as Sciborben Point stretches out, and we have had losses off there, and there is no very good guide to St. Tudwall's roads, which is a capital harbour of refuge itself.

7046. Did these wrecks to which you refer take place before the light was put on the Moneyweights?—Speaking from recollection, mainly, I think, before the light was put there.

7047. Is the north channel, in your opinion, sufficiently lighted?—I think it was the opinion of the committee that it was; in fact, that the lights up channel were very good indeed; in fact, the impression was that a multiplicity of lights is rather a disadvantage than an advantage.

7048. You said to Sir F. Smith that in insurance you make no difference whether a vessel take the north or south channel, and that you allow them to take any channel?—Yes.

7049. Then there is no extra risk in taking the north channel?—None whatever.

7050. Because it has been stated in evidence that if there were a harbour of refuge, a great many ships would take the north channel which do not take it now. You say that there is no prohibition, no restriction on them at any season or at any time?—None whatever.

7051. (*Capt. Sulivan.*) You say you make no difference in premiums on ships going through the north channel?—None.

7052. Have you any clause in your policies that if the ship goes through the Caledonian Canal the premiums shall be reduced?—On all late vessels coming from the Baltic there is a small return; but there is only a proportion of vessels which can come through the Caledonian Canal.

7053. But when vessels can come through there is a reduction, because they escape the dangers of the north passage?—It is a very common thing to make a return.

7054. Have you ever heard of a reduction of the premium of insurance on a ship which more than equalled the dues which she pays to go through the canal?—That I should say was really very possible and very common.

7055. Then, escaping the passage through Pentland Firth is considered to lessen the risk of loss?—No doubt.

7056. Speaking of the losses on the Blackwater bank, are you aware that losses generally occur on those shoals in thick weather from neglect of the lead; is that the result of your experience?—I should be disposed to say that it was.

7057. Are you aware that this danger can be guarded against, by a single cast of the lead?—No doubt.

7058. Do you ever make it a condition that the ship shall be provided with means of sounding?—One general safeguard lies in the respectability of the owners, and the parties with whom we deal. We cannot in the course of business make that stipulation.

7059. Have you ever heard it remarked that underwriters are not interested in reducing wrecks as others are, because if ships were perfectly safe underwriting would soon cease altogether?—No.

7060. But premiums of insurance come down with a reduction of losses?—The opinion of a great number of underwriters is very unfavourable to the present rates of premium.

7061. But I believe they are calculated on the average of losses?—I do not think there are any very accurate calculations for insurance.

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7062. What was the suggestion as to Cardigan Bay?—It was suggested that there should be a flash light on Sand Badrig ; it is called the Causeway.

7063. But in Cardigan Bay, near the port of Cardigan, have you ever heard any suggestion of a light? —No, never.

7064. Is Cardigan Bay generally avoided by merchant ships?—If there were a light they would make more boldly for the Welch coast, to avoid the tide.

7065. I think it has been stated that the set of the tide carries ships into Cardigan Bay ?—I believe so.

7066. Do you know any case in which parties interested in the Liverpool trade have applied for a light to the Trinity House or the Board of Trade?—No, I cannot say that I do.

7067. Do you know any reason why if they wish a light they do not make application to have it considered?—I cannot say. The only persons who have considered it are the committee of our association.

7068. Will you suggest to them to consider the subject again, and if they think it desirable to make an application ; I mean with regard to a light between the Bishops and Bardsey lights ?—Yes, I will bring it before them.

7069. You said that wrecks had taken place chiefly on the Blackwater bank before the light had been put there. The light has not been there sufficiently long to ascertain whether it has had any effect?—I do not recollect any late wrecks on the Blackwater bank. There was one the other day on the Arklow banks.

7070. Is it not frequently the case there that ships get on shore when the weather is not clear enough to see the light?—Yes.

7071. Is that light very little protection against a ship going on shore if she neglects the lead ?—I do not understand.

7072. In thick weather, the light cannot be relied on for carrying vessels off the bank if they neglect the lead?—No, certainly not.

7073. (*Mr. Lindsay.*) You said that you charge less premium of insurance on vessels going through the Caledonian Canal than upon the vessels going north-about?—Yes.

7074. Does that arise from the distance being shorter and the dangers less than those to which ships are exposed in the North Sea ?—It arises from the dangers being less.

7075. But would you make any difference in the premium of insurance on a vessel making her passage to the north of the Orkneys to what you would if she were going through Pentland Firth?—No ; we do not go so much into the minutiæ of distance as that.

7076. (*Chairman.*) I think you have a wreck chart there?—Yes.

7077. Does that wreck chart which your hold in your hand show total casualties 5,128 ?—Yes.

7078. Now, from your experience as an underwriter, what proportion of these casualties are you disposed to say would have been met by harbours of refuge; because out of the accidents which occur at sea, whether wrecks or otherwise, great numbers we know arise from neglect, carelessness, drunkenness, and other causes of that description which harbours of refuge would not meet at all?—To take them in their order, I should say that with regard to stranding, harbours of refuge would have been of very great use, as I perceive this number of vessels stranded is made up in a great part of vessels employed in the colliery trade on the east coast ; therefore, I conceive a harbour of refuge would be of great service to them, and diminish the losses. With regard to collisions, I am of opinion that harbours of refuge would not be of any very great service except in very thick weather, when captains would go into harbour rather than risk collision by keeping out supposing they had it handy. The same remark may apply to serious damage. On the whole it appears to me that harbours of refuge would be of very considerable advantage to vessels, more particularly in the case of stranding and partial damage.

7079. From your experience as an underwriter, even in the case of stranded vessels, do you not find accidents frequently occur from other causes not preventible by harbours of refuge ?—No doubt.

7080. Can you, for a period of one, two, or three years, furnish the Commissioners with any return which will show the proportion of casualties preventible by harbours of refuge, and cases clearly not so ?—I am afraid that would be a very difficult and a very laborious task for anyone to attempt. When I go back I will consult our books and secretary, and see if we can furnish any information of that kind, and if so, it will be at your service.

7081. Say, for a period of one year only ?—I will see.

7082. (*Mr. Lindsay.*) Having had great experience as an underwriter, have you had many losses off the Isle of Man?—I remember some few, but they are not very many.

7083. Have you formed any idea in your own mind as to the necessity of a harbour of refuge at the Isle of Man?—I cannot say that I have. My impression would be, that it is hardly needed there.

Mr. Alexander Coghill examined.

Mr. Alexander Coghill.

7084. (*Chairman.*) What is your occupation?—Shipagent and shipowner.

7085. How long have you been connected with the port of Liverpool in that capacity ?—I have been 20 years in business on my own account, 25 years altogether.

7086. And the shipping which you have owned, in what direction have they traded?—To the north-east of Scotland and to the Baltic.

7087. Have you any opinion to offer as to the advantage or necessity of a harbour of refuge on the north-east of Scotland or in the Pentland Firth ?—I came to speak especially of Wick, as I believe there is no part of Great Britain where a harbour of refuge is more requisite than at Wick, or on that coast at all events.

7088. Will you state your reason for that opinion ? —My reason, in the first place, is on account of the very great local trade, particularly in the fishing season, and likewise the passing trade. I have no doubt many ships coming from the Baltic to and from, would be saved if there were a harbour of refuge there.

7089. Is it a subject upon which you have conversed with masters of vessels, as one in which you have been interested?—Yes, I have, repeatedly.

7090. You have conversed with them ?—Repeatedly.

7091. And the opinion which you have formed is based upon their nautical experience and not upon any personal knowledge?—On their experience as well as my own personal knowledge.

7092. Have you ever been at sea?—Occasionally.

7093. (*Sir F. Smith.*) You speak of that coast and of Wick on account of your personal knowledge?—Yes.

7094. What do you mean by personal knowledge ? —I am a native of the place.

7095. Of what place ?—Of Wick.

7096. How long is it since you left Wick ?—Twenty-five years.

7097. But the fishing is very much altered in that time?—The number of boats is greater and they are larger.

7098. And the want of a harbour of refuge is greater?—Yes, very much greater.

7099. Have you any knowledge of the number of losses in recent years ?—I have no statistics. I only know that some few years ago there was a very serious loss of lives, and even this season vessels have been obliged to lay in the bay as much as 10 days owing to the want of room in the harbour.

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Sir F. Smith.

7100. Are you at all connected with the fishing?—No, I am connected with the shipping belonging to Wick.

7101. Do you make the fishing a subject of study?—Yes.

7102. Are you of opinion that many lives would be saved if there were a harbour of refuge there for the fishermen alone?—I am certain of it.

7103. Even if it were unfit for the passing trade it would be desirable as a national object to make Wick a harbour of refuge for the fishing boats?—I think it would.

7104. Are you at all aware that for a considerable portion of the fishing season vessels do not go out in consequence of a fear of bad weather coming on, which vessels would go out provided they had a harbour to run for in case of bad weather?—I know that vessels now are glad to get out if there is the least chance.

7105. Even as it is now?—I speak as to sailing vessels.

7106. My question was entirely confined to the fishing trade. I wanted to know whether you had reason to know that the fishing boats are deterred from going to sea, because in stress of weather they have no place of shelter?—I have often known a loss of life, because there was no safe harbour to run to.

7107. Then do you think that the catch of fish would be increased if they had a harbour to run to?—I think it highly probable.

7108. Do you think that a national object?—I do.

7109. Inasmuch as it would increase the amount of food for the poor and raise a hardy race of seamen for the navy?—I do.

7110. Do you know anything of the east coast of England?—Not particularly, I know more of the coast of Scotland.

7111. Do you know anything of the coast here?—No.

7112. (*Mr. Lindsay.*) Are you from Wick?—Yes.

7113. Are you interested in ships?—Merely as agent; I am agent for all the ships belonging to Wick.

7114. Then when you recommend it as a harbour of refuge, you recommend it as a national object and you include the passing trade, as well as the trade of the place?—I think if it is applicable for one it is applicable for both.

7115. Do you think Wick the best site for such a harbour?—That is my opinion.

7116. What are the most dangerous winds on that coast?—From north-east to south-east, I will take that range.

7117. Do you know Long Hope?—I know the position of it, I have not been there.

7118. Can a ship get in and find shelter there?—If south of Duncansby she would find a difficulty when she could get to Wick.

7119. But she could easily get there with a south-east wind. How far is it from Wick?—About 40 miles.

7120. Then if there is good shelter in the prevailing winds at Long Hope for the passing trade, why do you recommend Wick as the best site for a national harbour?—In the first place I consider that supposing a vessel were caught with an east gale off Wick bay, 20 miles off, and could not fetch Long Hope, she would be obliged to run for Cromarty. Many vessels have been lost in running there, when if they could have got into Wick they would have been in safety.

7121. Considering the passing trade, and presuming that there is a safe harbour at Long Hope, which in your opinion would be the best site, Wick, Fraserburgh, or Peterhead?—I think Wick still, because of its being so near the Pentland Firth.

7122. Is there not a large trade from the east coast of England to the Baltic and Archangel?—There is undoubtedly.

7123. If it rested between Peterhead and Wick, to which would you give the preference?—A harbour is desirable for Peterhead as well as Wick; but supposing there were only one, I should say Wick.

7124. That being the case, that there is a very large trade, and numbers of vessels frequenting the north from the east coast of Scotland and the north-east of England, why do you hold the opinion, that for the passing trade, Wick would be a better site than Peterhead?—Because, in the first place, for vessels bound westward it is more convenient to take Wick.

7125. But for vessels trading to Archangel and the Baltic?—In that case I should say it is quite as convenient as Peterhead, there is very little difference.

7126. Would it not be very much out of the track of such vessels?—I do not think it would; it might for some vessels, but generally I should say it was convenient.

7127. If there were to be but one harbour, I understand you would prefer Wick?—That is my opinion.

7128. At the same time you think there should also be a harbour at Peterhead?—Yes; because the trade is very extensive all the way from Inverness.

7129. You are now resident at Liverpool, have you formed any opinion as to a harbour of refuge in the north channel?—No; except one at the Skerries would be very useful.

7130. As to the Isle of Man?—Judging from the few wrecks I should say it was not called for.

7131. Have you any opinion as to the necessity of a harbour of refuge on the north-east coast of England?—No, I have not thought much on that point.

7132. (*Capt. Sulivan.*) From what you know of the Pentland Firth, do you think any vessel bound from the Baltic to the west, with the flood tide running and a gale from the south-east, would dare to enter the Firth?—I believe very few vessels would attempt it.

7133. Would any vessel run across that race to get to the Orkneys?—Comparatively few would attempt it.

7134. Would it be safe?—It would be rather a risk.

7135. Speaking of a harbour of refuge to be made as a national harbour, do you consider any port which is not situated in or what may be a dangerous lee-shore, and is merely a place for vessels stopping in foul winds, such as would justify an outlay of public money?—I do not understand.

7136. Do you consider any port which may be very useful for ships stopping, but where there is no danger of going on a lee shore, such as would justify the making it a harbour of refuge?—I do not think it would.

7137. Do you see a great distinction between a refuge harbour on a lee shore, that a vessel must go into if disabled, or be wrecked, and a harbour which is a good stopping point in foul winds, but from which vessels can go off and be in no peril of wreck?—I see that difference.

7138. Where a harbour is only wanted for stopping, will that justify an outlay of public money?—I do say it would in the case of Wick, where the local trade is very great.

7139. I am asking whether you think an outlay of public money on a port where a ship can get off on either tack is to be justified?—I should say not.

7140. Do you know Peterhead?—I do.

7141. Can you tell me any possible wind in which a ship could be caught on a lee shore near Peterhead or Fraserburgh?—I can suppose that with a north-east very heavy gale she could be driven on shore there.

7142. That is one point?—Yes.

7143. Could she not keep off on either tack?—Supposing she were a distance off she could weather it.

7144. Have you heard of any wrecks occurring there?—I think I have.

7145. Do you know whether those ships were driven on a lee shore or were shaving the land too

close, and so ran on the rock ?—I think I know cases of wrecks from vessels being driven ashore.

7146. If a harbour of refuge were made at Peterhead, would it not almost exclusively be used as a stopping harbour in foul winds, and not as a refuge harbour ?—I should think it would in a great measure.

7147. A stopping harbour, not a refuge harbour ?—It would be used for both, more or less.

7148. Allowing that the trade to Archangel and the north was large, and that it was a desirable point for the trade to go in cases of foul wind, would it not be a stopping harbour instead of a refuge harbour, on a shore which might be a lee shore, and vessels could not get off the land ?—Yes, I think it would.

7149. Do many vessels come through the Caledonian Canal instead of through the Pentland Firth ?—They do, many of them.

7150. Do you consider they escape great danger ?—They all prefer it—all the smaller vessels.

7151. And they pay less insurance ?—Yes, always about $\frac{1}{2}$ per cent. less.

Mr. Joseph Mandell examined.

7152. (*Chairman.*) Are you a shipowner ?—I am.

7153. How long have you been connected with the port of Liverpool ?—It is 37 years since I sailed from it.

7154. You are aware of the objects of this inquiry? —I am.

7155. Have you read the report of the Committee of the House of Commons ?—I have not.

7156. Have you any opinion to offer to the Commissioners as to the advantages or necessity of a harbour of refuge on the north coast of Ireland for the Liverpool trade ?—No, I think my opinion would not be of much importance as to that. I have not had time to consider and study the subject, and I would not like to give an opinion without having well considered it.

7157. As respects the subject of harbours of refuge generally, have you any opinion to offer to the Commissioners ?—In St. George's Channel, or as a general question, affecting the whole country ?

7158. As a general question.—I think harbours of refuge very desirable at points where experience has shown great losses have occurred, but that is all I can say at the moment.

7159. Would you consider it desirable that a passing toll should be paid ?—No, certainly not.

7160. State your reasons.—I think that the formation of harbours of refuge, having regard to the saving of life mainly, is a national question, and therefore the cost should be borne by the nation at large, as it would be an anomaly that a Liverpool shipowner, trading where losses are comparatively few, should contribute to the maintenance of harbours of refuge on the east coast of England where the losses are many. That would be one of my objections.

7161. (*Sir F. Smith.*) How would the shipowner in Liverpool contribute by a passing toll to a harbour of refuge on the east coast of England ?—There might be Liverpool vessels occasionally up the Baltic, going to the Baltic, going from the Havannas, going from America, going from the Brazils.

7162. They are occasionally ordered up the Baltic, and might contribute in that way ?—Yes.

7163. But it would be only for that one particular voyage ?—Only for that particular voyage.

7164. They would be mulcted then precisely in proportion to the possible advantage, and no more than vessels using the coast, which pay more because they use them more frequently ?—That is very true, but the vessels lost there are a very different class of vessels to the shipping sailing from Liverpool, for our vessels are very differently found and equipped. They are different in their original construction, and therefore they are not so liable to casualties as vessels on the east coast, which are colliers and differently found, of different construction, and altogether of inferior quality.

7165. Do you think it would be unjust that owners of vessels on that coast should contribute to the formation of harbours of refuge chiefly for their own trade ?—I think that vessels using the harbours of refuge, resorting to them in any case, should contribute, whether they belong to Liverpool or elsewhere ; but that we should pay any dues because we pass those ports, is not fair.

7166. Then you have not the same objection to a using, as to a passing toll ?—Certainly not. I should willingly contribute to the maintenance of a port which had afforded me protection.

7167. Would not that tend to increase the loss of life, inasmuch as masters, for the sake of the owners, would desire to keep the sea rather than pay harbour dues ?—No ; I should think not. I am of opinion, as a seaman, that there are three risks in attempting to enter a harbour of refuge to one in keeping the sea, with a good ship—inasmuch as a harbour of refuge must be a port to leeward on a lee shore, and there is also the further contingencies of wreck or accident in entering and of collision when you have entered the port to anchor in bad weather.

7168. Is there not also the risk of collision not entering a port or not having a port to enter ?—Very rarely.

7169. It has been given in evidence that there are sometimes 300 or 400 vessels off Flamborough Head, which have run for the first port, and that a great number of collisions do take place ?—In running to leeward for a port of refuge ; exactly. That is one of the risks which I have spoken of. When you have to take an anchorage among a great number of ships the collisions are many ; I have seen that in the Needles of the Isle of Wight.

7170. Do you know the English coast ?—Not further than the Thames.

7171. You have never been further ?—I have never been further, except to Hamburgh.

7172. Are you prepared to give your opinion whether a harbour of refuge is better on a salient point or in the bight of a bay ?—A harbour of refuse on a salient point would be easier to get out of than out of a bay after you had once entered it, but the point might be so shaped that it formed itself a protection, and obviated the necessity of a harbour of refuge.

7173. It might. Take Flamborough Head, for instance. Supposing you were given your choice at the Tees or at Filey, which should you prefer, in case you were running along that coast ; should you prefer to take refuge at the bottom of the bay, or on one of the horns of the bay ?—I am speaking without experience. I am speaking from my knowledge as a sailor. If I am asked which I should prefer, I would say, I would run for a port, where if I miss it I am not altogether on a lee shore, where I should have a little room to fetch to and anchor.

7174. Then I gather from your answer that you prefer a salient point to the bottom of a curve ?—I premised that I did not speak from experience of the localities, but as a sailor I should prefer to run for a port which was on a salient point than for one in a deep bay, where if I missed it I must certainly be wrecked.

7175. (*Mr. Lindsay.*) I understand you would prefer the harbour at the point for two reasons : first, because you could leave it with greater facility; and secondly, because if you missed it you would have some escape ?—Exactly so.

7176. Is there not another reason that ports so situated, as a rule, are more in the track of vessels, and therefore vessels in distress have less distance to run ?—I can imagine a case where that would not be any argument. I can imagine a vessel a little to the leeward of the point and not able to get to it.

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7177. Then in such a case as that the harbour of refuge at the point would be of no value to her? —Certainly not.

7178. Then you speak only of harbours under your lee?—Certainly, there can be no other as a harbour of refuge.

7179. In that case, if the harbour of refuge were on a salient point there would be less distance to run than if it were in the bottom of a bay?—It may be less distance if you are to windward of the point, but it may be you cannot fetch it; and it may be that although nearer, the bay is a better protection.

7180. Then there may be cases in which it is more desirable to have a harbour of refuge in the bay than it would be to have it at the point, for the reasons you have stated?—There may be cases. I have stated to you the objection to the bay, in answer to which you say the salient point may be nearer than the depth of the bay, if the vessel were in the offing. But if the vessel were driving in within the point it may be she could not fetch into the point when she could fetch into the bay. I can hardly see the general object of the question.

7181. Your opinion on salient points would depend very materially on the line of coast, and the usual track of vessels?—Yes.

7182. I understood you to say that you objected to a passing toll for the construction and maintenance of harbours of refuge as unjust in principle, but you, as a shipowner, say you think it would be fair to charge vessels entering a harbour of refuge with dues?—Yes.

7183. Would not that have the effect of defeating, to a great extent, the object which this Commission has in view, namely, the saving of life and property? —No, I hardly think it would. If you mean by a harbour of refuge, a port to which a vessel would only resort as a last resource, then I do not think that any consideration would deter the captain from taking it. But if you mean by a harbour of refuge, a place at which a vessel could take refuge during a gale of wind from one point, and wait until there was a change to another point, that is a harbour of contingency.

7184. Do you think that in such cases as those the dues might prevent a vessel taking it?—Hardly. I suppose if the weather does moderate it might be an advantage to go into such a harbour. It might be worth while to go in at night to Kingstown with a southerly wind, and wait until the next morning, and start with the wind on the port. I give that instance to show that it might be to the advantage of a ship to go in rather than stand the sea.

7185. Do you mean dues rather to maintain than construct such harbours?—Certainly.

7186. Then it would be only a small due?—Only a small due.

7187. On what points of the coast do you think harbours of refuge would be most likely to prove of the greatest advantage in saving life and property?— Is it on this side you mean?

7188. Take this side first. Do you think a harbour of refuge necessary for the Isle of Man?— There are several. At any rate a contingent harbour which a vessel could take waiting for a wind would be of advantage occasionally for shipping here. It blows heavy, we will suppose from the south-west. If a vessel had the port of Douglas to take, and men could be properly instructed as to the advantage, and wait until the certain north-west wind which follows, she could then start from the weather side, and go right to sea.

7189. Then you think for the facilities of commerce, a harbour about Douglas would be of considerable advantage to the shipowners of Liverpool?—I think it would be of considerable advantage.

7190. Have you formed any opinion as to the north channel, looking at the natural harbours which we have there already?—If you speak as to Liverpool solely, I would point out that up from Liverpool to Solway Firth there is no harbour of refuge. If a vessel is blown off either St. Bee's Head or Newry, she cannot get back to Liverpool, and there is no port whatever. The port of Peel is a good port for small vessels when you get into it, but there is no protection for large shipping. It is quite an exposed coast. The port of Whitehaven is not sufficiently deep either.

7191. Speaking of the north channel for vessels bound to North America, do you think there is any necessity for a harbour of refuge there?—There are a great many ports of refuge in the north channel.

7192. Large ports?—Available ports.

7193. Then you think it is not so necessary there as in other places?—Certainly.

7194. A harbour of refuge is always of advantage, is it not?—Yes, relatively speaking.

7195. We will ask you whether you think a harbour of refuge at Port Rush would be of more benefit to the shipping of Liverpool than at Douglas. Say it lay between constructing a harbour of refuge at Douglas and at Port Rush, which would you prefer?— A port at Douglas would be of much more advantage than the other.

7196. As to St. George's channel, would you think it advisable to deepen the entrances to Carlingford and Waterford, so as to make those harbours of refuge accessible at all times of the tide?—Carlingford might be of some use. It is a deep bay, and if vessels get disabled and cannot fetch Kingstown, or the Skerries, the next best place, and cannot get round the point, there is no option. They either have to anchor or go ashore, and therefore that place might occasionally be an advantage.

7197. If it rested with you to expend a fixed sum on Waterford and Carlingford, which of those two points would you recommend?—The same expenditure.

7198. Which would you think of most advantage to the Liverpool shipping?—It is a very nice point to say.

7199. Do you think it would be of considerable advantage to the Liverpool shipping if both those harbours were made accessible at all times of tide?— It would be some advantage, but as to a considerable advantage I hardly think I should be justified in saying that I think it would be of considerable advantage to the trade of the country.

7200. I spoke of Liverpool because you wished to confine your remarks to Liverpool. You think, then, the improvement of those two harbours would be of general advantage?—I think so.

7201. Have you formed any opinion as to a harbour of refuge at the Land's End?—I do not think we have experienced any want of that. I only know of one Liverpool ship of any tonnage lost there. Our ships outward bound never go that side, and inward-bound ships keep close to the Irish coast. It might be the salvation of ship and crew, if Waterford were available. It seems to me that as to Carlingford and Strangford, an outward- bound Liverpool vessel has nothing to do with them, except in a continuance of southerly gales, other than as a place of stopping, which is better, I think, at the Skerries and Kingstown.

7202. (*Capt. Sulivan.*) Speaking of the relative advantages of a bay and a salient point, the more salient the point, the less the chance of getting on a lee shore? – Certainly.

7203. Take it that the point is at right angles, south and west, it is almost impossible that a vessel can get lost on a lee shore?—Certainly.

7204. Then, the great danger is when she is so embayed that she cannot weather on either tack?— Yes.

7205. And a harbour of refuge is most desirable within such points as a vessel cannot weather on either tack?—Yes.

7206. But, supposing the point so salient that there is very little risk of any vessel going ashore, though very desirable as a stopping place, do you think it would warrant the outlay of national money when the

vessel can go off on either tack and keep the sea?—No, I think not; as I said before, a harbour of refuge, as I understand it, is a harbour solely for the refuge of ships which are without the power to help themselves, and to spend money on them is not to be condemned. But would any one incur expenditure for what is a very questionable possibility.

7207. And in any point making a small angle with two coasts, that is, a very salient point, is it not almost impossible for a ship to require a harbour of refuge in the acceptation of the word as you use it?—Perhaps you will allow me to state a familiar instance. At the Bill of Portland you are aware the south-east wind blows into the east side, and the south-west wind blows into the west side; therefore, the Bill of Portland would afford a refuge in almost any wind as it stands, but either side may be improved for that purpose.

7208. I think it is almost a straight shore on either side. Is the south gale ordinarily a very dangerous gale?—Yes; I said south-east or south-west wind. The south point will almost afford any shelter.

7209. But suppose we take the south-west of Ireland or the north-east of Aberdeenshire, near Peterhead, supposing there were no natural harbours; would not the shores make such a point that a ship could scarcely fail to get off on one tack or the other, and would you think an outlay of public money on such a point for a harbour of refuge to be justified?—The south-west point of Ireland is very extensive; there are a great many bays, and in each of these bays there is a considerable in-draft. A vessel inside the mizen head could not get off.

7210. I meant merely to illustrate a salient point. I will take it that the coast forms a right angle, much passed by vessels, but where it is almost impossible for a vessel to get on a lee shore; do you think that would justify making it a stopping harbour, where life and property were not endangered?—If the local advantages were such as to justify the outlay, I should have no hesitation in adopting it, if there were local facilities. If an island were lying parallel with the coast, that would be a local facility for making a port, and that might justify making it safe by extending a pier or breakwater at either end.

7211. Because it could be done at a small outlay?—At a moderate outlay.

7212. But two straight coasts meeting at an angle where there was little chance of a vessel being caught?—No; it would be more a harbour of contingency to take advantage of than a harbour of refuge.

7213. As respects Douglas, would not a ship meeting a south-west gale find good anchorage at Ramsay now?—No, not for large ships. The sands are rather far to leeward; they would rather not run so far to leeward. If they ran west they would stop at Douglas Head; you could not induce them to go to Ramsay.

7214. The ship has always under her lee Ramsay Bay to bring up in?—She has.

7215. And Ramsay is an admirable place to meet a south-west wind when it blows?—No, it is not so desirable, I think, for if a ship runs into Ramsay Bay to bring Maughold's Head as a shelter from the south-east, it is difficult to fetch.

7216. I never spoke of south-east, I spoke of south-west. Are not south-west winds the prevailing winds?—Our winds generally range from south to south-east. In south-west winds Douglas at present gives no shelter, and a vessel might then go to Ramsay; but Ramsay is a very awkward place to get out of; it is somewhat awkward; it is 20 miles further, and no sailor likes to run to leeward. If his ship is not disabled he will not do so; he would run out to sea.

7217. The usual shift of wind would be a fair wind for a vessel running out of Ramsay and going on her voyage?—Yes.

7218. Then except ten miles difference, Ramsay is preferable to Douglas?—I think it is twenty miles.

7219. (*Chairman.*) You have a good observatory here?—Very good.

7220. I suppose you have meteorological observations for several years?—We have them registered for several years.

7221. If we wished a register of the prevailing winds we could easily obtain it?—Yes.

7222. Can you give us any information whether the winds observed at Liverpool give any clear indication of the winds in the Irish Channel? Is there any difference?—A considerable difference. Our wind at south-east or south-south-east is nearly south-west at Holyhead. I trust we shall remedy that. When we establish an electric telegraph at Holyhead we shall be able to have the winds there and compare with the winds of Liverpool.

Mr. WILLIAM CLARK examined.

7223. (*Chairman.*) What is your occupation?—Shipmaster.

7224. How long have you been at sea?—About 45 years.

7225. How many years have you been a master?—Upwards of 30 years.

7226. And what parts of the coast are you best acquainted with?—All through both channels, south and north.

7227. Are you acquainted with the roadstead inside the Skerries?—Yes.

7228. Have you seen it often in bad weather?—Very often.

7229. What wind brings in the heaviest sea in that roadstead?—North-west.

7230. Have you ever been at anchor at the Skerries in bad weather?—I have, in very bad weather.

7231. Many times?—Frequently.

7232. Have you ever passed through it in bad weather?—In bad weather I have passed through it both ways.

7233. And frequently?—Frequently,

7234. In what description of vessel?—Both sailing vessels and steam vessels.

7235. You know the two entrances to the Skerries, one of which is called the Broad Sound and the other the West Sound—you know them distinctly?—Distinctly.

7236. In a heavy north-west gale through which of those entrances does the heaviest sea come in?—Through the Broad Sound; it is only a roll, a swell; the sea does not break inside the Skerries.

7237. Have you ever passed out of the West Sound in bad weather?—Frequently.

7238. And have you then noticed the sea in the Broad Sound?—Yes.

7239. And you are sure it was much heavier in the Broad Sound?—There is more of a roll in the Broad Sound.

7240. Have you ever seen it break right across the Broad Sound?—Never.

7241. Have you ever seen it break across the West Sound?—Never.

7242. Supposing a breakwater was made for the purpose of enclosing the Skerries, which of the two sounds would you propose to shut up?—The Broad Sound.

7243. Will you state your reasons?—You would have an entrance at each end; there would be nothing to hurt you in it.

7244. And do you suppose if that were done that there would be no heavy sea through the West Sound to disturb the anchorage in a north-west gale?—None. I have been riding in it with seventy fathoms of cable out in a very heavy gale of wind.

7245. (*Capt. Sulivan.*) What are the winds in which you think vessels require refuge in the

LIVERPOOL.

Mr. Wm. Clark.

20 Sept. 1858.

Capt. Sulivan.

Skerries ?—Vessels bound in or out of channel ?

7246. For the homeward bound ?—For the homeward or outward bound ?

7247. For the homeward bound what wind is a dangerous one ?—The wind from the east ; but there is never any sea with it.

7248. With a north-east wind would there not be a heavy sea ?—It is quite sheltered.

7249. With an east or north-east wind would a vessel be in any danger if there was open sea to run back to, to the north-west ?—Yes.

7250. I think you misunderstand me. Would a vessel be in any danger of wreck in an easterly gale if there was the open sea to drive out to ?—She would be in no danger.

7251. Because there would be the open sea to heave to ?—Yes.

7252. But irrespective of the Skerries Road, would a vessel be in danger of wreck if she could not use the Skerries Roads ?—It is a very bad coast from Rathlin Island down to Lough Foyle.

7253. But could not a vessel always run out seaward and heave to ?—Certainly she could ; an easterly gale would be a fair wind.

7254. How would the outward-bound ship be ? What wind do you consider a dangerous one ?—North-west.

7255. Have you ever entered Lough Foyle with a north-west wind ?—Hundreds of times.

7256. With a sailing ship ?—And steamers.

7257. With a north-west wind can you fetch in close under the head ?—If she is close under the head she will fetch up as far as Greencastle, and fetch into safety.

7258. Then with a northerly gale, supposing a vessel caught off that bay between the Skerries and Lough Foyle, has she good refuge in Lough Foyle ?—She has if she can fetch round.

7259. But supposing she is to the north, within the line of the large bay with Lough Foyle under her lee, and a northerly gale, can she always go in safety into Lough Foyle ?—She can.

7260. And with a north-west wind she can fetch in if she is to windward ?—She can.

7261. With a westerly gale a vessel cannot get into Lough Foyle ?—But she will have smooth water off it.

7262. And she would also have smoother water at the bight of Culdaff ?—Yes.

7263. Suppose a vessel, caught a little to the leeward of Lough Foyle, so that she could not fetch it, with good lights and an open channel, could she not run back, and to the eastward ?—If she had sufficient offing she could.

7264. Suppose she were in mid-channel, between Islay and the coast of Ireland, she would be in no danger ?—None whatever.

7265. (*Sir F. Smith.*) Port Rush would be pretty nearly land-locked if you filled up the north channel ?—Of the Skerries, yes.

7266. You say it is sheltered from the north-east wind ?—Yes.

7267. (*Capt. Sulivan.*) The East Skerries give shelter from the north and north-east ?—Excellent shelter.

7268. Do ships use it in east and north-east winds ?—They do sometimes.

7269. You know where it is proposed to block up the Broad Sound ?—It would cause it to be as smooth as the docks of Liverpool.

7270. In north-west but not in north-east gales ?—The pier would bear away to give shelter.

7271. You see the Skerries on the chart. Now, if a breakwater were built as far as the Broad Sound—— ?—It would be the finest harbour on the coast.

7272. If a breakwater were built as far as the Broad Sound, it would still depend on the rocks, and you would not thereby have added to the safety of ships in north-east gales ?—It would make it smoother.

7273. But that anchorage in north-east gales is as good now as it would be if that wall were built, is it not ?—It would be smoother.

7274. (*Chairman.*) Are you acquainted with Lough Larne ?—Very well.

7275. What kind of harbour is that for the coasting trade ?—A very fine harbour.

7276. And is it much used for that purpose ?—It is frequented considerably. Ships can lay without anchor or cable there.

7277. Are you acquainted with Lough Strangford ?—I have been in Strangford two or three times.

7278. Are you acquainted with Lough Carlingford ?—I never was over Carlingford bar.

7279. Do you know Wexford ?—Very well.

7280. Or Waterford ?—And Waterford too.

7281. Tell me about Wexford. Supposing a good entrance could be made to the harbour of Wexford, do you consider that would be an advantage to ships passing ?—A very good harbour of refuge could be made to go into south bay.

7282. Supposing it were possible to make it, you think it would be of great service ?—I do.

7283. And for what class of ships ?—Any ships which can run over the South Shears.

7284. Therefore, you consider it would be useful to outward-bound ships, as well as coasters ?—I do.

7285. What is your opinion as to the advantage of Waterford as a harbour of refuge, from its site and position ?—Waterford cannot be run for, except at tide time.

7286. Why, from want of water ?—Yes, for want of water. There is not more than 12 feet of water at spring tides.

7287. But supposing it could be increased to 20 feet ?—It is a very clear harbour to run for. There is no difficulty whatever.

7288. Do you know the Bristol Channel ?—I am not thoroughly acquainted with the Bristol Channel.

7289. Do you Loughindall ?—I have passed it ; I was never in it.

7290. Do you know Lough Swilly ?—Yes.

7291. Is Lough Swilly easily taken ?—Any time, night or day, if you make the light out.

7292. And as respects the land there is no difficulty ?—It is quite bold from side to side, except the harbour.

7293. And there is plenty of room for working ?—Plenty of room for working.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry ?

No answer.

Sittings at Liverpool closed.

WATERFORD.

Thursday, 23rd September 1858.

PRESENT :

Admiral HOPE (Chairman).

Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Mr. JOHN FARRELL examined.

7294. (*Chairman.*) You are Secretary to the Harbour Commission ?—Yes.

7295. How long have you been connected with the port of Waterford in that capacity ?—Nine and a half years.

7296. Are you connected with the shipping interest of the port personally ?—No, rather otherwise ; it is not considered desirable that I should be.

7297. Have you read the report of the Committee of the House of Commons on the subject of harbours of refuge ?—I have.

7298. Will you be kind enough to state to the Commissioners any opinion which you may entertain as to the advantage or necessity of deepening this harbour for the purpose of rendering it a subsidiary harbour of refuge for the trade bound south of the Irish Channel ?—I think it would be very expedient and is most desirable.

7299. Will you state your reasons for that opinion ? —I should prefer handing in a professional report on the subject, a report made to the Harbour Commissioners by Mr. Lecky.

7300. That report, I presume, is from an engineer with reference to the practicability of deepening the harbour ?—It is. It alludes in a few sentences to that subject.

7301. Will you be good enough to lodge a copy of it with the secretary ?—Certainly.

7302. Can you personally give to the Commissioners any evidence as to the character of the shipping that are likely to frequent this port, or as to its increase in later years ?—There has been an increase of late years.

7303. Have you any report to offer to the Commissioners as to a vessel having been obliged to run for the harbour in distress, and stopping at the bay for want of water ?—Yes; there was one in 1854 ; and as to particulars I can give them to you if you please.

7304. Will you hand it in ?—A copy I suppose will do ?

7305. Yes. [*The document was handed in.*]

7306. Have you any report to make to us, with reference to a vessel which took a pilot outside the bar, and discharged him being afraid to come in ?—Yes. On the afternoon of the 15th of March 1857 there was a large ship six miles off the harbour. She stood a little in towards the harbour. The master thought there was not water enough, and he would not wait until the tide had flowed sufficiently but went on to Cork. The second day afterwards he got into Cork harbour. It was the ship *Hotspur*, if you will allow me to identify the instance by name.

7307. Are you able to furnish the Commissioners with any returns showing the increase of the shipping which frequents the harbour of Waterford ?—I can. I have brought the returns with me. There is an increase principally in consequence of the local steamers.

7308. Can you furnish the Commissioners with an abstract of these returns showing the character and description of the shipping which frequents the port ? —I can.

7309. (*Capt. Washington.*) You stated that a report had been made by an engineer upon the bar of Waterford harbour ?—Yes.

7310. To whom was that report made ?—To the Harbour Commissioners.

7311. Was it made at their request ?—It was.

7312. Had they any intention at that time of undertaking the deepening of the harbour ?—I cannot answer as to what was their intention. No intention was expressed by resolution.

7313. How long ago ?—In 1856.

7314. Do you know whether any estimate was made for deepening the harbour ?—There was an estimate in the report.

7315. Did you say it was a printed paper ?—Yes.

7316. Is it a long report ?—Yes.

7317. Can you state precisely the proposal as to the depth and breadth of the Channel ?—I will read a few lines of the report.

"The length of the proposed cut is almost exactly 2,000 yards. I should propose a finished width of 400 yards, and the average depth of cutting may be taken at three feet. This would give a total of 800,000 cubic yards, or 1,200,000 tons. If we suppose the dredging vessel to be able to work on the average 46 hours per week during the six summer months, and to raise the very moderate quantity of 100 tons per hour, she would complete the work in 10 years ; and taking her average weekly expenses at 20*l.*, a tug-steamer 15*l.*, and barging and discharging at 15*l.*, making a total of 50*l.* per week, and 1,300*l.* per season, or 13,000*l.* for the entire work. This is, however, exclusive of contingencies, which, on work extended over so much time, cannot be estimated at less than 20 per cent., making a total of 16,000*l.*"

7318. Was a copy of that report given to the Select Committee of the House of Commons ?—I am not aware ; I think not. The Harbour Commissioners had a report referring to another plan prior to the last. It was a much cheaper one ; a proposal for cutting another channel.

7319. By whom ?—By Mr. Stephens.

7320. Who is Mr. Stephens ?—He is an inhabitant of Duncannon.

7321. What situation does he hold ?—He is harbour-master for the county of Wexford side.

7322. Can you state his proposal briefly ?—The Chairman asked me about the intention of the Board ; I said they had expressed their intention by resolution, but I find their intention was not expressed by resolution, but in a petition to the Lord Lieutenant.

7323. I will ask further, has it been the desire of the Harbour Commissioners or of the community of Waterford to have the bar deepened ?—It has.

7324. Has that wish been ever expressed at a public meeting by resolution in any other manner ?— It has been expressed as desirable and expedient.

7325. Please to answer the question. Has it been expressed at any public meeting by resolution or in any other public manner ?—No ; not at any public meeting, but at meetings of the Corporations of the Harbour Board and of the Chamber of Commerce.

7326. Has any memorial or petition ever been grounded upon it ?—There has.

7327. To whom was the memorial sent ?—I think to the Lord Lieutenant, I think that was in 1854. There were some proceedings subsequently, I think in 1855. The Admiralty was applied to in 1857.

7328. You stated that a second report had been made for deepening the channel by Mr. Stephens ?— Yes.

7329. What is the date of that report ?—The 4th September 1851. In point of date it was the first.

7330. In point of date Mr. Stephens' is the prior

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Capt. Washington.

report. Will you state the length, depth, breadth, and cost of such a channel as he proposed ?—I wish to remark that his proposal refers to the small shoal patch to the east; it is not a long cutting.

7331. Is Mr. Stephens present ?—Yes.

7332. Will he be a witness ?—Yes.

7333. Then we will leave it to him, if you please, to answer that question. What is the present amount of the harbour income ?—More than 6,000*l.*, including pilotage, ballast, and all.

7334 How much for tonnage ?—Perhaps 2,000*l.*

7335. 6,000*l.* total receipts, 2,000*l.* of which is tonnage duty ?—Yes.

7336. What is the whole expenditure ?—We have generally expended the full amount.

7337. Is the whole expended every year ?—It was not the last year or two.

7338. Is there any debt ?—No.

7339. Can the harbour fund contribute to the improvement of the bars ?—I do not think that the Commissioners can.

7340. Is it not of sufficient interest for the public of Waterford to contribute ?—I think not ; I think the depth of water at the bar is sufficient for the local trade of Waterford.

7341. (*Capt. Sulivan.*) Is the depth which it is proposed to increase only three feet beyond the present depth of the channel ?—An average of three feet.

7342. Do you know the maximum depth it will give in the channel ?—It will leave about 18 feet, but that is scarcely sufficient, we want more than that.

7343. Is that the extreme depth you think would be obtained for 16,000*l.*?—It proceeds on that calculation, but 18 feet is not sufficient.

7344. Have you any estimate of the cost of an increased depth ?—No, I have not.

7345. (*Capt. Vetch.*) Suppose this new cut to be effected and carried out to the extent of 19 feet, do you imagine that vessels passing the port, and not being able to proceed on their voyage, would enter the river for refuge ?—I think many would.

7346. Any number ?—Oh yes ; the number would be very largely increased.

7347. Do any vessels take refuge under present circumstances ?—They do.

7348. How many in the last 12 months ?—I can tell you the number for the year 1857. I will make out the number and furnish it to the Commissioners.

7349. You have mentioned the case of a vessel about to enter the harbour which proceeded afterwards to Cork. Was that vessel prevented entering by want of depth of water ?—I think that was the main obstacle.

7350. By this return I see that, during the year 1857, 221 vessels not bound for the harbour came in. Did they come in for shelter ?—A few of them would have come in because they were short of provisions or of coal.

7351. Those were small vessels ?—Twenty-three were upwards of 13 feet draft of water and 198 under 13 feet.

7352. And should you think, if the bar were deepened to the same depth as the rest of the channel, 21 feet, a great many more vessels would come in ?—I think there is no doubt of it.

7353. (*Mr. Coode.*) You say 23 vessels of 13 feet and upwards came in. Can you tell us the greatest draft of water of any of those vessels ?—About 17 or 18 feet probably.

7354. Have you the particulars for any year besides 1857 ?—No, I have not.

7355. Do you think you could furnish the Commissioners with a list of such vessels within a short period ?—Oh yes.

7356. Can you furnish a list for the last five years ?—It would take a long time to make out.

7357. Can you do so for three years without much trouble ?—Oh yes, that shall be done.

7358. You have made reference to the ship *Appleton* ?—No, to the *Hotspur*. The *Appleton* did come in.

7359. You made a reference to a vessel that put off on the 15th and that reached Cork on the 17th March ?—Yes ; she would not wait until the tide rose sufficiently.

7360. But had the bar been deepened, no doubt she would have come in ?—Yes.

7361. But she was only drawing between 15 and 17 feet ?—She knew it was deeper at Cork than at Waterford.

7362. Do you know whether any ship has got beyond Cork and put back again ?—I do not.

7363. Did you notice the sort of material to be dredged ?—I have samples here.

7364. Can you mark the positions in the map, from which they were taken ?—Yes ; but Mr. Stephens will tell you better than I can, he took them.

7365. Before you leave perhaps you will hand in the Minutes of the Harbour Board on Mr. Stephens' plan ?—Yes ; it was before the report of Mr. Lecky ; Mr. Stephens' was the only project before the board at the time.

Read by Secretary.

"QUAY COMMITTEE,

"*Monday, 8th September* 1851.

"The Board at its last Meeting referred to this Committee the duty of ascertaining the nature and material of the shoals, popularly but incorrectly known as 'the bar,' existing between Duncannon and Creden Head. Befitting the importance of the subject, and the greatness of the improvement to be effected by the deepening of a channel through these shoals,

"We have given to the Board's reference anxious and protracted consideration, and a majority of the Committee went to the bar on the 1st instant, for the advantage of personal superintendence.

"We commissioned Mr. Stephens of Duncannon to make borings into the shoals at the eastern and western sides of the river.

"Somewhat impeded by the roughness of the weather which has prevailed at frequent intervals, he has been able to carry on operations to such an extent —and to make borings in so many different spots—as to lead to the conclusion that a rocky bottom does not exist in any part of the shoals. He found their stratum to be gravel, shells, and mud, with a substratum of light blue clay or marl.

"By his communications, entered upon our minutes, it appears that he effected the boring of three holes in the shoal at the eastern side, remarked by Captain Frazer, outside the buoy. The depths of the holes bored there varied from $7\frac{1}{4}$ feet to $8\frac{1}{3}$ feet. In the shoals between the buoys three holes were also bored, their depth varying from 4 to 11 feet. Mr. Stephens' report of his operations is submitted to the Board's consideration. Specimens of the strata brought up by the boring apparatus are also presented.

"Having reported the nature of the mass composing the shoals, we have completed the inquiry referred to this Committee, but we ask to be allowed to notice a few of many considerations arising out of this most important subject.

"Should the Board determine upon proceeding to deepen a channel through the shoals, matter for grave consideration will arise as to the part to be selected for operations. Mr. Stephens recommends the cutting of a channel through that shoal to the eastward of the eastern buoy to which, as we have stated, Captain Frazer directed attention—recommends it as requiring less length of cutting, in order to get into deep water above and below it.

"We desire to be permitted to remark that many persons have intimated an opinion that a sailing course through that shoal would bring vessels too near the eastern land—which, in the winds most prevalent here is a lee shore with much sea-breaking—and would dangerously increase the difficulty of weathering Duncannon Strand.

"We would suggest that as the Chamber of Com-

merce called the Board's attention to this subject by a deputation of its members, and the Board, by its chairman, undertook that it would receive the most serious consideration of the Harbour Commissioners, the Chamber may be informed you have ascertained that no engineering difficulty is likely to prevent the deepening of a channel through the shoals, but that the Board is unable to provide the funds likely to be requisite for this most useful purpose.

"It may then become matter of consideration whether the Board and the Corporation of the Chamber of Commerce will unite in calling upon the Board of Public Works for a grant or an advance of money to carry out a work so beneficial to the maritime interest as the improvement of one of the few harbours of refuge on this coast. The Board of Works may be induced to make a survey of their own, or to undertake the work of themselves."

7366. Have you put in a copy of the report of Mr. Stephens to which you have made allusion ?—Mr. Stephens himself will produce it.

7367. Perhaps you can tell us whether any record of the soundings made at former periods, has been found ?—Yes.

7368. I understand that those records are of soundings in the old charts ?—There has been no alteration of the soundings within the last 50 years.

7369. Have you a chart showing the soundings within the last 20 years ?—There is such a chart.

7370. Of what date and by whom made ?—It was made for the Harbour Commissioners in 1855 by Mr. Sampson Carter and Mr. St. Leger.

7371. Will you put in that chart ?—Yes.

7372. Have you any accurate chart prior to that of Mr. Carter ?—Yes.

7373. Can you put that in ?—I will have a tracing made and give it to the Commissioners.

7374. Do you remember by whom it was made ?—I do not know.

7375. (*Chairman.*) Have you anything further in the shape of documentary evidence that you wish to tender to the Commissioners which throws light on the present inquiry ?—I do not recollect anything now, but if you will allow me, I will put in anything additional which may occur to me at a subsequent period.

7376. We shall be happy to receive at your convenience, if you will forward it to the Secretary, anything further in the shape of documentary evidence which you may desire to put in ?—Very well.

7377. (*Mr. Coode.*) Can you tell us to what standard these soundings referred ?—Low water of spring tides.

7378. Of ordinary spring tides ?—Yes.

7379. Were you speaking about the old soundings, and of your own knowledge ?—I cannot speak of my own knowledge, but the senior pilot will be ready to give information that the soundings are the same as they were 40 years ago.

Mr. Abraham Stephens examined.

7380. (*Chairman.*) You are the person who made the borings on which Mr. Lecky's report is founded ?—I first bored in 1851. Afterwards the Harbour Commissioners called on me to assist Mr. Lecky in his operations ; I brought him to the same ground, and he founded his report upon the borings which were made at that time.

7381. (*Capt. Vetch.*) You made your borings, I understand, in 1851 ?—Yes ; the 4th September 1851.

7382. And how long afterwards was this ?—I think three years afterwards.

7383. That would be in 1854. Can you point out on the chart whereabouts those borings were made ?—Yes ; very near the east buoy.

7384. And where were the other borings made ?—Between the east buoy and the middle buoy, and one near the west buoy.

7385. And to what depth did you carry your borings ?—I carried them to 11 feet.

7386. From the surface ?—Yes, 11 feet from the surface.

7387. What material did you find ?—I found the top surface encrusted with oysters, and underneath shell, sand, and gravel, and the lower stratum was blue clay.

7388. When you got down to 11 feet below the bed of the harbour you found blue clay ?—Yes, three or four feet of blue clay.

7389. And again at the middle buoy what were your borings ?—The same.

7390. Of the same description ?—Of the same description.

7391. And in none of your borings you came upon the rock ?—No ; in none.

7392. Did you make any borings higher up the river ?—No ; I did not ; merely a section across the bar, from east to west.

7393. Did you make any borings further down towards the sea ?—I varied them. I did not go in a direct line; I went round the temporary buoys off the bank on the east side near the east buoy. There were temporary buoys placed on the east bank in 1851, to mark where the borings were to be made for the Waterford Harbour Commissioners.

7394. I see a mark R for rock, but you found no rock ?—At that time Captain Frazer was of opinion from sounding with an iron-shod pole that that lump was rock ; I believe that was the cause of the Harbour Commissioners wishing me to make borings.

7395. Then having verified those borings of Captain Frazer you found no rock ?—I found no rock.

7396. And have you reason to believe that from the soundings of 17 feet above down to 18 feet below seawards the materials are of the same description ?—I found the ground on the Wexford side of the harbour somewhat softer—stiff mud.

7397. To make the harbour more accessible, to what extent would you recommend that dredging should be effected ?—The bank on the east side stands about 9 feet over the base of the water inside and outside of it. You will see that the soundings inside are 19 feet, and outside 18 feet, and on the lump only 8 or 9 feet.

7398. I want to know to what depth you would like the channel to be deepened ?—If that lump were removed there would be fully 20 feet at ordinary low water of spring tides.

7399. All away to sea ?—Yes ; all away to sea.

7400. South of that bank the water deepens and inside also ?—Yes.

7401. Will you cast your eyes on that chart (*produced*); you will see soundings 8 or 9 feet on the east bank, but going seawards 16 or 17 feet ?—That is west, but direct from the bank you will find 18 feet; I found outside the bank 18, 17, 17, 18, 22, and 24 ; inside the bank I found 18, 17, 19, and 20, in the direction in which I have drawn two pencil lines on the chart.

7402. Would not that opening you have now marked W. narrow the channel unless extended to a sufficient breadth. What depth do you propose to deepen it out to ?—At the time I made my report in 1851, I confined the breadth of my cutting to 300 feet ; Mr. Lecky's is three times that—900 feet.

7403. Whose ?—Mr. Lecky's, who afterwards made a report.

7404. (*Mr. Coode.*) Will you put in a copy of your report for the use of the Commissioners ?—I believe it is in.

7405. You say that you made borings, and found that the top surface was composed of oysters ?—Encrusted with oysters.

7406. Were they living or dead oysters ?—Living, principally.

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Mr. Abraham Stephens.

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Mr. Coode.

7407. How did you ascertain that?—Our boats are constantly dredging there for oysters. They take up a number of dead oysters as well as living oysters.

7408. But living oysters are found on the ground?—Yes.

7409. Then from that you may safely infer that there is no accumulation ofsand, or other material?—Yes.

7410. How long have the boats been dredging for oysters?—As long as I can remember.

7411. Can you state any number of years?—At least 30 years.

7412. They have made a practice of dredging?—Yes; I have taken up oysters there myself.

7413. Through what thickness of sand did you penetrate before you reached the blue clay?—Two or three feet of sand, gravel, stones, and mud. Nothing that would shift at all.

7414. You say you penetrated two or three feet before you reached the clay?—Yes.

7415. Did you find much difficulty in penetrating there?—Two or three feet were as hard as the road outside.

7416. Have you had any experience of the system of dredging?—Never.

7417. Do you think it could be easily dredged?—I think it would be no difficult matter.

7418. Was the clay very stiff?—Very stiff, so much so, that it stuck like glue in the boring apparatus.

7419. Can you produce samples of the sand and clay?—No other samples than those you have.

7420. Have you any plan showing the exact spot on which you put the boring apparatus?—I have.

7421. Can you put it in?—That is the longitudinal section (*paper produced*).

7422. Is there any plan?—No; the longitudinal section shows the whole section of the bar from east to west.

7423. Can you furnish the Commissioners with a plan showing the exact positions in which your borings were taken?—I can.

7424. Will you furnish the Commissioners with such a plan, and mark on it plain letters to indicate the borings and corresponding letters on the samples you now produce?—Yes; this section shows the exact rise of the bank.

7425. Were these soundings taken by yourself or from a chart?—They were taken by myself.

7426. What low-water mark is that which is shown on the plan?—Low water of spring tides.

7427. Ordinary or extraordinary spring tides?—That was an extraordinary spring tide, the lowest for years.

7428. How much lower than ordinary?—I think 18 inches if not two feet. You will find by the time of the year, it was the month of September, when you have the lowest spring tides.

7429. Can you tell us the thickness of the upper bed of oysters?—They are not thick, they may be six inches.

7430. Not many layers?—No.

7431. What number of borings do I understand you to say you made in all?—I think I made fully six or eight.

7432. However, you will show on the plan the position of all the borings you made?—I will.

7433. Have you samples from every bore?—I have furnished Mr. Farrell, the secretary to the Waterford Harbour Commissioners, with samples.

7434. As you produce only two samples, are you prepared to say that those are a fair average result that you obtained from the bore holes?—I think so; it is seven years since I took them, and I have not seen them since; I am certain that one (*designating a sample*) is from the east side; the softer or finer sort is from the west side.

7435. Were you present during the whole time these borings were being made?—During the whole time.

7436. You found no difficulty in penetrating the gravel or sand, to induce you to believe that there would be any difficulty in getting the dredge to act upon it?—I am convinced that there is no difficulty in dredging.

7437. Will you be good enough to mark these samples A. and B., and to put corresponding letters on the place from which they were taken, upon the plan which you have undertaken to furnish to the Commissioners?—I will.

7438. (*Chairman.*) Have you any further remarks to tender to the Commissioners, relative to the engineering part of the question?—I offered some remarks in my report.

7439. Have you anything further to offer in addition to those remarks?—As to the improvement of the harbour?

7440. As respects the engineering question?—I think that by increasing the ebb tide, if that cut is made it would produce a greater scour, and would certainly deepen the harbour. I proposed in that report, that the cutting shall be placed on Duncannon Strand, commencing at the south side of fort, and extending southward along Duncannon Strand to Spit Buoy, so as to increase the current through the intended new cut.

7441. Nothing to the east?—I live in the neighbourhood of the bar, and frequently in my life time I have have seen vessels aground on it. I saw one of the steamers belonging to the port for several hours on that patch lately.

7442. Is there a heavy sea when the wind sets in?—When the wind is to the south.

7443. Is the sea such as would break up vessels if stranded on the bar?—I have frequently seen vessels lose their rudders although they got over it.

7444. Did you ever know a vessel that grounded become a total wreck?—I have seen them severely injured, become leaky, and obliged to run ashore.

7445. With a heavy sea and the wind right in, is the sea ever so heavy up to Duncannon fort as to prevent a boat crossing?—Do you mean an open boat?

7446. Yes, an open boat?—I do not think it is.

7447. In the heaviest weather you have seen boats crossing?—I have seen boats down there in all weathers.

7448. In heavy weather between Duncannon fort and Creden point, running a line to Broomhill point, is the sea such as to prevent open boats from crossing?—Sometimes.

7449. (*Capt. Washington.*) I think you said you had resided many years at Duncannon?—Yes.

7450. Were you acquainted with Captain Frazer, and were you present when he made that survey of the harbour?—Yes.

7451. Had you any conversation with him about the east shoal?—I think about the time we made the borings he left the neighbourhood. I met a son-in-law of his afterwards.

7452. Mr. Hoskyns?—Yes, it was.

7453. Did you ever point out to Mr. Hoskyns that what was marked as rock in Captain Frazer's chart was not rock?—I did.

7454. Do you remember his answer?—He said he was very glad to hear it.

7455. Can you tell us the nature of the rock on the land?—Broomhill is wholly composed of traprock. And between Broomhill and Priorhill, that is composed of rotten slate.

7456. Do the strata of slate project out towards low water?—The low water extends beyond it.

7457. Are the strata of slate visible outside high water mark?—Yes; for a considerable distance.

7458. That Prior shore is a very flat shore?—It is known by the name of Ballystraw flats.

7459. Of what is that flat composed?—Of sand.

7460. In the shoal in which you bored you stated you found some stones. What was the size of the largest stone that you found?—The size of a marble. There might have been much larger ones, but the apparatus would not bring them up.

7461. What was the diameter of your boring apparatus ?—Three inches.

7462. Then if it had happened that a boulder stone of two feet diameter was lying close to it, it would not have touched it ?—I should certainly have felt it.

7463. From your borings are you able to say that there is no chance of finding boulder stones ?—I think not.

7464. I think you stated that a steamer lay for some hours on that shore lately ?—Yes, three or four months ago.

7465. Was it foggy ?—I think it was thick at the time.

7466. Is there not a buoy to mark that shore ?—There is.

7467. Was there much wind ?—It was blowing hard from the south.

7468. Did the steamer damage her bottom at all at that time ?—I do not think she did.

7469. Then it is fair to assume that there are no stones or rocks thereabouts ?—I do not think there are any.

7470. Can a steamer lay on a shoal where there are rocks for a whole tide without injuring her bottom ?—If there had been any large boulder stones she would have been injured.

7471. As far as you know she was not injured ?—She proceeded to sea, and she was laden too.

7472. Do you believe that, if a channel were dredged through the bar, the ebb tide would tend to deepen it ?—I am persuaded that it would.

7473. What is the strength of the ebb tide hereabouts ?—I suppose two and a half knots an hour.

7474. Not more ?—Or three knots.

7475. Were the borings you made in 1851 the first that were made in Waterford bar ?—I never saw any others made.

7476. Did Sir William Cubitt make a report as to the improvement of Waterford harbour ?—He did.

7477. What was the date ?—About 20 years ago.

7478. At that time were any borings made known ?—No.

7479. Have you heard that any one has made a report as to the improvement of Waterford harbour ?—I have heard that Captain Washington did.

7480. But unfortunately he is not an engineer. Do you know of any engineer making a report?—No one but Mr. Lecky.

7481. Were you present when Mr. Lecky made his borings ?—I made the borings for him. I showed him the deepest sections.

7482. How many borings did you make ?—I think four or five.

7483. Were they different from those in 1851 ?—As near as I could I took them on the points where I had taken them in 1851.

7484. Can you make on the map the precise position ?—I may not be able to do that. But I came across a section of the bar as I had done previously.

7485. And the results were the same ?—They were. We found no difference or change in the soundings whatever.

7486. Had you anything to do with making the new cut up to Waterford ?—No ; it was before my time. I just remember the ford being made.

7487. When was it made ?—About 35 years ago.

7488. Within your knowledge has any system of dredging been employed in any part of Waterford harbour ?—I am not aware that there has been since.

7489. (*Capt. Sulivan.*) Do you know whether the ford has increased the depth of water since it was first cut ?—I am not aware ; I should think it must have been deepened by the action of the scour.

7490. Do you know the depth at which it was originally dredged ?—I do.

7491. At low water spring tides what was the depth ?—I think about seven feet.

7492. You have said you would recommend dredging the east side of the bar ?—Yes.

7493. You also said that in the centre between the buoys you found a much stiffer bottom ?—Yes.

7494. About two feet less water than the general portion of the east bar, with the exception of the bank ?—More than that.

7495. Which do you think could be deepened to 20 feet the cheapest—the centre channel, with the softer bottom, or the east channel, with less depth but with the addition of the banks ?—The centre I think would be a very extensive cut, the east side would be a very short one.

7496. I am not asking as to the length of the cut. Would the construction of the extra length and depth on the other side be more costly as compared with the softness of the centre ? Which can you cut to 20 feet the cheapest ?—I think I stated that to the north I found soft ground between the middle buoy and the west buoy, but beyond the lighthouse marks the ground is equally hard.

7497. At low water in a gale of wind when you have seen vessels strike there, what do you think was the lift of the sea ?—I dare say three or four feet.

7498. Supposing the channel were deepened to 20 feet at low water what draft of ship could attempt it with safety ?—I think vessels drawing 20 or 22 feet would get in at an hour's flood.

7499. If the depth of water—of low water at spring tides—was made 20 feet, could any vessel take it with safety, allowing for the lift, whose draft of water was 20 feet and upwards ?—I should think vessels of not more than 17 feet of water.

7500. How far out have you seen the sea break ?—I have constantly seen the sea breaking on those shoals.

7501. But in the channel ?—There is not much break there.

7502. Have you ever seen the sea break out at Credaa Head ?—I have seen it break outside Credan Road.

7503. Have you seen the sea break right across the harbour at Credan Head ?—Not right across the harbour.

7504. Taking the three fathom line have you seen it break at the 18 or 19 feet line ?—I have not noticed it break much there, the breakers are generally on the east side of the dotted line.

7505. Do not ships come in for refuge with south-east winds ?—Frequently.

7506. Would it not add greatly to their danger in taking the channel if you dredged closely along this blast or fault ?—The blast is considerably east of the channel.

7507. Would it not be more to leeward and less sea for vessels if the channel were dredged between the buoys ?—I think it would ; but the question is whether you could keep open the channel on account of the state of the tide from the fort.

7508. (*Capt. Vetch.*) How long have you known this bar ?—For the last 40 years.

7509. During that time have you seen or heard of any alteration in its depth ?—Never.

7510. Then, according to your belief, it remains just as it was ?—Yes, just as it was.

7511. Neither increased nor diminished ?—Neither increased nor diminished.

7512. Is there any improvement you would suggest for the navigation of the harbour ?—Yes. I would recommend the running out of a breakwater from the old fort at Passage to the Spit Perch, which would increase the scour of the ebb tide over the bar ; at present the first half of the power of the ebb tides is lost over the flats south of Passage. If stones were run out from the old fort they would double the force of the scour, and ultimately deepen the harbour.

7513. You would then suggest a breakwater from the old fort passing to the Perch buoy ?—Yes ; it would considerably improve the roadstead, and would shelter it from the south wind.

7514. (*Mr. Coode.*) Have you had occasion to measure the velocity of the tide over the bar ?—No, I never did.

7515. Do you know whether it has been done by any one ?—I am not aware that it has.

BIBLIOTECA DEL C.O.A.M.

WATERFORD.

Mr. Abraham Stephens.

23 Sept. 1858.

Mr. Coode.

7516. Suppose a cut were made more to the east, do you apprehend the tide would set more truly through that cut?—Yes; the direction of the ebb tide sets direct from Duncannon Fort over the east side of the bar.

7517. What is the direction of the tide?—The power of the first half of the ebb is lost by the tide running over Duncannon Strand; and it is only from half tide to low water that a scour is caused by the set of the tide running to the east side of the bar.

7518. Then do I understand you that about half of the ebb tide runs to the east side of the bar?—It does, from half ebb to low water.

7519. Does the strength of the current set that way?—It does.

7520. How does the flood tide run?—The strength of the flood tide runs from Credan Head towards Duncannon Strand.

7521. And does the whole flood continue to set in the same direction?—I dare say it shifts.

7522. But the general run is from Credan Head to Duncannon Strand?—Yes; to Ballystraw flat, that is the general set of the flood tide.

7523. Can you give us an idea of the velocity of that tide stream?—The ebb is the strongest.

7524. Much stronger than the flood?—Yes.

7525. Can you tell us nearly the strength of the ebb stream?—I think $2\frac{1}{2}$ or 3 knots an hour.

7526. That is your opinion?—Yes, it is my opinion, seeing the drift of the boats.

7527. Have you had frequent opportunities of seeing and forming an opinion of the strength of the ebb?—Yes.

7528. You said that you were present during Mr. Lecky's borings. Do you know whether he took samples and recorded them?—They are my samples.

7529. (*Chairman.*) Do I understand that you expect Mr. Lecky to be here in the latter part of the day?—No; it is almost impossible for him to be here to-day.

Captain W. Price examined.

Capt. W. Price.

7530. (*Chairman.*) You are Lloyd's surveyor?—Yes.

7531. And you were formerly harbour-master?—Yes.

7532. For how many years were you harbour master?—Three or four or five, something like that; I do not remember exactly.

7533. How long were you at sea?—Perhaps 35 years.

7534. And for how many years of that period were you in command of vessels?—For 25 or 30 years.

7535. And of what description of vessels were you chiefly in command?—Sailing, and steam.

7536. And what size?—Large and small.

7537. In the foreign or coasting trade?—In both foreign and coasting trade.

7538. Have you read the report of the Committee of the House of Commons on Harbours of Refuge?—No, I have not.

7539. You are aware of the nature of our present inquiry?—I am.

7540. Will you state to the Commissioners any opinion that you have to offer to them as to the advantage or necessity of improving Waterford harbour in order to make it a subsidiary harbour of refuge for the trade bound to the south of the Irish Channel, or to the trade homeward bound from the Irish Channel?—I have known many instances of captains telling me they would come here but for want of water; and I have known instances of ships lost for want of shelter. The first case that comes to my mind is a ship in which I was myself; she was three hours outside the bar for want of water, in distress; she was laden with mahogany; her sails were blown away; and she was making a great deal of water.

7541. Were you in command of that vessel?—No; I merely happened to be on board her. We came into harbour and grounded on the bar; she was making a great deal of water and her sails were gone.

7542. Can you call to mind other cases of a similar character?—There was the *Adriatic*, a very large ship, an American ship. Two or three winters ago she went into Duncannon harbour, and was lost. Two vessels were lost the same day belonging to the same owners; they were vessels of 1,300 or 1,400 tons belonging to Cork. The captain of one them told me he would have come to Waterford if there had been water. Then I remember a ship belonging to Messrs. Waring and Gilmour; she anchored outside because there was not water to come in; she had to slip her anchor, and went to sea afterwards leaving her anchors and cables there; that was a ship of about 900 tons, I forget the name of her, laden with cotton.

7543. Any other case?—I remember, not long since, an Austrian brig grounding on the bar when she went to pass through. I was myself in command of a steam boat, and I picked up a ship off the harbour, a Frenchman; I was obliged to remain outside because I could not find water, and in the night, having a ship in tow in heavy weather, it was extremely dangerous.

7544. Have you any dates from which you could make a return of the number of vessels that have run into Waterford harbour during the period that you were harbour master, vessels in distress?—No, I cannot; because my station was up here, and those vessels went down to Passage; I had to go down frequently to survey vessels damaged, but I cannot give the dates.

7545. Have you any opinion to offer to the Commissioners as to the advantage or otherwise which Waterford harbour would present if deepened for ships homeward bound?—Ships of a large draft of water could then come here which would not think of approaching now because of the bar. If they miss Cork, they must go to Milford Haven or take the chance of the Channel; when they could not come here I have known them obliged to hang to windward.

7546. And therefore the harbour might come into more extensive use as a port of call for orders?—Yes, Cork is a port of call for orders, and for ships in distress. If there were plenty of water large ships would come here.

7547. Have you any opinion to offer as to the advantages of Waterford to the trade out of the Bristol Channel?—In what way?

7548. As a harbour of refuge in heavy south-west gales?—It would be very desirable, for it is the only port if you go up the Channel where you can get on sand.

7549. Of your own knowledge, do you know of many vessels from the Bristol Channel having taken refuge at Waterford?—From St. George's Channel principally.

7550. But vessels from the Bristol Channel?—They do occasionally come here.

7551. Have you ever known of Clyde ships putting into Waterford harbour?—Yes, all ships get as far as outward bound from the Clyde or anywhere else; they would be glad to come here if there was water, for they do not like to run back.

7552. (*Capt. Washington.*) Then I understand you to say that all vessels from Liverpool to the Clyde bound for America south, pass within a few miles of Waterford harbour?—Yes, they must do it.

7553. Also homeward bound ships?—Yes, they must come along the coast.

7554. Is there any account kept of vessels which pass the Hook light?—No, I rather think not.

7555. Can the pilots give any notion of the number of vessels which pass?—No, I should think not.

7556. Have you charge of the pilots?—No.

7557. You are harbour-master?—Not now.

7558. Do you hold any situation at present?—I am surveyor to Lloyd's.

7559. Do all damaged vessels pass under your hands ?—Yes.

7560. Have many damaged vessels come to Waterford for repairs ?—A great many at different times damaged from collisions.

7561. Can you state the number in any particular year ?—No, I cannot do that.

7562. Are there all facilities at Waterford for the repair of vessels, both steamers and sailing vessels ?—We have a slip, but no dock.

7563. A patent slip ?—Yes.

7564. What sized vessels can it take up ?—500 or 600 tons.

7565. Do large vessels come ?—There are several 900 ton ships belonging to the port.

7566. Do you know the number of vessels belonging to the port and their tonnage ?—No.

7567. Do you know the number of arrivals and sailings ?—No.

7568. (*Capt. Sulivan.*) You spoke of the *Adriatic* being lost for want of water. About what size was she ?—A very large ship ; a 1,400 ton ship.

7569. Was she laden ?—Yes ; she was deeply laden.

7570. Did she draw as much as 18 feet of water ?—I should think she drew 18 feet of water.

7571. Have you come in during a heavy sea over Waterford bar ?—Yes.

7572. What draft of water would you venture to take over the bar, supposing the wind was blowing a south gale and the channel was deepened to 20 feet at low water ?—I think I would just allow four feet for the send of the sea. I think you ought to allow four feet for the send of the sea. Where there is a heavy sea, say 17 feet draft of water, a long ship would not make so much send.

7573. With 20 feet draft of water you would not not hesitate to run in a 17 feet ship ?—No, I would not.

7574. Are you aware of the dredging of the east side of the channel ?—I have heard of it.

7575. Supposing the wind were south-east would you take a 17 feet ship in ?—I think it would take me too far to leeward. If the wind were dead against me, I should not be able to go out.

7576. Do you consider it important that all harbours of refuge should be so constructed that, with a fair wind for ships to put back, the ordinary changes of wind would give a fair wind to go out again and to proceed to sea ?—Yes.

7577. Does Waterford possess that advantage ?—It does.

7578. Would you consider 20 feet depth in the channel at low water sufficient, considering the large amount of the American trade and the large class of vessels employed in that trade ?—It would be well to have it more for the large vessels they have now-a-days ; for ships deeply laden it would be better.

7579. Is the tide strong enough, supposing the channel were cut, for ships to back and fill out ?—Yes, particularly if constructed as Mr. Stephens described.

7580. From what you know of the state of the bar, could vessels back and fill out ?—Yes, unless it were blowing very strong and then they would not require to go to sea.

7581. Is the channel in all parts from the inside of the bar up to the Passage, wide enough for vessels taking refuge to bring up ?—Plenty.

7582. Should you fear ships being too crowded ?—No, for if they put in for refuge, they would run up to Passage where there is smooth water.

7583. Would the whole distance from Duncannon Passage afford them accommodation ?—Yes, there is very fine anchorage there.

7584. Within that area ?—Yes.

7585. Have you seen ships frequently at anchor there ?—I have not seen them frequently but I know there is room for a great many. There is a long space and the pier would encourage ships always to run up to Passage and Ballyhack where there is very great accommodation. You can run on the bank if you like, and I have known ships come in without anchors or cables run on the bank.

7586. From the run of the sea should you say it was dangerous for vessels broaching to ? Do you think that any sized vessel might run through that comparatively narrow channel in safety ?—Yes.

7587. The sea is regular ?—Yes? I have been running in with light ships and heavily laden ships too, very often.

7588. (*Capt. Vetch.*) Looking at the chart, I see there is a current running from Hook Point to the west ?—Yes.

7589. Are you aware of the strength of it ?—There is a great race there, two tides meet.

7590. What is the strength of the race ?—Two and and a half or three knots, something thereabouts.

7591. Did you find that sufficient to run down the wave ?—No, keeping round the Hook Tower, there is a great sea running there. So much broken water makes a terrible sea. It is cross water.

7592. Do you not think the run of the tide across the mouth of the bay has a great effect in reducing the sea ?—No, I do not think it has.

7593. (*Mr. Coode.*) You stated that you were not prepared to furnish particulars of vessels damaged. Do you think you could do so within a week or two ?—No, I have no date ; for a great many are towed away for repairs ; they send sometimes and take them away.

7594. Could you give us the name of any one who could afford that information ?—The Secretary to the Harbour Commissioners, because they take the pilotage in and out.

7595. As a practical seaman with a knowledge of this locality, give us your idea of the least breadth that the channel should be, always bearing in mind that the length is somewhere about 2,000 yards ?—If you haul one of those long ships you cannot always keep the course you want.

7596. I want to know from you, as a practical man, what is the minimum breadth of channel that should be dredged ?—To be laid athwart the harbour a ship should have not less than six times her length.

7597. Mr. Farrell said 400 yards ?—That is what I say too, but the wider the better ; that would be a very fair breadth. It is seldom such cases would occur, and in bringing up large ships perhaps you might anchor in the middle, and if you weigh you then get sternway.

7598. Do you consider 400 yards too much or too little ?—I should say I think about 1,200 feet.

7599. Do you apprehend it would be necessary to bring up in that channel ?—You might. You might meet another ship but I should think 1,200 feet or 1,400 feet enough.

7600. You say a greater depth than 20 feet would be desirable. Tell us what is the least depth there should be ?—Some large ships draw 24 feet of water, and if one of those came and could not keep out, she would want to come in. A ship of that size does not make much sand in the sea.

7601. I should like a direct answer ?—I should think 20 or 22 feet.

7602. You said just now that 20 feet would be more than sufficient ?—I should like 22 feet for the very large ships and steamboats.

7603. (*Chairman.*) As Lloyd's surveyor do you not keep regular books ?—No; my report is always sent away with the ship.

7604. (*Capt. Washington.*) In what part of the south coast of Ireland do most wrecks occur ?—I think this neighbourhood, between this and the Saltees, near Wexford.

7605. Are there many on Tramore Sand ?—Yes, a great many.

7606. Is it not notorious that there are more wrecks on Tramore Sand than on any other point ?—It is more dangerous, but I think there are more wrecks in this place.

7607. What place ?—About the coast of Wexford,

WATERFORD.

Capt. W. Price.

23 Sept. 1858.

Capt. Washington.

7608. How far is Tramore Sand from Wexford harbour?—Three or four miles, there is a wreck lying there now, a Norwegian.

7609. Will you consider your answer?—Which one?

7610. As to the wrecks at Tramore not being as many as at other places?—There are a vast number of wrecks there. I have seen four at one time—French vessels.

7611. Have you seen a similar number about the Saltees?—No, I do not go there.

7612. Do you know of any great loss of life in Tramore Bay?—Yes, the *Seahorse*.

7613. What was she?—She was a transport; that was a great many years ago, because there is a monument to the officers who were in her which gives the date. Last winter there were two men drowned.

7614. In the *Seahorse* how many lives were lost?—I know there were a great many, between 300 and 400.

7615. On the occasion of the wreck of the *Seahorse* as many as 300 or 400 lives were lost in Tramore Bay; do you know any other spot on the coast of Ireland where a greater loss of life has occurred from wreck?—No.

7616. You say that a great many wrecks occur east of Waterford?—A great many.

7617. Between Waterford harbour and the Saltees?—Some.

7618. What is the distance?—12 or 14 miles.

7619. Then within 12 or 14 miles to the east, and near to the west of Waterford harbour, the greatest number of wrecks occur of the total number which occur on the coast?—Yes.

7620. Are the approaches to Waterford well lighted?—Yes, very fair.

7621. And the channel well buoyed?—Yes.

7622. Would complaints of lives or buoys come before you?—I recollect asking and recommending that the Hook light should be coloured; you approved of the suggestion but it has not been done. It was done at Dungeness, and has very materially assisted vessels.

7623. Give us your reason why you would colour the Hook lighthouse?—Because when the atmosphere is thick, I have often seen the house and the cottage at the bottom when I could not see anything of the tower.

7624. Then to make it more clear you would recommend its being painted in alternate stripes or bands of black and white?—Yes; I recollect saying that to you, and you approved of it when you were here before. Dungeness was white at one time, and coloured for that very reason. I recollect writing to the secretary of the Ballast Board, and he said they could not make any change in it. He did not give any reason, and I told him that you had approved of it.

7625. You allude to the Ballast Board of Dublin?—Yes.

7626. Are all lights under the Ballast Board of Dublin?—Yes.

7627. Are no lights maintained by the Harbour Trust?—No; all are under the Ballast Board.

7628. Are they good?—Very good.

7629. Would you suggest any alteration in them?—No.

7630. You told us you had been a sailor for 25 years, and yet you spoke of a narrow channel of about a mile range requiring room for ships to anchor, why should they require to anchor at all?—They might get into collision. There might be a hundred reasons for wanting to anchor.

7631. Would any vessel anchor in a narrow channel if she could help it?—I have often seen it done coming out of Liverpool. Vessels are obliged to let go sometimes from fouling, and other ships on putting about. You can never tell when those circumstances may occur.

7632. You do not mean to say that as a general rule you want breadth for vessels to bring up in a channel?—No, I suppose not.

7633. Only under very special circumstances?—Yes.

7634. You are aware that widening the channel would be double the expense of making this out?—Of course; but ships generally run with a fair wind and do not require it.

7635. Is there a steam tug belonging to the harbour?—Yes, two.

7636. Do they go to the bar to look for ships?—No, they go when they are ordered.

7637. Is it likely that steam tugs would go down and wait outside the bar in the event of its being made a harbour of refuge?—I think decidedly they would.

7638. (*Capt. Sulivan.*) You never applied to the Board of Trade on the subject of colouring the Hook lighthouse?—Never; it was to the Ballast Board in Dublin, and the secretary threw cold water on it.

7639. Have you ever seen a lighthouse striped with red and white or black and white?—Yes, I do not know where, but I have seen it.

7640. A parti-coloured lighthouse would show better, would it not?—It would.

7641. How far out at low water have you ever seen the sea break across the harbour?—Somewhere about Credan Head; but that might be owing to the tidal stream.

7642. But I mean the curl of the sea from the wave meeting the shallow water. In what depth do you think the sea breaks in the heaviest gales at low water?—I think it runs out to Credan Head.

7643. Have you ever seen it break out beyond 22 feet?—I do not remember; I have often seen it break as far as Credan Head, and the pilots will be able to say how much further.

Captain BATHURST, R.N., examined.

Capt. Bathurst, R.N.

7644. (*Chairman.*) You are the inspector commanding the coast-guard of this district?—I am.

7645. And your station is at Tramore?—Yes.

7646. Have you any opinion to offer to the commissioners connected with their present inquiry?—With regard to the wrecks in Tramore Bay, I do not think they are caused so much by ships being driven on by stress of weather as by vessels running in mistaking the bay for Waterford harbour. I think the danger would be diminished if the two pillars on Brownstown were removed.

7647. For what are they mistaken?—They are mistaken for the Hook Tower.

6748. You have only been here one year I believe?—Yes; but I have seen the list of vessels wrecked for the last 10 or 12 years.

7649. Can you supply the Commissioners with a copy of that list at your convenience?—Certainly.

7650. Is not Tramore Bay the worst place for wrecks in the south of Ireland?—I think not. The worst place is at Wexford; I have to report all wrecks which occur in my district, and for one which I have to report the inspector commanding at Wexford has to report three. Tramore Bay runs in very deep, and persons not acquainted with the bay mistake it for the river. There are three pillars, one at West Point and two at Broomhill; seeing three pillars on one side and two on the other, they take it for granted that it is the entrance to a large river, and knowing that there is something on the East Point going into Waterford, they think the two pillars mark it, and they run in. There is a vessel on the beach at this moment which did exactly the thing I have been stating. At the time of the wreck of the *Seahorse*, in 1816, there was a martello tower very like the Hook, and I believe it is supposed she took it for the Hook and run in. About 1823 the martello tower was taken down and the two pillars put

up in its place, but the two pillars were nearly as bad.

7651. Does the return of wrecks of which you have told us show the circumstances of each wreck in any detail?—No, I cannot say that it does, but three and four vessels have been upon the beach at a time, and I am imformed that they each of them run in mistaking it for Waterford river.

7652. (*Capt. Washington.*) How long have you been stationed at Tramore?—eleven months.

7653. Were you ever on the south coast of Ireland before?—No.

7654. Then you have no personal experience on which you have your evidence?—Only the wreck charts with which we were supplied this morning by the Board of Trade.

7655. Can you produce a wreck chart?—I have it at Tramore. There all the wrecks are marked.

7656. You have stated that you believe those wrecks were caused by the three pillars on the west side?—I believe more wrecks are caused from vessels mistaking the coast than from being driven in.

7657. May I ask on what ground you found that that belief?—From the circumstances of each individual case that I have heard of.

7658. Have you had occasion to examine into the matter?—Yes.

7659. How many wrecks have you noted in the 11 months?—I have not noted more than four, but I have seen the circumstances under which the wrecks have occurred for the last 10 years.

7660. Have you that return?—I have the names of the vessels, the number of lives lost, and the number saved, but not all the details.

7661. But does it say whether mistaking Tramore for Waterford Bay is really the cause of the wrecks?—I drew the conclusion from what I have heard from masters of vessels whom I have examined, and from those who have been on the spot for some years.

7662. You quite understand that if it should be so every step would be taken for obviating that likewise?—I have no doubt in my own mind that it is so.

7663. Can you furnish the Commissioners at your leisure with any information bearing on that point?—I think I can.

7664. (*Capt. Sulivan.*) Can you state what number went in by mistake and what number by stress of weather?—Three out of four went in by mistake.

7665. Are you aware why the pillars were put there? Was it considered necessary to have the pillars for the local traffic?—They were put there after the dreadful loss of the *Seahorse*, they took down the Martello Tower and put two towers on Brownstown Head and three on the West Point.

7666. If there were no towers on Brownstown Head do you think any danger would arise unconnected with the mistake of Waterford, which is at present guarded against by the towers?—No, certainly not.

7667. Have you ever heard any reason for marking Brownstown Head?—Nothing further than that the bay should be well marked.

7668. Have you heard any reason why Brownstown Head should be marked more than it is by nature?—No.

7669. Would you have any fear of mistake if those two towers were entirely removed?—No; not if three towers were left on the west side, because Waterford harbour mark is on the east side instead of the west.

7670. Have you made any report of these circumstances?—I did three or four days ago to the Board of Trade.

7671. (*Capt. Vetch.*) I think the back strand of Tramore Bay is very extensive, is it not?—If you speak of the water it is about 1,000 acres.

7672. Does it often happen that by the narrow entrance there is a considerable run of tide?—A spring tide runs into the little village of Arkshaw.

7673. Is it not generally believed that the tide is the cause of bringing vessels in?—It is a small body of water. I do not think the influence of the tide is felt much out.

7674. But if a vessel were embayed it might have that effect?—No, I did not think so; because the wrecks are generally to the west. They would be drawn to the east if the tide had any effect.

7675. Where do the wrecks take place?—At any part of the strand.

7676. Do wrecks occur in the Rinna Shark Channel?—Yes, I knew of a vessel that run in there and struck.

7677. They are embanking the back strand, are they not?—No, the banking has not commenced.

Mr. Edmund Henry Alcock examined.

7678. (*Chairman.*) You are pilot master here?—Yes.

7679. How long have you been connected with the port of Waterford in that capacity?—Since 1851, seven and a half years now.

7680. Have you ever been to sea?—I have.

7681. For what number of years?—I suppose altogether 15.

7682. In what capacity?—I have commanded a ship of 590 tons.

7683. During the whole of that time?—No; I was in command of her when I gave up the sea in 1847.

7684. How long have you commanded vessels?—That one trip was my last; having more to do on shore and having seen enough of the trade, I gave up the sea.

7685. Will you state to the Commissioners any opinion you entertain, or will you state generally whether you concur in the opinion of the previous witness, Captain Bathurst?—I perfectly agree with him. I have frequently had visible proof myself of ships that entered the harbour in a sea that pilots could not attempt to face. I have seen the pilots leave the ships when they could not communicate to keep clear of the harbour altogether, even with a south-east wind; and I was an eye-witness of that case of the *Hotspur*. It is a matter of frequent occurrence that vessels come in and speak to pilot boats; and I have known ships wanting provisions that would not enter up, on account of the name which the bar has got, and they have employed the pilot boats to get off provisions, and have proceeded on their voyage afterwards.

7686. Have you anything further to state in addition to what has already been stated by Mr. Price?—I suppose it is perfectly needless for me to remark on the position of Waterford, you are as well acquainted as I am with its central position.

7687. What is the character of the pilot establishment here?—I, as pilot master, am stationed at Dunmore, and we have two cutters, two masters, 18 pilots, and two apprentices on that particular station, and always, day and night through the year, one cutter is under canvass, no matter how the wind is.

7688. Have you been successful in relieving vessels in distress by bringing them into the harbour?—Yes, there was the *Appleton*, she was lost, and not a soul saved. There was the wreck of the *Columbus*, she was lost on the Hook Point, it was impossible to face up harbour with a south-south-west wind. If you run to leeward under such circumstances there is nothing but certain destruction. The captain of the *Columbus* reached to the east and endeavoured to wear to the HookPoint. She struck, and the captain had to let go his anchor. I was in the pilot boat at the time. She became a wreck in the course of the night, and I believe 13 or 14 souls were lost. She was bound from New Orleans to Liverpool. That was on the 6th January 1852.

7689. Do ships bound to or from the Bristol Channel ever put into Waterford harbour?—In gales of south wind, if reaching up shore they lay to the west; and if there were safety here at all times of the tide they would come in, but with the bar ships rather avoid the harbour. They are afraid.

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Chairman.

7690. Have you any opinion to offer as to the probability of Waterford becoming more extensively used as a port of call for orders in the event of a harbour of refuge being constructed?—From its central position, from its being the nearest in position to Liverpoool and the Clyde, and from its not being so far to leeward as Cork, the fair logical conclusion is, that Waterford will receive that attention to which, by her position, she is entitled when there is a safe anchorage for ships at all times of the tide, which there is not now.

7691. (*Capt. Washington.*) You mentioned that there were two pilot cutters?—Two on the outside station.

7692. How long have these pilot cutters been on the station?—Always, from time immemorial; at least, I believe since 1816; that was before my time.

7693. Where is their station?—Their station is at Dunmore. They always keep on the weather shoal. In westerly winds they prepare to command the harbour by going to windward.

7694. You spoke of the wreck of the *Columbus* of which you said you were an eye witness, had she a pilot on board?—No, she could not be boarded.

7695. How far in did she come?—When I saw her she was about half a mile or a mile to the south or south-south-west of Dunmore. I was in the pilot cutter, and instantly reached away towards her, but the sea was too heavy, and I was only able to witness the very awful scene that ensued.

7696. Do you remember what sail she was under when you saw her?—Under three close reefed topsails. She appeared to me as well as I could make out, as if reaching before making sail, but the captain said she would not weather the Hook.

7697. Did she make sail?—No. She appeared to me in the act of trying to set her mizen topsail, and could not do it.

7698. How did you say the wind was when she got on the bar?—It was about south-west. She was endeavouring to get out of the bay, but there was nothing but broken water all to leeward, and it was low water.

7699. How near was she ever to Dunmore?—Within a mile of Dunmore when I saw her.

7700. No nearer?—No; and she went ashore inside there.

7701. Do you mean just inside of the Hook?—Yes, not half a mile north of Hook Point.

7702. And how many lives were lost?—Thirteen.

7703. And the ship became a total wreck?—Yes; and next morning there was scarcely a vestage to be seen of her.

7704. Are there any means of saving life at Dunmore point?—Nothing, all is a matter of chance; and there is a fearful sea breaking in there.

7705. Is there not a coast-guard station?—Not nearer than Mather.

7706. What is the distance?—three or four miles.

(*Capt. Bathurst.*) There is a coast-guard station and rocket at Mather.

7707. (*Capt. Washington.*) Are the coast guard generally forward in saving life?

(*Mr. Alcock.*) Decidedly so.

7708. Do you know whether they came down on that occasion?—I know that rockets were firing on the shore, as well as on the ship, tar barrels were burning, every thing was done to save life. There is not a better hearted people in the world. I know the man well who saved the captain out of the sea.

7709. Have any other vessels been ashore in that immediate neighbourhood?—There was a steamer lost there years ago, the *Liverpool*, inside the Hook. The *Atlantic* got ashore on the back of the Hook, but was got off again. She lay about an hour.

7710. Seeing that it is the site of many wrecks, is it not desirable that it should be made a situation for life boats or rockets?—Decidedly, it would be an advantage there.

7711. (*Capt. Sulivan.*) Do you know the outer limits of the breakers on the bar. In the heaviest weather how far out does the sea break?—I have seen it break within half a mile of Credan Head.

7712. In the channel?—It is not a weighty sea, but a kind of spitting, curling, chopping sea. The water is so shallow that there is a very heavy send. It is just in the race of the tide.

7713. In what depth of water do you say that is?—18 or 20 feet.

7714. If the bar were deepened to 20 feet, do you think the sea would break through the channel?—The greater water in the tide way will tend to run the sea down. There would not be the same amount of broken water.

7715. Have you any experienced pilot here to be examined?—Yes; one of the most experienced pilots; and I have also brought the master of one of the cutters, Samuel Mitchell.

7716. (*Chairman.*) When vessels run in for refuge which is the part of the harbour that they lay in?—They go up the harbour.

7717. Simply for refuge I mean, not vessels bound for the port, but vessels who run in through stress of weather. Where do they generally anchor?—I have seen them anchor in all parts, but if in running up, the tide is at the flood, or the wind becomes light there is remarkably good anchorage inside Duncannon Fort. You can have as much as six, seven, and eight fathoms from Duncannon Fort up to Passage. From Passage to a mile above the anchorage is considered the safest. We have had some Australian ships there. The *Meander* anchored abreast of Parkwell; she was drawing 19 feet and lay there for the greater part of the winter.

7718. Then you would be disposed to say that all the way up from Duncannon Fort there is good anchorage for vessels to run into?—I do not know any better anchorage. There is first rate holding ground, and no sea to speak of.

7719. In the heaviest weather, blowing right in, have you ever seen the sea about Duncannon Point such that a four-oared boat could not cross it?—I have been there in a gale of wind, and I have seen boats drifting for salmon in full gales of wind.

7720. From Duncannon Fort outwards, drawing a line from Duncannon Point to Brownstown, can boats cross at all times?—In gales of wind from south-west they can come down on the weather shore, but you cannot expect them to round into the open sea.

7721. But my question has reference to this, to give an idea of the sea running up the harbour, say, from Woodsland to Beadey Bay, can boats get across?—May I ask whether you mean rowing or sailing boats?

7722. Rowing boats?—I am satisfied that there are times when rowing boats cannot pull across there, but that would be an exception.

7723. Have you any life boats?—None in this harbour. I applied for them myself, and the answer I received was that there was not sufficient loss of life in Waterford harbour, and that there were other places which had prior claims to ours.

7724. Perhaps the observation as to the prior claims might have had reference to the funds at the disposal of the society?—The secretary gave me to understand that the funds were limited.

7725. With reference to the evidence as to Tramore bay, what is your opinion as to that being the most dangerous part of the coast?—I am rather inclined to think that there is more loss on the Wexford coast, because if a vessel in a south-west wind is inside of Conibeg light, and cannot weather the Hook, she is sure to go ashore.

7726. Are you disposed to concur in the evidence of Captain Bathurst as to the necessity of removing the towers on Brownstown Point?—I never could understand the reason of it. If three towers were left on the west side it would be impossible to make a mistake. A man must see the three. But where there are two there is a possibility of a ship bringing the two into one, and causing them to have the appearance of only a single pillar, like the Hook, which is

only a single pillar ; especially, if you get sight of it for a moment, and then it is clouded by thick weather.

7727. Therefore, without doubt, you think they should be removed ?—In my opinion they are of no use at all, rather an injury than otherwise.

7728. (*Capt. Washington.*) Do you mean that you have thirty-five pilots ?—We keep the younger and fresher in the cutters. We keep the older men at the inshore stations.

7729. Do you make a distinction between sea pilots and shore pilots ?—We do not take the old men in the cutters.

7730. Then do I understand that you have 35 men in all ?—No.

7731. How many have you at Dunmore ?—Eighteen pilots, four apprentices, and two masters. We occasionally have more, but sometimes a pilot gets the offer to go as mate or master of a ship, and I never object when we can spare him with safety.

7732. You referred to the wreck of the *Columbus*. I should like to give you an opportunity of contradicting a rumour that she stood into Dunmore, under close reefed top sails, waited for a pilot, and not getting one drifted on to the bar ?—Assistance was sent to her immediately. The young pilots in the cutter could not board her. Anybody who had attempted it would have been lost.

7733. Then you are able from your own experience to contradict that rumour ?—Positively.

7734. You heard the opinions expressed as to colouring the Hook tower ?—That is with regard to the tower itself. It would make it more distinct and prominent. I think common sense shows that.

7735. The object is not so much variety of colour as to enable you in certain states of the atmosphere to see black objects before white objects become visible ?—I have seen on the American coast lights painted red and white longitudinally. I think the variety of colour draws attention sooner than when the light-house has only one colour.

7736. Are you not aware that there are lighthouses parti-coloured on the Irish coast ?—I believe that there are.

7737. Do you know the Maiden light tower ?—I cannot speak as to that.

7738. Are not the Maiden and other light towers coloured ?—I believe they are.

7739. Is the bouying of the harbour under your orders ?—Yes.

7740. Are they coloured differently ?—Yes ; port side all red and starboard all black.

7741. How long do you say the bouys have been coloured ?—As long as I have been pilot master.

7742. And I think you said you had pilot cutters cruising in Waterford harbour for many years ?—I believe 1816 was the first. I cannot give the date with accuracy, but within my memory there have always been cutters, and I recollect the harbour for the last 25 years.

7743. Do you know the cost of the whole of the pilotage ?—No, I do not ; the secretary can supply you with that.

7744. Does not the payment of the pilots pass through your hands ?—No.

7745. Is it a large amount ?—The pilots on any station average 4*l.* or 5*l.* a month, sometimes more, sometimes less.

7746. Are they considered to be well paid ?—They would like more if they could get it.

Mr. FARRELL was here re-called and examined.

7747. (*Chairman.*) Can you tell us how much is paid to the pilots ?—In the year ending the 31st March 1858 it was 3,768*l.* ; that included 256*l.* for pensions —that is, for the pensions of pilots and the widows of deceased pilots.

7748. And while the revenue of the harbour was 6,000*l.* the whole amount of pilotage was 3,768*l* ?—The revenue was more last year ; it was 9,000*l.* ; but that was beyond all precedent, and we do not expect a continuation of it.

7749. Then, whether the revenue be 6,000*l.* or 9,000*l.*, do you state that fully one-third or nearly one-half is laid out on your pilot establishment ?—Yes. It is illegal the way that it is going on. The pilot fund is too expensive. It is contrary to law and is not a proper distribution of expenditure.

7750. I only wanted to point out that the pilotage is on an extremely liberal scale ?—It is too liberal.

7751. That is your idea. There are two pilot cutters at sea, and 25 pilots ?—Rather more, 36 generally.

The examination of Mr. ALCOCK resumed.

7752. (*Capt. Washington.*) In all my experience I am not aware of any similar pilot establishment on so liberal a scale ?—I believe there was only one night during the last year when there was not one cutter under canvas, and that night she was forced to run. Of course where vessels are day and night under canvas that expense must be in accordance therewith.

7753. (*Capt. Sulivan.*) You say the buoying is under your superintendence ?—Yes.

7754. In the harbour ?—Yes.

7755. Including those on the bar ?—Yes.

7756. Are they maintained out of your funds ?—I never made particular inquiry.

7757. The Ballast Board of Dublin keep up the leading lights and they also keep up the buoys on the bar ?—No, they are kept up by the local Commissioners.

(*Chairman.*) Before we part with you, I have the pleasure of saying, that all the Commissioners concur in the opinion expressed by Captain Washington as to the creditable and admirable way in which the pilot establishment appears to be conducted.

The witness withdrew.

Mr. JOHN MURRAY examined.

7758. (*Chairman.*) What is your occupation ?—A pilot.

7759. How long have you been a pilot in Waterford ?—Since 1816.

7760. You have heard the evidence given by Mr. Alcock ?—Yes.

7761. Do you generally concur in it ?—I think he is perfectly right in all his remarks, in all he has said.

7762. Is there anything you wish to add to his evidence ?—In my opinion there ought to be 22 feet of water to enable ships of large size to come into the port. There was the *Malabar*, with 35 men on board and not a day's provisions. She was afraid to come in for want of water over the bar, and the captain asked me, as a favour, to come ashore and get him his provisions.

7763. (*Capt. Sulivan.*) You heard the evidence respecting those two towers on the point ?—I did.

7764. Do you know any reason why marks are required on that head to distinguish it. I mean the two towers ?—They are to mark the head on the east side of Tramore Bay. They are without any light, and I do not see how they can be mistaken for the Hook. If a man has his chart he sees where he is.

7765. Then would you object to their being removed ?—I would.

7766. You think them especially useful in thick weather when the West Point cannot be seen ?—Yes.

7767. If the tower on the Hook were painted in red

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and white bands, do you think they would be sufficient to distinguish it at all times from those two towers, supposing those towers to be left?—I would prefer to see the Hook left as it is, white, for I have often seen it from the sea when I could not see land.

7768. If red bands were put, do you think it would be sufficient to prevent its being mistaken for Brownstown Head?

7769. From what you have heard of the wrecks in Tramore Bay have you reason to believe that the bay is often mistaken for Waterford from those two towers?—Yes; many a man I have heard say that he kept too close to the Waterford side of the harbour, got embayed and could not get out.

7770. If wrecks have occurred from mistaking the towers for the Hook why would you wish to continue them?—From mistaking the towers, wrecks are very rare. They are the same distance from one another and face to the sea, and they do not come into one until you are in the bay, and I rather think at the bottom of the bay.

7771. Then you are decidedly of opinion that it is better to keep the towers than to do away with them?—I am. It was shortly after the *Seahorse* was lost that they were erected there.

7772. (*Mr. Coode.*) What is the greatest number of vessels that you have known put into Waterford Harbour for shelter in a gale of wind?—200 sail and upwards.

7773. Upon what occasion was that?—A south-east and east-by-south wind.

7774. Is that a matter of common occurrence?—It is, and those ships haul away for Cork in consequence of the bar, there not being deep water.

7775. Is that within your own knowledge?—It is.

7776. You have boarded vessels where masters have told you that they were afraid to come in because of the want of water over the bar?—Yes.

7777. Do you know of any change in the depth of water?—Not within the last 40 years.

7778. Have you sounded?—I sounded when the buoy was laid down.

7779. When was that?—Within the last 30 years.

7780. Have you sounded since?—Yes, I have.

7781. Independently of bringing in vessels?—Yes, when I take out a heavy ship I take soundings.

7782. And you can say positively you have not known of any perceptible change within the last 30 years?—Not in the deep water channel.

7783. I speak of the bar?—I have seen ships strike drawing 18 feet.

7784. Have you armed the lead?—Yes.

7785. What did you bring up?—Shell, and sand and black mud come up on the anchor.

7786. Are you speaking now of cases where the anchor is dropped on the bar?—In gales we drop the pilot cutter's anchor there.

7787. And does mud come up?—Yes.

7788. What does it consist of?—Of black mud and some shells.

7789. Is it loose?—It is a little tough on the east side.

7790. How is it on the west side?—Not as much shells as on the east.

7791. Is there rock or stone in any part of the that bar?—No; not to my knowledge.

7792. You never saw any indication of rock or stone?—No, all small shingle.

7793. Does the anchor ever drag?—There is very good holding ground.

7794. You have never known an anchor to drag?—Never, unless in a very heavy gale; it might drag then.

7795. (*Chairman.*) You stated that you were desirous of keeping those two towers on Brownstown Head?—Yes.

7796. Is there any similarity in the appearance of Brownstown Head and the high land on the east side of Waterford Harbour?—I do not know what you mean.

7797. Does the land by Brownstown Head at all resemble the land on the east side of Waterford Harbour?—Yes, there is high land.

7798. Do they resemble one another?—They are very like, but then the land seems higher towards Waterford.

7799. And the entrance to Tramore Bay is so like Waterford Harbour that you think it is desirable to keep those marks to distinguish one from the other?—Yes, coming from the west you might mistake Tramore Bay from Waterford.

7800. That is a mistake which might be easily made by a stranger?—Of course.

7801. Therefore you think it very desirable that there should be some distinctive mark kept on Brownstown Head?—Of course.

7802. (*Capt. Washington.*) How far out is the indraft into Tramore Bay felt?—Between Brownstown Head and the three towers.

7803. It is felt as far as that?—The latter end of the west tide fetches into Tramore Bay.

7804. And you say from what you have seen that ships get in there in moderate but thick weather?—Yes.

7805. (*Capt. Sulivan.*) If the channel were deepened into Waterford, which would you prefer, a centre channel where the leading marks now are, or one to the east across the patch suggested by Mr. Stephens?—I should prefer the west channel, for generally when you are a cable's length from head of Cape Duncannon, the eddy current sends you up to the west, and if a vessel touches on the west shore there is not as much danger as there is on the other side.

7806. If the channel were made to the east it would not be straight, would it?—No.

7807. No leading lights or marks would be placed?—The present marks are very correct.

7808. But if the channel were to the east shore marks could not be put to carry you straight through the channel?—No.

7809. Therefore you would prefer the channel deepened in the present line of the leading marks?—Yes.

7810. Then you would prefer a channel to the west?—I should prefer in a heavy wind a channel to the west.

7811. That would take you right over the middle patch?—Yes, that is the course we run in a gale of wind.

7812. (*Capt. Vetch.*) Suppose the channel were cut through the banks, how wide would you require it to be?—About 400 yards, I should suppose.

7813. And to what depth do you think it ought to be carried?—I should like 20 feet at low water.

7814. Not less, but you would not object to a little more?—Three or four feet, of course, would be better.

7815. (*Mr. Coode.*) Will you tell us the least depth you would think necessary to ensure safety in bringing a vessel over the bar at all times?—From 20 to 22 feet.

7816. Then you think 22 feet would be enough at all times?—Yes.

7817. Was not your evidence to the effect that you would prefer a channel from Credan Head to Duncannon?—Yes.

7818. You have heard the evidence as to the state of the tides?—There is a draught from Credan Head to Dunmore bank near Bromhill shore. The first of the flood sets in along the Duncannon side. The first of the flood comes from Duncannon past Credan Head, meets the tide on the east shore, goes up to Passage to the west. If you are close to Credan the tide sets you along from the west side of the harbour.

7819. Does it take that course for the whole of the flood?—Not for the whole of the flood.

7820. For what time?—At least three hours; the bank keeps the tide off, but when the bank is covered it then sets in on the west shore.

7821. I do not quite understand your explanation as to the direction of the first of the flood?—If you

cross to Credan it goes in on the bank on the west side of the bar.

7822. Is it for half, three quarters, or for what period that it sets that way?—The latter end of the flood sets straight up to Duncannon.

7823. What is the greatest velocity of the flood stream at spring tides?—Two and a half to three knots an hour.

7824. How does the ebb come out?—At first the ebb comes over the bank from Passage to Lord Hill's place, inside the Hook about a mile or a mile and a half.

7825. Does the whole of the ebb continue to set in that direction?—Nearly so.

7826. At what period does it change?—The last quarter of the ebb sets towards Credan Head, or outside fair channel.

7827. And what is the greatest strength of the ebb tide?—About three knots, high spring tides with much freshet in the river.

7828. Then, considering the direction of the ebb, and the flood streams you would prefer a channel on the west side of the bar?—I would.

Mr. Samuel Mitchell examined.

Mr. S. Mitchell.

7829. (*Chairman.*) You are master of one of the pilot cutters?—Yes.

7830. How long have you been employed in that capacity?—Since 1851.

7831. And how long have you been connected with the port of Waterford?—20 years.

7832. You have heard the evidence of the two previous witnesses, the pilot master and Mr. Murray, the pilot?—Yes.

7833. Do you concur generally with the evidence they have given? is there any point on which you differ from them which you wish to state to the Commissioners?—Before I got on the pilot establishment I was employed in fishing large boats, 50 ton boats, from Saltees to Duncannon. We used to meet a great number of ships in that direction, all the ships going to Liverpool up Channel passed the Saltees. I have met ships in strong east winds short of provisions; at times I have met them disabled in strong winds, but the captains are always dubious about going into Waterford. I have often tried to get a few pounds out of them. They do not like to go in because there is not water enough, and they are afraid if once they get in that they will have a job to get out again.

7834. Have you anything further to offer to the Commissioners?—Yes, I boarded a ship dismasted, the *Lord Elgin*, from Benin to Liverpool, it was about 20 years ago. She made the Hook light; the captain thought there was not water enough, he let go the anchor and cut away the mast. A fisherman and a coast-guard boat from Dunmore boarded her.

7835. What became of the vessel?—She was towed up to Waterford by one of the screw boats.

7836. (*Capt. Sulivan*). Do you know what the pilotage is for ships of 20 feet draft of water?—For the winter half of the year 3*s.* a foot if you board her outside; that is, for all vessels of 12 feet 3*s.*, under 12 feet 2*s.* 6*d.*

7837. Do you know whether ships taking refuge have to pay anything besides pilotage?—Do you mean wind bound ships?

7838. Yes, wind bound ships?—Yes, they pay anchorage.

7839. Do you know how much?—Foreign vessels generally pay 5*s.* for anchorage.

7840. Do they pay any of the port dues?—I do not know.

7841. Does 3*s.* a foot take the ship into Passage?—Yes.

7842. What is paid for taking her out?—Not so much.

7843. How much?—I do not generally receive that; it is generally paid in Waterford for ships going out.

7844. (*Mr. Coode.*) Were you ever occupied in oyster dredging?—I have been trailing about the bar.

7845. Can you give us any idea of the nature of the ground on the bar?—It is very hard ground.

7846. Do the trawlers ever bring up boulders?—I never took any stone away.

7847. What have you brought up?—If the wind got light the nets would bring up mud; about the bar we used to get up oyster shells which cut the nets.

7848. You never brought up anything in the shape of stones?—Never; I have been towing a large net from Dunmore over the shoals, right out to the open Rhinehead and we never took any stones; I have been down there dozens and dozens of times.

7849. Have you a knowledge of the depth of water over the bar during the last 15 or 20 years? Do you know whether during the last 15 or 20 years any change has taken place?—I do not think there has been any change in it, not an inch.

Mr. Hassard examined.

Mr. Hassard.

7850. (*Chairman.*) You are Member for Waterford?—Yes.

7851. You wish to give evidence in relation to paragraph 13 in the report of the Committee of the House of Commons on Harbours of Refuge, with regard to the advantages of this port for the embarkation of troops?—I will merely add to that evidence that, if large vessels were able to get over the bar, it would be of great service. The *Abiona* is employed in the transport of troops to the East Indies; if she were able to get over the bar she would be able to go up to the bridge and lay alongside the trains of the Waterford and Limerick railway; she would find deep water alongside and cranes on the jetty head, and she would be able to discharge baggage or goods direct into trucks brought down to the quayside; and the lines with which that railway is connected give communication with Cork and Fermoy. There is another railway now being constructed through Mayo, and that line would be also brought into communication with the Temple House station depôt, with Curragh, and with Kilkenny; it is that information in illustration of the report of the Committee that I wish to give to you. Perhaps you will permit me to go to the question of saving life; when in London I applied to the Life Boat Committee, and they told me very liberally that they would be prepared to give us a life boat if a committee of Tramore would build a house and contribute a small sum, perhaps 20*l.*, to keep the boat in repair and exercise the crew; that committee has been formed, the secretary of it is in the room, the site for the life boat house has been determined upon, and I trust in a very short period to have an efficient life boat in Tramore Bay.

7852. (*Capt. Washington.*) I think that Captain Price told us that the secretary had replied that there were prior claims?—I do not know what Captain Price alluded to; I think he must refer to something much further back. I had a personal interview with the secretary of the institution in London, and I have told you the result of the application.

7853. And local funds have been obtained?—I rather think they have, but the secretary and treasurer is in the room.

7854. And I understand you to say that there is every facility in Waterford for embarking and disembarking troops at the railway station and for sending them all over Ireland?—Yes.

7855. (*Capt. Sulivan.*) You limited your remarks, I think, to the south of Ireland. Is not the Waterford and Limerick railway in connection with Dublin also?—Yes, with Dublin, and by Dublin with all the other stations in Ireland.

WATERFORD.

Mr. Hassard.

23 Sept. 1858.

7856. (*Capt. Vetch.*) You referred to a large transport ship?—Yes, the *Abiona*.

7857. What amount of water did she draw?—15 feet.

7858. If the bar were deepened to 22 feet?—She could come in at any time of the tide, for there is 33 feet of water at Waterford bridge.

7859. (*Mr. Coode.*) What depth of water is there alongside these quays at the railway?—I know it is about the deepest water in the river.

7860. Is it as deep as any other part of the river at that point?—I should say so.

7861. Can you tell me when the railway communication with Fermoy is likely to be completed?—I rather think in a year, or not exceeding a year and a half. I have been informed that the water alongside the jetty has been sounded, and that there is 20 feet at low water.

7862. And cranes will plumb from the railway trucks over into the vessels?—They are constructed for that purpose.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sitting at Waterford closed.

WEXFORD.

Friday, 24th September 1858.

PRESENT:

Admiral HOPE (Chairman).

Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Mr. CHARLES ARTHUR WALKER examined.

WEXFORD.

Mr. Charles Arthur Walker.

24 Sept. 1858.

7863. (*Chairman.*) In what way are you connected with the port of Wexford?—I am one of the harbour commissioners under the Act of Parliament. I should first mention that, with regard to nautical knowledge, I have none, and with regard to the harbour, that is a matter on which I cannot speak, except so far as to give a general opinion.

7864. Have you any statement which you wish to make?—Well, the statement is simply this,—In consequence of the notice of this Commission, the Mayor and Town Council, and also the members of the Commission under the Act of Parliament for the harbour, appointed committees, and these committees met, took depositions, and agreed on what would be thought the most desirable for the port. We drew up, and the substance of the report is to show, in the first place, the importance, not merely to the locality, but to the trade of the nation at large, in having near the coast, where a great deal of danger exists, a refuge, even an auxiliary refuge, to a general harbour of refuge, where vessels, instead of having to go to a great distance might repair for refuge when they get near the Tuskar Rock. It would be a great convenience to have an auxiliary place of refuge, which would be easy of entrance and safe; and with that view, we feel that if the harbour of Wexford could be so improved and made available for that purpose, well and good. In the next place I wish to point out what the opinion, the general opinion of the people here, is as to Ballygeary being a safe place, and to give their reasons why that would be an advantageous place. In the first place, when a vessel is at the Tuskar Rock, she can run for that place by keeping the natural channel, which is deep water, and which runs into a deep place. There is for land shelter Ballyteigue. The lighthouse of the Tuskar Rock would act, in the words of one of the witnesses, as an approach to guide into that harbour, and if the entrance into that auxiliary harbour was properly lighted, no stranger could mistake its entrance. They give as an illustration, that many vessels have been saved, which, taking advantage of the natural advantages which that place possesses, sailed in and were saved, which, in all human probability, would have been lost had they run for one of the more distant shelters. There is also the advantage, that in any wind they can sail out of it again. The anchorage too is good, and no vessel drags unless she breaks her cable or by other accident. Large vessels have taken advantage of it and been saved. I think that is the general line, and I shall show the national advantages as well as the local ones if it is allowed. I shall show by evidence that more vessels, outward and homeward bound, pass close by Wexford than by any other point in the United Kingdom, except in the Downs. There is no harbour so advantageously placed. There is no harbour between Castle Haven and Waterford, available for that purpose, where vessels pass so near the coast, and if an auxiliary harbour were made there, not only would it materially serve the port, but it would be a national advantage by the saving of life and property.

7865. Will you proceed?—You will excuse me if my statement is rather rambling.

7866. Anything you wish to say we shall be happy to hear?—There are many reasons why you would obtain the object sought for. A harbour of refuge in the neighbourhood of the danger would be of much greater service than having to run a great distance, as back to Kingstown or running to Waterford, or keeping the open sea. Then there are a few things which I must incidentally mention, just to show that even in a national point of view it would be of use. It would serve our fisheries materially as a harbour of refuge, which would be near the fishing grounds, because the distance which the fishing boats have to go before they can get to the ground, and the bad accommodation which they have, both injures the vessels and prevents all but the larger class of boats which can remain out in a rough sea from going out. If there were a harbour, it would be available near the fishing ground, of course it would be a great encouragement to the fisheries, and in a national point of view it would be useful, as they form a very good nursery for the Royal Navy. There are a number of men at Wexford,—men and lads—who always prefer a seaman's life. I do not know that there is anything further that I need say.

7867. Among the evidence that you have tendered is there any engineering evidence?—No; the only engineer we can refer to is our county surveyor.

7868. I see a number of names here, are they all seafaring men?—They are all seafaring men.

7869. (*Chairman.*) I should like Mr. Farrell to be summoned.

(*Mr. Walker.*) By all means.

Mr. MARK DEVEREUX examined.

7870. (*Chairman.*) In what way are you connected with the port of Wexford ?—I am a pilot master.

7871. For how many years have you held that situation ?—For 26 years.

7872. You are well acquainted with the banks and the entrance of the harbour ?—Yes.

7873. Will you describe to the Commissioners what change has taken place in them since your knowledge of them ?—Of the outside banks ?

7874. Yes.—I am not aware that any changes have taken place.

7875. What is the nature of the bank marked on the chart Dogger Bank ?—Sand.

7876. There is another bank separate from the Dogger Bank by a small swashway, part of the Dogger Bank, I presume ; is that sand too ?—Yes.

7877. As to Hantoon Channel, has that always existed in its present state ?—It has always existed in its present state in my time, sometimes better, sometimes worse. It chokes up sometimes in bad weather. The east winds send in shingle, and so on.

7878. In the Hantoon Channel I see less depth of water. Is this the fact, and have you ever known it to be less ?—I have.

7878-*a*. What is the least depth of water you have ever known it ?—Five feet.

7879. What has been the greatest depth in the shallowest part of the channel within your recollection ?—Seven feet at low water.

7880. Has any change taken place in the channel up to the town, within your recollection ?—There has been a trifling change, not much.

7881. None of consequence ?—No.

7882. I see a channel here, which runs from Rostare Point to the embankment ; has that always remained in its present state, within your recollection ?—It has.

7883. Did you know the harbour before that embankment was made ?—I did.

7884. Describe to the Commissioners what change that embankment was made in the harbour, if any ?—Since the embankment was made, the shoals on the north side of the bar, out towards Dogger Bank, have increased very much.

7885. And the embankment on the south side, has that produced any change in the harbour ?—I don't know, except that the point is nearer to the fort. They are become much more shoaled, and extending towards the point.

7886. (*Capt. Washington.*) You have stated that the north part of the Dogger Bank has increased since the northern embankment ?—Yes, very much.

7887. State how you know that ?—By observation, and by information.

7888. Has that improved or made worse the approaches to the harbour ?—Why, I should say, it has made them worse.

7889. By what channel ?—By the north channel.

7890. The north channel is not in so good a state as formerly ?—Not near so good.

7891. Can you name any period at which it was better ?—About 1842 or 1843.

7892. When was the north embankment made ?—I can't say.

7893. Was it not in 1850 ?—I should say it was made before that.

7894. Was it made in 1845 ?—I should say it was commenced, at all events, if not finished.

7895. Did the Harbour Trustees receive any indemnity for taking away so much slob land from their harbour ?—I am not aware that they did, except that the Embankment Company were obliged to deposit a certain sum of money for any supposed injury which might occur.

7896. Do you think there has been any injury ?—Injuries have been done to the bar and the shoals of the harbour since the mudlands commenced.

7897. That is your opinion ?—Yes.

7898. You are not aware that the Harbour Embankment Company engaged to pay 20,000*l.* for the enclosure of this land ?—I was in London at the time.

7899. Were you not one of the witnesses at the time they obtained their Act ?—I was.

7900. Were you not aware of the nature of that Act ?—I think that was made a condition.

7901. You say that Rosslare Point has shoaled ?—I know that Raven's Point, on the spit, has gone out.

7902. Has Rosslare Point ?—I can't say ; I know that the Dogger Bank has increased, and come in towards the port. The sand is extending from the spit, all the time, for these many years back. I should say eight years, at all events.

7903. The Dogger Bank is extending to the south ?—Yes, very much.

7904. Has Hantoon Channel become deeper or shoaler ?—I can't say. There is no great difference now. Some part is deeper, but the approaches to it are just the same.

7905. Does the sea break away the sand beach near the North Ball ?—It does.

7906. Does it carry a quantity of sand into the channel ?—It does.

7907. When washed out is it deposited near Rostare ?—I don't think that a great deal went into the channel.

7908. Do you know what caused the sea to break in ?—The sand has been rather growing up these two years past.

7909. But what was the cause ?—Because the south tongue of the Dogger Bank does not extend so far south-west, so that there is more range coming in from the sea than at present.

7910. But you said that the Dogger Bank had shifted to the south ?—Yes.

7911. But before that, was the bank broken away ?—It was.

7912. Is the beach protected by grass ?—The outside beach.

7913. Yes ?—There is nothing there.

7914. Is there not grass on the top of the sand hills ?—Not at present. There was some bent grass.

7915. Then there was bent grass there formerly ?—Yes.

7916. What has become of it ?—It is washed away.

7917. Was it got for making baskets ?—No.

7918. The bent grass is never taken away ?—Very rarely, I have never seen it.

7919. Is the buoying of the channel under your orders ?—Partly.

7920. Is the channel properly buoyed up to the town ?—I should say it is.

7921. Black buoys on one side, and red on the other ?—Yes, there may be another added at Dundalk. There is a buoy, it is merely put on the stones, it is merely placed as a guide to prevent vessels going on that spot.

7922. How long has it been there ?—I should say two or three years.

7923. Is it to remain there ?—I think the harbour-master has so ordered.

7924. If it is to remain, is it not desirable that it should be coloured ?—Yes, certainly, if it is to remain. I should say it should be red.

7925. You mean black ?—Oh yes.

7926. How many pilots are there belonging to Wexford ?—We are 13 at present, 13 sea and 3 Hull pilots.

7927. Have you any vessel cruising in the offing ?—Yes.

7928. To put pilots on board ships ?—Yes.

7929. And you do so ?—Yes.

7930. (*Capt. Sulivan.*) Which channel do you allude to, round Ravenspit, or straight out to sea ?—Round Ravenspit.

7931. What water have you known in that channel ?—I have known 12 feet.

7932. At low water ?—No, high water.

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Mr. Mark Devereux.

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Capt. Sulivan.

7933. What water, then, at dead low water ?—4½ or 5 feet.

7934. That is 10 feet at high water ?—Yes, 10 feet at high water.

7935. You have never known more than 12 feet ?—In the other channel.

7936. Then there is about 2 feet difference in these channels ?—There is.

7937. The channel which goes out straight in 1845 appears to have had only 4 or 5 feet of water in it; that was before the embankment, was it not ?—I can't say how long.

7938. The embankment was not made in 1845 ?—It may have been commenced.

7939. What water have you known in the channel ?—What channel ?

7940. The straight channel ?—In the channel direct out, 12 or 13 feet.

7941. Seven feet at low water ?—Yes, more.

7942. When was that, do you recollect ?—I can't exactly tell you the time.

7943. Tell us about the time,—in 1845 ?—In about 1840, I should say.

7944. But since 1845, when by this chart there appears to have been 5 feet only in that channel, are you aware whether any deeper water has been in it ?—No, I don't think there has.

7945. Is there now ?—It is dry.

7946. The eastern channel is quite dry, then ; it does not exist at low water ?—No.

7947. North-east, between that and Ravenspit, there was, in 1845, 7 feet of water at low water ; does that exist ?—Yes.

7948. Is there as much water as there was ?—No, less water.

7949. Is that the best of your north channels ?—Yes.

7950. With respect to the Hantoon Channel, since the dredging commenced, in July last, have you been able to take in vessels which you did not before ?—No.

7951. Have any larger vessels come in through the Hantoon Channel in the last two months than what you were in the habit of taking in before ?—No, not so large.

7952. Then the channel is not wider in consequence of the dredging ?—No.

7953. Do you think it is filling up ?—The work has commenced at the centre ; both the ends are left as they were.

7954. Exactly, there was a little narrow ridge thrown up ?—Yes, that is what I spoke of.

7955. Is that dredging away ?—No.

7956. Then there is no more width in that channel since the dredging began ?—No.

7957. (*Capt. Vetch.*) What is the rise and fall of the tide in the channel ?—Five or six feet.

7958. What is the rise and fall of the tide at Wexford ?—Six feet, I should say.

7959. Is there five or six feet fall at Rosslare Point ?—Yes.

7960. Then there is little difference between the rise of the tide there and at Wexford ?—Certainly.

7961. How long is the tide in running from Rosslare Point to Wexford ?—There is a difference of about three quarters of an hour.

7962. What is the present state of the Coal Channel to what it was 10 years ago, worse or better ?—I don't think there is any alteration in it, except it may be from the discharge of the lighters which have thrown stuff into the middle of the channel.

7963. That fills it up ?—I should say so.

7964. With regard to the North Channel, is that better than it was 10 years ago ?—In the main or middle channel of the North Channel there is a bed of mussels or oysters, but there has not been much variation for many years.

7965. How long have you been acquainted with this place ?—Since I was born.

7966. Did it ever occur to you that the sea had broken across the North Sands ?—Yes, I have seen it.

7967. You have seen it run across the North Sands ?—Yes, I have.

7968. Have you ever seen it in old times run across the sand hills near Rosslare Point ?—I have seen it.

7969. Has that been an uncommon circumstance or not ?—Not at all uncommon.

7970. (*Mr. Coode.*) You have stated that the Dogger Bank is sand, and that the accumulation in the channel is sand and shingle ?—Yes.

7971. How have you ascertained that this accumulation differs from that in the Bank ?—I should say that it goes out with the ebb tide towards the Dogger Bank.

7972. How have you ascertained that this material is different in the channel ?—By seeing it.

7973. In the bottom ?—By taking it up.

7974. How taking it up ?—In buckets ; in various ways when I was lying aground on it.

7975. You said that five feet was the least depth and seven feet the greatest ; has this change extended over long periods, or have they been frequent ?—Over long periods. As to Hantoon Channel it has been a long time ; it has been with large variations for 10 years.

7976. Then the change you speak of has extended over long periods of time ?—It has.

7977. Do you apprehend that the change you have spoken of in the North Channel has been greater since the embankment was formed ?—I should say much more.

7978. Towards the Ravenspit ?—Yes.

7979. Has that change been so marked that you are able to form an opinion whether it is due to the formation of this embankment or not ? Have you any opinion on the point at all ? Has the change been due or not to the formation of this embankment ?—I have no opinion to form whether the change is due or not to the formation of the mud bank, but I know that for the last 26 years, until three or four years ago, there was much better water, and not at all the accumulation of sand as at present.

7980. Then the change in the last few years has been much greater than at former periods ?—Yes, very much.

7981. Can you give the Commissioners any reason for that change ?—I cannot give you any reason further than that the force of the tide does not come sufficiently down from the town as it formerly did, and its reaches cause an eddy on that side more than formerly.

7982. Do you mean that there is a stronger tide through the Coal Channel than formerly ?—No, not much.

7983. I understood you to say there was a stronger tide ?— The tide is stronger through the Coal Channel, but the action is stronger in the lower channel.

7984. Then that is not as it used to be ?—It is not as it formerly was.

7985. How do you account for that ?—I do not know.

7986. Has not the operation of the tidal water been cut off by the construction of the north embankment ?—It has.

7987. Can you say whether that has affected it in any way ?—I should say it ought to have some tendency towards it.

7988. You say there has been no change in the main channel for many years ?—No.

7989. I think you said something about the accumulation of mussels and oysters ?—Yes, in the harbour.

7990. Not in the main channel ?—No.

7991. Down to what point ?—From Gall Bar down to about opposite the chimney of the engine house.

7992. The north engine house ?—Yes.

7993. And there has been an accumulation of mussels and shells within the last few years ?—Yes.

7994. When was your notice first directed to that accumulation ?—Four or five years ago.

7995. Then we may fairly conclude there is no accumulation of sand and shingle in that channel at any rate ?—I should say not.

7996. If I gather rightly what fell from you, you think no benefit has been derived from the dredging operations ?—There may be some in time ; at present there is no difference.

7997. No additional depth of water has been gained by the dredging operations up to the present period ?—None.

7998. Do you imagine that any additional depth may be gained if a different course were pursued ? I ask with a view to any suggestions which you may have to make ?—I have not the slightest doubt that if the dredger had worked continuously since it came here it would have made a very good channel.

7999. Could she have worked more frequently than she has ?—Yes.

8000. Do you mean that she has not been at work when she might have been ?—Yes.

8001. Can you give us an idea as to how often that has happened ?—For a week or a fortnight she did not work more than two days.

8002. When the weather permitted ?—I speak of the smoothness of the water.

8003. You think it might have worked a tide many times when it was lying idle ?—Undoubtedly.

8004. Can you give us any idea of how many days or how many times ?—I cannot say.

8005. State something approximate—give us an idea, because many and few are comparative terms ?—I cannot say.

8006. Has it been 5 days, or 10 days, or 20 days that the dredger has not worked when she might have done so ?—I think you may say 40.

8007. When she might have worked ?—Yes.

8008. Do you keep any record of the weather ?—I do.

8009. Can you, by reference to that record, give actual days that she has not worked when she might ?—I suppose I can.

8010. Will you make reference to that, and give us some idea from it of the actual number of days that she has not worked when she might ?—I will.

8011. Will you refer, and give us a statement within a few days of how often she has not worked ?—Yes.

8012. You must have had considerable experience of the harbour of Wexford ; can you offer any suggestion where we should place this dredger so that she would work to the best advantage ?—I think she was doing very well as far as she went ; but there was a loss of time when she didn't work, when the weather permitted her.

8013. You think she has worked in the right place, but that there have been many occasions when she might have worked and did not ?—Yes.

8014. Are you quite confident that this breach through the Ball is not owing to the removal of the bent grass ? Have you had opportunities of observing ?—I have resided on the spot for the last 26 years.

8015. You speak with some confidence. Have you ever seen people tearing up this bent grass ?—Yes.

8016. I believe it is generally used for thatching houses ?—Yes.

8017. Is the practice to cut it, or to tear it up by the roots ?—They generally cut it.

8018. Then if the roots remain they would act to preserve the sandbank ?—I should say better than if it were not cut.

8019. (*Chairman.*) In the report which I hold in my hand, I see it it stated that, with the exception of the Downs, a larger number of vessels pass by Wexford than any other port of the kingdom. Can you corroborate that statement from your own experience as a pilot ?—I should say there is.

8020. Can you furnish any return of vessels which pass ?—Yes.

8021. Will you point out to me Ballygeary Bay, or describe it. Is that correctly marked by Captain Washington on the chart produced. (*No.* 2049 *put into witness's hand*) ?—I have marked it.

8022. Are you acquainted with this report. Have you read the report of the Committees of the Town Council and Harbour of Refuge Commissioners ?—I have heard it read.

8023. In that report Ballygeary Bay is stated as an eligible site for a harbour of refuge. Do you concur in that opinion ?—I do.

8024. Will you now state to the Commissioners your reasons for doing so ?—In the first place it is a bay which nature has formed as a harbour. From the south and south-south-east to the north-north-east it is safe for any vessel to anchor. In the next place, you have good water for ships drawing 20 to 24 feet water to come in through the south channel, provided it were buoyed and lighted and beaconed to guide vessels through. The only difficulty is that the tides run very strong between there and the Tuskar. It is difficult to come in with a fair wind unless you have a very good guide. You must have a light to come in by night, and in the daytime you can come in very well. It is the turning point for all vessels bound for ports in the British Channel this side of England. They all make the Tuskar, and get a sight of it. Ships, both foreign and outward bound, generally meet contrary winds—some bound out, some bound up—where it is difficult to fetch a harbour of refuge, and they have to go to Kingstown, Holyhead, Liverpool, and various other places.

8025. Have you anything further to state ?—I should say it would be a great thing for our trade, and for fishermen generally, if they could get a harbour of refuge near their fishing ground. The whole day is taken up in getting to the fishing ground, and they are obliged to return into port as quick as they can. Foreign vessels, too, coming in, are obliged to stop in the bay and discharge a portion of their cargo before they can come in here.

8026. Has the bay ever been surveyed, or any plans formed with a view to a breakwater for the purpose of making Ballygeary Bay a harbour of call ?—I can't say there ever was. It was talked of some time ago. Mr. Brunel surveyed it several times. I had the honour of being with him.

8027. Do you know whether any plan exists, or whether the estimate was ever made ?—No ; I do not think there ever was.

8028. What objection is there to a vessel anchoring in South Bay. In a south-west wind, it appears to me, the protection is perfect ?—Perfect for a ship to come and anchor.

8029. In a south-west gale the protection in South Bay is perfect ?—Perfect.

8030. In a south-east gale would you say that protection is not so good, but still is good ?—There are instances of vessels riding out heavy gales in it.

8031. South-east gales ?—Yes ; the holding ground is excellent so long as the ground tackle will hold.

8032. From your description of the ground, and the nature of the bank, it appears to me that it ought to be considered very good indeed in south-east gales. Is it so ?—Yes.

8033. In a heavy north-east gale, I presume, there is a heavy sea in South Bay ?—There is a good run ; there must be on shoal water.

8034. Have you ever known a vessel ride out a heavy gale from the north-east in South Bay ?—Frequently.

8035. Then would you consider it sufficient, for the purpose of making this South Bay available as a harbour of refuge, that it should be properly buoyed and lighted without the expense of a breakwater ?—It would be a very excellent thing to have it buoyed, but I should prefer a breakwater with it.

8036. From what place would you propose to run this breakwater ?—I would come nearly as far as White House. I would not connect it with any portion of the mainland.

8037. Be good enough to mark on the chart where

WEXFORD.

Mr. Mark Devereux.

24 Sept. 1858.

Chairman.

you would place the breakwater ?—I have marked on the chart (No. 1772) where I would place the breakwater.

8038. At what distance from Greenore Point are the best fishing grounds ?—I should say from three to four miles.

8039. In what direction ?—Opposite to Wexford, between the Dogger Bank and the Hole Bay ; we generally obtain oysters between the Long Bank and the Dogger Bank, a little to the north and a little to the south of it.

8040. And was it to that fishery that you alluded when you told us of the advantage of a harbour of refuge ?—Yes.

8041. From your experience as a pilot——I have been a shipmaster for eight years, sailing out of Liverpool.

8042. Oblige me by hearing the question out. In your experience as a pilot, do you know of many vessels which have passed this port which would have liked to put into it if it were easier of access ?—I have heard of many and know of many, when I was a shipmaster myself, that have put into Kingstown and Holyhead. I have been bearing up from the Tuskar and lodged in Holyhead seven weeks wind-bound.

8043. Were you a pilot before you were pilot-master ?—No, I was a shipmaster.

8044. (*Capt. Washington.*) Do you know the number of vessels sailing in and out of Wexford annually ?—I have them down.

8045. Can you furnish a return ?—Not at present.

8046. But later ?—Yes.

8047. And what number of fishermen are there in the port?—I think there are 13 or 14 smacks of 22 tons.

8048. How many men to each smack ?—I should say six each. There are others besides.

8049. And the fishing ground is near to Wexford ? —North and south bays.

8050. Are the Long Bank and Holder's bed buoyed? —They are.

8051. How long have they been buoyed ?—Within two years.

8052. By whom ?—By the Ballast Board of Dublin.

8053. (*Capt. Sulivan.*) When you put back off the Tuskar how was the wind ?—South-south-west.

8054. The bay would have afforded just as much shelter as if there were a breakwater, would it not ? —I should prefer it if it were blowing from the north-east.

8055. South-west generally goes round to north-north-west ?—Lately they have gone much to the east.

8056. Do ships use the bay commonly with a south-west wind ?—They do.

8057. Does the sea break on the bank with an easterly gale ?—Yes, right along it.

8058. What wind would the breakwater be specially required for ?—From north-east to south-east.

8059. You would not close the south entrance ?—No.

8060. Then the south-east would come in just the same through the channel, would it not ?—I should not think it would.

8061. (*Mr. Coode.*) Referring to this occasion when you bore up to Holyhead and were wind-bound for seven weeks, what prevented you going into South Bay; you knew it very well ?—I knew it, but not so well.

8062. But what prevented you going in, was it solely the fear of the wind going round to north-east ?—Yes.

8063. That and that only ?—Yes.

8064. Do the tides flow strongly round Holder's Bed and Greenore ?—Yes.

8065. How much ?—Four knots.

8066. Do you not think that the current would be increased by a breakwater ?—I don't think it would be. We have not many obstacles. We have some rocks, but they are rather a protection than anything else if they were lighted sufficiently.

8067. Assuming that it is not thought desirable to incur any outlay to make a breakwater such as you have sketched, which outlay we will assume would be very large, can you suggest anything else which might be done to improve this bay ?—If a light ship were moored in the centre of the channel that would be sufficient. There is a beacon on Carrick Rock.

8068. Do you think a light wanted ?—Yes.

8069. Do you think it is wanted enough to justify the expense ?—I think it much wanted.

8070. Do you think more vessels would come if there were such a light ?—I do.

8071. Do vessels frequently bring up there for refuge ?—Very frequently.

8072. How many have you seen at a time ?—Six or seven.

8073. Is that a matter of common occurrence ?—Yes.

8074. How many times in the winter season, say on an average ?—50 times.

8075. Large vessels ?—Large and small, varying from 300 to 50 tons.

8076. I understand it is not commonly used by large vessels ?—Most of the larger vessels come to the port.

8077. I speak of vessels going to South Bay for refuge.—No, it is not.

8078. (*Chairman.*) Will you tell me from what quarter your heaviest gales of wind blow ?—We have latterly had the heaviest gales from the north-east. South-east and south-west were the heaviest gales we experienced before the last few years.

8079. How do they begin ? Do they begin from the south-west, go round to the north-east, and increase and blow hard ?—They do.

8080. And the south-east, how do they begin—generally with what kind of weather ?—With wet weather ; they generally back out towards the east.

8081. From south to east ?—Yes.

8082. After blowing hard do they generally veer round to north-east ?—They generally veer round to north-east.

8083. And blow hard ?—Yes.

8084. How do the south-east gales end ?—From north-east they work round to north-west and die out.

Mr. McCan examined.

Mr. McCan.

8085. (*Chairman.*) You are harbour-master of Wexford ?—I am.

8086. How long have you held that situation ?—Seven years.

8087. And how were you previously occupied ?—I have been master of a vessel. I have been in the foreign trade, and in the coasting mercantile business.

8088. How many years were you at sea ?—35 years. I was with Lord Nelson when he was killed.

8089. For how many years were you master of a vessel ?—I was master of a vessel at the time I was pressed illegally.

8090. That is irrelevant to our present inquiry. It will very much facilitate our business if witnesses will abstain from any remarks which are irrelevant. —That was just a mere remark made to show that at that time I was at sea.

8091. What was the class of vessels you generally commanded ?—Sailing vessels. I never commanded a steamer.

8092. Of what size ?—From 150 to 50 tons.

8093. And in what direction did you generally trade ?—Liverpool, Glasgow, Bristol—different ports on the coast.

8094. Have you seen this report of the committee appointed by the Town Council ?—No.

8095. There is in it a statement that, with the exception of the Downs, more trade passes by Wexford than any other part of the United Kingdom.

Should you be disposed to concur in that statement? —I should.

8096. Are you able to furnish the Commissioners with a return showing the number of vessels entering or leaving the port of Wexford for the last five years? —From 600 to 700 a year.

8097. Can you at your convenience furnish a detailed statement, showing the number and size of vessels, whether coasting or foreign?—I can, in the course of a little time.

8098. Will you be good enough to do so at your convenience, with any other remarks that may suggest themselves to you to forward the object of our inquiry?—I will.

8099. Is it the general opinion that if the access to this port was made better than it is, vessels would resort to it for the purpose of refuge, vessels not bound to the port?—I think they would.

8100. From stress of weather?—Yes, from necessity.

8101. State the ground upon which you have formed that opinion—At present they want no such thing, because there is no harbour to run for, in fact some of our own vessels are obliged to run from bad weather and easterly winds, and from there being no water on the bar sufficient to take them in.

8102. So that perhaps, I may say, that from the bar the port has got a bad character with vessels which don't belong to it?—It has.

8103. You have heard the evidence of the previous witness with respect to Ballygeary Bay?—I did not.

8104. What opinion have you to offer to the Commissioners as to this Ballygeary Bay being made a harbour of refuge?—I think it would be a most important thing for the trade and for foreigners also.

8105. But this bay is already so well protected by nature that it appears to me not to require much more. What is your opinion, will you say what you think about it?—It is very good for the south-westerly winds, and for winds shifting from south-west to north-west, though otherwise it is very much exposed.

8106. In a heavy south-west gale could vessels ride in safety in South Bay?—No, certainly not.

8107. Has it ever occurred in your experience that a vessel has ever gone ashore in a south-westerly gale?—Yes.

8108. Can you state the name of the vessel or about the time?—I can; it was a vessel belonging to Mr. Hawker, of Bristol, which was broken up.

8109. What size was she?—A brig of 260 tons.

8110. Did her cable part?—I don't know whether she dragged or whether her cable parted.

8111. Is the holding ground good?—Pretty good.

8112. Only pretty good?—Sand, you know.

8113. Have you ever seen the sea break along the bank with the wind from the north-west?—At high water a heavy sea flows in across the bank.

8114. Under such circumstances, would a four-oared gig live in the bay?—No, not in some gales.

8115. I speak of the wind blowing across the bank? —She must be a good smart boat to do it.

8116. When the tide falls the sea falls in the bay too?—The bank is always dry, it does not make any perceptible difference.

8117. As respects the fisheries, where is the best fishing ground?—In the south and north bay.

8118. (*Capt. Sulivan.*) How long have you been harbour-master?—Nearly seven years.

8119. Did you know Wexford much before the north embankment was made?—I have known it all my life.

8120. Is there any difference in the rise and fall of the tide since that embankment was made?—Yes, six or eight inches.

8121. Then a larger body of water comes to the quay than there did before the embankment?—I should say so.

8122. (*Chairman.*) From what direction do your heaviest gales blow?—The heaviest gale that we feel is east to south-east, and south-south-east, right in shore.

8123. How do shore gales commence, from what quarter do they begin to blow. Describe the weather previously?—Generally with thick weather. They commence from the east, go round to south-east and south-south-east, and increase as they go round.

8124. Or they go round from south?—They back round to east-south-east, and sometimes round to north-east.

8125. Do they frequently go round to north-east, and then blow hard?—They do.

8126. For how long?—Sometimes twenty-four hours, sometimes three or four days.

8127. How do easterly gales end?—Cease a little, and then become moderate. I have known them continue for a week. It is a very bad wind for the harbour, for the fishermen cannot get out to fish, which makes the people very distressed in consequence.

8128. There are embankments in your harbour; by whom were they made?—By the Harbour Embankment Company.

8129. Do you know if there is any gentleman present who can give evidence on the part of the Company; any gentleman connected with the Company?—I think Mr. Farrell will be very efficient evidence; he is the engineer.

The witness withdrew.

Mr. Walker stated that Mr. Redmond would give evidence with respect to the Harbour Embankment Company.

Mr. Martin Boen examined.

8130. (*Chairman.*) What is your occupation?—A pilot.

8131. How long have you been a pilot?—Seven years.

8132. What were you before you were a pilot?— A sailor.

8133. In what vessels were you chiefly employed? —In coasting vessels, sometimes foreign.

8134. Are you in the habit of going to meet vessels out at sea?—Yes.

8135. Within your knowledge, have many vessels passed the port without coming in, from the circumstance of the access not being easy? Has it frequently occurred that vessels have wished to come into the port from stress of weather?—Yes, many of them.

8136. During the last 12 months how many such cases have occurred within your own knowledge? —To the best of my knowledge, perhaps six or seven.

8137. What description of vessels were they?— All sorts; all rigs.

8138. Coasting, or foreign?—Foreign and coasting too.

8139. What is the greatest draught of water that you can remember a vessel coming in with at low water, with a gale blowing from the east?— 20 feet; from that to 25 feet.

8140. At low water?—Yes.

8141. But I mean Wexford Harbour, not the bay? —From six to seven feet.

8142. Vessels from six to seven feet can come in in any weather?—Yes.

8143. Have you made any use of Hantoon Channel? —It is the one that we make most use of; it is the safest bar.

8144. Do you mean by the safest bar, that there is much less sea?—Yes.

8145. How far east must the wind be in order to give facility for getting into Hantoon Channel?—

WEXFORD.

Mr. Martin Boen.

4 Sept. 1858.

Chairman.

The wind east-north-east is right out of Hantoon Channel.

8146. Can you get in with the wind at south-east?—Yes, well.

8147. Can you get in with the wind at east-south-east?—Yes, as far as east-and-by-south.

8148. Have you ever known vessels get ashore on Rosslare Point?—Yes, I have.

8149. Was that in bad weather?—Yes; but most times in bad weather. The want of water does that.

8150. Does that happen frequently?—No, not very often.

8151. Have you ever been at anchor with a vessel in South Bay?—Yes.

8152. What kind of anchorage is it?—Very good.

8153. Can you lie there in a heavy south-east gale in safety?—No; not with the wind so far out as that, and a heavy gale, with the wind at south-south-east.

8154. But if the vessel were well found in ground tackle, should you fear running for South Bay?—No; we have rode out many gales there.

8155. Is the ground good?—There is very good anchorage at three fathoms.

8156. What is the nature of the bottom?—Sand, and deep marl below.

8157. Wnen a vessel purchases her anchor in South Bay, there is very heavy heaving there, is there not?—Yes.

8158. Have you known many vessels part from their anchors in South Bay?—Not a great many.

8159. Have you ever known a vessel drive in South Bay?—Never; so long as she holds, she will burst before she will drive.

8160. With the wind at north-east, have you ever rode out a gale in South Bay?—I have.

8161. When was that?—Two years next month; I was there five nights in a very heavy breeze.

8162. How many anchors had you down?—Two.

8163. And what cable to each?—50 fathoms to one, and 45 to the other.

8164. And were all her masts on end?—She was schooner rigged; we had our topmasts up.

8165. What yards had you crossed?—Two topsail yards and the foreyard.

8166. Have you ever run into South Bay at night, in bad weather?—Yes, often.

8167. Does it want any additional facility in lighting?—Yes, if there were lights at night it would be better. Many are afraid of running into the bay as it is.

8168. (*Capt. Washington.*) Where would you place the light?—In the middle of South Shear, if I could.

8169. Not at the south end of the long bank, or thereabouts?—Yes.

8170. Then you would have a floating light?—Yes; inside Holder's Bed.

8171. Is it a common practice for timber ships to lie every winter in South Bay?—Yes.

8172. Sometimes for a fortnight?—Yes, and longer.

8173. Did you ever know a timber ship to lie there a month?—No; but I have known them lie there 20 days.

8174. Without driving from her anchors?—Yes.

8175. Surely that must be a good harbour of refuge?—The finest place in the world for a pier.

8176. (*Capt. Sulivan.*) Would you place a light inside or outside of Holder's Bed?—Inside altogether, in the bay.

8177. At the edge of Holder's Bed?—Yes; it would be better than outside, because a man who made the Tuskar could see it.

8178. And the bearing of the Tuskar would take him right through?—Yes.

8179. What water do you carry through the south channel?—Six or seven fathoms.

8180. I speak of the south or Hantoon Channel, what water do you carry through that?—Eleven feet must be a good tide; we had more than that at the deep water.

8181. Have you sounded since the dredging began?—Yes.

8182. And before?—Yes, and before.

8183. Are you aware that last year there were said to be only ten feet there?—I am.

8184. And only five feet at low water?—Yes.

8185. I think now you say you draw six feet?—Yes, and seven feet.

8186. What would you take a vessel through with now?—With a good spring tide, eleven feet.

8187. Then you think that depth of water has been attained since last year by dredging?—I do.

8188. One foot?—Yes.

8189. Since the dredging began do you find the channel safer for bringing vessels through?—No doubt it did a great deal while working.

8190. Do you bring your vessels in with a foul wind, backing and falling with the tide?—We do.

8191. What breadth can you carry through?—The narrowest point is 35 fathoms from the main to the shore.

8192. Do you know the little flat, off the point?—I do.

8193. If that were dredged away, would it help you greatly in rounding the point closely?—Of course it would.

8194. Would any work upon the other channel be so good as upon Hantoon Channel?—No, Hantoon Channel is the safest.

8195. And would you prefer that all the work at Wexford should be in reference to deepening the Hantoon Channel?—Yes; to deepening the Hantoon Channel.

8196. Do you know the west sandbank of that middle bank? You know, the sort of island formed on the Dogger Bank—between the washway and the west end of Dogger—is the sand on the west bank increasing?—It is closing.

8197. Do you mean that the channel is closing?—Yes; in a few years it will be closed up altogether.

8198. You think the second or Dogger channel will close?—I do.

8199. Does the tide strike the south, or does it go out to the east?—At low water there is a great tide coming in—the tide is going south. It does not come in dry until nearly low water, then it strikes right through.

8200. Do you mean through the east channel?—Yes.

8201. Before the ebb itself sets under the Dogger Bank?—Yes, the ebb does.

8202. You know the bank above, where the black buoy is; would any deepening there assist pilots much in bringing ships up?—It would; we must have very fine weather to be there.

8203. No; I speak of Gall Bar, right in the harbour?—Of course it would.

8204. You have only the same depth that you have in Hantoon Channel?—Not quite so much.

8205. Whatever depth is taken down in Hantoon channel, would it be a great assistance to reduce Gall Bar to the same depth to get large vessels up?—Yes, it would.

8206. Do you know much of the rise and fall of the tide at Wexford?—Yes.

8207. And across the Cuts?—Yes.

8208. Do you think that the tide rises higher than before the embankment was made?—I do not think the embankment does any harm at all; it is all owing to the wind; some tides only rise to $2\frac{1}{2}$ feet.

8209. But still, putting that aside, do you think there is any more rise and fall at Wexford now than when you first knew the town?—No; I do not think there is.

8210. (*Capt. Vetch.*) You find South Bay a safe place to bring up in?—Yes, it is a very fine bay.

8211. You have not got enough of shelter there?—No, not exactly.

8212. Will you show me where you would like to

have the necessary shelter ? Where would you place that protection ?—At Ballygeary.

8213. You would like to have a breakwater more to the north, opposite the bay ?—Yes.

8214. Do you understand this chart ?—No.

8215. (*Mr. Coode.*) Did you hear the evidence of Mr. Devereux as to the practice of letting the dredger remain idle when she might have worked ?—No.

8216. You have been constantly about here ; do you think she has worked every day when the weather permitted ?—I can say that there were days when she might have been at work when she was not.

8217. Can you give an idea of the number of those days ?—Not approximately.

8218. Do you think 20 days ?—Very likely it might be 20.

8219. Do you think there have been 10 days when she might have worked and has not ?—Yes.

8220. Can you speak as to 20 days ?—No.

8221. But you feel satisfied as to 10 ?—I dare say I may safely say 10.

8222. You stated that you did not believe there had been any change in the rise of the tide in consequence of this embankment ; do you think there has been any change by the silting up of the channel, and the accumulation of material, since the formation of the embankment ?—No.

8223. Do we understand that you would put this light vessel in the middle of the channel, between Holder's Bed and the shore ?—Yes.

8224. In what line ?—Between Holder's Bed and Greenore Point.

8225. You would place it in that line in the middle of the channel ?—Yes.

8226. And you think if it were there, a stranger with an ordinary chart could run in at all times ?—I am sure of it.

8227. (*Chairman.*) You stated in a previous part of your evidence that timber ships lay in the South Bay during the winter ?—Yes.

8228. What number of vessels have you seen lying there at one time ?—I have seen three or four together.

8229. Do they ride out north-east gales ?—Yes.

8230. Did you ever know one of them go ashore ?—I did, once.

8231. During the experience of how many years ?—It was nearly 30 years ago.

8232. Then, during the last 30 years' experience, how many of these timber ships, which you have seen lying in South Bay for a month together during the winter, have you known go ashore in a north-east gale ?—I have not known any other go ashore within the last 30 years.

8233. You stated you preferred Hantoon Channel to the other ; will you give your reasons ?—In the first place, we never have half as much sea ; and the ship is sure to be safe if she did go ashore, which she would not be the other way.

8234. If the ship went ashore in a heavy south-east gale in the Hantoon Channel, would she be safe on the beach ?—She would ; she would be sure to come off again with lightening.

8235. And life would be saved ?—Yes.

8236. Which are your heaviest gales in—from which quarter ?—South-south-west in winter time.

8237. (*Capt. Sulivan.*) With a south-east gale in the South Shear, and the tide running out, is not there a heavy race ?—There is a good current out—it makes a nasty sea.

8238. Would that be a good place for a light ship to anchor ?—Yes, inside the shoal.

8239. But you said you would have it in mid-channel ?—I would.

8240. Would not that be in the strength of the race ?—Further in there is less tide.

8241. If it were under Culver's Shoal, or on the outside under Holder's Bed, on one end or the other, coming in, would not that be as well as the middle ?—Yes.

8242. And the light ship would be more sheltered, would she not ?—Yes, she would.

8243. (*Mr. Coode.*) Had you any particular reason when you said just now you would prefer to have the light ship moored in mid-channel ?—I think it would be the best place for the vessel to run for.

8244. Do you not think it would be just as well on one side as the other, so that it is laid down on the chart ?—Yes, it would, if men only knew on which side it was.

Mr. W. Clarke examined.

8245. (*Chairman.*) What is your occupation ?—Shipmaster.

8246. How long have you been at sea ?—45 years.

8247. How long have you been master of a vessel ?—Upwards of 30 years.

8248. And what description of vessel have you commanded ?—Sailing and steam.

8249. How long have you been in command of a steam vessel ?—25 years.

8250. And previous to that in what trade were the sailing vessels which you have commanded ?—Generally in the coasting trade.

8251. Have you ever come into Wexford Harbour with the wind blowing hard ?—I have.

8252. Which channel do you use ?—The Hantoon Channel.

8253. Do you prefer it to the other ?—Yes.

8254. Will you state your reasons ?—If the wind is east you cannot approach the other channel at all.

8255. Why can't you approach it ?—The sea is so heavy, it breaks all across.

8256. Hantoon Channel is protected by the Dogger Bank ?—By the Dogger Bank quite.

8257. Have you ever been at anchor in South Bay ?—I have.

8258. In bad weather ?—In bad weather, blowing very heavy.

8259. How was the wind ?—West-south-west.

8260. Have you ever rode out a south-east gale in South Bay ?—No.

8261. Have you ever been anchored in South Bay in a north-east gale ?—Never.

8262. Have you ever run into South Bay at night ?—No, I have not.

8263. Have you ever run in, in bad weather ?—Yes, in a strong breeze from the south-west, running round to south-south-west.

8264. Have you done so without difficulty ?—Yes.

8265. Would it be improved by a light ?—It would be a great improvement on a dark night.

8266. (*Capt. Washington.*) Are you well acquainted with the Hantoon Channel ?—Pretty well.

8267. Do you pass in by it often ?—Yes.

8268. How often ?—In bad weather we have always to take that channel ; with the wind from the east you can't approach the North Channel.

8269. Are you trading constantly to Wexford ?—Yes, for nearly five years.

8270. In command of a steamer ?—Yes.

8271. How often does she come into the harbour ?—Once a-week.

8272. Do you take the Hantoon Channel or the North Channel oftenest ?—Generally the Hantoon Channel in the winter season.

8273. Are you aware that the dredging vessel has been employed in the channel ?—I am quite aware of it.

8274. Has it done any good ?—I think it has improved the channel.

8275. To any considerable extent ?—I think it is considerably deeper than what it was previous to the dredging commencing.

8276. How long do you say you have known the Hantoon Channel ?—Nearly five years.

WEXFORD.

Mr. W. Clarke.

24 Sept. 1858.

Capt. Washington.

8277. Do you think the dredger is dredging at the right place?—Yes, at the right place. She commenced at the entrance, on the shoal which runs across from the point of the Dogger Bank.

8278. You have heard it stated by Mr. Devereux that, in his opinion, 40 days she might have worked when she did not?—She might have been working a considerable time when she was not.

8279. Do you know what prevented her?—I cannot say.

8280. Which channel do you think it most desirable to improve as an entrance to Wexford Harbour?—The Hantoon Channel.

8281. Would it be desirable to make the Dogger Bank grow up above high water, to make an island of it?—That would be a noble entrance.

8282. Do you think that is the best means of sheltering Hantoon Channel?—Yes.

8283. Would you rather see that done than any attempt to improve the East Channel?—It is a much safer channel, and always will be, even if there is no improvement. You cannot approach the North Channel with a wind south-south-east, running to north-east.

8284. Then it is your decided opinion that Hantoon Channel is the one to improve?—I would say so.

8285. (*Capt. Sulivan.*) You say that the dredge might have worked some days when it did not. Do you mean by the smoothness of the water you found coming in?—I mean by the smooth water coming in and out.

8286. Do you know that a small lift in the sea is a sore obstacle to the dredger working?—I am quite aware of that.

8287. And you think that on these occasions there was no lift in the sea?—There was no lift whatever when I went out and in.

8288. What water does your vessel draw?—11 feet or 11½ feet; but she has never drawn that when coming into the harbour of Wexford.

8289. When you were coming to Wexford Harbour to what depth have you ventured to load your vessel?—10 feet.

8290. Have you ventured to load her deeper since the dredger commenced?—I have not frequented the Hantoon Channel since the dredger began; generally we have taken the North Channel.

8291. From what you know of the channel, would you venture to load your vessel deeper than you did last year?—No, not more than 10 feet, and that at spring tides.

8292. Is there more water in the other channel?—I do not think there is any difference in still water, when the water is smooth.

8293. (*Capt. Vetch.*) How long have you known the harbour of Wexford?—Nearly five years.

8294. Do you find the banks southward of the mouth of the bar shifting?—They have shifted considerably.

8295. Sometimes the deepest entrance is the North Channel, is it not; sometimes the east, and sometimes the Hantoon?—I never use but two, the North Channel and the Hantoon.

8296. If these channels are of a shifting character you cannot reckon on the channel remaining open?—Hantoon filled up considerably before the dredger came. Previous to 1853 it was a very good channel, and a very safe one, a good bar and a safe bar.

8297. And now it is better?—It is better now.

8298. Do you not think that having been better and become worse, it may do so again?—I have no doubt. There is no accounting for those shifting sands.

8299. All seawards to Raven's Point is shifting sand?—The south-south-west spit of the Dogger Bank has extended very much to the south in my time, which of course gives more shelter to the Hantoon Channel, coming in with a heavy breeze from the south-east or an east wind.

8300. Then if you were to spend 20,000*l.* anywhere to make a good channel, would you have any confidence that it would remain so?—It would depend a good deal on how your improvement was effected. If the Dogger Bank were secure, so that the tide could have a fair run through, no doubt a strong tide would keep it secure.

8301. Is the DoggerBank covered at high water?—Yes, it is covered at high water.

8302. Then you think it is of great importance that the Dogger Bank should be made fast, particularly at high water?—I do.

8303. (*Mr. Coode.*) You have said that the Hantoon Channel has become worse since 1853, and that recently it has become better. Do you attribute that to the dredging or to natural causes?—To the dredging.

8304. I think you said there was little tide through the Hantoon Channel?—Not with an ebb tide, but a strong north stream runs through.

8305. What is the strength of the ebb tide?—It is a mere drain. It does not run by the second buoy on Hantoon Bar. It does not run more than a knot.

8306. In the opposite direction what do you think is its greatest strengh?—I dare say a flood runs in at the rate of 11 knots.

8307. You seem to think that considerable improvement might be made by judicious operations. Have you any suggestions to offer as to the best mode of improvement?—If the Dogger Bank could be piled off I think it would be a great improvement to bank it from the sea side.

8308. Is there anything else which you would propose to do?—No; I can't say there is.

8309. Then you consider the great and only improvement would be to secure the Dogger Bank, and on the west side to make it permanent?—Yes, that is on the east side of the channel.

8310. Have you observed many vessels taking shelter in South Bay?—Yes, a good many.

8311. Have you seen them riding there in a gale of wind as you have gone in and out?—In some heavy breezes.

8312. In gales of wind?—I never saw them in a gale of wind. I have passed in a gale of wind when I could not make the bay, and had to run to Waterford.

8313. In what direction was the wind?—About east. The heaviest gale of wind was last winter.

8314. Suppose you had felt it necessary to come to Wexford, which would have been the best way in on that occasion?—The North Shear was the best way, but it was not prudent for any vessel to run to Wexford on that day.

8315. Was it high water or low water when you passed?—It was high water when we passed the Tuskar Rock, about eight o'clock in the morning.

8316. Did you notice the state of the sea?—Wexford Bay was all broken that day, throughout the South Bay all the way from Greenore Point to the Black Water.

8317. You ran to Waterford; had you any difficulty?—I had smooth water all round the Saltees.

8318. Do you think any additional shelter much wanted in this neighbourhood?—I think it is much wanted.

8319. Have you known many vessels want shelter here, and not being able to get it, run elsewhere?—I think many of those which run to Holyhead and Kingstown would come here. I have known ships even put back to Liverpool.

8320. You have known instances of vessels putting back to Liverpool?—Several.

8321. Were they large vessels?—Yes, large vessels; if there had been a harbour of refuge in South Bay there would have been no difficulty in coming in.

8322. What is the largest vessel you have ever known obliged to put back to Holyhead or Liverpool?—From 800 to 1,500 tons.

8323. Is it a common occurrence for vessels of that size to have to bear up?—It is.

8324. Does it happen every winter?—Yes, every winter.

8325. Do you speak of facts which came within your own knowledge?—Of facts within my own knowledge. I have been myself a fortnight between Holyhead and the Tuskar.

8326. Had you to bear up?—I was sometimes losing ground, sometimes gaining.

8327. Was that since the new harbour was made at Holyhead?—Before.

8328. Would you make for Holyhead now?—It is bad for a ship to wear round with a north-west wind.

8329. Have you seen it since the extension was made?—Yes.

8330. When were you there last?—I have not been there for three years.

8331. Do you know that it is carried more towards the north-east?—I do. I have seen it every week, as I pass. That will not enable a ship to fetch in running the near point of the harbour.

8332. Can you find shelter there now with the wind at north-west? Have you good shelter outside the Platters?—Yes; under the lee of the breakwater.

8333. You are aware the breakwater is extended?—Yes, it slopes in on Church Bay.

8334. I think you said there was no shelter from the north-west?—That was before the breakwater was carried out to the Platters.

8335. Then you would not hesitate now to run for Holyhead in a north-west gale?—No; there is good anchorage, quite sheltered. I have seen a good many vessels there myself, outside the Platters.

8336. Did you hear the evidence as regards the advisability of having a light in South Bay?—It would be very desirable to have a light vessel inside Holder's Bed.

8337. Where should you think it most desirable to place a light ship?—At the south-east tail of Holder's Bed.

8338. In what depth of water would you place her?—Six or seven fathoms.

8339. You think that would be the best position?—Yes, it would be far away from the Tuskar, right in. I have run in many dark nights myself. It would be a great service, for a ship can't run in without some guide.

8340. Do you think that if a light were placed there many more vessels would run in?—I think they would with heavy gales from the south-west.

8341. (*Chairman.*) You stated just now that in a heavy south-west gale vessels generally took refuge in this South Bay?—For outward-bound ships it would be a very good thing instead of running for Holyhead or Kingstown.

8342. But the shelter from west or south-west would not be more perfect by a breakwater?—No; it is quite sheltered from those winds. The breakwater would be in case of a sudden shifting of the wind.

8343. Would that breakwater tempt vessels to make use of the harbour?—It would.

8344. On the occasion which you mentioned, about two years ago, when you ran for Waterford in a heavy easterly gale, did you take notice whether any vessels were anchored in South Bay?—No vessel could anchor in South Bay then.

8345. But as a fact, were there any?—None whatever; it was all broken water.

8346. (*Capt. Sulivan.*) You are aware that if a light vessel were placed here there would be a passing toll?—There is a toll on all vessels.

8347. You think the trade would find it to their advantage, and would not object to the toll which they would have to pay?—I don't think they would object; the toll on lights is very small.

8348. Do you think, if a light vessel were placed there, outward-bound vessels would run for it boldly from the Tuskar? Do you think an ordinary master would consider it a safe channel, and that it is merely because there is no light that they don't use it?—Unless they had some knowledge previously I don't think they would.

8349. Do you know in what month the timber ships lie in that bay?—More lie in summer; in the fall of the year they make a second voyage.

8350. What is the second voyage time?—About this time vessels arrive from North America.

8351. Are there some every year about this time?—Oh yes.

8352. And after this?—And after this.

8353. How many have you seen lying here at a time?—I never saw more than two or three timber ships here at once in my time.

8354. Have you ever known any of them lost during the five years that you have been on the coast?—No.

8355. (*Mr. Coode.*) Should you have any fear of a light vessel dragging from her moorings if she were placed at the south-east corner of Holden's Bed?—There would be no danger; she would be sheltered from the gales from the south-east.

8356. In what direction do these south-west gales turn?—They sometimes back in towards the east, and sometimes out towards the north-west.

8357. Have you noticed which way they usually turn?—No, sometimes one way, sometimes another.

8358. If the light were placed as suggested would a master hesitate to run for the bay if he had a chart?—There would be no difficulty. I have run in with the bearings of the Tuskar on a dark night.

8359. (*Chairman.*) Are you acquainted with the nature of the coast from Greenore Point up to Wexford?—Yes.

8360. In a gale from the north-east, if a vessel went on shore, would life be saved?—Life would be most likely to be saved; I will not say as to property.

8361. What is the nature of the beach?—I believe marl.

8362. All round South Bay, is it rather steep?—It has a middling descent.

Mr. Devereux re-examined.

8363. (*Chairman.*) You are acquainted both with Greenore Point and Rosslare Point; do you know what is the character of the beach?—Shingle.

8364. Is it rather steep?—It shoals out. If a vessel parted with her anchors, what chance would there be of saving life?—I think life would be saved invariably.

8365. And property?—In a great measure property too.

8366. (*Capt. Sulivan.*) Do pilot boats ever keep outside the harbour?—No, except there is anything to induce them.

8367. If a light vessel were placed there, would there be any chance of a strange vessel finding a pilot?—There is no protection to pilot boats in easterly winds to lie out there.

Mr. Edmund Roach examined.

8368. (*Chairman.*) What is your occupation?—A master mariner.

8369. For how many years have you been so?—26.

8370. And of those 26, how many as master?—From 16 to 18.

8371. What vessels have you chiefly commanded, sailing or steam?—Sailing chiefly.

8372. What is the vessel which you command at present?—A steamer.

8373. Running where?—From Liverpool to Wexford.

8374. In what trade have the vessels you have commanded been chiefly employed?—East Indies, West Indies, North America, and United States trade.

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Chairman.

8375. Have you been present during this inquiry ?—Part of the time.

8376. Have you heard the evidence of the previous witnesses ?—Part of it.

8377. Do you generally concur in that evidence ?—In what I have heard of it.

8378. Is there any point on which you are disposed to differ ?—No.

8379. Have you ever been at anchor in South Bay in heavy weather ?—No, not in very heavy weather.

8380. (*Capt. Washington.*) You command a steamer trading to Liverpool ?—Between Liverpool and Wexford.

8381. What is her name ?—The *Troubador*.

8382. Of what draught of water ?—Ten feet when laden, but we never exceed nine.

8383. What channel do you take ?—The North Channel.

8384. In winter ?—No, the Hantoon Channel. There is too much sea over the North Bar.

8385. Did you come in on Tuesday last, when it was blowing hard ?—It was blowing middling on that occasion.

8386. If one of the two channels were to be improved, which should you prefer ?—I think the North Channel too, but the Hantoon Channel is safest.

8387. But if there be only merely enough for one, which should you say ?—I should say Hantoon Channel.

8388. Have you seen the dredger at work ?—I have.

8389. Has the Hantoon Channel improved since it has been at work ?—I think, from what I have heard, that she can do much good ; but as she has not been working where the sand is, she can't have done much good.

8390. It has been stated that she might have worked many days when she has not ; do you concur in that ?—I do, in part. I have known many fine days when she has not worked.

8391. Do you know the reason why ?—I heard that when she got lighters they were not fit ; that was what was reported to me when I made inquiry.

8392. What lighters do you allude to ?—The iron barges; they say they were too high for the side of the dredger and required alteration, which hindered them some time.

8393. Are the alterations made ?—I don't know.

8394. (*Capt. Vetch.*) How long have you known the port of Wexford ?—From childhood.

8395. And during that time have you seen great alterations take place on the bar outside Rosslare Point ?—I have seen Hantoon Channel with better water.

8396. Sometimes one channel better, sometimes another ?—Yes.

8397. A considerable degree of change takes place in these channels ?—Yes, after a gale of wind.

8398. Suppose you improve any one, could you depend with any confidence on its remaining so ?—No, unless you pile off the outside of one of the banks.

8399. Can you suggest any plan of improving the entrance to that harbour ; any mode which you think would answer ?—Yes.

8400. What would you recommend ?—I would recommend the Dogger Bank being piled.

8401. Made an island of ?—Yes ; the land raised so that the water shall not get over, and we should have a free set of the tide then.

8402. (*Mr. Coode.*) Will you be kind enough to mark on the chart the extent to which the line of piling should go ?—I have now marked it on the chart (1772).

8403. Do you fix on this point from your knowledge of the set of the tide ?—Yes.

8404. And you apprehend that one line of piling would suffice ?—It would.

8405. (*Chairman.*) What is your worst weather in the Irish Channel ?—In winter months, south-west gales.

8406. How do they begin ?—They commence from the west and come back round to the south.

8407. And when you have heavy weather from south-west how does it begin ?—Sometimes they come in with windy weather and a little rain ; they then commence from south-east and back out to east.

8408. They come round to east ?—Yes.

8409. Do they ever come round to north-east and blow hard ?—Sometimes I have seen them fly round to south-west.

8410. They generally go to south-west when the gale breaks ?—Yes, they moderate and come down to north.

8411. Does a heavy south-east gale ever back round to north-east ?—Very seldom.

8412. You prefer the Hantoon Channel in bad weather ?—We have to take it because the ground is safer. If we get on the North Bar, we could not save property or life ; there is hard sand, which will not give.

8413. Have you any other reason for preferring Hantoon Channel ?—None but that.

8414. Hantoon Channel is available to sailing vessels with the wind how far round to the east ?—East-north-east is right out of it.

Mr. Martin Boen re-examined.

Mr Martin Boen.

8415. (*Chairman.*) You know the beach from Greenore Point round to Rosslare Point ?—Yes.

8416. What is the character of it ?—Very good.

8417. In a north-east gale, if a vessel went ashore, would life and property be saved ?—Yes.

8418. And the cargo and the vessel ?—It is likely they would be saved too.

8419. Have you ever known life lost in Ballygeary Bay, on the occasion of a shipwreck ?—No ; I never did.

Mr. James Barry Farrell examined.

Mr. James Barry Farrell.

8420. (*Chairman.*) In what way are you connected with the port of Wexford ?—I am employed by the Admiralty.

8421. In what capacity ?—As engineer.

8422. How many years have you been connected with the port in that capacity ?—About four.

8423. (*Capt. Vetch.*) What works are going on at present ?—Merely dredging.

8424. Will you inform us when the dredging commenced ?—In the first week in July.

8425. How many tons a day are you able to raise ?—We have been able to raise very little, in consequence of not having sufficient flats to take away the material dredged.

8426. How much do you suppose has been raised ?—About 8,000 tons.

8427. Have you made any considerable impression on the bar ?—We have.

8428. Can vessels of a greater draught of water come in now ?—Vessels of the same draught of water come in with greater ease than before we commenced.

8429. Not of greater draught ?—No, not of greater draught than when Hantoon Channel was good.

8430. To what do you attribute that ?—Because there was an obstruction in Hantoon Channel before we commenced, which we have got away.

8431. Then this is quite a preliminary business to the main work ?—Quite a preliminary business. I am quite satisfied we shall have a very good channel through Hantoon,—a very good one indeed.

8432. From your knowledge of Wexford Harbour, and the changes you have seen take place, can you

repose any great confidence in the channel, when made good by artificial means, remaining so?—Not without assisting works.

8433. What kind of assisting works would you propose?—I should propose to pile the Dogger Bank in the direction of the ebb and flood tides, in a north-easterly course and along the eastern side of Hantoon Channel, to confine their currents and prevent their strength being wasted in passing, as they now do, through the swatchways of the outer sands. Until that is prevented, you can't count with any certainty on a fair channel being preserved through Hantoon for any length of time.

8434. Having raised the Dogger Bank to the height you propose, do you think you might count on Hantoon Channel being preserved open for any length of time?—I do. I have no doubt in my own mind that by extending that plan you would also get a very fine north entrance too.

8435. Would not such a work on the Dogger Bank produce again the former outlet to the sea in an easterly direction?—Decidedly, in a north-easterly direction.

8436. Then such a work would give two channels—Hantoon and an eastern channel?—A north-eastern channel.

8437. Then in that order of events would it not be advisable to make the Dogger Bank stationary?—I would do it if I had the power.

8438. Have you any work, Mr. Farrell, that you would put in hand to accompany these works?—I should improve the present sailing course within, and extend that improvement as the trade required it.

8439. I am speaking of the outside?—I would confine the works to the present entrance in the way I have stated.

8440. Do you mean the Hantoon Channel?—To Hantoon and the north-eastern channel.

8441. But in your work do you consider it necessary to keep both open?—Decidedly.

8442. That is with respect to the navigation outside Rosslare Point. What would you do inside?—I would improve the present sailing course, particularly at the Gull Bar. I would deepen that to the same depth I got at Hantoon.

8443. What depth do you think that would be?—I think it might be 11 feet; whatever depth you get at Hantoon, you ought to get the equivalent at Gull Bar.

8444. Do you mean high water?—I am speaking always of low water.

8445. Ten feet below low water you expect in the Hantoon Channel, and you propose to carry the North Channel to Wexford to the same depth?—I do.

8446. Did it ever occur to you that the Coal Channel should be made use of in leading to Wexford Bar?—It did. I have given it a great deal of consideration.

8447. What is the depth of the Coal Channel; can you tell us?—It varies from 12 feet to 36 feet at low water.

8448. What is the general depth of the river from the quay at Wexford upwards?—It varies. You have 15 feet and 26 feet. You have 12 feet, and you have higher up as much as 60 feet.

8449. Then do you not think it is a subject of some importance for the navigation from Rosslare to Wexford and from Wexford up the river, that you should avail yourself of those deep channels which are already provided?—Looking at it simply as an engineering question, with reference to obtaining a strong tidal current to bear on the entrance of the harbour, I certainly do; if you make a cut carrying the depth at the quays into Coal Channel, the increased momentum of the tides would be of importance outside, but I think it would be attended with serious disadvantages and should not be undertaken. With regard to the entrance of the harbour, I think if you did that, you would certainly alter the present state of things outside, but you would be doing what might be very prejudicial to the trade; you would have to wait and watch what further effect might ensue, and then perhaps have to make new arrangements altogether, supposing it to be successful, and that is very doubtful. If you direct the weight of the tide out through Coal Channel, it will pass by the Channel of Hantoon, create an eddy at its entrance, where deposit would take place, and close it up altogether. Nature is endeavouring to maintain it, and as all evidence is strongly in its favour with regard to life and property, I think it ought to be maintained and improved.

8450. Then you think Hantoon Channel is the place upon which all other measures should turn?—I think every endeavour should be made to maintain and improve Hantoon Channel.

8451. Are you aware that nearly 30 years ago the main channel to Wexford was nearly due east?—Yes.

8452. And there were leading marks and beacons, showing it to possess then a greater depth of water than it has ever since?—Yes.

8453. Then if these things have changed and become as they now are, do you see any reason why they should not change and become the same again?—The opening of that Eastern Channel was merely a change from a former state of things; and old pilots—intelligent men—have told me it was an exceedingly dangerous one, and that its use was attended with loss of life. It went out at right angles to the set of the tides outside, which is always productive of danger, and most likely to close it shortly again, if it were again to break open.

8454. Then the whole proposition tends to this, that natural causes have closed the East Channel, and if natural causes to the same amount close the Hantoon Channel, all the work that you may make dependent on that must become necessarily nugatory?—No, by no means entirely nugatory. I think that in piling the Dogger Bank you are following nature's channel. The deep channel you alluded to is now a *cul de sac*. The proposed piling would lead it out in a north-east direction, very nearly coinciding with that of the ebb and flood tides, and so render it always available and very useful. If ever it was an object to close Hantoon Channel, it would be the easiest thing possible to continue piling across it. It is outside the harbour that nature requires to be watched most closely, to ascertain where the time tidal currents are endeavouring to make their best channels, and in order to aid them I propose to pile the Dogger Bank and prevent the sand being washed from it through its present numerous swatchways into the navigation channel.

8455. Do you think that among these shifting sands you can make a permanent work with piles?—I think so, with screws on piles of timber. They would also form a very good shelter.

8456. Then you think piling a necessary adjunct to the improvement of the harbour?—I think it absolutely necessary.

8457. Then by commencing one work before the other, you don't think you place both in jeopardy?—Vessels last year were stopped so frequently that the Admiralty Commissioners urged me to do something. The only speedy remedy for the evil was dredging. In obedience to the orders of the Admiralty Commissioners, a steam dredger was obtained, and put to work with the least possible delay in Hantoon Channel, where the obstruction existed.

8458. As a temporary expedient?—Yes. I may mention that when the island called the Dogger Bank was covered with bent grass, there was a good entrance into Wexford.

8459. Can you furnish the Commissioners with a plan of what the Dogger Bank was then?—I have no document showing the state of things then.

8460. What is the distance from Rosslare up to Wexford Gull Bar by the North Channel?—I think about four miles.

8461. What is the distance along the Coal Channel by the face of the proposed embankment,—how many miles?—It may be something shorter, but I would

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recommend some improvement in the curves of the present sailing course, by which a very good line may be had, and which is as short as going by the Coal Channel, and would carry the tide more directly out by the mouth of the harbour.

8462. Is it not a natural fact, that in a curved channel the current clings to the concave shore, and scours and deepens it ?—Certainly.

8463. And wherever the current runs concavely that current will deepen the channel ?—Certainly.

8464. From these premises it must follow, that the Coal Channel, if connected with the upper deep channel, ought to be more permanent than the North Channel ? — I don't think it would, if the North Channel were properly improved and deepened. You will have the same current on the concave side of that channel as you would on the concave side in the Coal Channel.

8465. By using the Coal Channel, would it present the means of constructing a roadway, tramways, quays, &c., with deep water alongside from Wexford, to Rosslare Point ? Could you have that accommodation on the North Channel ?—That is a different question ; of course you could have more convenient works on the Coal Channel.

8466. Is it not a question for an engineer to consider ?—I don't think you would ever have works of that kind on the Coal Channel.

8467. Not if there were funds to do it with ?—It is possible of course to do it.

8468. (*Mr. Coode.*) I believe the dredging operations are entirely under your superintendence ?—Entirely in my charge.

8469. Can you tell us the depth you have gained in Hantoon Channel ?—About 18 inches.

8470. Do you mean absolute gain ?—Yes.

8471. How long have these new barges been at work ?—Within three weeks they have come here, or a shorter time.

8472. But you commenced operations in July last ? —Yes, in July last.

8473. Had you any special reason for commencing operations before a proper supply of barges came ?— I should have commenced with anything I could meet with to clear the harbour.

8474. To meet an exigency ?—Yes, to meet an exigency.

8475. What was the exigency ?—A shoal lying somewhat south of the buoy outside the point of the fort, crossing the entrance diagonally, and leaving but a very narrow gut. Vessels were constantly caught upon it. I have seen small oyster boats lying there myself, and to get that away was a great object.

8476. And you considered the immediate removal of that shoal was essential to the trade of Wexford ?— Very essential.

8477. It was for that reason you commenced operations with what you considered an insufficient supply of proper barges ?—Yes ; and I may mention, I recommended the Admiralty Commissioners to send three large hopper barges here as soon as the dredger arrived ; but some parties connected with the town called at the Admiralty, and persuaded them that we could get proper barges here. It was then thought desirable to try here ; every effort by advertisement and otherwise was made, but in vain. I was ultimately obliged to purchase three inferior boats in Waterford.

8478. Did you take any measures to secure the improved barges at the earliest possible period ?—The moment I got the proper order from the Admiralty.

8479. There was no delay on your part ?—No delay whatever.

8480. You considered these barges necessary ?— Yes, absolutely necessary.

8481. Have you heard the evidence with regard to the number of days that the dredger might have worked and did not ?—I have.

8482. Do you agree in that evidence ?—There were some, not several, days when she did not work, when the weather would have permitted her to work. A diary is kept of every day's work done, and sent in to me once a week, and every day that she did not work is satisfactorily accounted for. For instance, a large barge which we took down here, the Commissioners' ballast lighter, an unwieldy boat, swept across the dredger and carried away the shoot, so that we were obliged to have a new shoot made ; that disarranged us and delayed us for a day, but it is set down in the diary returned to me.

8483. Then every effort was made to expedite the dredging operation by every reasonable means that you could adopt ?—Every effort. I am sorry to see the jealousy which there appears to be with regard to the improvement.

8484. Have you any doubt that it is the proper course to pursue to direct your attention solely, at present to deepening Hantoon Channel ?— None whatever.

8485. At the same time you propose a line of piling on the Dogger Bank ?—I think that essential.

8486. To what length would you extend it on the Wexford side of the Dogger Bank ?—I think two miles would be ultimately useful, but it might be done in sections.

8487. What do you consider essential, at any rate ? What is the least amount ?—To shoal up the south-east channel, which has broken out through the Dogger Bank, and the swatchways which rob Hantoon Channel of so much scour.

8488. What length is required to do that ?—That would be three quarters of a mile.

8489. Have you ever made any estimate of the expense of that ?—Yes.

8490. Can you give me an idea of the cost ?—I should say about 30,000*l.* would do it.

8491. Have you ever turned your attention to stone banks in lieu of piling ?—It would be uncommonly expensive.

8492. Do you think they would be more expensive than piling ?—Oh yes, from the difficulty of getting the stone.

8493. Have you taken into account the delay in piling ?—Yes, and I don't think stones would be as good as piling, unless they were laid on a good foundation. The scour that would be created by confining the currents to one channel would undermine any wall that may not be sufficiently founded, and the stones would thus slip into the channel.

8494. Do you not think an embankment might be placed there ?—Not of stones, it would be so enormously expensive.

8495. But it would be less liable to be washed away? —If properly done, no doubt, but it would cost a very large sum.

8496. Have you made any comparative estimate ?— No, but it is almost self-evident. In the first place you have no stones within a reasonable distance, and in the next place getting a foundation would be expensive.

8497. I am not speaking of building, but merely of dropping stone material in ?—I think that would take a very large quantity of stone, and would create an obstruction in the present channel ; the foot of your slope would tail into it.

8498. Presuming that could be guarded against, have you any other objection to offer beyond the cost of an embankment ?—Cost certainly would be a main objection.

8499. Assuming that it were decided to adopt a stone embankment, where would you go for material? —The nearest place would be to take it from Wexford.

8500. What distance from the site of the works ?— Four miles and a half.

8501. What is the material ?—Quartz.

8502. Have you had occasion to quarry any of the rock ?—Yes.

8503. And at what price per cubic yard could it be acquired ?—About a shilling.

8504. And how far would the quarries be from the point where you would get it into the barges ?—

There are quarries where you could get it near the shore.

8505. At what distance?—I dare say there are quarries where you could get it within a quarter of a mile of the shore.

8506. You were asked, with reference to the expediency of improving the Coal Channel as compared with the maintenance of the present channel. I understood your objection to the improvement of the Coal Channel lay in the opinion that the tide setting into the Coal Channel, would cause an eddy likely to fill up the Hantoon Channel?—That is one objection.

8507. Is that simply your own opinion, or have you taken the opinion of persons who know the locality? —It is my own opinion; and I have heard others express their fear of it.

8508. You stated that was one objection; have you any other?—On consulting the pilots I find that they would rather have the present sailing course than the Coal Channel. The pilot who brought the Commissioners up in the tug-boat gave that answer.

8509. Then, if the approach to Wexford by the Coal Channel could be made and maintained with the same depth as now exists in the main channel, they would still use the main channel in preference to the Coal Channel?—I think sailing vessels would.

8510. How long had the Hantoon Channel remained in the condition in which you found it, when you commenced dredging operations?—It had been so the entire winter.

8511. Had there been any material change within the few years previous?—Nothing, that I am aware of. Nothing material; only the obstruction which I have pointed out.

8512. There were great complaints of the want of water, in consequence of that obstruction?—Yes.

8513. Have these complaints been removed?—To a great extent; but we want to do something to make it as perfect as I wish it for the winter.

8514. Do you hope to accomplish that before winter sets in?—A fortnight's good weather will enable me to do it.

8515. What depth of water would you get in a fortnight's operations?—I think I could get two feet in the Point of Rosslare.

8516. Having already gained 18 inches, you think you could gain three feet?—Yes.

8517. Then you desire so to regulate your operations that the tide should come in and do all that nature should have done?—We thought that the most expeditious way that we could do it.

8518. If I rightly understood the principle on which you propose to work, it will be to follow nature rather than to take her by storm?—Exactly; and the whole must be done very cautiously.

8519. Then you wish to aid natural operations which you find are going on?—Precisely.

8520. But if you had the means you would, simultaneously with these natural operations, construct a line of piling across the channel lately opened through Dogger Bank?——

8521. (*Chairman.*) If I understand rightly the nature of the operation in which you are engaged, your object is first, to deepen the Hantoon Channel; secondly, to pile round the Dogger Bank, so as to form it or part of it eventually into an island?—Precisely so.

8522. And you further believe that in pursuing these operations you will preserve if not improve the north-east channel?—Yes.

8523. Suppose, with the experience you have of the port, that you had unlimited command of pecuniary means, is that the course you would be disposed to adopt?—It is.

8524. And you believe that by that, both these channels would be preserved?—I have little doubt of it.

8525. And with reference to the interior of Wexford Harbour, putting again the same question and assuming the same data, that your command of means is unlimited, what measure would you still propose for the improvement of the harbour, carrying out the present line of sailing channel?—I would improve the present sailing channel.

8526. You are acquainted with the Clyde?—I know the circumstance to which you would allude.

8527. Would you consider that if the same course were pursued with the Wexford Harbour as has been pursued with the Clyde, that is, of embankment on either side of the channel, that you would improve it?—It would be valuable, on this condition, that you did not interfere with the quantity of water which entered the harbour.

8528. Then in the river, supposing the embankment were made on each side, do you think that would interfere with the quantity of water thrown in by the tide?—Not if so made that the tide might pass through it, constructed, for instance, in sections overlapping each other, with immediate openings for the free ingress and egress of the water, and using the embankments merely as guides for the currents out to sea in a proper direction.

8529. Then, in such a case, the land within the embankment would not be used for agricultural purposes?—I would not embank an inch more; at least, the lines, according to the Admiralty plans of 1845 or 1846, are the utmost to which I would go.

8530. Are the lines shown on the chart before me? —No, but I can draw them for you. At the time when these lines were fixed and assented to by the Admiralty, it was proposed to deepen the river up to Enniscorthy, as an equivalent for the water that would be cut off by the embankments.

8531. Suppose the embankment you have drawn were carried out, would the value of the land enclosed be available as a contribution?—It belongs at present to the Harbour Embankment Company, all within these lines.

8532. Therefore no more funds for the improvement of the harbour can be drawn from that source? —Not from the land within the harbour.

8533. And why would you preserve so large a sheet of water as is drawn within the lines of this embankment?—Because every foot of water that comes in at the neap tides is the least that is necessary to preserve the entrance.

8534. By the entrance you mean the entrance to the harbour outside?—Yes; if you decrease the effective quantity of water that enters the harbour, you will proportionately decrease the sectional area of its entrance.

8535. As respects the entrance, are the circumstances entirely different from those of the Clyde?— They are; Wexford is peculiarly dependant on the quantity of tidal water. It was the shape of the harbour that did it so much harm; the lines of embankment were laid out to correct that shape as much as possible.

8536. (*Capt. Washington.*) To continue the Chairman's question respecting the embankment, are you of opinion that the outer south embankment should be carried out on the line proposed?—I think it would be useful.

8537. Do you think it would be for the benefit of the harbour?—I do.

8538. Is there not fear from a north opening being made, and part of the south embankment, that the tide is overbalancing the tide from the usual sailing course?—I do not think there is any fear of that. The late survey made by Captain Frazer shows that no such effect has been produced; the effect of the tide has been to improve the north course. The deep waters have gone in further into the harbour, as shown on the chart made in 1856, than we find it on the chart of 1845.

8539. I wish to get your opinion on the subject?— My opinion is clearly that no damage has been done by the construction of the present embankments. I consider the clear proof of that to be, that on comparing the two charts, I find at the mouth of the harbour quite as much, if not more, water in depth

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than before the embankments were made. If the scour were decreased by the quantity of water stated to have been shut off, the first place where we should find evidence of it would be at the entrance, where the sectional area would have been reduced. But it is not reduced; on the contrary, I find it 61 feet instead of 57 feet.

8540. Then do I understand that the sectional area is rather increased than decreased? — It is shown to be greater than before the embankment was made.

8541. By whom were these two charts made? Both of them by Captain Fraser, the Admiralty surveyor; a gentleman entirely independent of Wexford?—Yes.

8542. And I can have no doubt of the accuracy of the charts?—None at all. I think a great deal of injury has been produced by the bursting in of the sea south of Rosslare Point. It swept sand into the Coal Channel, which must have been carried out; and as shortly after that, injury to the Hantoon Channel began to appear, I have every reason to believe that it must have been carried out and lodged there.

8543. That which was thrown into the Coal Channel?—Yes.

8544. Do you know any case of the burrows being broken through?—I think the people must be in the habit of tearing the bent grass up, because the bent mats are common.

8545. Do you know where there is any bent grass besides at Rosslare?—Nowhere in this immediate neighbourhood, except that protected by the Wexford Harbour Embankment Company.

8546. Have you any reason to believe that bent grass is imported?—No, I have not. I know that if the bent grass were preserved, you would have the sand banks preserved also.

8547. Do you think it desirable that strict orders should be given, if possible, to prevent the bent grass being taken away?—Decidedly.

8548. Are you aware who is owner of the soil?—I am not aware if their Act gives that burrow to the Embankment Company.

8549. But if it did, they would be willing that orders should be issued?—I think they would preserve it, if it belonged to them.

8550. You were asked whether the land reclaimed would yield anything for the improvement of the harbour; has any sum been derived from that source?—The Harbour Embankment Company are charged with 20,000*l.*, of which they paid a portion.

8551. Do you know what portion they have paid?—I believe they have paid 10,000*l.*, if not more. I should mention that after the north embankment was made, I had very accurate tidal observations taken to test the result, and found an additional rise of tide equal to one-eighth of the whole range of tide. I did the same with greater accuracy by means of a self-registering tide-gauge after the south embankment was made, but found no increase of rise. I traced the cause: the progress of the tide was accelerated, but the increased action of the river appeared to have depressed the tidal wave at Wexford. We have this from the returns on the self-registering tidal gauge.

8552. How long has that self-registering tidal gauge been in use?—Three years.

8553. And observations of it are carefully taken and recorded?—They are.

8554. To return to the use of the dredger in the Hantoon Channel; is it not a fact that representations were made by a member for the city to the Admiralty, and by several leading merchants of Wexford, that until a short time ago this was all but a sealed harbour?—Such representations were made.

8555. Was it not in consequence of these representations that the dredger was immediately put to work in the Hantoon Channel?—It was.

8556. Did not a great deal of delay arise in consequence of the foundering of one on the passage?—Yes; we lost the first one that was made, but immediately afterwards the contractors commenced and finished another in three months.

8557. Then the foundered dredger was replaced in three months?—Yes, the contractors sent it over here from Liverpool as soon as they possibly could. Several matters required to be done after its arrival, owing to the incomplete state in which it was sent over, but we used the greatest diligence, though we could not prevent delay.

8558. Is that dredger in perfect order now?—It is.

8559. Have you found it to be so?—Yes.

8560. Are the barges reported to be fit?—Yes.

8561. It has been reported that the hopper barges were so high that they could not be loaded from the shoot?—That is quite a mistake. All they required was to have the shoot raised higher than for ordinary barges.

8562. Did you convey three of the Commissioners to-day to examine the channel?—I did.

8563. Did you convey them outside the bay?—Yes, I did, into the South Bay.

8564. Are you aware that the delay in sending the barges was caused by the Embankment Company not paying up their settlement?—I am not aware of that.

8565. Of the 10,000*l.* how much has been laid out in plant—in the hopper barges, the dredger, and other barges?—7,270*l.*

8566. Having only 10,000*l.* to expend, would you consider it prudent, as an engineer, or would you recommend the Admiralty, to lay out more than 8,000*l.* in plant?—Certainly not.

8567. Or would you recommend the works to be commenced with little prospect of the money being paid up?—I think it was better to wait.

8568. You said you were not aware of the Harbour Embankment Company having refused to pay up their settlement?—I am not aware.

8569. With respect to the Coal Channel, you did not tell us the cost of making such a cut?—About 27,000*l.* was the estimate.

8570. For the whole?—Yes, for the cut into the Coal Channel.

8571. Are any funds available for that purpose?—I am not aware of any.

8572. Is there any probability of any funds being obtained for such a purpose?—I don't see any.

8573. Do you know the income of the Wexford Harbour Commission?—I believe it is about 2,000*l.* a year.

8574. Is any part of that sum available for improvements in the harbour?—I believe not.

8575. Do the harbour trustees contribute any thing out of their funds towards the improvements now going on under your charge?—Nothing.

8576. Have you anything to suggest yourself, as engineer, for the better and more rapid improvement of the harbour?—I think it would be a waste of money to attempt making this port a harbour of refuge to any great extent, and that the money which would be required for such an experiment as I understand has been proposed in the South Bay, would be much better spent in improving the present entrances into the harbour.

8577. Have you ever formed any design for a harbour of refuge on this coast?—Yes.

8578. Where do you mean?—Carnsore Point. I think if a harbour of refuge is to be made, that is the place, but it would cost a very large sum of money.

8579. Can you tell the Commissioners how much, in round numbers?—I don't think that less than half a million would do.

8580. Do you think that the wrecks on or about the coast call for a harbour of refuge?—The wrecks certainly call for it.

8581. Are the wrecks frequent at Carnsore Point?—Frequent in the neighbourhood.

8582. Is a register kept of them?—I think there is, by Mr. Sparrow.

8583. Who is Mr. Sparrow?—He is one of the Harbour Commissioners. When I spoke of a waste of money, I used it comparatively with the value of a sum of money spent at the mouth of the harbour. There is the list of wrecks up to 1845.

8584. I dare say that list can be continued up to the present time?—Yes; I don't think there has been a single winter, during the 18 years that I have been here, in which sad wrecks have not occurred.

8585. (*Capt. Sulivan.*) If the work of piling the Dogger Bank succeeded, would it make Wexford more of a harbour of refuge than at present?—If the piling succeeded and was continued as the Dogger Bank extended itself to the south, as it would, and if the channels and banks outside were well buoyed, and perhaps lighted. I think the South Bay, having the Dogger Bank as a great natural breakwater to protect it, would thus be made as good a refuge harbour as its natural circumstances would admit.

8586. Have the set of the currents from the entrance taken that line that reduces the points? Is that set as favourable for a preventing work at the bank, so as to throw on the present channel the ebb tide from the entrance? My object is to know whether there has been any great working away of the points from the present state of the currents from the entrance?—No, there is not; there are sometimes temporary changes.

8587. Neither in the set of the currents nor the line which it makes is there the least waste at the point?—The point is just now at the deep water.

8588. If you cut into the Coal Channel, will not the North Channel silt up?—If you carry the depth of water at the quay through the cut to join the deep water in Coal Channel, no doubt the North Channel will become shoal.

8589. And in time may close up?—Yes.

8590. Directly the current of the South Channel is increased, will not the certain consequence be to throw the water across the Ravenspit?—There is no doubt of it.

8591. Would not the effect be to throw a large mass of sand into the present north-east and east channels?—No doubt of it.

8592. Do you think also it would have the effect of prolonging the point of Fort Point east, and so across Hantoon Channel?—I have not any doubt of that.

8593. Do you think the present set of the channel should be as little interfered with as possible, except between the banks?—Certainly.

8594. Will you explain how you consider that this embankment, joining the two shoals, will throw a greater body of water into the Hantoon Channel, except by sweeping away the banks near that embankment?—A considerable portion of the tidal currents setting both north and south is at present diverted through the swatchways in the Dogger Bank; the effect of the proposed piling would be, to prevent this diversion—this waste, as I may term it—and to guide the whole of the stream into Hantoon Channel.

8595. Would you not fear its opening a new channel?—No; the tides passing along the present sailing course within the harbour would join the north and south currents outside fairly.

8596. Does your ebb sweep by Hantoon seaward, and is there little or no tide on the ebb?—I know we have a very strong tide. We find it very hard to keep the barges at work. We have had strong tides since we commenced dredging.

8597. Does the force spend itself now from Hantoon Channel to the south?—A considerable portion.

8598. Is there no decided contraction of its current seaward, or how?—The north current comes down by the North Bay, and a portion goes off in a south-east direction. Much of the ebb tide always runs out through these banks, wasting its strength.

8599. Do the south-east gales throw up a quantity of sand on the west side of the Dogger Bank?—Yes.

8600. Would there not be some fear of the bank being increased when an island was formed there?—No. I think the constant current there, north and south, would tend to carry the sand off, and would have the effect of carrying it round to the south end of the Dogger Bank, and there lodge it. Some portion of it, if carried to the north, would be caught by the main channel tide, and I think the Dogger Bank would be very largely increased indeed.

8601. When that bank extended beyond the extent of the piling, would you not fear that it would bring sand round the end of it into the channel?—If it brought any, the current, confined by guiding lines between the banks and Rosslare Point, would always keep the sand in suspension and carry it out to sea.

8602. One of the witnesses states that the swashways were closing up?—I have not seen it, but I should not be much surprised if it were so, because soon after we commenced our dredging operations the bank began to show on the west side of the Dogger Bank, near the swashway, showing that we had brought a better tide into the Hantoon Channel, and diminished the run in the swashway.

8603. And if the course of the swashways close up, might not an island be formed without piling?—I don't think you could ever permanently form it without piling. I surveyed the Dogger Bank in 1855; it was considerably higher than it is at present. I was then anxious to take advantage of what nature was doing. It was considerably over high water, but it has been diminished since, and the tides run more over it.

8604. You said a single row of piles would be sufficient?—A single line, not a single row.

8605. Can you give us any idea of what the breadth of piling would be?—I would make it six feet, from out to it, with three rows of piles.

8606. Would you place them longitudinally?—I would place them herring-bone, very near, and filling up the back. I think the best thing for backing would be bags filled with sand.

8607. The estimate you have given for it includes all that expense?—Yes.

8608. And do you think that any contractor would be found to undertake a work of that kind?—Not here, perhaps, but the patentees of the screw pile would probably take the contract.

8609. Is there any difficulty in putting down screw piles so close in such a place?—We do not want sustaining powers; with screws of large diameter you can drive a timber pile into sand deeper than about fifteen feet without splitting it; but it can be easily screwed down.

8610. Don't you want to go deeper than fifteen feet?—I would go deeper throughout the channel; unless it is done well, and permanently, it is better not done at all.

8611. (*Capt. Vetch.*) Do you know when this chart was made?—In 1856.

8612. Did you see Captain Fraser's previous chart?—Yes.

8613. Do you think that if the piles were driven in that bank they would remain permanent?—I do.

8614. Are you aware that the present state of the Dogger Bank is very different from that which Captain Fraser found in his first soundings:—that the bank is now where was formerly the main channel?—It was so. I discovered it first myself. It was on my report that Captain Fraser was sent here.

8615. Considering that the bank has shifted so much, that from being on the south side it has gone into, and filled up what was then the main channel, do you think the present position of the Dogger Bank likely to be maintained more fixed than previously, and that anything which human nature can drive in, in the way of piles, will stop its future movement?—I do.

8616. Are you aware that this part of the bank has formerly extended very much to the south?—I am.

8617. Then these great changes having taken place, do you conceive that by means of piling you can fix the banks?—I do.

8618. And to spend a 100,000*l.* on it, would you be bold enough to propose such a thing?—An island once

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existed there, and would be there now had it been properly preserved. There is a letter in the Report of the Tidal Harbours Commission, 1846, referring to that island when it was covered with bent grass. I conceive that by the assistance of piling, planting, and encouraging the growth of bent grass and preserving it, the island may be re-created, and be as likely to become permanent as when it existed in its natural and unprotected state. If you look at the chart of 1856 you will find the Dogger Bank pretty much in the same position as it occupied in 1845. It appears to be a nucleus collecting sand that shifts round it. On McKenzie's chart you will find it marked dry where it is now so, and so marked by Frayor in both his charts. You will also find it tailing, as it now does, much to southward, with Hantoon Channel between it and Rosslare, and that chart of McKenzie's is between 80 and 90 years old.

8619. You consider then that the present is the normal position of the Dogger Bank, that it has driven north, and that you can fix it by means of piling ?—Yes, its normal position.

8620. You have mentioned that dredging the Coal Channel would cost 27,000*l.* ; at what did you estimate the cost of the other channel ?—I think it was 13,000*l.*

8621. The same depth of water ?—The same depth that it is proposed to carry through the new cut, 11 feet depth.

8622. (*Mr. Coode.*) What induced you to turn your attention to Carnsore Point ?—I examined the whole coast when the question was started.

8623. And you think more wrecks would be prevented by a harbour at Carnsore Point than nearer Wexford ?—There is material for making a harbour of granite formation.

8624. Then you were induced to prefer that site rather on account of the material than from any other cause ?—Yes ; and there is far deeper water in shore. There are 300 acres, varying from three to ten fathoms.

8625. Did you ever make any design of a harbour there ?—I did.

8626. And an estimate ?—Yes; I did not put it forward because I saw the expense would be so great that it was almost useless to propose it, but you can get 10 fathoms of water.

8627. Can you tell us anything of the origin of the material of which this Dogger Bank is formed ; does it come from seaward or landward ?—Its origin may perhaps be derived from both.

8628. What is the nature ?—Quartz sand.

8629. Are the outer banks composed of material of the same character ?—I believe so.

8630. You never tried them ?—No ; I think the same operation assisted to create both.

8631. Are there any shells on the Dogger Bank ?—Fine sand, very little shell.

8632. You spoke of the relative sectional area of the entrance to the harbour at two different periods, can you give us the exact number of superficial feet ?—I think in 1845 the area contained between high and low water levels was 14,000. You can easily calculate what it is now.

8633. You have not compared them ?—No.

8634. Can you furnish the Commissioners with the superficial area of the channel in 1845 and now ?—Yes.

8635. You gave us the quantity removed by the dredger since July, was it 8,000 tons or 8,000 cubic yards ?—8,000 tons.

8636. What can you remove per day ?—The average work is 112 tons per hour.

8637. Can you keep that up throughout the day ?—It might be done in extremely fine weather and with other very favourable circumstances.

8638. If the weather permitted, how much could you remove in a month ?—If we had fine weather with these barges I think we could remove 1,000 tons a day, assuming the dredger to work without interruption for ten hours each day.

8639. Then, in the course of a fortnight, with good working weather, you could remove as much material as you have dredged since last July ?—Very nearly.

8640. I think you said you intended to give two feet additional water before winter ?—No, to lower the present obstruction by about two feet.

8641. Would not that be tantamount to giving an additional two feet throughout the entire channel ?—Very nearly so, but certainly where the great obstruction lay.

8642. What quantity should you have to remove in the channel then ?—Oh, considerably less than 10,000 tons, I should think.

8643. (*Chairman.*) I think you mentioned about 30,000*l.* for the line of piling which you proposed to make. Suppose now the Government made a grant of 10,000*l.* for that object, would you be able, by doing a portion of it, to test its ultimate success ?—It would tell for itself as it went on. It may be executed in sections, and one section would tell pretty nearly correctly what may be expected from the next, and you may stop or proceed as it was found useful or otherwise.

8644. And without injury to the entrance to the harbour ?—No injury whatever would be done.

8645. Then the proposal for piling the Dogger Bank is not any new proposal of yours ?—It is one I made in 1846.

8646. In your report on Wexford Harbour you state that to be, in your opinion, one of the best modes of improving it ?—Yes, I do.

8647. And that with a view of improving Hantoon Channel as well, as probably the north-east channel also ?—Yes, certainly.

8648. You said you thought that there was some feeling of jealousy respecting the works ?—The evidence of the master pilot, coupled with some matters that came previously under my observation, created that opinion ; but as his statements were corrected by subsequent witnesses, further remark is perhaps unnecessary.

8649. Recurring to the evidence which we have had given to us that the dredger might have worked for forty fine days when she did not work, are you in a position to furnish us with a diary showing what she has been doing on every day since she has been here ?—I am.

8650. Be good enough to do so, then ; but is that statement the fact, or directly contrary to fact ?—What ?

8651. That the dredger lost forty fine days when she might have worked ?—It is directly contrary to fact.

8652. (*Capt. Sulivan.*) On whom does it depend to decide the days when the dredger shall work ?—On myself.

8653. Daily ?—The men in charge have orders to go out, if it is possible to go out, and their report comes in to me every day.

8654. Upon the days when they made objections to going out on account of the lift of the sea, were you satisfied as to the state of the sea outside the bar? —I was.

8655. Have you reason to suppose that they might have frequently gone out to work when they were absent ?—On the contrary, I think they were most anxious to go out—most anxious.

8656. Supposing operations were commenced, would you put in the centre portion of the work to enclose the swashway at once ?—I think that would be best.

8657. Might that not have the effect of adding to the banks right and left, as well as closing the bank immediately behind it ?—No ; I think the effect would simply be to direct the current in its proper course, and carry any sand which might be in suspension away with it, and that it would deepen the inner channel.

8658. Might it not also have the effect of continuing the deposit on those banks which are already formed ?—No doubt it would.

8659. From the piling not being extended round them ?—I have no doubt that if the two operations of dredging and piling were carried on, in a very short time you would have that bank dry.

8660. And that there would be no injurious effects on the present banks until you had time to embank them ?—No.

8661. (*Capt. Vetch.*) Do I understand you to say that the tide-making comes through the north mouth and runs out again at the south mouth ?—There is a true tidal current north and south.

8662. Suppose the tide rising to about half tide, do you inform us that the tide is then running in at the north entrance, and out at the South Channel ?—It runs into the hhrbour.

8663. Not through the Hantoon Channel ?—It does not pass by the entrance to the harbour and run through the Hantoon Cbannel.

8664. Does the ebb tide run through the Hantoon Channel ?—The ebb tide runs out over here, and the in flood tide runs over there.

8665. So that they do not interfere with one another ?—Any tide running southwards is partly diverted through the swashway.

8666. Do they meet ?—The flood tide runs up and they meet in the north channel.

8667. And do they then take a joint direction instead of running, as I imagine you intended to describe ?—They take this course (*marking in pencil on the chart*).

8668. (*Mr. Coode.*) At what cost per lineal yard have you estimated this line of piling of which you have spoken ?—At 40*l.* per yard.

8669. What is the shortest length which you think would be of service ?—The shortest length would be of about half a mile.

8670. At what distance apart would you place the piles transversely ?—I would put them herring-bone way. The extreme distance between them I should suppose to be six feet transversely.

8671. You propose three lines of piles ?—At distances between the two outer lines of about six feet.

8672. About six feet, including the thickness of the piles ?—Yes.

8673. And at what distance would you put them transversely ?—About the same.

8674. And to about what depth do you propose to screw them ?—I should be inclined to screw them down below the depth of the channel which goes out to the north-east.

8675. What height would the top be ?—Five feet over high water.

8676. Would you have any cross or diagonal planking ?—Yes, and other ties.

8677. Have you ever had occasion to use screw piles ? Are you aware of the rate at which the Screw Pile Company charge them ?—I have been in communication with the company upon the matter.

8678. And do you base your calculation on the result of that communication ?—Partly. I do think they charge extravagant prices for their patent.

8679. (*Capt. Washington*). I observe that in your report of 1846 you state that one of the greatest means of improvement which could be made in Wexford Harbour would be removing the bridge and causeway of Wexford. That was in 1846. Has any step been taken in that matter ? Has it been done ? —A great many steps have been taken. The contract for building a bridge higher up has been signed, and the timber has been ordered for it.

8680. When will the works probably be commenced ?—As soon as the timber is received. We have been expecting it for some time past.

8681. Will they be commenced as early as the spring ?—I hope so.

8682. And in the course of how many years is the old bridge to be taken away ?— The contractors are bound to complete the new bridge in 1860 ; the old one cannot be removed until the other is available.

8683. In 1846 was not an Act obtained to improve the river up to Enniscorthy ?—That was part of the plan for improving Wexford Harbour, and for which the original Act was obtained.

8684. Has anything been done towards it ?—The Embankment Company were relieved from that in 1852, and a company was subsequently formed by the merchants of Enniscorthy and others to carry it out. The Earl of Portsmouth takes a great interest in the matter, and Mr. Dargan has intimated that he is disposed to take a contract and do the work.

8685. Does there seem any probability that the work will be carried out ?—I think it very probable it will.

8686. Will it be useful in the improvement of Wexford Harbour ?—It will be a very useful adjunct. I do not know anything which would be more useful.

Mr. John Edward Redmond examined.

8687. (*Chairman.*) You are connected with the Wexford Harbour Embankment Company ?—I am.

8688. Have you been present during this inquiry ? —I have.

8689. Have you any observations to offer as to the effect which the embankments produce on the harbour, whether injurious or otherwise ?—With regard to the harbour, I was the person who originated the Harbour Embankment Company. At that time the Company had Mr. Farrell as engineer, and among other suggestions made by them was piling outside the banks at sea. I am decidedly of opinion that the original entrance to the town was on the Coal Channel ; that has been the original entrance, and that the present, which we call the Town Channel, is fictitious and false. The reason I state so is, that the soundings in the Coal Channel are excessive, and not to be accounted for on any other principle, and it must have been a considerable number of years ago connected with the Slaney. The Slaney, about six or eight miles up the river, is of considerable depth. I live six or eight miles up the river, and opposite my own house there are twenty-eight feet at low water ; and from history we find that, at the period of Cromwell, the frigates of the English Parliament entered the harbour, and lay at Wexford ; putting that and the soundings together, it seems clear that there was a great main original channel, and that the Coal Channel must have been connected with the Town Channel. From the soundings which the Company caused to be made in the slob in the centre, it appeared there was no bottom, which was the reason why we could not construct any form of embankment without vast expense, and it is therefore not improbable that through the soft part of that slime was the original entrance. It has been suggested by Captain Vetch that that could be excavated at a small cost. I think the plan which he has submitted, connected with that and the bar, would considerably improve the east channel without interfering with the Hantoon Channel. I am a shipowner. I have been a shipowner for upwards of thirty years, and the owner of steam-boats twenty-six years, and have had frequent means of communicating with seafaring men. I think an entrance could be made without interfering with the easy entrance of the Hantoon Channel, and that the mouth of the harbour could be contracted in the same way as on Mr. Farrell's plan, towards the east and north-east. From the experience which I have had of similar works, I do not think the cost would be excessive, and that a small grant would be sufficient, in addition to the funds which I think would be available ; indeed, the locality ought to produce them.

8690. Supposing that the line of embankment marked on the plan in a concave form to the south were adopted and made, would any more funds be

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available from the Midlands—anything in addition to the 20,000*l.*?—No; nothing in addition to the 20,000*l.*

8691. In the view which you take do you contemplate the Coal Channel principally?—Yes; to make that the leading channel, with 18 feet of water at low water.

8692. What effect would that have on the present sailing channel?—I do not think any. There is nothing in the Slaney in the shape of deposit or silt. Boatways have been opened by the fishermen, and they have not filled up. We also commenced, on the part of the Harbour Embankment Company, to open a cut from the coal into the main channel. There was some interference which prevented its being completed. It cost a few pounds, and it has remained open ever since.

8693. And therefore, supposing your plan to be carried into effect, you think that you would possess all the advantages from the present sailing channel, and also have this deep-water channel for large vessels?—I take it so.

8694. As a shipowner, I would ask you whether the narrowness of the channel would be of any importance, considering the use which is now made of tugs?—I am altogether an owner of steam vessels, and of course, as to that, it would suit us very well, and for sailing vessels it is equal in size to the entrances to other harbours, and I do not see much against it.

8695. And would there be any possibility of making the slob land available for the purpose of providing funds towards the improvement?—I think not. The flats are all sand, and I do not think that they could be enclosed with profit or utility.

8696. I think you stated that you thought local funds would be available. From what source would they be derived?—I think we ought to help ourselves when we are asking other people to help us. The income of the quays is from 1,500*l.* to 1,800*l.* a year, and I do not see why the Quay Commissioners could not appropriate half that for the interest towards the improvement of the harbour. I do not remember any improvement to the quays. I have sometimes acted with the Commissioners, but I have generally been in a minority; they have received from 1,100*l.* to 1,800*l.* a year, and reduced the debt lately.

8697. And supposing that the improvements which you contemplate were carried into effect, would the trade of the port be increased, and consequently the revenue of the port improved?—I have no doubt of it. My steamer, which is one of 800 tons, sails once every week. If a steamer were to sail every day it is evident what the income would increase to. In the autumn of 1856 I sailed a small steamer to South Wales in connection with the South Wales line of railway, but the expenses of the port and the difficulty of entering the harbour, expenses one way or another, would not let it pay, though I showed there was a trade.

8698. I think it was stated by Captain Washington, during his examination of one of the witnesses, that the original contribution of the Harbour Embankment Company was 20,000*l.*, and that they have only paid 10,000*l.* Would there be any difficulty in getting the other 10,000*l.* Is the rest forthcoming?—If the Admiralty perform their part of the agreement. We paid 5,000*l.* in 1854, and 5,000*l.* in 1855. I know that for some successive years we paid our contributions, which were secured on the reclamation of the land on the north side, and up to this time we have no certificate from the Admiralty that we have embanked to their satisfaction on the south side. I hope that in the course of the autumn we shall get the necessary certificate, and then we may get sufficient funds for our operations. Perhaps I may also mention that the Admiralty withhold their consent to embanking 4,000 acres. There are 4,000 acres unembanked still; there are, in fact, 4,000 acres of land still untouched, inasmuch as the Admiralty withhold their assent to the enclosure, and as the whole 10,000*l.* was a contribution for unreclaimed land, that will, of course, materially affect the question.

8699. But you have no reason to suppose that the assent of the Admiralty will be withheld ultimately?—I believe the communication from the Admiralty was to the effect that until the flow of the tides outside the bar was ascertained they did not wish to receive any more plans.

8700. You have stated your opinion that if the channel were deepened to 18 feet up to the quay the trade of the port would be considerably increased; will you inform us generally the grounds for that opinion?—In the first place, the situation of the county and town of Wexford is nearest to the English coast, and if there was equal facility of ingress and egress it must be the means of communication with the south parts of Ireland and between the Scotch and English coasts; because we have plenty of evidence that all perishable articles are conveyed by the shortest sea passage if it can be safely done, and through the instrumentality of steam, by means of the lines of railway, which we hope to extend to the centre of Ireland, I do not see why it should not be the principal export place for the south-east part of Ireland. The land in the neighbourhood is extremely productive. The people are industrious. The fishery is only half developed, and I should hope with those improvements the trade of the port would not only be increased by a per-centage, but that it would be considerably more than that.

8701. (*Capt. Sulivan.*) You say that the channel is to be dredged to 18 feet. Would you consider the trade of the port to depend on a corresponding depth outside?—I think if you were to get 18 feet in the channel, you would get 18 feet all through, as long as the currents were directed in a proper manner.

8702. How would you direct the currents?—At the entrance.

8703. How?—By the bank outside. In 1800 there were 16 feet of water, and at that time there was only a single bar.

8704. We have heard of inclosing this bank in one, and making it an island, leaving two channels, the East and the Hantoon Channel. Do you think that would have the effect of obtaining 18 feet of water in both?—I am afraid not, but you have not that as it is.

8705. You would get more depth, you suppose?—I am afraid the shape of the east entrance is too much to the north. I should suggest a stone embankment to the north. I should be afraid that if you make an enclosure or island you would force the current into the shoal water in the North Bay, which is not our object.

8706. Can you see any way by which any piling could overcome the difficulty of the water getting more to the north than at present?—The prevalence of easterly winds is to force the entrance to the north, and unless you put a protection to the other edge, I am afraid it would be forced up as I said, but of course that is an engineering question.

8707. Still, the embanking the two islands would deepen the channel in the harbour, would it not?—You would shut up the little swashway, which I consider does no good but harm.

8708. But if the Coal Channel were deepened you would think that comparatively useless without an equivalent outlay to deepen the water outside?—I think it would have a considerable effect towards deepening the outside without anything else.

8709. Explain the reasons why you think so?—You would put the volume in a single direction.

8710. Would it not have the effect of striking more to the north?—I think it would take a little off the north point.

8711. Would not all which was taken off that point be thrown on the banks?—No; the sooner you have protection there the sooner you would have a complete current leading up through the Coal Channel.

8712. You have heard the witnesses speak of the value of the Hantoon Channel, more especially from

its protection from the sea; do you adopt that view?—Decidedly.

8713. Would it not be losing a valuable mode of safety to close that channel?—I do not propose to close the Hantoon Channel.

8714. But if the result was to deepen and make one channel to the eastward, would not the effect in some measure be to close the Hantoon Channel?—If you could secure 18 feet at low water, through the Coal Channel, it would be infinitely preferable, in my opinion, to six or seven feet in the Hantoon Channel; and you can hardly put it at more than seven feet.

8715. You proposed this morning, I thought, to stop up the Hantoon Channel?—Being ignorant of Mr. Farrell's views, I thought it better to propose something.

8716. (*Capt. Vetch.*) You are of opinion that if the deep Coal Channel were connected with the deep channel above Gull Bar, the connection of the water above and below would be the means of more permanently providing a deep channel to the sea?—I think it would secure us a fixed entrance.

8717. Supposing a channel were made near the proposed south embankment, in prolongation of the Coal Channel, would that be a great facility to navigation and to the land?—I think it would be a considerable object to have the south embankment made, and that it would reduce the expense of the cut if both were constructed together; and it would afford a convenient place for material removed inside the Gull Point.

8718. Is it not a fact that small craft in hazy weather get on the bank?—Yes, and even steamers.

8719. With that Coal Channel improved and extended into the deep water above the Gull Bar, would they then do so?—No; because there would be a continuous landmark.

8720. And the shore could be converted into quays or jetties?—Certainly.

8721. Would you prefer, on the whole, a deep channel along the south embankment, or the north and shallow channel?—I do not think there can be a second opinion on the subject.

8722. You are aware that the Dogger Bank is now in what was the middle of the fairway?—Still, the section of the obstruction at present is nearly the same as in 1846.

8723. Nearly the same with respect to depth, but different in position?—Very little; but as to the section of the obstructions, it is just the same as it was in 1846; it is only altered in place.

8724. You propose a breakwater on the north side?—Yes; inside the Raven's Spit.

8725. Where would you get your stone?—There is a great facility for getting stone.

8726. At what cost per ton?—You can quarry stone at 6*d.* per ton.

8727. And conveyed for how much per ton?—I think, with the aid of the tug boat, you could convey the stone for another 6*d.*

8728. And if your breakwater were run out from Raven's Point, it would give facilities to vessels entering?—No doubt.

8729. And would confine and guide the main channel to the sea?—I think it would have the effect of a kind of guide to the channel towards the north, on the north side; but that would not affect Mr. Farrell's idea of a breakwater on the south or east.

8730. (*Mr. Coode.*) Be good enough to point out the line where the borings were made when no bottom was found; the line which you assume was the line of the original Coal Channel?—It was somewhere in the line of the proposed embankment. I objected to the certain expense of the embankment.

8731. Was it on the line marked?—I think it was a little more to the north, which was the line proposed under the Act of Parliament. This line is somewhat inside, to the south of the Act of Parliament line.

8732. Then do I understand you to say, that the line shown here is the line sanctioned by the Act?—No; that line is a little to the south.

8733. When is it likely that will be completed?—We must first get the consent of the Admiralty.

8734. Have you applied to the Admiralty for their consent?—Yes; in 1856.

8735. And you have not yet obtained it?—Yes; we said the plans were prepared and everything necessary, but they said that until the harbour question was settled they did not wish to give their assent.

8736. Are you prepared to say that the line of embankment proposed will be carried out?—I am only a single individual, but at that time——

8737. Have you any reason to doubt that this embankment will be carried out at once?—I cannot give a positive answer to that question. I should do all that I could to get it carried out.

8738. What is the probable cost?—Something less than 40,000*l.*

8739. By whom was the estimate made?—By our engineer.

8740. Of what material was it proposed to form that embankment?—Clay, and faced with stone.

8741. You say the cost of the stone is 6*d.* per ton. Is that put on board of the barges, or at the quarry?—At the quarry; but that would be at the edge of the navigation.

8742. Has any stone been so carried to the embankment already made?—Hundreds of thousands of tons.

8743. Can you tell us the cost per ton of that which has been conveyed?—It was delivered at 1*s.* 6*d.* or 1*s.* 8*d.* a ton; but if a considerable work had to be executed it would be cheaper. The contractor would have his own plant ready.

8744. You spoke of a channel being opened by the fishermen?—There are three or four of them.

8745. You spoke of one which had remained open and become wider?—The present entrance at Peger was opened, as I am informed, by the fishermen some years ago. It is 18 feet at low water, and perhaps 100 yards wider.

8746. Is that deeper or wider than the one which you first mentioned?—Yes; that was only for a cot to go through. We opened one to the mainland. We opened it to 6 feet breadth and a foot depth. It is now 8 or 9 feet deep, and 60 or 70 feet wide. There is another in the passage of the Knob, which connects the Coal with the Town Channel. It was opened by the fishermen for the facility of communicating between the two channels. That also has remained open.

8747. You spoke of a single entrance in 1800?—At that time I believe it was so. According to the survey the sand banks have risen, but the charts will show that.

8748. What was the direction of the channel?—A direct east course from the Fort, upon which point you may refer to Captain Vetch's report.

8749. Have you any estimate of your proposed breakwater?—Yes, 40,000*l.*

8750. By whom was it made?—By myself and an engineer.

8751. Of what is the breakwater to be made?—Of stones.

8752. Can you procure stones of a large size? Can you procure stones of five tons weight each?—I have not seen them so big as that.

8753. Of a ton or two tons weight?—Not in any quantity. Our object is to get the stone handy, and we must get small stones.

8754. Do you think they are fit to form a breakwater?—Not to face it.

8755. (*Chairman.*) You spoke of maps and charts which show what the channel was in former days?—There is a county map of 1800.

8756. Is there anything prior to that in existence?—There is a very ancient map in the British Museum. I was asking our engineer to-day about it. He saw it, and he believes it is 500 years old.

8757. Has the embankment already carried out

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been sufficiently remunerative to induce capitalists to proceed ?—Taken in the aggregate I think it has not, but when we commenced to enclose it we had a considerable expense for the Act of Parliament, and preliminary expenses, not connected with the work. The contribution to the Admiralty has added much to the expense.

8758. Is there a fair prospect of its affording remuneration without these expenses ?—There are persons in negotiation to get new subscribers.

8759. As far as the persons locally concerned, there would be no obstruction to the work being carried out ?—I can see no impediment at all.

Mr. William Coglar examined.

Mr W. Coglar.

8760. (*Chairman.*) You are collector of customs at this port ?—Yes.

8761. How long have you held that appointment ?—Nearly three years.

8762. Can you give a return of the number and tonnage of vessels and the arrivals and sailings for the past year ?—Yes.

8763. Can it be carried back for a considerable number of years in the form of an abstract ?—It can.

8764. If it will not be involving too great labour can you give it from 1845 downwards ?—Yes.

Mr. Richard Adams examined.

Mr. R. Adams.

8765. (*Chairman.*) You are one of the Harbour Commissioners ?—Yes.

8766. Can you give us an account for the last year of the harbour revenue ?—I can procure it for you.

8767. And would it be any inconvenience to you to give it for the last 10 years, from 1845 downwards? —Not the least.

8768. Will you supply it at your own convenience to our Secretary ?—Certainly.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry ?

No answer.

Sitting at Wexford closed.

ST. IVES.

Monday, 27th September 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Vetch.
Mr. Lindsay.	Captain Sulivan.
Captain Washington.	Mr. Coode.

Mr. Evans, Secretary.

Mr. Tremearne, Agent to Lloyd's, examined.

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8769. (*Chairman.*) What is your name ?—John Newman Tremearne.

8770. What is your connection with the port of St. Ives ?—I am agent to Lloyd's and consul to Sweden and Norway. I hold also other offices.

8771. And for what period have you been connected with the port of St. Ives ?—From childhood. I was born here, and have lived here ever since.

8772. Will you proceed with your statement ?—I first of all hand to the Commissioners a chart of St. Ives Bay, with the depths of water, as taken by Captain Williams ; also a chart taken 70 years ago, showing the depths then ; also one taken in 1814, as far as I can gather ; also one taken 50 years ago, showing the depth of water then ; and a chart of the port of St. Ives.

8773. Have you anything to hand in derived from your own knowledge and experience ?—I next hand in a paper, showing the number of registered vessels and boats belonging to the port of St. Ives. The vessels registered amount to 13,118 tons. There are 44 registered drift boats from 15 to 30 tons ; 76 under that tonnage ; 250 pilchard seine boats ; while a large number of drift boats come here from other places during the pilchard, herring, and mackerel seasons. The next paper I bring under your notice relates to the damage vessels have sustained, more particularly in 1857. On the 27th May, 1857, upwards of 100 vessels came for shelter from a tremendous south-east gale ; 33 only ventured to enter the harbour, and had the wind shifted to north or north-west, very great damage and loss of life must have occurred. The next paper shows the trade of Bristol, and of the Welsh ports. The total tonnage of coasting and foreign vessels entered inwards and outwards at Bristol, Cardiff, Newport, Swansea, Neath, &c., is roughly estimated at 4,707,000 tons, and a great amount of this must pass the Land's End. I have one paper to hand to the Commissioners, more as a curiosity than otherwise. It is an estimate for a breakwater 80 years ago (4,000*l.*), and shows that at that period there was an idea of such an erection. My last paper is an estimate of the mackerel and fish taken in St. Ives during the last two years, their value, &c.

8774. Do you wish to make any further statement ? —No, I don't know that I do. I have given these statistics to enable the Commissioners to judge what St. Ives is.

8775. Do you wish to make any further statement ? —No.

8776. (*Sir F. Smith.*) Have you reason to believe that if a harbour of refuge were constructed a great number of vessels would come in ?—Most assuredly.

8777. How far is a vessel protected in stress of weather ?—We have no shelter except our pier, which is so small that it yields little accommodation.

8778. You have at the bottom of the bay sands which, if a vessel should take them, would save her ? —Yes, we can beach a vessel.

8779. Do you, as Lloyd's agent and consul for Norway and Sweden, know any cases in which vessels bound up and down the Channel would be desirous of coming in here ? — I have frequently known vessels coming from Norway remain until they considered the weather favourable in Falmouth ; when favourable they have come round.

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8780. What would they do if a harbour were formed here?—They would not go to Falmouth at all.

8781. And that would expedite their passage?—Yes; I have sometimes known them at Falmouth for two or even three weeks, with a wind at north-west.

8782. (*Mr. Lindsay.*) How many vessels have you known wind-bound in this bay at one time?—I have shown a large number so late as 1857.

8783. I want to know from you, so as to have it in evidence, the number of vessels you have seen here at one time?—It is all in that paper.

8784. Well, I now see that on the 27th of May, 1857, 110 vessels came to an anchor in a heavy gale from south-east?—Yes.

8785. Had the wind suddenly shifted to north and north-north-west great damage to life and property would have occurred?—Yes.

8786. Now, are you aware, of your own knowledge, if many vessels would take shelter here if protected from the northward and northward and westward?—We have often seen 100 sail off here, and frequently I have heard masters say, if a harbour were here they would come in; many have been driven to sea and lost.

8787. You speak of this from long experience as Lloyd's agent?—Yes. There is often a difficulty in weathering the Land's End, and masters say that had there been a harbour here they could have gone round days before.

8788. Do you know, of your own knowledge, of any loss to life and property that has taken place, and which would have been prevented by the formation of a harbour?—Yes, by the reports of masters; they say they have been obliged to stand to sea, when otherwise they might have taken shelter, had there been a port at St. Ives they could have come to. If they had come in, and the wind had suddenly shifted to the north-west, they would have had to encounter such a tremendous sea that their vessels would not lie in safety.

8789. Confining your remarks to the immediate neighbourhood, can you mention any particular instances where life or property would have been saved?—Two wrecks occurred about three years ago: the *Concord* and the *Swift* sank, and one of them remains here now.

8790. How was the wind when those vessels were lost?—North-north-west.

Mr. Quick examined.

Mr. Quick.

8791. (*Chairman.*) What is your name?—James Stevens Quick.

8792. What is your occupation?—I am the harbour master of St. Ives.

8793. How long have you held that appointment?—Coming on for six years.

8794. What was your previous occupation?—That of a seafaring man.

8795. How long?—I have been to sea from an apprentice.

8796. Have you ever commanded a vessel?—For eight years.

8797. What description of vessel have you chiefly commanded, sailing or steam?—Sailing, and not steam.

8798. In what trade was your vessel chiefly employed?—Both in the coasting and foreign trade.

8799. Are you aware of the objects of this inquiry?—I am.

8800. Will you give the Commissioners any opinion you may entertain as to the advantage or necessity of a harbour of refuge at St. Ives?—The harbour cannot give accommodation to wind-bound vessels.

8801. Do you refer to vessels bound for any particular port, or wind-bound vessels generally?—Wind-bound vessels. They can come in, in a south-east wind, and lie on a sandy beach, but if the wind veers round to north, north-east, or north-north-west, they would be wrecked. In such cases there is a tremendous sea.

8802. Do you consider this the most advantageous point for a harbour of refuge for vessels running down the Bristol Channel?—I do. There is, comparatively, safety until you come to the Mumbles.

8803. What is your opinion of Padstow?—We dread running in there with a wind in; there is no place where a man can run to take shelter.

8804. (*Sir F. Smith.*) You have sailed a good deal up and down the coast?—I have.

8805. Do you know Lundy Island?—Yes.

8806. What is your opinion of it?—Lundy Island affords good protection, but the wind is liable to cast in there, and the water is very deep only a little way off the island, so that I have always held off the island.

8807. Do you know Clovelly Bay?—I do not; but I should think it would be too high up for a majority of vessels, because coasters could run for Penarth. Large vessels chiefly keep mid-channel, and Penarth Roads is good to run to for large vessels.

8808. What state of the wind and what position of a vessel would render it desirable to have St. Ives as a port of refuge?—We want shelter from the north-east, and for vessels going up channel; we are well sheltered from all points of the compass except from north-east to east.

8809. I am speaking of vessels that might encounter severe gales, either homeward or outward bound; what wind makes it desirable for them to come in here?—Any vessel caught this side of the land, coming home or going out, would be glad to take shelter here in St. Ives.

8810. There is no better holding ground than in this harbour?—None better.

8811. From what point of the shore would you project a breakwater?—If it were a point of economy I should go on from the present pier; if this is to be a naval station, I should go from the Head.

8812. Why?—It would give more space and a greater depth of water, but would cost more.

8813. Should you be disposed to leave an opening between the Head and the beginning of the breakwater, or close it up entirely?—I should close it up entirely, because of the tremendous tide.

8814. At what rate does the tide run here?—I should think four knots an hour at spring tides. I am not sure, but I think so.

8815. How far should the breakwater be carried outward to make it a useful harbour of refuge for national purposes?—From a quarter of a mile to half a mile would make it a naval station and give a large area.

8816. (*Mr. Lindsay.*) Is it the case that the wind often chops round from south-west to north-west?—Very often, and that makes St. Ives Bay so dangerous.

8817. What is your most dangerous wind?—From north-north-west to north-north-east is the most dangerous wind for vessels entering the Bristol Channel.

8818. Would the shore between St. Ives Head and Hartland Point be a dead lee shore in north-west winds, and consequently make it the most dangerous part of the entrance to the Bristol Channel during gales from that quarter?—Yes.

8819. From Hartland Point to the Land's End, is there any port where a ship can find shelter in that most dangerous of gales, one from the north-north-west to north-west?—None.

8820. What description of shore is it between the Land's End and Hartland Point; is it a rocky and dangerous shore?—There is Padstow Sound. From Godrevy Head to Padstow it is a bold rocky coast, and there is no place where a ship could take shelter.

8821. Have you ever run to Padstow in a gale?—No; I should have great hesitation in running there with a vessel of 300 tons, because of the "dumb puffs" which come round the hill; unless your anchor

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Mr. Lindsay.

is ready to let go at once, you are on the sand. The anchorage also is short ; you cannot have much scope. The Doom Bank is a very dangerous bank.

8822. What would you do in such a gale ?—I would not run for St. Ives in such a gale ; I would get round the land if I could. But if I could not get round the land I should run in on Kidney Sands, for a chance of saving my life, if nothing else.

8823. Do you know Milford Haven ?—I do.

8824. What do you think of it ?—It is a magnificent shelter in all winds, even in south-west gales.

8825. Having Milford Haven to run to in south-west gales, do you think, for the preservation of life and property, a harbour is necessary on the other side of the channel during north-west gales ?—I should think it is, for we do not like very well to run to Milford. It is situated so that if you miss it you are on shore.

8826. Do you know, from your own experience here, if many vessels are lost in this immediate neighbourhood, and if so whether they would have been saved by such a harbour of refuge as you described to Sir F. Smith ?—Just as I went to sea, I think four were lost on Kidney Sands, to the westward of Hayle Bar. They became total wrecks. One was a Frenchman, and got off again. The lives were saved.

8827. Any others ?—The *Concord* and *Swift* were lost there three years ago, and the remains of the *Concord* are here now with a buoy upon them.

8828. Were any lives lost then ?—One man was lost, belonging to the *Concord*.

8829. How was the wind when those two ships were lost ?—North-north-east, I believe, but I did not take particular notice.

8830. With a breakwater here, would they have been saved ?—Certainly, they were close in on the back of the pier.

8831. Perhaps it is only a matter of opinion, but you may know from your own knowledge, or have heard, whether it is the case that a great number of ships would take shelter in westerly winds, but are afraid of the wind chopping round to the north-west and north-north-west, and therefore will not come in here ?—I believe that, because the north country clubs all hinder their vessels from coming in here.

8832. The north country clubs do not allow their vessels to come in here ; why ?—The north country clubs will not allow their vessels to come into the pier at all.

8833. The pier and the bay are different things ; there is often no water at the pier. But are you sure they have any instructions as far as the bay is concerned ?—I don't know exactly. I have reasons to believe they have instructions to keep out of it as much as possible.

8834. And you think many vessels have kept out to sea and been often lost ?—I have no doubt of it in the least.

8835. Lloyd's agent has given a report of the number of vessels which have put into St. Ives in distress, and I find that this year, up to the present time, 20 vessels have been in harbour disabled or seriously damaged ; is that the case ?—I cannot say so from my own recollection ; four were here disabled in the last breeze.

8836. I want to have a little talk with you, as an old sailor, about the other ports ; what kind of anchorage is there under Lundy Island ?—I cannot exactly say now ; I know the water is very deep ; I never was laying there in a gale of wind.

8837. Is there anchorage ground to the eastward of it or south-eastward ?—It is to the eastward. The Pill smacks lie under the island.

8838. Consequently ships are protected there from the most dangerous of winds, north to north-north-west ?—If the wind is from the eastward they do not require shelter.

8839. Is there any anchorage on the other side of Lundy Island, eastward of it ?—The Pill smacks sometimes anchor there.

8840. Speaking to you as a practical man, do you think a harbour of refuge necessary above Lundy Island ? Do you think it would be the means of saving many ships and lives ?—Lundy Island cannot compare in my opinion with Penarth.

8841. I see there are several natural harbours : above Hartland Point you may find shelter in Barnstaple Bay, Clovelly Bay, Penarth Roads, or King Road ; is it therefore your opinion, if Government money is to be expended in a harbour of refuge, that it should be laid out at Lundy or above Lundy ?—I should think no money lost, for the reasons I have given.

8842. Have you ever been in Swansea Bay ?—Yes.

8843. What kind of anchorage did you get there ?—Some shoal water and rocks.

8844. Is there a large area of water ?—Yes, but shoal water.

8845. Have you known many ships to anchor there ?—Yes ; but if we seek shelter we make away to the Mumbles (being chiefly wind-bound ships), and there get on the mud until the tide flows again.

8846. We don't want any information about ships lying on the mud, do any ships find shelter in Penrith Roads ?—Yes, but they must lie rather open.

8847. Is there a heavy sea at the Mumbles ?—Not a very heavy sea. A south-south-east sea is the heaviest.

8848. Do you know anything of King Road ?—A little.

8849. Is there good anchorage there ?—There is ; chiefly mud.

8850. What sort of anchorage is there in Penrith Roads ?—Mud.

8851. Swansea ?—Swansea is all mud in going in.

8852. Do you think that a harbour at St. Ives would be of much benefit to ships generally, as well to those frequenting the Bristol Channel as to ships bound up the Irish Channel to Liverpool ? Petitions have come to us from Waterford ; other petitioners allege that a harbour here would be useful to vessels trading round the Land's End, and that, in their opinion, a harbour of refuge would be useful to those employed in going up the Irish Channel, and would be also available for vessels going to Liverpool ; is that so ?—Yes, exactly ; vessels caught by north-west gales and getting disabled would find good shelter in St. Ives, if a harbour were here ; ships bound to Liverpool and Ireland from Falmouth and Bristol, and all vessels coming down the English Channel and going up the Irish Channel would be protected.

8853. Have you had many ships put into St. Ives Bay as it is now ; I mean vessels not bound to other ports in the Bristol Channel, as their final port of destination ?—I don't keep an account, as we make no charge.

8854–5. Have you ever seen many large ships here ?—Not many large ships.

8856. (*Capt. Sulivan.*) Then there is no place at present about here where you can take refuge ?—You must either weather the land at the Land's End or go on shore.

8857. Would a harbour of refuge at St. Ives be available for all the vessels we have referred to ?—I should say so.

8858. There is a very large coal trade, I believe, carried on between Wales and Falmouth and Plymouth, and with the ports east of those places ?—There is, very large.

8859. Those vessels don't venture to anchor here in south-west gales, because the wind might chop round to the north-west ?—They do not.

8860. If a harbour of refuge were made they might all come in safely ?—As a port of stoppage, in addition to a harbour of refuge, it would be very favourable to them.

8861. Do you know what number of seine boats you have here ?—I cannot exactly say.

8862. About how many ?—About 250.

8863. What is the time of year when they are principally employed ?—They begin at the latter part of August and continue through September, October, and November ; a part of that time they are exposed

to some of the worst weather we have, to the equinoctial gales.

8864. Would a breakwater benefit them?—They would be enabled to do more in the fishing way if they could lie under one.

8865. A breakwater would, then, be an advantage to the fishery?—No doubt of it.

8866. How many men and boats are employed at this season?—About 80 men are employed now; there are four concerns or partnerships, and each takes its turn; there are eight men in each seine boat.

8867. Would an opening make it worse or better for the entrance of vessels in north-east gales?—I think they would go round to leeward and haul in, for the tide makes out here very strongly at half-flood.

8868. You spoke just now of the rate of the tide; how do you judge it?—From the appearance of the tide, and other reasons, I think it runs four knots an hour, but vessels would have no difficulty in fetching round the lee side and hauling into good anchorage.

8869. (*Capt. Vetch.*) Do you find your holding-ground good?—So good that it breaks anchors.

8870. What kind of bottom is it?—Blue mud on the surface; in some spots it is not altogether so good, but it was too good for my anchor at one time.

8871. Does it shoal gradually: is there an even bottom?—There is only one pool; it is a deep one and close to the head; it is quite clear of rocks and any number of vessels could take shelter in it.

8872. Suppose, under present circumstances, vessels were waiting for a wind and it veered round to the north, what would happen?—We consider our bay dangerous then and wrecks would happen. Vessels could not get out.

8873. Is there any place up channel where they could find refuge in such a gale?—They could find refuge in the Mumbles or Penarth Roads.

8874. What do you say to Padstow?—I could not recommend any vessel to run there in a north wind.

8875. What is the cause of that?—There is room to get in, but the "dumb puffs" are off that land.

8876. Is the passage when you get past the entrance narrow or wide?—Narrow.

8877. The sand bank at Doom Bar is a very dangerous sand, I believe?—It is a quicksand, and a vessel would soon be lost upon it.

8878. Are vessels lost there?—I don't know that vessels are lost there every winter, but occasionally they get upon it.

8879. Is there any other port on the south coast preferable to St. Ives Bay, as a harbour of refuge?—My opinion is there is not; you may say that I belong here, and am partial, but I never saw any bay equal to it.

8880. (*Mr. Coode.*) You said there was a four-knot tide in the bay; where does that occur?—Close by the Head.

8881. Supposing the chart only makes that tide one knot an hour?—No, that would be quite incorrect; I say it is much stronger than that.

8882. Have you ever measured a current of tide?—I have, but not here.

8883. And you think decidedly it is more than one knot an hour?—I am certain of it; the strongest tide runs close round the Head.

8884. You spoke of the puffs off the land at Padstow; supposing that land to be lowered, should you have any hesitation in running for Padstow then?—No, if with a fair wind.

8885. What is your objection to Milford Haven?—Generally speaking, because if you don't strike it exactly—if you make the least mistake in the world—you are ashore.

8886. Have you ever known a vessel drag her anchor in St. Ives Bay?—I have.

8887. How many?—Not many, I don't think any within the last ten years, but I have known vessels drag their anchors.

8888. What became of them?—Let go another anchor and brought up. I never knew one to go on shore from dragging her anchor.

8889. What is the greatest number of vessels you ever knew bring up here for shelter?—I don't know; I keep no accounts.

8890. Is it a fact that only 80 men belong to 250 boats?—There are eight to each seine boat, twelve to each tow boat, and two to each follower, that makes 88. Seiners have always found shelter in the pier, though they have lost boats sometimes. I have known seine boats capsized in the pier, though that don't often happen.

8891. Supposing it were decided to make a harbour of refuge further up the channel, what is the most eligible point?—I have never been to Clovelly, but have been off Bideford and other places. I cannot form an opinion as to the best site for a harbour of refuge above Lundy. I have been to Portishead, perhaps twenty times; a great number of vessels used to go there, they find good riding; I never knew any bad riding; I consider it a good natural anchorage.

8892. (*Capt. Washington.*) What number of pilots belong to the place?—We have no licensed pilots at all.

8893. How many act as pilots?—Sometimes three times as many as at other times. I suppose thirty or forty are in the employ now.

8894. Perhaps the bay is so safe that pilots are not requisite?—I don't know that. There never were any proper pilots here; but they don't go fishing at all, they give their time entirely to hobbling.

8895. How far do they take vessels?—They have gone to Cardiff with vessels, and I consider them competent to do so.

8896. Have you much foggy weather in this part of the channel?—We have not had much fog this summer; we have more fog in the spring and fall of the year than in winter.

8897. You know that a light vessel has been placed on the Stones, and a lighthouse is in course of erection on Godrevy Island, do you think those rocks require a bell on them?—I suppose it would be a great deal better if we could have a bell upon them, but no one asked about it. I was with the Trinity boat when here, and know there is a monster buoy to put on the rocks; it is waiting in Hayle Creek to go out.

8898. Should you think it an advantage to have a bell on it?—I should.

8899. Do you know the fog bell off Liverpool?—I am acquainted with Liverpool, and have been there many times, but not lately. I have found the bell there useful in foggy weather. There is one in Swansea Bay, but none other that I know of.

8900. How far do the channel pilots come down?—The Lundy Island and Bristol pilots come down in our bay sometimes. Distance money begins at Lundy Island; fishermen are paid by agreement, they charge according to agreement, and not so much a foot. Norwegians are the only ones who pay so much a foot going over Hayle Bar.

8901. What is the depth of water at Hayle Bar?—We can take 17 feet at high-water springs over Hayle Bar.

8902. Have you measured the tide round the Head?—I have not.

8903. Have you any boats here that can pull against it?—We have some smart pulling boats here, and they can pull against the tide. I remember Captain Williams making a survey of the bay. I was not with him at all, and I don't know what rate he found the tides to run. I saw a chart of his on board the Trinity yacht.

8904. (*Mr. Lindsay*). What is the depth of water in St. Ives Bay?—13½ fathoms in Pool Merran; that is the deepest water in the bay; about a quarter of a mile off is the deepest water in the bay.

8905. What is the best anchorage in the bay during a westerly wind?—Seven fathoms.

8906. In what description of ground?—Clay and blue mud; to my knowledge it is all clear of rocks.

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8907. What is your opinion about the lighthouse on Godrevy ; will it keep ships clear of the Stones ?—I think it will, but in my opinion in most cases it is a dangerous thing to put a light inside the danger ; you should put the light on the danger or outside it.

8908. Do you think it would have been much better if the light could have been erected on the Stones ?—No doubt of it.

8909. If a lighthouse could have been put upon this headland (*pointing to a chart*)—this entrance to the bay, St. Ives Head—would it have been of much service in warning ships of the danger of the Stones ?—That was my evidence before the Trinity Brethren ; it would have warned ships of the danger of the Stones better than a light on Godrevy Head.

8910. You have said that pilots belonging to this place take vessels up to Cardiff ?—Yes, they do.

8911. Are they allowed to do so until they come into the district of the Lundy Island pilots ?—The Bristol pilots come on board and claim their pilotage, and the others are out of charge directly.

8912. (*Capt. Sulivan.*) Were you here when petitions went from St. Ives and Hayle in favour of Godrevy ?—Yes.

8913. Do you know that some hundreds of persons belonging to the port signed the petitions in favour of the light ?—They did.

8914. Where was the light to be placed, according to their petition ?—On the Stones. I don't know exactly, but I believe that the petition went for the Stones.

8915. Do you mean to say that the six petitions asking for a light in St. Ives Bay selected the Stones ?—I don't know that they did ask for any particular spot.

8916. Did you see the petitions ?—I did.

8917. Do you or do you not know that all the petitions asked for Godrevy Island or Godrevy Head ? I don't know.

8918. Did they say on Godrevy Island or on some other place near ?—I don't know that they did mention any light outside the Stones.

8919. Is not the light in the best place now, and where all the trade petitioned it to be ?—I don't know that.

8920. Is there not a very good passage inside the Stones ?—Very good.

8921. Do you find the steamers use it ?—Yes.

8922. If the light were on the outer edge of the Stones, would any steamer come through the inner channel on a dark night ?—I suppose they would, but that depends entirely upon the wind.

8923. How would steamers, coming from a distance, manage the inner passage if the light were on the outer edge of the Stones ?—They would come in and make the island.

8924. Is it commonly the case that steamers make the passage ?—Very commonly.

8925. Where the light now is, on the island, will it not make it far safer at night for vessels taking the passage ?—Exactly.

8926. And will not a large buoy outside the Stones mark them ?—On light nights.

8927. Then, for the coasting trade, the present light is best : is it for the advantage of Hayle, St. Ives, and neighbouring ports to have the light where it is ?—Yes.

8928. Would any coaster, after making a light on St. Ives Head, venture to steer up that passage ?—The light is better for coming through the passage by night.

8929. Are you aware of the difference in cost between erecting it on the island and on the outer Stones ? are you aware that whereas the light now will cost 8,000*l.*, the cost of an outer one would be 50,000*l.* ?—I suppose it would.

8930. If the present light will light the passage well, do you think it justifiable to expend 50,000*l.* or 60,000*l.*, when for 8,000*l.* it is comparatively safe ?—I should not do so myself.

8931. Are you aware that the buoy now at Hayle is peculiarly constructed,—that it will float perfectly upright in a sea ? Supposing that buoy safely moored, would it not be advantageous ?—Yes.

8932. (*Mr. Lindsay.*) Supposing it fixed, could it ring a bell ? does not a bell beacon require to oscillate a great deal in order to secure the ringing ?—If the beacon does not move the bell will not ring.

8933. Just so ; the steadier the beacon the better, independent of the bell ?—Exactly.

8934. And therefore, should it prove very steady, it is of no use to put a bell upon it ?—Not if it is steady, but I should not think it would be very steady.

8935. Is it deep water close to the island ?—Yes.

8936. A vessel from abroad would, I presume, make St. Ives Head (supposing a light on it) quicker than Godrevy Island ?—It is the leading mark for St. Ives Bay, and, warning vessels of the danger of the Stones, it would keep them outside.

8937. Do you think it wise to encourage vessels to take that passage other than coasters and steamers ?—I would not encourage it at all ; it would be unwise for foreigners to attempt it.

8938. (*Capt. Sulivan.*) Is it likely that strange vessels would attempt the passage ?—It is not likely, but we have seen vessels attempt it.

Mr. William Jennings examined.

Mr. W. Jennings.

8939. (*Chairman.*) What has been your occupation ?—A fisherman and pilot.

8940. How long have you been occupied in that capacity ?—For the last 20 years.

8941. And always with the port of St. Ives ?—Yes.

8942. For what district of the coast do you hold a licence ?—I have no licence.

8943. You are aware of the objects of this inquiry ?—Yes.

8944. State your opinion, if you have any, of the advantage or necessity of a harbour of refuge at St. Ives to the trade passing down the Bristol Channel ?—I think no place more requisite than this is, in various ways ; for vessels coming from Wales often come down off the point of the Land's End, and in consequence of the weather cannot get round the Land's End. The wind blowing hard south and west they are driven back again ; then, if there was a harbour of refuge at St. Ives, they would come here. The consequence is, with the prevalent north and west winds, they must run up the Channel, and if the wind flies round they have no other alternative but to go ashore.

8945. From what quarter do you have the heaviest winds ?—South-west are very heavy winds, and they generally fly round to the north-west ; then it comes in, wind and sea altogether, and makes a regular wreck of vessels who go ashore. Nothing hard by can stand it.

8946. How do your south-west gales generally begin ?—Generally with moderate weather first, and so get on with rain.

8947. In what direction do they begin to blow ?—From the south first ; they pass on to the south-west, then to the west, then it generally blows and rains hard, and then comes round to the north and north-north-west.

8948. (*Sir F. Smith.*) I suppose the vessels trading up and down the Irish Channel would find great use in having a harbour of refuge here ?—There is no question about it.

8949. Would a vessel with the wind strong from the north-west, if she was far off shore, be unable to run round to Falmouth ?—If she was five or six leagues off she could.

8950. Do not those vessels keep mid-channel ?—No ; they come in here along the shore.

8951. Do you know any of the ports between this and Bristol ?—Yes, I know them all.

8952. What do you think of Padstow ?—It is no place at all.

8953. Why not ?—Because no man in England can make that a harbour.

8954. What do you think of Clovelly ?—Clovelly is no better.

8955. Why not ?—You cannot lay there.

8956. What if a breakwater where thrown out ?—No.

8957. Is there not water enough ?—It is shallow water, five or six fathoms.

8958. Is there any large area ?—Not very good.

8959. Not so good as here ?—No.

8960. Is the holding ground very good here ?—None better.

8961. Are you of opinion that a gap between the piers would be useful or not ?—It would not be useful at all.

8962. Would it be more harm than good ?— Yes, more harm than good.

8963. Does the harbour of St. Ives silt up at all ?—No.

8964. Has any change in the depth of water taken place for many years ?—No ; none at all.

8965. Do you know the Mumbles ?—Yes.

8966. What would be the effect of a breakwater there ?—Why you would have to go three or four miles with a breakwater there.

8967. Would you have to go a long way at a great expense to make anything efficient ?—You should.

8968. With regard to Lundy Island, what do you think ?—I have not much opinion of that.

8969. Why not ?—It is a bold rock and you must go close in along shore.

8970. Give us the extent of the anchorage ?—Not more than half a mile.

8971. Could not you have a large fleet of vessels laying off Lundy Island ?—No, it is no place for it at all.

8972. (*Mr. Lindsay.*) There is a place called Church Bay ?—That is what we call Harleen Bay.

8973. Church Bay we have it on the chart ; what point do you mean ?—Harleen Point.

8974. That is the place. Have you ever been at anchor there ?—Yes.

8975. Is it good anchorage ?—No, it is loose sand and sunken rock.

8976. Is there good shelter there from south-west winds ?—Oh, yes ; from south-west winds there is shelter beneath Harleen Point.

8977. Have you often piloted ships above Lundy Island ?—No ; but I have been to Lundy Island often.

8978. You have been there often ?—Yes.

8979. With all respect to your opinion, might not a good harbour be made at the Mumbles and at Clovelly ?—If you do not care for expense. I can understand you.

8980. Do you think such harbours are necessary for the saving of life and property ?—No, I do not ; because, if you can go to the Mumbles you can go to King's Road.

8981. That is to say, if the wind is strong from the north-west you can find good shelter at the Mumbles, and if south-west you can anchor at Clovelly now ?—Yes.

8982. Or in either of these winds vessels can get into the Newport Roads ?—Yes.

8983. And if they cannot get to King's Road there is good anchorage in Newport Roads ?—Very good.

8984. Well sheltered ?—Yes, from westerly winds.

8985. And north-west also ?—Yes.

8986. At King's Road vessels are sheltered from all winds, are they not ?—No, they are exposed to north-west winds.

8987. Have you known many wrecks take place at Lundy Island ?—I have heard of many frequently.

8988. Have you known of many, of your own knowledge ?—No, not of my own knowledge particularly ; but I have heard of them. I have no knowledge of the causes of those wrecks except that they go down to the Land's End and draw back, and are obligated to go ashore there.

8989. Do you mean to say that a number of vessels are lost above Lundy Islaud which have been driven back from the Land's End ?—There are often such cases ; they are not uncommon—it is a common case.

8990. Is that during westerly gales ?—Yes ; I have been and talked to them, and afterwards I have heard they were gone ashore.

8991. Why did they not come in here ?—Because the harbour would not answer properly.

8992. But the bay is sheltered from westerly winds, and there is good anchorage ?—It would not do to come in and trust to the wind going round to the north.

8993. I understand you to say that vessels have been wrecked above Lundy Island which have been driven back from the chops of the Channel, and afraid to come into St. Ives in case the wind should go round to the north-west ?—Yes.

8994. Then is it your opinion that if there had been a harbour that would protect ships in St. Ives Bay during north-west winds, those ships would have come in, and if they had come in, been saved ?—There is no question of it.

8995. You think there is no question of it ?—No question of it at all.

8996. You know the coast. Now, do you think a harbour of refuge at St. Ives of much value to ships going up the Irish Channel, bound to Liverpool, and also those outward-bound ?—I do not think it can be valued.

8997. How do you mean ?—No price would be too great for it. So many lives and property are lost that it could not be valued at all.

8998. Can you tell us any particular instance where life and property would have been saved if there had been a harbour of refuge at St. Ives ?—There were two vessels last winter, the *Conqueror* and the *Swift* —the *Cape* also might have been saved ; she went ashore on Pengelly Point—and many more if I had got the names of them. I could enumerate scores in my time that have gone ashore that might have been prevented if there had been a harbour at St. Ives protecting ships from north-west winds.

8999. Have you known any instance of ships that have put back because they were afraid to take St. Ives ?—Yes, there was one Frenchman ; she came from Newfoundland ; I was aboard her myself. The captain would not agree to come in with us for that reason. I told him if he kept to the west the chances were he would round Milford, but instead of that he kept to the east, and next day he was on shore at Bude Bay, and all hands were lost.

9000. What do you think of another light being put on the small island ?—I think it does best as it is, on Godrevy Head.

9001. If it were possible to have erected a lighthouse on the outer Stones, do you think such a lighthouse would have been as valuable as on Godrevy Island ?—If it could be erected there with safety, I should say on the Stones was best.

9002. You think it would have been better if the lighthouse could have been erected there ; but, say one costs 6,000*l.* on the island, and another on the Stones would cost 50,000*l.*, taking into consideration the question of cost, do you still think it would be better erected on the Stones ?—I do not think money of any value.

9003. 40,000*l.* has no weight in your opinion of the position of a lighthouse ?—No.

9004. Have you often taken vessels up to Newport and Cardiff, and those places ?—No, I never did.

9005. (*Capt. Washington.*) How long have you acted as a pilot ?—About 20 years.

9006. You say you do not take vessels up as far as Cardiff, how far do you take them ?—I am a pilot for our own place.

9007. Do you mean pilot for the bay ?—Yes, in and out.

9008. Being only a pilot for the bay you are acquainted with this part of the coast through trading up and down and fishing ?—Yes.

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Capt. Washington.

9009. You have given a decided opinion as to the difficulty of making a harbour of refuge at Padstow, have you ever been there ?—Yes.

9010. In gales of wind ?—I have run in there in very strong weather.

9011. The wind, in what quarter ?—With the wind west. In a north-westerly wind you have no chance whatever.

9012. You are speaking of a sailing vessel or a steamer ?—A sailing vessel.

9013. Could you take it with the wind at south-westerly ?—The Doom Bar Sand would prevent you; the wind at north-westerly is two casts out and one in.

9014. What is the course into Padstow ?—South south-east, and you have to enter close under the point.

9015. You enter under Stepper Head ?—Yes.

9016. Would not the wind at south-south-east carry you on the Doom Bar ?—No.

9017. With a south-west wind would you venture to take the harbour ?—Yes, in fine weather.

9018. Not in heavy weather ?—Not very well.

9019. Would you with the wind at west ?—You cannot with a small vessel, you would have to work in.

9020. Could she not fetch in ?—No, because the wind comes round the point.

9021. With the wind west in the channel, how is the wind in Padstow ?—South-west.

9022. Is Stepper Head high ?—Very high.

9023. Do you think it might be cut down level ?—It might be possible.

9024. If fifty yards were cut down could you take Padstow safely ?—I do not know that you could.

9025. Is there any buoy or beacon on the north-west edge of the Doom Bar Sand ?—No.

9026. When where you there last ?—fifteen months back.

9027. In a north-west gale would you venture to take Padstow ?—No, not if I could get anywhere else. I could not insure my life or property.

9028. Is there any wind in which you would venture to take Padstow ?—North-east, but not a gale of wind.

9029. I speak of a gale of wind ?—I should not like to have anything to do with it in a gale of wind.

9030. Where would you go in a north-east gale ?—I must come down to St. Ives or go round the Land's End.

9031. Is there no stopping place where you could get in for shelter ?—No.

9032. In a south-west gale, is there no stopping place along the channel on the south side, where you could get shelter between St. Ives and King's Road ?—You can anchor at Lundy Road.

9033. I mean on the main land. What do you think of Bideford Bay ?—You cannot come to anchor there.

9034. You say that the south-west wind chops round to the north-west ?—Yes.

9035. Is it of common occurrence that the south-west wind chops round to the north-west without any warning ?—Very possibly. Sometimes we have some intimation, but most commonly there is no warning at all scarcely.

9036. Do the great bulk of vessels come down the north side of the channel, or the south side ?—From Lundy do you mean ?

9037. Yes ?—They come through the Race.

9038. What do you mean by the Race ?—The Race between Lundy and Hartland Point.

9039. Do vessels from Newport and Cardiff come that way ?—Yes.

9040. Why do they come over on the east instead of keeping north ?—They are nearer the Land's End, and make a shorter distance of it.

9041. You say you are well acquainted with St. Ives Bay; is there much fog there ?—We have fog at intervals in the spring and about the fall.

9042. Much the same as at Swansea ?—I think there is more up there than we have here.

9043. You have heard what the last witness said about having a bell on the beacon on the Stones. Do you think it desirable ?—I think it would be very desirable to have a bell, such as they have at Liverpool Bar.

9044. Have you been at Liverpool lately ?—Yes.

9045. How lately ?—Three or four years ago.

9046. Do you know the Bell-buoy ?—Yes.

9047. Is it of great use ?—Yes, the bell is put in a triangle. You hear the sound a long way off.

9048. Is there any difficulty in ringing it, or does it ring commonly with the least motion ?—Yes, it gives a very loud sound; sometimes you hear only a tink.

9049. You are pretty good engineers down here ?—I know nothing of engineering.

9050. Some of your neighbours profess to do so; you have Harvey's foundry here, have you not ?—Yes.

9051. Are not the Cornish engineers celebrated all over the world ?—I believe so.

9052. Do you think that it would be quite beyond their skill to attach a simple wheel to that buoy to make it ring in all weathers ?—I think if I was half a mechanic I could do that.

9053. As an honest sailor, you think it very desirable ?—I do.

9054. You think it necessary ?—I do.

9055. (*Capt. Sulivan*). Do you know any bell-buoy where the thing on which it is hung is fixed, or are they made purposely to oscillate ?—The Liverpool buoy is across the tide, and is in one perpetual motion from the sea.

9056. Are all bell-buoys made that way ?—All that I know of.

9057. With respect to Godrevy Light, you say that you think nothing of the expense ?—No.

9058. I think you said, at the same time, you did not believe, from the nature of the Stones, that the lighthouse would stand upon it ?—I do.

9059. Supposing that the expense of the light-house had to be paid by the trade of the coast, and that all those who were acquainted with the coast, and especially those who knew this port, had approved the light,—would you, knowing that they had approved it, recommend that 50,000*l.* should be spent on a lighthouse on the Stones in preference to 8,000*l.* on a lighthouse on Godrevy Island?—I do not think money is to be valued at all in such a case.

9060. Do you think that the local trade would prefer a light outside, and the channel left dark; or do you think they would prefer a light on the island, to light that inner channel, and a large beacon on the Stones?—I have passed that inner channel without a light. Our object is to make the east land, so that we make the nearest point; and it is of great consequence that we should be certain where Godrevy Island is. I have been coming in scores of times at night, raining and blowing hard, and my object always was to make the east land, and follow it along. We always were prevented going near enough, in consequence of being afraid of the Stones.

9061. But now will you not steer to the island with the light, and come through safely ?—Of course.

9062. You have known some vessels wrecked near the Stones without being heard of, even in fine weather?—Yes.

9063. Do you think they were lost because in trying the inner passage at night they missed it?—No doubt.

9064. Will not that be guarded against by the light where it is ?—Of course.

9065. Have you not known of wrecks in fine weather in daylight, through vessels rounding the Stones too close outside?—Yes.

9066. Will not that be guarded against by that beacon buoy?—Of course.

9067. And do you not think that the beacon will be seen before vessels get on the Stones?—It ought to be.

9068. Then, for the local trade, do you not think the light more beneficial where it is, by lighting the inner channel, than if it were put on the Stones?—I think it best where it is in that respect.

9069. Do you know anything of petitions that went up from here about it?—I heard of no such thing.

9070. Do you know that all those petitions asked for the light to be put on Godrevy Island, or on Godrevy Head?—I am not aware.

9071. (*Capt. Vetch.*) You say you are very well acquainted with the whole coast of Cornwall?—Yes.

9072. Within the distance between Hartland Point and Cape Cornwall, which do you consider the most eligible place for a harbour of refuge?—Unquestionably St. Ives Bay. There is no place like it.

9073. What is the danger that St. Ives Bay is now open to?—North-north-west and north-east winds.

9074. Then vessels coming down channel, and not being able to put to sea, might find shelter in St. Ives from westerly winds?—Yes.

9075. But the danger arises from the wind veering round to the north, and then vessels would be caught on the lee shore ?—It is all open.

9076. Have you known any wrecks arise from that circumstance?—Yes, many.

9077. Is the anchorage ground in St. Ives Bay good?—None better.

9078. Then what is required to make it a perfect harbour?—A breakwater from the Head.

9079. Do you think such a harbour necessary for the safety of the many foreign vessels and vessels coming from abroad ?—Yes.

9080. They could take it with great safety and assurance?—Oftentimes vessels coming into the Channel get this far bound to Liverpool and Bristol. If there was shelter they would come in, but being none, they know they cannot have it, and they are obliged to draw away again in gales from the north and east.

9081. Do you know any other place between Hartland Point and Godrevy Head, which would answer as well?—None in any respect.

9082. And would your breakwater protect as many vessels as are likely to take shelter ?—We have many vessels running for shelter—sometimes as many as 130.

9083. The question you were asked was, whether, supposing the breakwater was made in the way proposed, it would then shelter any number of vessels likely to take shelter ?—Oh yes ; there is no question at all about it.

9084. (*Mr. Coode.*) You have been asked some questions with reference to a harbour of refuge between St. Ives and Hartland Point ; but suppose that district was provided for, do you think any other harbour is required to the east or north-east ?—I do not know any other place more proper than our own.

9085. But, suppose you are provided for, are there any harbours wanted further up ?—Supposing a place could be made, of course it would be no disadvantage.

9086. Suppose you were caught half-way down with a westerly gale, would a harbour of refuge at St. Ives do any good ?—No.

9087. What would you do ?—Go back again.

9088. Where, under such circumstances?—If it were only possible I do not think you could do a more providential thing than to provide a harbour.

9089. Supposing a harbour made at St. Ives, and one that satisfied the wants of all the coast between Hartland and the Land's End. If you were then caught half-way from South Wales to the Land's End, where would you prefer to have another ?—I do not know.

9090. Supposing there were a harbour in Clovelly Bay, would you like to run to that ?—It is the danger of running back. Vessels have often foundered in the Race going back.

9091. Is that so dangerous ?—Yes.

9092. Have you known vessels founder there ?—Yes, many.

9093. Large or small ?—Large and small too.

9094. But can you mention the name of any one ?—We have heard often of vessels being foundered in the Race.

9095. You say you should not, in a question of such importance, regard money. If there were a harbour of refuge in the upper part of the Channel to save life, would you regard money in that ?—Not at all.

9096. Then if a harbour could be made in Clovelly Bay, what would you say to that ?—I do not think there is water to do it.

9097. Have you anchored there ?—Yes.

9098. In what depth of water?—Four or five fathoms.

9099. Do you not get seven fathoms close into Clovelly ?—Not close in. Half a mile off.

9100. Within half a mile you would be in seven fathoms of water ?—I do not think you would.

9101. Is it not enough ? you know it is possible to have too much water ; I suppose you would rather have six than sixty fathoms ?—Yes.

9102. Then six fathoms are sufficient for any vessel seeking shelter there or elsewhere, are they not ?—It is little enough.

9103. What size vessel would require more than six fathoms ?—We have vessels drawing 24 feet, and supposing a gale of wind there is a great send.

9104. But supposing a harbour of refuge made, should you hesitate to anchor a vessel drawing 24 feet in six fathoms of water ?—No.

9105. You have known vessels that could not get up to Lundy Island, and have been obliged to put back ; does it happen to large as well as to small vessels ?—Yes.

9106. Do coasting vessels hug the land more than larger ones ?—Yes.

9107. And get caught and want shelter ?—Yes.

9108. And you are convinced they can get shelter better at St. Ives than anywhere else ?—I am quite convinced of that.

9109. You do not think there is any possibility of making a harbour at Clovelly ?—I do not know how there can be.

9110. Do you know why it could not be made there ?—They would have to go so far off to make it.

9111. Is your opinion grounded on the depth of water there ?—Just so.

9112. Do you know any place on the coast of Wales that you would prefer for a harbour of refuge—any place that you would select ?—I do not know any.

9113. Can you not mention any ?—There are harbours formed by nature, as they are.

9114. Do you think they are sufficient ?—I think so.

9115. As a pilot and a man of considerable experience, you do not think harbours of refuge are wanted on the coast of South Wales ?—I do not say not wanted.

9116. But you think there are natural and good harbours there now ?—Yes, there are.

9117. (*Capt. Washington*). With reference to the last question, supposing a refuge harbour made in St. Ives Bay, and all these, and you had all the shelter you wanted there—then go along the whole of the rest of the coast of the Bristol Channel—where would you place the next harbour, if another had to be made ?—I should go above Lundy Island, above Hartland Point.

9118. Whereabouts, in Bideford Bay ?—Bideford Bay is a small bay and very shallow water ; I do not know where you could make a harbour there.

9119. Go up the coast ?—There is no place at Coombe.

9120. Where else ?—The next place to Coombe is called Lynnouth.

9121. Would that do ?—No ; the next place is Minehead. You might make improvements at Minehead, but it is close to King's Road.

9122. Come down the other side ?—There is Penarth Road.

9123. That is a very good road now ?—Yes.

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Capt. Washington.

9124. What water is there there ?—Two or three fathoms.

9125. Which do you mean ; two or three fathoms? —Three fathoms.

9126. Is that at low water ?—Yes.

9127. But you have just now said that you would not consider six fathoms enough at Clovelly ?—But I was supposing a vessel would ride there with the send.

9128. And would they ride with a send in Penarth Road ?—It is good for the accommodation of vessels to and fro.

9129. Of what depth ?—Of all sizes.

9130. In what winds ?—Winds to north-north-west.

9131. The vessels are where from ?—All parts of the coast and foreign.

9132. But vessels bound to Cardiff, Newport, or Gloucester ?—They are only windbound.

9133. From where ?—Perhaps the same coast.

9134. Would they get the length of Lundy Island? —Yes ; and drive back again.

9135. Would they not anchor off Lundy Island ?— No ; for fear of the wind dropping round to the north.

9136. What is the distance from Lundy Island to Penarth ?—Eighteen leagues.

9137. Do you think they would rather run back to Penarth than anchor under Lundy Island ?—They do sometimes.

9138. You have known them to do so ?—Yes.

9139. Come down the north-west and tell me where, besides Penarth, is a good place for a harbour of refuge ?—There is no place.

9140. Why not in the Mumbles ?—It is a common place of anchorage.

9141. I thought you said there was no place for anchorage ?—Yes, at the Mumbles.

9142. Is it much frequented ?—Yes.

9143. It is now much frequented ?—Yes.

9144. What is the depth of water now ?—Vessels are dry at low water.

9145. Is there no protection ?—Not for large shipping.

9145*a*. Do you say, that being much frequented, it is a convenient place to run for?—It is a good outlet.

9146. From Cardiff, Gloucester, or Newport ?— Yes ; they drop down here, and take the opportunity of going to the westward.

9147. How many vessels have you seen laying at the Mumbles at one time ?—From 100 to 200 sail.

9148. In what wind ?—Wind up south and west.

9149. But blowing hard ?—Yes ; blowing hard.

9150. And from a 100 to 200 sail can ride now at the Mumbles ?—They do.

9151. Do they ride very heavy ?—Not with the wind that way.

9152. How long can they stay there ?—Until there is an opportunity to go to the westward.

9153. If the wind is south ?—If the wind is south-west.

9154. Further round ?—No ; south-east and south-south-east the wind is all in.

9155. Then must go ?—They must, or go ashore.

9156. Seeing that you have got a harbour like that, all exposed to the chances of the wind going round to the south-east, would you not give them some refuge if you could do it ?—No, none at all.

9157. If there were a detached breakwater off the shelter, would you think it desirable ?—Of course it would be desirable, but you must go a terrible length. The water is shoal and the tide is strong.

9158. And it would cost a terrible lot of money ?— Yes.

9159. Should you care about the money. Do you not think that the saving of sailors' lives is worth any money ?—That is the way I look at it.

9160. I think you said at the beginning of your evidence that you thought no cost too great for a refuge harbour in St. Ives Bay ?—Yes.

9161. Would you not apply the same reason to the Mumbles ?—Certainly I would.

9162. It is within your own knowledge that from 100 to 200 vessels are anchored there constantly ?— It is.

Mr. NATHANIEL PAYNTER examined.

Mr. Nathaniel Paynter.

9163. (*Chairman.*) What is your occupation ?—A fisherman.

9164. Do you belong to St. Ives ?—Yes.

9165. Have you been occupied as pilot to take charge of ships ?—Occasionally.

9166. Have you heard the evidence of the previous witnesses ?—Yes.

9167. And do you generally concur with them ?— In many points.

9168. Are there any points in which you differ from them ?—None materially, but if a harbour could be made at Padstow, I should prefer its being there.

9169. You would prefer it at Padstow to its being here ?—No ; by no means. I should prefer it at Padstow to its being made up the channel further.

9170. You would prefer a harbour at Padstow to a harbour further up channel ?—It would be an advantage to vessels down the channel. They might fetch it when they could not otherwise save themselves.

9171. Is there any other point in which you differ from the last witness ?—No ; I do not think that there is.

9172. (*Sir F. Smith.*) You are not a native of St. Ives ?—Yes.

9173. Have you passed your life here ?—Yes.

9174. Have you not been in Ireland ?—Occasionally, a few times.

9175. What is the distance from St. Ives to Padstow ?—About eight leagues.

9176. Would not that be very close to have two harbours of refuge ?—You could not have harbours of refuge too plenty on this coast, there is so much danger.

9177 Is there so much danger as to justify having two harbours ?—As to that, if you had one here, of course that is much better than anywhere else, as the former witness has told you.

9178. You prefer St. Ives, but from a neighbourly feeling you would like to give Padstow a turn also ? —If possible.

9179. But you have no doubt that if it could be made for the same money this would be the best of the two ?—There is no doubt about it.

9180. (*Mr. Lindsay.*) Say that the site for a harbour at Padstow was quite as good as the site at St. Ives,—say that they had a natural bay equally as good as the bay here, will you tell me the reason why you should prefer it here to having it at Padstow ? —It is more convenient ; it is a shorter passage round the land ; you can round the land in less time ; you can do it in one tide from this ; you cannot do so from Padstow.

9181. Is there any other reason ?—Yes; the reason is that it is much better to run for this ; there is so little water about the entrance to Padstow Harbour.

9182. But speaking as if there were the same facilities that there are here, is there any other reason why you would prefer the site here to Padstow ?—I do not know that there is.

9183. The most dangers are between St. Ives Head and Hartland Point. A vessel caught in a gale of wind cannot fetch St. Ives when she could fetch Padstow, say in a north-west gale ?—It is dangerous to attempt Padstow in a north-west wind, for the reason the former witness has given you.

9184. But supposing Padstow Bay was as good as St. Ives Bay ?—It is not so good.

9185. I know it is not so good, but I am speaking

of the site. Then it is your opinion that you can fetch, as a general rule, the one site as easily as the other ?—Where from ?

9186. Vessels caught in a gale in the usual track? —Padstow would be further to leeward. If you reach Padstow you could also reach St. Ives.

9187. Would you have any hesitation in running a vessel of 300 tons for Padstow in a north-west gale ? —Yes.

9188. You would think you were running a great risk in so doing ?—Yes.

9189. Would that arise from the baffling wind you would have to encounter at the entrance of the harbour, or from the narrow space of the anchorage ?—Yes ; and the sea breaks heavy outside the harbour.

9190. What anchorage have you inside the passage ? —Very narrow.

9191. Is the holding ground good ?—It is sand.

9192. (*Capt. Washington.*) I think you said that some refuge was desirable at Padstow. If a large harbour cannot be made, can you point out how the present harbour may be improved for vessels ?—It would be a very difficult job to do.

9193. But it would be desirable if you could improve the present harbour ?—Yes.

9194. What then would you recommend ?—I do see where you could improve it.

9195. Did you not say that it was the best site after St. Ives ?—For one advantage, for its being further down channel.

9196. Further down channel than St. Ives ?—Than any other place above it.

9197. Still you would not recommend anything to be done there ?—None compared to this.

9198. We will suppose the harbour in St. Ives Bay made and completely built, will you be good enough to tell us where is the next place a harbour of refuge should be ?—I cannot say where it should be.

9199. Why did you mention Padstow ?—In preference to any other place above, because, as I said before, it is not so far to go back, and is nearer the Land's End.

9200. Would not Lundy Island answer as well ?—It would be a difficult matter that also.

9201. What would be a difficult matter ?—Lundy Island.

9202. Do you mean that it would be difficult to improve Lundy Island ?—The roadstead is open from south to north-north-east. Both sides of the island would be exposed.

9203. But if engineers could build a breakwater to protect from those winds, can you say where you think that harbour would be best ?—I should prefer Padstow to either Clovelly or Lundy Island if possible, but I do not see how it could be done, on account of the shallow water outside.

9204. (*Capt. Vetch.*) Then between St. Ives and Bristol you think Padstow would be the best site for a harbour ?—If there was a possibility of its being made.

9205. I will come to that presently. That is the best site, supposing it can be made ?—Yes, I should prefer its being there.

9206. Do you think there is any probability or possibility of making Padstow a good harbour ?—I doubt its being done.

9207. But supposing you had plenty of money, how do you think you could form it ?—I do not know. I should not like to undertake that task.

9208. Do you think you could remove the Doom Bar ?—It would be a very heavy task.

9209. Is it quick-sand or hard sand ?—It is a hard sand.

9210. Between Hartland Point and King's Road is there any other place you would recommend on this side ?—No.

9211. And on the north side of the channel does any place occur to you as particularly useful as a harbour of refuge between Newport and Milford Haven ?—There is a pretty good roadstead at Penarth.

9212. What depth of water have you ?—A great part of it dry at low water. You anchor in different depths, according to the size of vessels.

9213. Does a considerable current pass through there ?—Yes.

9214. At what rate ?—Five miles an hour sometimes.

9215. Have you ever considered the Mumbles might be useful ?—It is very useful for coasting vessels.

9216. Then you think money laid out there would be well applied ?—It would be of advantage to coasting vessels.

9217. (*Mr. Coode.*) You spoke of a heavy sea breaking outside Padstow Harbour, do you mean outside Stepper Point ?—Yes.

9218. Do you say that it is so objectionable that you would not run for Padstow for shelter within the Doom Bar ?—Yes, for some vessels.

9219. What size, what tonnage ?—60, 80, or 100, and so on.

9220. If it were possible to give shelter within the Doom Bar, you think the heavy sea outside a great objection ?—It would be dangerous.

9221. You would not like to run for it ?—I should not like to run for it at all.

9222. Have you ever had occasion to run for Padstow Harbour ?—Not in heavy weather.

9223. Then how do you know of this heavy sea ?—In passing it coming down channel, and hearing others say so.

9224. But you have seen it passing down channel ? —Yes.

9225. You have seen it yourself ?—Yes.

9226. How far does the heavy sea extend ?—Half a mile or three quarters of a mile out.

9227. From where ?—Padstow.

9228. Mention some point ?—Padstow Point.

9229. Do you mean Stepper Point ?—Yes.

9230. Half a mile outside Stepper Point ?—Yes.

9231. Supposing it were decided to construct a harbour of refuge on the east side of a line drawn from Milford Haven to Hartland Point, do you think you could suggest any site eligible for such a harbour ?—No.

9232. Have you traded much in that part ?—I have been to that part.

9233. Often ?—Yes.

9234. And you do not know of any point eligible for the site of a harbour on that channel ?—No.

9235. Supposing St. Ives Bay were at Padstow, and that Padstow was in fact another St. Ives Bay, which would you prefer for a harbour then ?—I should prefer this.

9236. Even if the bay were equally good at Padstow ?—Yes.

9237. Why ?—From the advantage of being near the Lands' End.

9238. You think that would decidedly weigh in favour of St. Ives Bay, even if the Bay of Padstow were equally good ?—Yes.

Mr. Richard Andrews examined.

9239. (*Chairman.*) What is your occupation ?—A sailor most part of my time.

9240. And what now ?—Nothing.

9241. How many years have you been at sea ?—About thirty-five years.

9242. And of that time how long in command of vessels ?—Twenty-four years a master in Harvey & Co.'s employ.

9243. In what description of vessel, sailing or steam ?—Sailing vessels.

9244. In whose employ did you say ?—Messrs. Harvey & Co., at Hayle.

9245. What size vessels did you command ?—Vessels from 100, 120 to 150 and 160 tons.

9246. And trading chiefly in what direction ?—Chiefly from Wales to Hayle, and round the Land's End to Plymouth, and to Ireland, Scotland, and Liverpool.

9247. Have you been present during this inquiry ? —Yes.

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9248. And are you aware of its object ?—Yes.

9249. Will you state any opinion which you may entertain as to the advantage or necessity of a harbour of refuge at St. Ives ?—If it had been here for the last twenty years I should not have had so many thrashings, and many a poor fellow would have saved his life. Many a time I have run up in a gale of wind trying to come into this place. Many a time I have tried, but neither I nor any man could venture in, and those who have ventured I have known to be lost.

9250. And when vessels are afraid to come in, is it on account of the wind flying round to the north-west ? How was the wind at those times ?—South-west or west-south-west.

9251. And when they bore up, under such circumstances, to get up channel, where did they find refuge ?—They generally ran for Lundy Island. They try to make Lundy Island. They are always afraid to run to Milford Haven ; they are afraid of thick weather there; it is a good harbour, but a bad place to run for.

9252. How do you mean it is a bad place to run for ?—It is a blind place to make. It is generally very thick on that land with the wind south and west.

9253. You say theyrun for Lundy Island, but do they not anchor under Lundy Island ?—It is a bad place to anchor ; it might do for small vessels close under Lundy Island. When the wind is very strong vessels drag their anchors and pull them right into deep water.

9254. After you pass Lundy Island, where do you find good shelter in a south-west wind ?—Going up along, small vessels run for the Mumbles, other times for Penarth.

9255. That is for small vessels, but for large ships ?—There are few large vessels run to the Mumbles. It is a very shallow place for vessels to anchor.

9256. Therefore, with the exception of Swansea-bound vessels, no large vessels, I suppose, take shelter there ?—Very few large vessels.

9257. The next place is Penarth ; that, of course, is very good ?—From Barry Island right up to Penarth.

9258. Will that do in any weather, in any wind ?—They generally bring up there better. If the weather is very bad indeed they run up for King's Road.

9259. But with the wind blowing south-south-east, or even east, can ships lay in Penarth Road ?—The sands are enough shelter ; it is not a heavy sea that comes down that way.

9260. Can you tell me, when ships are making a passage down channel from Bristol, whether they keep on the north or south shore by preference ?—They generally come to the south of Lundy Island, because it is smooth water, and it is rocky on the north.

9261. And from Lundy Island to the Land's End, do they keep along the south shore ?—They generally go clear for the south.

9262. But working down ?—Beating down, we see them frequently come to the south shore, beating within a mile of the south shore.

9263. With winds from the west, is there any preference for the north or the south shore ?—They bear for the north when it is thick, and make a stretch to westward, for it is fair with the wind to the west, and they keep off with a view to catch the north-west wind.

9264. And so try to weather the Land's End and get down ?—Yes.

9265. Vessels homeward bound which have to work up channel, do they keep either side by preference ?—They keep as they find the wind generally.

9266. With the wind right down channel ?—We generally keep in on the south shore, and get the advantage of the tide.

9267. But vessels bound from foreign parts, not likely to be acquainted with the tide, do they keep on the south shore ?—They generally watch the motion of coasters, and where we go in they follow.

9268. (*Sir F. Smith.*) Have you navigated the Irish Channel ?—Yes.

9269. Do you know anything of the Isle of Man ?—I have been there many times.

9270. At what port of the Isle of Man should you, as the commander of a small vessel, wish that a harbour should be made ?—I have been generally to Peel when I was fishing, but I have been down to Douglas, and that is the best harbour.

9271. You think that preferable to Ramsey ?—I think it is.

9272. Have you ever been to the north of Ireland?—Never.

9273. (*Mr. Lindsay.*) You stated that you had heard the evidence of the other witnesses ?—Yes.

9274. Do you agree with what those gentlemen have said ?—With some of them.

9275. Wherein do you differ ?—A little as to the tide. The tide is not so strong going round St. Ives Head.

9276. What is the strength ?—Two and half knots an hour, it never exceeds three knots an hour with the strongest tide.

9277. Is there any other point in which you differ?—Not particularly.

9278. Is there anything you would like to add beyond what the Commissioners have already heard ?—I should like to talk a little about Padstow, for I have run in there in a gale of wind.

9279. How was the wind blowing ?—With the wind north-north-west, with that to north-north-east.

9280. Did you consider you were running a great risk in taking Padstow ?—Not with the wind north-north-east.

9281. Is there much difficulty when you get inside?—I do not consider it is anything but a dry harbour.

9282. You think there is no water ?—There is no water at low water. I have seen the little *Express* in there and not room enough to swing her.

9283. Do you mean between the Doom Bar and the land ?—Yes.

9284. Then you think there is great danger in running for Padstow ?—I would not attempt to take it if I could avoid it in any way.

9285. Does the fact of vessels keeping down on this side from Hartland Point arise from the great proportion of them being engaged in the trade between the ports of Swansea, Newport, and Cardiff, and the north of Europe, and consequently keep this side of the land as being nearer to their destination ?—Yes.

9286. Then they would steer to sight the land near the Land's End all the way ? Do they keep the coast in sight ?—Yes.

9287. All the way down ?—Yes.

9288. Do they steer between the Longships and Scilly Islands ?—Yes.

9289. Is there anything further you wish to add, any points which strike you that have not been stated by the other witnesses ?—Not that I know of. This is the proper place to put a breakwater. No doubt, if a breakwater had been put it would have saved hundreds of lives every year.

9290. Say that you had to make it ; from what point would you carry the breakwater ?—To make it an extensive place, I should put it from St. Ives Head.

9291. But for merchant ships what do you say ?—You might go where you began it before, but I should still prefer it from St. Ives Head.

9292. Do you think the breakwater shown there by the red line would be of great value to the passing trade ?—You should not, under any circumstances, go inside where the old breakwater was.

9293. If the breakwater was formed, would you prefer that it should run out from the land, or that it should be detached with a passage ?—I should like it attached to the land.

9294. (*Capt. Washington.*) Following up the last question, would you say why you wish to have the pier connected with the shore instead of detached ?—I fancy there would be a good deal of room to heave

in ; no vessel, I think, would try to pass so close to the land, though you might find the packets do it.

9295. Against what wind do vessels want shelter ?—The bay is open from north-north-west to north-east.

9296. Further round than north-east, is not it ?—We do not care when we have the wind from east-north-east.

9297. Which throws the heaviest sea into the bay?—North-north-west and north generally ; north-north-west is dead on the shore.

9298. You think a passage between the breakwater and the land would be of no good ?—It would be too much sea. Vessels would sooner go round the end of the breakwater. It might be a longer passage, but it would be smooth water.

9299. Supposing a breakwater at St. Ives ; St. Ives, no doubt, is the first place in your opinion ?—Yes.

9300. Would you have a second harbour or not, because there is a good deal of trade up and down the channel ?—Oh, yes, there is a good deal of trade.

9301. Do those vessels want a shelter ?—If they could get a shelter it would be a very good thing for them. I do not say the exact place or the number. It is a great distance down here. We consider a vessel safe when she has got above Lundy Island.

9302. You consider a vessel safe above Lundy Island ?—Generally, we are so well acquainted with the coast.

9303. But if you have a south-westerly gale, you want shelter, do you not ?—Yes.

9304. Where would you run for it ?—With a small vessel we generally run for the Mumbles, unless it is a dark night, when we keep up to Penarth.

9305. If it blows harder you go higher up ?—Yes.

9306. Why do you prefer the Mumbles ?—It is better for the wind to come down again.

9307. South-west wind chops generally to north-west, does it not ?—Yes, and the Mumbles is quite smooth.

9308. And a very good outlet ?—Yes.

9309. The best in the Bristol Channel ?—Yes.

9310. You have a good many ships to Gloucester ?—Yes.

9311. Do they generally go north or south about ?—Generally south-about.

9312. There is no trade northward for Liverpool and the Clyde ?—Not large vessels.

9313. But coasting vessels ?—Yes, a good many coasting vessels.

9314. You have said that they come to the southward of Lundy Island ; do any of them pass St. Ives ?—They are not bound that way, but they must keep it in sight.

9315. And hug the weather shore ?—Yes.

9316. Those who trade from Bristol, Gloucester, and Newport do the same thing, and of course those from Swansea ?—Yes.

9317. Are they not five of the greatest ports in the Bristol Channel ?—More vessels come to go round Lundy Island than go round the north coast.

9318. In what proportion ?—More than two to one.

9319. Are you sure ?—Yes, three to one.

9320. They would be provided for by a refuge at St. Ives, but what would those do who hug the north shore ?—They generally make for Milford.

9321. Do they fetch as far as Milford ?—They go to the Mumbles.

9322. Have you heard that that is often the case ?—Hundreds of times.

9323. How many vessels have you seen riding at the Mumbles ?—I have seen 300 vessels riding there at once.

9324. How was the wind ?—West and west-south-west.

9325. Why do not those vessels anchor under Lundy Island ?—We do not consider that a place to anchor in.

9326. Is it not good shelter ?—Yes, but if the wind chops round to north or east, you are ashore.

9327. That is not so at the Mumbles ; you know you are quite safe there from all winds ?—Yes.

9328. If the wind is north-west, how are you at the Mumbles ?—When it comes north-north-west, then it generally begins to come open.

9329. But north-north-west round to south-east ?—About south, then it is open on the south side.

9330. The whole of the east is exposed ?—Yes.

9331. Vessels which get shelter from the south-west, and when the wind veers to north-west, it would be a fair wind down channel, would it not ?—Yes, but sometimes it flies out, and I have known vessels get foul, and do considerable damage, and obliged to put for Ilfracombe.

9332. Do wrecks commonly occur on Lundy Island ?—I have known many.

9333. Have you known Lee Rock ?—There is a little rock about a cable's length from the island.

9334. Are you acquainted with Bideford or Barnstaple Bay ?—I have been there hundreds of times.

9335. Then you know Clovelly ?—Yes.

9336. Do you think that a better site for a refuge harbour ?—It is a long way better than Lundy Island.

9337. It would be better than Lundy Island ?—Yes, a long way.

9338. Do vessels go to Clovelly with a south-west gale ?—Yes.

9339. Supposing the wind shifted to north-west ?—They must keep in; they would have to build a breakwater.

9340. Would not a north-west be a fair wind down round the Land's End, supposing the vessel was at Lundy Island ?—No.

9341. What is the course ?—South by west and by south.

9342. Would a vessel loose with a north-west wind laying along Lundy Island?—No, she would hold on ; she would not weather the land unless the weather was fine.

9343. When would a vessel loose from Clovelly ?—It would be rather worse at Clovelly, because it is 12 miles further in.

9344. Would the difficulty be getting round Hartland point ?—Yes, there is a nasty sea, which is called the Race. When it is blowing north we have a tremendous sea off Hartland Point.

9345. Then, with the wind shifting to the north-west it is not a fair wind from Lundy or Clovelly ?—No.

9346. But it would be from Penarth ?—No, that would be right up the Bristol Channel.

9347. Do you say that if you wanted to go round the Land's End you would not loose from Lundy or Clovelly ?—I would if the wind were as high as west-north-west, but you ought not to try with a north-west wind.

9348. Could you get to the Mumbles ?—Yes.

9349. How many vessels have you seen at the Mumbles at one time ?—The Mumbles is just open to the west. I have seen 150 commonly, and sometimes 300 vessels there. The inner harbour ebbs dry at low water.

9350. So do all the harbours on this coast, do they not ?—Yes, most of them.

9351. (*Capt. Sulivan.*) Do you mean that the anchorage is usually taken by 300 vessels at the Mumbles ?—Yes ; and 250 out of the 300 have to ground also.

9352. Then the anchorage is not fit for refuge at all times of the tide ?—Not if vessels will not lay aground.

9353. Then if the port were protected from the south by a breakwater it would be still unfit for a vessel to go in to lay afloat ?—Not for large vessels ; moreover the anchorage is not good. I have known vessels drive from their anchors on the Green Grounds, and been wrecked there.

9354. With the wind off the land ?—Yes.

9355. Yet they could not hold with the wind off shore ?—They generally lie open. Off the Mumbles they are obliged to keep far out on account of the water, and because of the number of vessels in there. They are very exposed to westerly gales.

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9356. How far out must you carry a breakwater to shelter vessels in southerly gales, and to make a harbour where large ships could anchor ?—If you put a breakwater out a mile or a mile and a half you might put in a vessel.

9357. But the rocks would not there be very far from the end of your breakwater ?—Yes, you would be too close to the Skerweather Sands.

9358. What water would this long mile or mile and a half of breakwater have to be made in ?—In some places eight or nine fathoms.

9359. And then the end of the breakwater would be close to patches of sand for vessels entering ?—Yes ; it would make it very bad.

9360. (*Capt. Vetch.*) You are well acquainted with the Bristol Channel ?—Yes, I ought to be.

9361. Then, looking to the south side from Gurnard's Head to Hartland Point, if you had to choose where money could be best spent in providing for the safety of lives and property, where should you say ?—I should put a harbour here in preference to any other place I ever saw, and I have been to all the harbours about here.

9362. In St. Ives Bay ?—Yes.

9363. Then between Hartland Point and Bristol, where would you say ?—If I was bound to put one I should put it at Clovelly.

9364. In preference to Morte Bay ?—Yes ; that is the place where vessels generally anchor when the wind is east and south-east, and they cannot get up the Bristol Channel.

9365. Then you think Clovelly the next best place between Hartland Point and King's Road ?—Yes ; I think so.

9366. Then, coming down the north coast of the Channel, where do you think the best refuge could be made for vessels navigating that shore ?—The north side.

9367. Along the north shore ?—Milford is one good harbour when you can find it out. There is no harbour that a man can run to.

9368. Between Milford and Newport where would you put a harbour for the protection of life and property ; supposing money were offered to you, where would you choose to put your refuge ?—If I was bound to put it that side, I should put it in the Mumbles. That would be a great good to coasting vessels.

9369. And you do not think the shelter under Lundy Island would effect that object ?—I cannot look at Lundy with any propriety at all, because the anchorage is not good ; the ground falls away into deep water. I have seen vessels go away with three anchors out.

9370. Then from your answer it appears that St. Ives and the Mumbles are the two best sites for the protection of life and property ?—These are the best places, in my opinion.

9371. (*Mr. Coode.*) Did I understand you to say that you prefer the Mumbles to Clovelly ?—On that side.

9372. But supposing a harbour of refuge were to be made somewhere eastward of a line drawn from Milford Haven to Hartland Point, what spot would you select ?—I suppose the Mumbles.

9373. You say the Mumbles for the north side ?—Yes ; for the north side.

9374. Supposing that breakwater built, where, taking the upper part of the Bristol Channel, is the best site either on the north or on the south ?—I should then say the Mumbles. I should not give it more than the length of a mile. The very large vessels would not come there.

9375. You prefer the Mumbles to Lundy Island or Penarth?—Penarth, I do not see what you can do there, you can anchor down as far as Barry Island is now.

9376. You think the Mumbles the best place ?—Yes.

9377. Might not a vessel loose easier from Lundy than from any other point ?—It would depend upon the wind.

9378. But with a north-west wind ?—Yes, a north-west wind ; but a wind coming in north-east, you are bound to go very near under the island, because the deep water falls away and then you have no chance.

9379. Supposing there was a breakwater at Lundy Island, your objection would be that it is bad holding ground ?—It is very bad holding ground.

9380. Do you think it expedient to make a harbour there ?—I do not.

9381. Being there, should you not like to take shelter ?—I should if I could.

9382. You would run to Lundy Island in preference to any other ?—I have been there a week at a stretch with sails reefed and everything ready for shipping.

9383. You spoke of vessels which ran back for Lundy Island, do vessels ever founder in running there ?—I have heard of vessels going up channel that we never hear of more.

9384. Are many lives so lost, do you think ?—A good many.

9385. Supposing a breakwater were made at Lundy Island and moorings laid down, should you not think that a desirable arrangement ?—Not in my opinion.

9386. But if you ran for it, where would you like the shelter ?—A quarter of a mile off you get ten fathoms of water.

9387. How far from Lundy Island?—Not a mile.

9388. You say you know the Isle of Man. You spoke of Douglas, have you ever been in Douglas ?—No, I have been fishing there four or five seasons.

9389. Were you ever in Ramsey Bay ?—No ; I have passed it.

9390. Do you know for what port vessels generally run ?—I have seen them running for Ramsey. I know very little about it, because I have never been in there.

9391. How many vessels have you ever seen at Lundy Island taking shelter at any one time ?—I have seen 20 sail, generally small vessels.

9392. You spoke of vessels keeping the south shore of the Bristol Channel. Is it one reason for doing so that there is deeper water ?—Yes.

9393. And it is not encumbered with sandbanks ?—You are not troubled at all with that until you get a long way up, but it is weather bound.

9394. You can keep close in on the south side without fear?—Yes, very close ; there is only one place, the Mort Stone, and they have got a buoy on that.

9395. You said that if a breakwater was to be made at St. Ives, we ought not, under any circumstances, to go inside the old breakwater ?—Not inside the piece of rock called Mering's Point.

9396. That was the point you alluded to when you spoke of the old breakwater ?—Yes.

Mr. Richard Stevens examined.

Mr. Richard Stevens.

9397. (*Chairman.*) What has been your occupation ?—I have been brought up to the sea.

9398. How long were you at sea ?—About 40 years.

9399. How long have you been master of a vessel?—About 30 years.

9400. And in what trade have the vessels which you have commanded been chiefly employed ?—Sometimes foreign, and sometimes coasting. I served my time in the trade here.

9401. How long have you been connected with the port of St. Ives ?—I was born here.

9402. Have you held any situation here ?—No.

9403. What is the size of the vessels that you have chiefly commanded ?—From 140 to 180 tons.

9404. You are aware of the objects of this inquiry?—Yes.

9405. State any opinion which you may entertain as to the advantage or necessity of a harbour of refuge at St. Ives ?—We need very much a harbour

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of refuge at this place. At this place we have very sudden gales from the north-west and north-north-east, and there is no place of shelter in this channel from the Land's End to Lundy Island.

9406. From what direction are your heaviest winds?—From north-north-west to north, that is the worst wind.

9407. In making your passage up and down the Bristol Channel, do you keep to either shore by preference?—We generally keep to the south of Lundy Island.

9408. Is there any reason why you keep to the south of Lundy Island?—There is no reason except that it is a straighter course and a shorter distance.

9409. Vessels out and homeward bound, foreign, do they keep to either shore by preference?—At times; they generally keep to the north coming down from Penarth, but in general they come down here to the south, and very often coasters in fine weather pass up channel, I suppose to take advantage of the tides.

9410. You have heard the evidence of the previous witnesses?—Yes.

9411. Do you generally concur in that evidence?—Yes, I think, in most points.

Mr. WILLIAM VEALE examined.

Mr. W. Veale.

9412. (*Chairman.*) What is your occupation?—In the seafaring line; brought up to the sea.

9413. How many years have you been at sea?—Near upon fifty years.

9414. How many of those years have you been master of a vessel?—Thirty-four years.

9415. What were the size and description of vessels that you chiefly commanded?—From 120 to 140 or 150 tons.

9416. In what trade were they chiefly employed?—Always in the coasting trade.

9417. Up and down the Bristol Channel?—Up and down the Bristol Channel, and all parts of this coast.

9418. You are aware of the objects of this inquiry?—Yes.

9419. You have heard the evidence of the previous witnesses?—Yes.

9420. Do you generally concur in that evidence, or are there points upon which you differ?—No, I cannot say there are many points that I differ in. I do say St. Ives is the best place. My reason is, that it would be for the benefit of the whole of the Irish, English, and Bristol Channels. It would be a harbour of refuge for the whole channel, in my opinion.

9421. Do you know the Mumbles?—Very well.

9422. What is your opinion of the Mumbles as a place of refuge?—I have laid in the Mumbles some hundreds of times from time to time.

9423. Is it good shelter for vessels?—For only small coasting vessels, but for large vessels it is not so well. Large vessels are obliged to lay off, and they ride about half a mile from the Mumbles Head. There it is open, but inside them the water is shoal to the north-west, so that it is dry at low water. The anchorage is good, and sheltered from all winds, except south and south-easterly winds.

9424. Do you know Penarth Roads?—Very well.

9425. Is the anchorage there good?—Very good.

9426. And ships can lay there in any weather and in any wind?—Penarth Roads is calculated for ships to ride in any kind of weather.

9427. And with the wind from any direction?—Yes, with the wind from any direction.

9428. What are the objections to Lundy Island as an anchorage?—LundyIsland may do to stop a tide in, just like that, but it is not safe to stay longer. I have laid two or three days at a stretch, but when I lay there I was afraid to run up the channel.

9429. (*Capt. Washington.*) I think you said that you had often been lying at the Mumbles?—Yes.

9430. What is the greatest number of vessels you have ever seen there at one time?—200 or 300 sail perhaps. I think more than that. I have counted them at times. I have counted 200 to 300, but I have seen more.

9431. To what parts were those vessels chiefly bound?—To all parts of the world; to all parts; to westward, and some of them bound foreign.

9432. In what wind do you run to the Mumbles for shelter?—From south-west and west.

9433. Why do they not run to Penarth?—They might, but they would rather stop there than go to Penarth to encounter the danger of the sand on both sides of the channel. You have got the Culver Sands, the Gore Sands, and the Skerweather Sands.

9434. What is the distance of the Skerweather Sands from the Mumbles Head?—About nine miles.

9435. Did you hear the witness state that if a breakwater were put out it would run from Swansea Bay to the Skerweather Sands?—No.

9436. Did you hear that stated?—No.

9437. But you say that a mile breakwater will not come out nine miles?—Of course not.

9438. Do many large ships go there?—No, not frequently, except those coming from Swansea, and bound into Swansea.

9439. Is there a great deal of copper ore brought from South America into Swansea?—A great deal.

9440. How much water do the vessels which bring the copper ore usually draw?—Twenty feet and over.

4441. And they anchor a half mile east of the Mumbles?—Yes.

9442. Have you seen many of those large vessels lying there?—I have seen many lying there. We count 12 or 20 lying in that situation; but because the place is narrow, some are obliged to go further off the head into the open sea, that might have wished to go if there had been room.

9443. Is it judicious to lie at the Mumbles in case of a south-east wind?—It is; but you do not feel the south-east wind so much as when the wind is from the westward.

9444. You spoke of 200 or 300 sail lying there, do they ground generally?—They always ground.

9445. Does any damage arise from grounding?—Sometimes, when the wind is from south-east, but the ground is very good.

9446. Do you know the nature of the Green Grounds?—I know them very well.

9447. Are they hard?—Yes; they are rock.

9448. Do you think they are oyster banks?—No; they are rocks.

9449. Are they extensive?—Pretty well; there is a buoy on each.

9450. Supposing they could be removed, would that be a good thing?—They always keep up at high water.

9451. Your belief is, that the distance from the Skerweather Sands to the Mumbles Head is nine miles. The real distance is seven miles. My reason for saying so is, that the last witness was mistaken; he said that a mile breakwater would reach to the Skerweather Sands; it is really seven miles. In what direction does the Skerweather Sand extend?—In an east direction from the Mumbles Head.

9452. Do you think there would be any difficulty in a vessel seeking shelter in Swansea Bay if a breakwater were extended a mile from the Mumbles Head?—No.

9453. Would there be breadth enough?—Plenty of breadth for all vessels coming up channel.

9454. (*Capt. Vetch.*) On the south shore of the Bristol Channel what place would you recommend for a harbour of refuge to save life and property?—I should say you cannot have a more proper place than St. Ives.

9455. And on the north shore, which is the best

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place for a harbour of refuge ?—I do not know any place on the north shore where a harbour of refuge could be built, except the Mumbles.

9456. That is the best place, in your opinion ?—That is the only place that I can see that could be made one.

Mr. THOMAS DANIEL examined.

Capt. Vetch.

Mr. T. Daniel.

9457. (*Chairman.*) What is your occupation ?—I have been shipmaster these 30 years.

9458. In what trade have the vessels been employed which you have commanded ?—In the coasting for some years, and for the last 20 years and better, or I may say 18 years, I have been trading here with ships of 500 tons or thereabouts to America.

9459. To America only ?—And other places.

9460. Have you been present in the course of this inquiry ?—Yes.

9461. You are aware of the objects of this inquiry? —Yes.

9462. Do you generally concur in the evidence of the previous witnesses ?—Yes.

9463. Do any points occur in which you differ from them ?—Two or three, scarcely worthy of notice. Captain Quick was wrong about the bay being clear of rocks, because there is the Carrick Down. About the tide, I do not think he was far out of the way, for close into the rocks I think it does run five knots an hour, but vessels have no business to come, I should say, nearer than a mile, or a mile and a half.

9464. Are there any other points you would mention in which you differ from the previous witnesses? —No, I do not know of anything in particular.

9465. Did the vessel of 500 tons which you commanded sail out of this port ?—Yes, for 18 years, once every year, and sometimes twice.

9466. Have you been up the Bristol Channel ?—Yes.

9467. Do you prefer one shore more than another ?—We generally keep the south shore ; we have better water and a bolder shore.

9468. Do you know Milford Haven ?—Yes ; but it is a place I do not like to meddle with running back. I never like to run unless I can make it before the weather sets in thick.

9469. What is your reason ?—When the weather is thick it is always a difficult place to make. If you can make out the Crow Rock before you steer for the harbour you are all right.

9470. You say it is a place generally difficult to make ?—It is generally difficult to make out.

9471. Do you know Swansea ?—It is many years since I have been there, but I have traded there.

9472. Have you any opinion as to the Mumbles as a place of shelter ?—I have been there when 200 or 300 vessels have been on the ground. Shipping in the deep roads are exposed to the sea along the shore, and then there is a drift down from the Green Grounds, so that you might pick up with a heavy sea and might be lost.

9473. Do you know Penarth Roads ?—Yes, I know about them all.

9474. What kind of anchorage is there at Penarth Roads ?—Similar to the Mumbles. With north-west or south of west, then it would be more open ; but outside the ships have to lay exposed to the drift of the channel, between the Holmes and Penarth ; but inside, all the small shipping, such as navigate these parts, are in on the mud and are in safety. I have been up, with a ship drawing 18 feet of water, off Laing Point inside, and I have found the ground there in low water.

9475. Can shipping lie there in any weather ?—They are exposed a little, but there is not a heavy sea like there is down here.

9476. They are exposed in the wind from what direction ?—Anything the south of west they are more open.

9477. But under no circumstances are they hurt?—If they have good ground tackle they can all ride out and generally do.

9478. Do you know of any accident ?—No, none in particular to the heavy ships lying out in the Roads.

9479. (*Capt. Washington.*) What is your opinion of Lundy Island as an anchorage ?—It does not please me; I have never admired it myself. I have been many times lying under the island, but I never thought of bringing up. I was waiting for the weather to clear to go up channel, having no pilot on board. I have run for King's Road with a vessel drawing 16 or 17 feet of water, without a pilot. I have run for Bridgewater with some ships, and there lay moored.

9480. With what draught of water can you go into Bridgewater ?—Drawing 16 feet aft.

9481. Can you go with a ship of that size up to Burnham ?—Yes, up to Burnham.

9482. Then is Burnham one of the best harbours thereabouts ?—It is the best in Bridgewater River, unless you get up to Pill.

9483. Would that be a place of refuge in a gale of wind ?—No ; I have been there since with a ship of 600 tons.

9484. Where, to Burnham ?—Yes.

9485. Have you ever been into Bideford ?—I have been, but I know very little about that place.

9486. Do you know Clovelly ?—I have seen it, but I do not know a great deal about it.

9487. You said you would not anchor under Lundy Island ?—I never did in my life.

9488. Why not ?—I dreaded the shifting of the winds. If the wind is north-west I would not attempt it.

9489. Is King's Road always a safe place to run for ?—Yes.

9490. In any weather ?—Yes, in any weather.

9491. Is the Bristol Channel generally well lighted and buoyed ?—Yes.

9492. Is there any part of it in which you think a light or a buoy necessary ?—I have not been for many years, and I have not taken notice ; but if I had known that I was to be examined I should. I might have been up occasionally during the last seven or eight years to take charge of ships.

9493. Did you say that you have seen 300 vessels lying at the Mumbles ?—I have said that I had seen them myself.

9494. But of large ships ?—Very few. It is the large ships that lie outside, remaining until the wind is fair to go down channel.

9495. (*Capt. Vetch.*) You are well acquainted with the navigation of the Bristol Channel ?—Yes.

9496. In your opinion, between King's Road and the Land's End on the south shore, what place is most adapted to save life and property by the construction of a harbour of refuge ?—St. Ives, for certain reasons.

9497. I do not want any reasons ; I only ask you which is the best place for saving life ?—St. Ives.

9498. Then I am going to ask you the same question as to the north shore. From your knowledge of the Bristol Channel, which place, in your opinion, on the north shore would be the best place for the construction of a harbour of refuge ?—I am not so well acquainted with the north shore. I know a little about it, but I do not know any place equal to St. Ives Bay.

9499. Suppose that were disposed of, and the Government were willing to aid in the formation of a harbour of refuge at St. Ives, then considering the safety of life and property, what is the best site for a harbour of refuge on the north side of the Channel ?—Well, Padstow is a place that would take a great deal to improve it.

9500. I am speaking of the north shore ?—If there were a little improvement, perhaps Caldy, with a breakwater turning in from the east probably.

9501. Do you think protection at Caldy of more advantage than at the Mumbles ?—No, I thought you were alluding to the places from Milford Haven.

9502. No, I was speaking of the whole distance from Milford Haven to Penarth Roads ?—By running a breakwater out from the Mumbles Head so as to stop the sea, by running a breakwater out a mile, or a mile and a half—if it were a mile it would leave a greater opening between the Skerweather Sands and the point of the breakwater, which I think very necessary—you would shelter all the shipping which now lie exposed.

9503. Then, taking into consideration all circumstances, you think the Mumbles the place where a harbour of refuge would save most life and property on the north shore ?—I believe so.

Mr. Charles Sharp examined.

9504. (*Chairman.*) What has been your occupation ?—Shipmaster.

9505. And for how many years at sea ?—Eighteen years.

9506. And how many years a shipmaster ?—Eight years.

9507. What description of vessels have you principally commanded, sailing or steam ?—Sailing.

9508. And in what trade have the vessels which you have commanded chiefly been employed ?—In the United States, Mediterranean, and coasting trade.

9509. You are aware of the object of this inquiry ?—Yes.

9510. Have you heard the evidence of all the witnesses ?—Not all of them.

9511. How long have you been in the room ?—An hour.

9512. Do you concur generally in the evidence which has been given ?—In some.

9513. State any points in which you differ from the previous witnesses ?—Well, in the year 1853 I was in command of a ship, which in October left for Quebec, laden with a cargo of railway iron. I was in company with five large American ships, all of an average from 900 to 1,400 tons. The whole of us left Penarth roads together. It came blowing very sharp from the west ; we got as far as Lundy Roads, and there brought up. After three or four days we went back to Penarth. After three or four more, then, the wind blowing north-west, I tried to get under weigh. The windlass was fractured, and in purchasing I lost the windlass, but I got here with the wind blowing smartly, and, after seeing our agent, I proceeded on my voyage. At the time I was 50 miles west the American ships were still lying in Penarth Roads.

9514. Have you anything further to state ?—Nothing further.

9515. Do you know Milford Haven ?—I never was there.

9516. Do you know the land there ?—No ; I have been merely running for it in a strong south-west gale, when I fetched the Mumbles, and hauled off.

9517. Why did you haul off ?—The weather was very thick. We generally find it so. Close along the land it is more enveloped there than it is here.

9518. Do you know the opinion which generally prevails among ship masters with respect to Milford Haven ?—In some cases.

9519. Are you disposed to think that they would agree with you ?—Yes ; that is the general opinion, I believe.

9520. You know the Mumbles ?—I have been there.

9521. What is your opinion of the Mumbles ?—I think, if you could make it any place at all, it would be a very good place.

9522. Is it a good place to start from after a south-west gale ?—It is not very good with a north-west wind, because you cannot come down the Race, and you cannot get round Hartland Point.

9523. Do you know Penarth Roads ?—I have been there.

9524. What do you think of Penarth Roads. Is it a place where a well-found ship can run in safety in any wind ?—I believe so.

9525. Then is it perfectly safe for a ship in any wind or any weather ?—I have always found it so.

9526. Do you ever anchor under Lundy Island ?—Yes.

9527. What is your opinion of the anchorage ?—I found it bad enough.

9528. (*Capt. Washington.*) Do I understand you to say, that in a north-west strong breeze, there is a difficulty in loosing from the Mumbles, and weathering Hartland ?—There is not any difficulty in loosing, but there is in weathering Hartland.

9529. Would there be any difficulty in a north-west wind in starting from the Mumbles and weathering Hartland Point ?—I am of opinion there is very great difficulty if it is blowing hard at the time, and especially when you come down about the Race, and take the flood on the weather bow.

9530. What Race ?—We call it the Race off Lundy, between Hartland and Lundy Island.

9531. Is there no chance of passing to the north of Lundy Island ?—None whatever ; you may do it in very fine weather.

9532. You were speaking of the flood tide ?—It is a matter of impossibility to do it then.

9533. At what rate does the Race run between Lundy Island and Hartland ?—Between $2\frac{1}{2}$ and $3\frac{1}{2}$ knots an hour.

9534. No stronger ?—It may be 4 knots at the top of spring tides.

9535. Is there a strong race off the south of Lundy Island, close in ?—I have always observed, that hauling off, you are generally in the middle of the Race.

9536. Does it extend the whole way across ?—Yes; from Hartland to Lundy Island.

9537. What is the distance ?—We call it nine miles.

9538. Does that cause a very heavy sea ?—It does with the westerly winds and an ebb tide coming down. It is a very heavy sea.

9539. Would that affect a refuge harbour ?—I do not know that it would affect a harbour in Barnstaple Bay.

9540. Would any shipmaster like to run through the trough of the sea if he could avoid it ?—No.

9541. Do most vessels prefer coming south of Lundy Island ?—Those going up to Penarth, not all that come to the south.

9542. By passing to the north of Lundy Island would you not avoid this Race ?—You avoid it, but you fall into broken water, on the White Horses, and often ships get injured about there.

9543. What number of vessels have you seen lying at the Mumbles at one time ?—I have seen from 100 to 150. I have been riding inside and outside with a foreign ship, and outside with a coaster.

9544. When you were lying outside did you want any shelter ?—Yes, certainly, and at many other parts we should like shelter if we could get it.

9545. Just so, but can you name any other place where it is more particularly wanted than at the Mumbles ?—We want harbours in several places, provided we can get them. A harbour would not be any objection, even in Lundy Roads ; provided you could put it there, it would be of use.

9546. But where would it be more useful than at the Mumbles after St. Ives ?—The question is, what trade, whether the general trade, or the coasting trade.

9547. The general trade ?—As to the general trade, more pass through the Race than to the north.

9548. You think so ?—Yes, ships from Cardiff, bound to the United States, take advantage of the tides, but it depends entirely how the wind is.

9549. (*Capt. Vetch.*) You are well acquainted with the navigation of the Bristol Channel ?—Well,

ST. IVES.

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Capt. Vetch.

I have been up and down several times with large and small ships.

9550. Taking the south shore of the Bristol Channel from King's Road down to St. Ives, where do you think would be the most proper place to put a harbour of refuge, with a view to save and protect life and property?—We might say Clovelly is as good a place as any.

9551. I am asking you which you think is the best place?—If you mean to guard against north-west winds many would prefer Lundy Roads, if it could possibly be put there.

9552. Do you prefer it to any other place?—Yes.

9553. But you allow that the anchorage is good there?—It is sand.

9554. Supposing you had a sum of money to lay out upon a harbour of refuge upon the south shore of the Channel, where would you lay it out?—If I understand aright money would be no consideration in the matter.

9555. Where would you apply that money?—I should prefer Lundy Island to any other place, provided it could be made, because you could get under weigh with north-west winds.

9556. You would consider Lundy Island the best place?—I should, provided a harbour of refuge could be made there.

9557. That is not exactly an answer to the question. I have put the question to you as to the south shore?—Do you mean from the Land's End up.

9558. From the Land's End to King's Road?—St. Ives.

9559. Then, taking the north shore from Tenby to Penarth, where would you put a harbour of refuge?—At the Mumbles, if it could be made.

(*Chairman.*) Is there any other point upon which, Mr. Tremearne, you wish particularly to call witnesses in addition to those who have now been examined. We have examined all the witnesses whose names have been given in?

(*Mr. Tremearne.*) No; there is Mr. Harvey, if you would like to examine him.

We do not think it necessary. But who is Mr. Harvey?—He is the proprietor of Harvey's Foundry, and would state that steamers could be repaired here.

We think that, a description of evidence not relevant to the purposes of our inquiry. Are there any parties present who would wish to tender any further evidence with respect to this inquiry?

No answer.

Sitting at St. Ives closed.

PADSTOW.

Tuesday, 28th September 1858.

PRESENT:

Admiral Hope (Chairman).

Sir Frederic Smith.
Mr. Lindsay.
Captain Washington.

Captain Sulivan.
Captain Vetch.
Mr. Coode.

Mr. Evans, Secretary.

Mr. John Eger Byrant examined.

PADSTOW.

Mr. John Eger Byrant.

28 Sept. 1858.

9560. (*Chairman.*) You wish to put the document you held in your hand in evidence?—Yes, on behalf of the Harbour Commissioners.

9561. In what way are you connected with the port of Padstow?—I am receiver of wrecks for the port and district, and commissioner of the harbour.

9562. Will you read the statement which you have handed in?—We have two plans to append to the memorial.

9563. Will you put those plans in evidence?—Yes; they are the charts of the coast. (*The witness read the following document.*)

"The port of Padstow having been reported by the Harbours of Refuge Committee of the House of Commons as deserving consideration for improvement as a harbour of refuge, the commissioners of the port of Padstow beg respectively to lay before Her Majesty's Commissioners the following statement:

"The extensive coasting trade passing and number of vessels lost on the north coast of Cornwall render the formation of a harbour of refuge at Padstow highly desirable, that being the most central position between Hartland Point and Cape Cornwall. (*See* plan No. 1. annexed.)

"That Padstow offers very great facilities for improvement, and being made a harbour accessible at all times of tide, with from 18 to 20 feet of water at low water at the entrance, and certainly an equal depth within the harbour.

"It is proposed to deepen the entrance to the harbour by dredging away the small bank off Stepper Point, which at present reduces the depth of water in the channel from 20 feet to 17 feet at low water spring tides, and also to lower the bluff of Stepper Point, and so give a true wind in, in gales at north-west, and obviate the baffling winds to which vessels are now exposed, and which is the great difficulty vessels have to encounter in entering the harbour.

"The aforegoing suggestions are offered on the authority of Captain Washington; and of the desirability of lowering the bluff of Stepper Point there is full proof; for the removal of a small portion of the point a few years since has enabled vessels to run up the channel a considerable distance further than heretofore before they lose the true wind.

"It is further proposed to use the hard stone arising from cutting down the bluff of Stepper Point in constructing guide walls for the tide within the harbour, as shown in plan No. 2. annexed, with a view to deepen and widen the present channel.

"The tide now running out of the harbour at about three knots an hour, spring tides, is found sufficient to keep the channel clear of sand, and give 20 to 27 feet of water at low water; and it is presumed by contracting the scour of ebb tide by guide walls, as proposed, a good and secure anchorage would be formed within the harbour upwards of a mile long, and from two to three hundred fathoms wide, and with from 14 to 24 feet of water at low water.

"That Padstow is the only place on the north coast of Cornwall which has sufficient back water to form a scour, and keep a harbour, when made, clear of sand and silt, to the accumulation of which this coast is so subject.

"That Padstow is very favourably situated for giving shelter to vessels endangered in Bude Bay, the most dangerous part of the coast from Hartland to Cape Cornwall.

" The improvement of this harbour, so as to make it a harbour of refuge, would be of incalculable value to the coasting trade, can be effected at a comparatively moderate cost and within a short time, and it is supposed that the accompanying estimate of 40,000*l.* for the whole work will be amply sufficient; and we would also respectfully submit for the consideration of the Commissioners that the value of the improvements suggested in the foregoing statements are such as to carry with them a progressive and considerable improvement as the works are proceeded with.

" Sections of the bluff of Stepper to be removed, and calculation of the cost of same and the guide walls, are annexed hereto.

" By order,

" Sam[l] Pollard,

" Clerk to the Padstow Har-

" bour Commissioners."

9564. You wish also to hand in another paper; what is it?—It is a statement of the trade of the port, the number of losses by wrecks, and the number of vessels frequenting it.

9565. Is there any other statement that you wish to offer to the Commissioners relative to the subject of this inquiry?—In looking at the report of the Harbour Refuge Committee, we notice that the port of Padstow is placed in a somewhat antagonistic position to St. Ives; but Padstow, as we hold, is not a rival to St. Ives. Padstow commands a space of coast which St. Ives does not, and the coasting trade frequenting this part particularly requires shelter. The improvements which we suggest would be amply sufficient for the coasting trade, which would be altogether unprovided for if there were ever so good a harbour at St. Ives. The winds we are the most subject to, and which are the most dangerous, are the north-west, and they usually come after south-west gales. We get a south-west breeze, and generally the wind falls round to north-west; and then coasting vessels which are obliged to travel near the shore to make their course are caught on a lee shore; and we hold that 9 out of 10 of the numerous vessels scattered up and down the coast which hug the shore would not fetch St. Ives, and unless refuge be provided hereabouts they must come on shore.

9566. Is there any thing further which you wish to state to the Commissioners?—I wish to draw attention to the model now in the room, which shows what we propose doing at the point perhaps better than any explanation I could give. (*The witness went to the model, and pointed out.*) That is the model of Stepper Point at low water; that is the Doom Bar sand. The scale is 26 feet to the inch. It has always been found that vessels taking the harbour with an ebb tide are obliged to hug the shore pretty close. When they get to the cliff the wind baffles over it. It has been suggested by many others, and by Captain Washington, that by lowering this bluff you would give vessels a true wind further on. Some years ago, the Padstow Harbour Refuge Association for the Preservation of Life and Property subscribed a sum of money, and cut down the point a little, and it was found afterwards that before meeting the baffling winds vessels could reach in 60 or 70 fathoms further than before. They were then in a much safer position. We found that when vessels get as far as Blouter Rock they have the true wind again. We propose that the point should be lowered in a slanting direction, something like the model; and we presume that we should have the true wind in with the wind at north-west; the most dangerous wind that we have on the coast.

9567. Does that finish your statement?—That finishes the statement which I wish to make.

9568. Has any estimate been taken of the expense of the improvements which are suggested?—Yes; there is a detailed estimate. The expense of the whole will be 40,000*l.*, for taking down the point, and forming the dead wall with the stuff arising from the excavations.

9569. (*Sir F. Smith.*) What is the total depth of this cutting?—The extreme is about 100 feet.

9570. That is the extreme depth?—That is the extreme depth; but the apex of the cone cut down is 136 feet from high-water mark.

9571. I am talking of the material to be removed. What is the length of that cutting?—600 feet.

9572. Can you tell me what the rock is?—It is various; trap rock and hard slate.

9573. Where is the trap rock situated?—It seems to be a kind of back-bone running through the cliff, and the slate is facing the harbour.

9574. Do you know at what price per yard that could be quarried?—We calculate 10*d.* a yard.

9575. Does that include the removal of the bank?—No; it includes putting the stuff in waggons.

9576. What number of vessels are there belonging to this port?—About 700.

9577. What is their average tonnage?—They run from 60 to 500 tons.

9578. In what trade are they engaged?—The coasting and foreign trade.

9579. With what foreign ports do they generally trade?—With North America and the Mediterranean.

9580. With what goods?—The larger class is in the timber trade to North America.

9581. From this port?—From this port and other ports.

9582. And the other class generally to the Mediterranean?—Yes.

9583. Have you any fishing boats?—Not many.

9584. Are those you have, engaged in pilchard fishing?—No.

9585. What fishing then?—Hook and line fishing off the coast.

9586. What number of men are employed in that trade?—Perhaps 50 or 60.

9587. Have many wrecks occurred on your coast?—Very many.

9588. Among the class of vessels which could enter your harbour if it were improved?—No; no vessel has been wrecked within the last 15 years that could not enter the harbour.

9589. Do you imagine that by forming guide walls you would be able to increase the scour, and keep your harbour clear?—Yes; we find that the tide between Doom Bar and Stepper Point keeps this channel clear, and we know that not one third of the tide is confined to the channel.

9590. Have you any streams tributary to this port?—Several.

9591. Are they of great volume?—Two are of considerable volume, and some of lesser magnitude.

9592. And where do they enter?—They enter at Wade Bridge.

9593. What is the total extent of the anchorage you would provide by your improvements in length and in breadth?—Well, I suppose it would be a mile long, and would average 230 fathoms wide.

9594. And the total depth at low water would be what?—It would shoal. At the beginning we should have 27 feet, which we now have, in fact, at low-water spring tides; and it would run up to the end of the mile to 14 feet, gradually shoaling all the way up.

9595. Supposing that the government decided upon improving Padstow Harbour, what other port is there between Padstow and the Bristol Channel which might be improved?—Nothing between Padstow and the Bristol Channel.

9596. Do you know Clovelly?—Yes.

9597. Do you think that Clovelly could be made a subsidiary or auxiliary port?—It is capable of being made a harbour, there is no question of it.

9598. And if it were would it not be very conveniently placed for the trade of the coast as a harbour of refuge for vessels encountering adverse winds?—No; I think Lundy Island would be a better place.

9599. Do you kno wany thing about Lundy Island personally?—I have passed it, but I never landed there.

PADSTOW.

Mr. John Eger Byrant.

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Sir F. Smith.

9600. Do you know anything of the soundings ?—No.

9601. You know nothing of them as a sailor ?—Nothing whatever.

9602. With regard to the opposite coast of the Bristol Channel, have you any information which enables you to advise the Commissioners as to a port on that side ?—No.

9603. (*Mr. Lindsay.*) What kind of sand is that Doom Bar ; is it shifting sand ?—Shell sand.

9604. Is it quick sand ?—Not particularly quick ; it will scour when disturbed.

9605. When the tide flows does it rise with the tide ?—Yes.

9606. To what depth ?—The upper part of the harbour is the sand that does not sink away.

9607. As to the lower part, do you know the extent to which that will sink ?—There was a little vessel on the lower part of the Doom Bar all last winter. She went down four or five feet, and there she stayed. She was got off in the spring of the year.

9608. Are vessels which get on that bank usually got off ?—Very rarely ; there is a very heavy sea on the bar, and they usually bring up.

9609. I see by the memorial that you propose to build guide walls along the whole range of the bank on one side. Have you had any engineering opinion as to the possibility of building walls on that bank ?—Captain Sherringham favoured us with the plans for those walls.

9610. And you would construct them on a bank which, as it appears to me, is a shifting bank ?—No ; we propose throwing out the rubbish on the edge of the bank, and keeping on till we find the bottom. Mr. Calver was here some little time ago, and he thought there would be no difficulty in finding the bottom, if we pitched out enough.

9611. You say you intend to deepen your channel, or roadstead, I will rather call it, to 24 feet at low water. Is that at Stepper Point and Hawkers Cove?—No. You will see that the calculation is based on this assumption,—we presume all these sands will scour out when the tide is confined by walls.

9612. You think that when the tide is confined by walls this sheet of water before the town, where it is now marked four, five, and six feet, will scour out to 24 feet ?—There are 14 feet now.

9613. But look at the numbers on the chart ?—We presume that if we got as powerful a scour at the Middle Bank as we now have abreast of Hawkers Cove we should have the same depth of water.

9614. But do I understand you to say that the formation of these tide walls will give so great a scour as to remove that Middle Bank, which is now dry, and even give a depth of 24 feet at low water ?—Yes.

9615. Twenty-feet at low water ?—Yes, 24 feet at low water.

9616. It is a surprising thing to me ; but allowing such to be the fact, your anchorage will be about the point past Hawkers Cove ; that will be your best anchorage ?—Yes; we have calculated that the anchorage abreast of Hawkers Cove will be much improved.

9617. You think the scour will remove the westmost point of this Doom Bank ?—Quite so.

9618. What is the width between the main land and the Doom Bank ?—800 fathoms.

9619. Would there not be great risk in running in in heavy weather of tailing on the Doom Bank ?—Yes, there will be that risk ; but it is calculated that if we increase the quantity of ebb tide in the channel we shall have a much wider channel.

9620. Would you like running in in a heavy north-west gale with a bank like that on your lee ?—I should not like it, but I should have that or nothing. I should have that or the shore.

9621. Do you not think you would be running a great risk ?—I have seen 15 vessels come in with a heavy north-west gale ; none of them were damaged. All were in the ebb tide, but we had to help them to the capstan houses, although not much.

9622. Has this bank not been changing since you knew this place ?—Nothing material.

9623. Is the water shoaling or deepening ?—Much about the same.

9624. To what length of time back do you speak ?—15 years.

9625. Has there been no change in 15 years ?—No material change.

9626. Does that apply to the Middle Bank and to the Horseshoe Bank ?—The Horseshoe Bank, I think, is drawing a little nearer to shore than it is marked.

9627. Do I understand you to say that the cost of removing Stepper Point, and building these guide walls, and deepening the channel, will not exceed 40,000*l.* altogether ?—Quite so.

9628. Then you ask for that on the ground of making it a harbour of refuge for the coasting trade?—Yes.

9629. Do I understand you to come forward and propose Padstow as a national harbour of refuge for all vessels of all sizes and descriptions ?—We go upon the principle of the harbour being open to vessels of all sizes not drawing more than 20 feet of water.

9630. Therefore, do you think that a harbour here would be of more value to the coasting trade, to vessels frequenting this particular part of the coast, than to passing vessels generally going foreign ?—As a general rule, vessels going foreign keep an offing sufficient to keep up or down with the wind north-west, but coasting vessels keep within the line of embayment, and if the wind is north-west they have no choice, they must come to the shore.

9631. Then they could fetch into here, but not into St. Ives Bay ?—Quite so.

9632. But that is not so with regard to passing vessels generally, because they keep more in the offing ?—They would be able to fetch St. Ives when coasting vessels could not.

9633. You ask for this harbour for coasters ?—Yes.

9634. (*Capt. Sulivan.*) What is the strength of the tide in the ebb in the channel ?—From two to three knots an hour.

9635. Is there any difference when it is flowing over the Doom Bar and when it is confined to the narrow channel, and the Doom Bar is dry ; does its strength increase ?—Yes, it increases a knot when the Doom Bar dries.

9636. Supposing this plan were carried out, would it greatly increase the strength of the ebb ?—We find the present rate of three knots will scour the channel out with the sand coming down. We should take care not to get the ebb stronger than three knots, by not narrowing too much the channel. We would not increase the force of the ebb tide running out.

9637. If you could have a channel to the west of Doom Bar you would have the tide throughout the same as it is when the Doom Bar is dry ?—No, not quite so much, I think, because we should have a wider channel.

9638. Have you any fear that what would be carried out would be drifted to the mouth, and make another bar ?—None whatever ; there is always a west swell rolling.

9639. Have you had the estimate of 40,000*l.* from an engineer ?—Yes ; from a surveyor.

9640. Do you think it likely that a contract would be taken in this neighbourhood to complete that work for 40,000*l.* ?—I think so.

9641. Do you think that in the neighbourhood any guarantee would be given to complete the work, if 40,000*l.* were voted, if it should not prove sufficient?—I am not prepared to answer that question.

9642. In sweeping out the up-channel by your plan the channel is not altered much in the scour until it gets down to Gun Point. Do you intend to effect it by deepening, or do you suppose that the Horseshoe Bank will be carried away altogether ?—The Horseshoe Bank is to go too. We find that the tide now, before the Doom Bar gets dry, is sufficiently strong to keep the channel clear, and that there is an immense

amount of back water coming up at two knots. We conclude that if we raise guide walls, and stop that which comes out at two knots, and make it come out at three knots, we shall have our guide walls clear of sand, because we find that three knots will keep the sand clear.

9643. Does that always keep the channel clear at the mouth which is now a bar?—That is if composed of rubble and sand.

9644. If three knots will scour sufficiently, how do you account for this bar forming exactly inside the point?—That is not composed entirely of sand.

9645. Do you think you would have a bar formed at Stepper Point from the sand swept out from the middle of the channel?—No; we feel quite satisfied that it would not.

9646. How do you account for its not having swept away this outside bar?—We consider that it is because it is not altogether composed of sand; it is composed of slate, shingle, and so forth.

9647. Have you had it bored?—No. Captain Washington said it could be removed for 500*l.*, and suggested that it should be done.

9648. By dredging?—Yes.

9649. What is your plan for removing the material when you have cut down Stepper Point?—Taking it all by rail to Hawkers Cove, and then making the east embankment by lighters and the west by rails.

9650. (*Capt. Vetch.*) Looking at the coast of Cornwall from Hartland Point down to Cape Cornwall, in a national point of view, where would you place a harbour of refuge if the Government were willing to advance the money?—I should place it at Padstow.

9651. In a national point of view, you would wish to have a harbour of refuge at Padstow?—Yes; I think the centre of the channel would be the better place.

9652. But if the local circumstances of Padstow were not equal to afford refuge for vessels of all classes, would you still consider Padstow a proper place?—If there were engineering difficulties in the way of Padstow I would go to the nearest point to Padstow.

9653. Then you think that there are engineering difficulties in the way of converting Padstow into a harbour of refuge?—I think there is no difficulty as to 20 feet depth of water in the channel.

9654. How long have you been acquainted with this port?—25 years.

9655. During that time how many vessels have you seen get aground on Doom Bar?—I can hardly tell you.

9656. How many have you seen during the last five years?—Three, I think.

9657. And what became of those vessels?—One was got off, and two were lost.

9658. Where were those two vessels lost?—The one that was got off touched on the outer part of Doom Bar, one went on the middle of the bar, and the other went on Trevethrick, and was lost.

9659. And the mode of improving the channel is the construction of two walls on the sides of it?—Yes.

9660. Tell us of what material those walls will be composed?—Of the material cut from Stepper Point; that is, of trap rock and hard slate. We take the whole slate there by rail, and thus the west wall will be continued by lengthening the rail.

9661. The whole way?—Yes.

9662. To what height would you carry that wall above high-water mark?—The high water of neap tides.

9663. And upon what are the rails to be carried out?—I suppose on the stuff of the embankment.

9664. But if you only carry your wall to high water of neap tides, at spring tides the embankment will be under water, and you will be obliged to suspend work?—While we were hindered by the tide on the west side we should go on with the east wall.

9665. Have you computed what is the sectional area, and what is the number of cubic yards required for your embankment?—We calculate that the wall will be 24 feet from the base to the apex.

9666. Twenty-four feet in height from the base; and what width of base?—Five feet slope to one foot rise.

9667. Five feet horizontal to one foot perpendicular?—Yes.

9668. And have you computed the number of cubic yards to be contained in the wall from one end to the other?—Yes. I have not the calculation with me, but I can furnish you with it.

9669. How many cubic yards would be contained in it?—Between 400,000 and 500,000.

9670. Then you do not speak exactly?—From 400,000 to 500,000.

9671. What is the bottom on which your wall will rest?—We found a clay bottom and rocks.

9672. You have sounded?—We have sounded.

9673. Then on the east shore from the Doom Bar up towards Rock what will be the length of the wall?—1,200 fathoms.

9674. And of what material will that be composed?—The material cut from Stepper Point.

9675. The same material in the same sectional area?—No; we conclude we shall have to line to 1,200 fathoms first from low water down to the deep, to secure it.

9676. Do you intend to line it with masonry?—No, with rubble.

9677. But to face it?—We find that if we put in rubble on a sand bank it will stay there. We have put it in in the upper part of the river, and we find that the scour deepens the channel, but the rubble remains. We propose doing this on the same principle.

9678. Do you consider the channel of the same nature at the upper part near Wadebridge as it is at the Doom Bar?—It is all the same.

9679. Above Wadebridge you could build an embankment; could you build one on the Doom Bar?—We would not build an embankment on the Doom Bar, but we would face the bar by a wall 50 feet long and 20 feet thick.

9680. Will you furnish the Commissioners with drawings of the sections for that proposed work?—I will get them for you.

9681. And any statement you can procure of the quantity of material and of the cost?—Yes.

9682. What are your best winds for coming into this harbour?—North-east round to north and by west.

9683. And can you get out with a north-east wind?—You can beat out.

9684. Have you room for beating out?—Oh yes; plenty of room for coasting vessels to beat out at high water.

9685. Then you consider, in a national point of view, that between Cape Cornwall and Hartland Point Padstow is best adapted for a harbour of refuge for the general trade of the country?—The neighbourhood of Padstow.

9686. (*Mr. Coode.*) You have given the cubic quantity in one wall; you have not given the cubic quantity in the other? You stated that there were from 400,000 to 500,000 in one guide wall?—The east guide wall we calculate will contain 336,000 cubic yards.

9687. And the other, how much?—We should be removing from the cutting of Stepper Point 500,000 cubic yards more than would make the west guide wall, and put in behind it; we should have abundance to spare to make another guide wall.

9688. And now what will be the total quantity of excavation at Stepper Point, according to your proposal?—430,000 cubic yards.

9689. I thought you stated you would require between 400,000 and 500,000 cubic yards for the west guide wall alone?—In excavations we find that the rubble increases in volume very considerably.

9690. In what proportion?—We find in working quarries that it very nearly doubles.

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9691. Then you imagine you will not have to remove moreth an 400,000 cubic yards from Stepper Point ?—Quite so.

9692. Did you make an estimate of the cost ?—Our surveyor did, and I checked it after him.

9693. He went over it carefully ?—Yes.

9694. Have you ever bored along the line of those walls, or has any one done so ?—Borings have been taken within the last week.

9695. What did you find ?—We bored down the sand till we got to some hard substance, and we presumed that we had reached the bottom.

9696. In every case except where it is marked "no bottom" on the plan ?—Yes; we presume we got to the clay, or to something harder than sand.

9697. You do not think you were stopped owing to the friction of the boring tools, and that it was still sand ?—No.

9698. Did the boring tools stop suddenly ?—Yes.

9699. They were not brought up gradually ?—No; you can very easily tell the difference. In boring the tool goes easily through sand.

9700. Have you ever sounded on rock ? Has the apparatus ever given indications that you have met with rock ? Do you know that it gives a different sensation ?—The depths given are those at which we came to a substance which we presume to be hard bottom.

9701. How do you propose to get the material for the east guide wall ?—We propose to take it to Hawkers Cove, and thence across in lighters.

9702. Do you know the price per cubic yard for the wall, including excavating the material, taking it from Stepper Point, and carrying it across to Hawkers Cove ?—7*d.* per yard.

9703. And that is the whole cost of excavating ?—No; of the carriage. The excavation is 10*d.* and the carrying 7*d.* per yard.

9704. Do you think it can be done for that, with all the contingencies of wind and weather ?—Yes; and the reason of my opinion is that similar works are going on at that price.

9705. Where are they carried on ?—From Rock to Wadebridge.

9706. Do not you think there would be greater interruption in works between Padstow and Stepper Point than between Rock and Wadebridge, which is sheltered all the way ?—There would be a little more difficulty, but the material would be carried in larger quantities, and therefore cheaper. In rough weather we should be under the shelter of the Doom Bar until the tide rose.

9707. Is that a heavy sea which sets in towards Hawkers Cove ?—Yes.

9708. For how many months in the year could you carry on an embankment across there at the level of high water at neap tides ?—All the summer.

9709. Do you think that the effect of the guide wall would not be to scour the light material down and the rails with it ?—We would provide for that by keeping a good wall of stuff outside.

9710. Is there any allowance for that in the estimate ?—We have calculated the quantity at three times the price we were told it would be carried for.

9711. We were told that it would cost 10*d.* a ton a mile ?—No; it will cost 3*d.* a ton a mile. We were told at Mr. Brunel's office in London that it would be carried at 1*d.* a ton a mile.

9712. Did the gentlemen in Mr. Brunel's office know anything of Padstow ?—No; they told us that rubble could be carried at 1*d.* a ton a mile, and we have trebled it in consideration of the locality.

9713. Then are we to understand that, except in those cases where no bottom was found, you found a hard bottom in your borings, of rock or some hard substance ?—Yes.

9714. To what additional distance have vessels been able to get in, by the excavations which have been made at Stepper Point ?—From 50 to 70 fathoms.

9715. And what length of the point must be cut away to give a true wind for any given length in ?—Less, very considerably.

9716. Can you tell the Commissioners to what extent, longitudinally, that point has been cut away ?—About 50 feet.

9717. That has given a true wind for an additional distance of from 50 to 70 fathoms ?—Yes.

9718. You spoke of cutting away to Clowter Rock, where vessels will have the true wind again; is that so now ?—Yes; they have now a true wind when they get to Clowter Rock.

9719. For what reason do you suppose that they have a true wind there ?—We calculate that they will have a true wind there.

9720. Have you ever taken the opinion of pilots and of practical men upon that point ?—Yes.

9721. Do they concur in that idea, that an excavation to the extent of your model will give a true wind, as far as will be necessary?—Yes.

9722. Can you give a list or statement of the number of vessels that have been obliged to run for Padstow, such as have had no alternative, and that have been lost or wrecked ? You stated that vessels within a certain line of coast must run for Padstow; perhaps you will give a statement of the number of vessels caught within that line; that will be a material point in the evidence ?—Will a statement of the vessels lost answer that purpose ?

9723. No; that statement will be merely a list of the vessels lost in the district. My question is as to the number caught within a certain line which had no alternative but to run for Padstow ?—I can give it to you.

9724. Please to give it to us at your convenience, and state at the same time the number of lives which have been lost ?—Yes.

9725. Have you any authentic charts prior to the date of Captain Sherringham's survey ?—None that I am aware of.

9726. You stated that the bank was to be 24 feet high; what width at the top have you calculated ?—Nothing.

9727. Nothing ?—Just width enough to carry the rail.

9728. I thought you must have something to carry the rail ?—Five or six feet or 10 feet will be sufficient. We have calculated to carry the wall a little higher, because the winter sea will break it down.

9729. You have calculated to carry the bank sufficiently high at the apex to allow the sea to break it down ?—I beg your pardon. You will have to make the pier lower. If it is calculated that the wall will settle four or five feet, we must carry it four or five feet above the level of high water.

9730. But I understand you to say that you would carry the wall out to nothing, and so allow the sea to break it down to a width sufficient to carry the rail ? I understood you to ask what it would be when finished.

9731. No; what is the top width that you propose ?—Perhaps the width of two lines of rails.

9732. What would suffice for that?—20 feet, may be.

9733. You were asked a question with reference to the chance of this stuff finding the bottom, and you said Mr. Calver was of opinion that if you put in sufficient it would find the bottom. I suppose you agree with him ?—Yes.

9734. What do you imagine would be the cubic contents ?—The side of the slope would be 50 feet and the thickness from 50 to 100 feet above low-water mark. We presume that the average depth will be 17 feet, and if we get a slope of 50 feet we shall keep the sand quite clear.

9735. Is not the sand pretty lively at flood tide ?—The top is, but the bulk is not. We calculated that it would come down to the bottom.

9736. You anticipate getting a clear 24 feet ?—17 feet at low water on the east side.

9737. And on the west side ?—On the west we shall have 24 feet.

9738. Can you give us also a list of those vessels

which have actually been driven on the end of the Doom Bar by the baffling winds, and the number of lives lost in these vessels ?—Yes.

9739. (*Sir F. Smith.*) Can you provide the Commissioners with sections of these proposed walls ?—Yes.

9740. (*Capt. Vetch.*) You have given an account of these two walls on either side. Are those the whole of the works besides cutting off Stepper Point, or do you propose to dredge also ?—We propose to dredge the little piece off Stepper Point, which Captain Washington estimates might be done for 500*l*.

9741. Any dredging inside ?—We propose to have a cradle with long legs just to move the sand; not to dredge, but to keep the sand in motion.

9742. No dredging ?—No dredging.

9743. No lifting ?—No lifting.

9744. But you propose to put such appliances on these walls that you expect that the natural action of the scour will carry the sand out to the mouth ?—The natural action of the water has been found in Bristol to remove mud.

9745. And that portion of the work will cost nothing ?—Not much; we have clapped on 20 per cent. for contingencies.

9746. In addition to the walls, there are no engineering works ?—None, but to dredge the bit off Stepper Point.

Mr. John Treadwin examined.

Mr. J. Treadwin.

9747. (*Chairman.*) In what way are you connected with the port of Padstow ?—As shipowner, shipbuilder, and general merchant.

9748. How long have you been connected with the port of Padstow ?—35 years.

9749. You are aware of the object of this inquiry ?—Yes.

9750. Will you state your opinion as to the advantage or necessity of improving the port of Padstow, for the purpose of rendering it a subsidiary port of refuge for the passing trade ?—I consider, from the position of Padstow, and the present depth of water we have in it, that if it could be made more available for vessels coming in generally it would be a great advantage, particularly to the coasting trade.

9751. Is there anything further which occurs to you to state in addition to what has been already stated by the previous witnesses ?—The great consideration is the removal of the Doom Bar, and if we cannot remove it, to get it further from Stepper Point, so as to give a wider entrance to vessels coming in.

9752. Are there any local funds which would be available in aid of the improvement of the port ?—I think all the local funds have been expended already. They were small, and have been spent in getting the matter under the notice of Parliament.

9753. So that for the improvement of the harbour you would depend upon other funds ?—We depend entirely on some assistance further than we have got. I was the person whom the Board deputed to make inquiries. I made borings in the sands at low water.

9754. (*Mr. Lindsay.*) You are a shipowner ?—Yes.

9755. Do you know anything about nautical affairs? I was two years at sea. I have lived here 25 years.

9756. Do you know whether any nautical witnesses are coming here ?—Yes, I believe so.

Then I will not trouble you.

9757. (*Capt. Vetch.*) You have examined the Doom Bar pretty frequently ?—Yes.

9758. What is the nature of the sand ?—The sand taken up at a certain depth was a sort of clay.

9759. I am asking you what is the nature of the Doom Bar sand ?—It is shell; there is a very large proportion of shell in it.

9760. Is it not very light?—I should not say it was very light.

9761. Not light for sand ?—Well, yes.

9762. Is it the same sort of sand as that which we see drifted on the rocks ?—Rather different, of course, from drift sand.

9763. Where do you suppose that sand is drifted from ?—I do not know.

9764. You have known the Doom Bar for 25 years?—Yes; there has been very little change for the last 40 years.

9765. Is some portion of the sand taken away for manuring the land ?—They generally use the sand from the Horseshoe Bank for that.

9766. Do you consider that a better quality of sand for the purpose of manure ?—Yes.

9767. You took those borings with considerable pains ?—Yes; it took three or four days to get through with them on the Doom Bar, and two days to do the others. There was very short time of the tide that we had to do it in.

9768. You left your boring rods there, and went back again the next day, I suppose ?—Yes; but for those shorter distances we took them up.

9769. Are those less depths where you found a hard bottom ?—I do not know. We found rock at 14 feet depth.

9770. You are quite sure you got rock there ?—Oh yes.

9771. But coming to the 24 feet marked on the plan; what bottom did you get in the middle of the Doom Bar ?—What length do you mean from the point.

9772. Close to your wall ?—The point of the borer was rounded, and we imagined that we had come to some obstacle. It might be gravel or stone.

9773. At the 29 feet marked on the plan, did you find a bottom?—Yes; after working for an hour or an hour and a half we could not go any deeper.

9774. Might not that be owing to friction ?—No; we gradually went down to 29 feet. We imagined we could have gone further though, because the instrument was as perfect at 29 as at 26 feet.

9775. Then you are satisfied that the whole of that is one hard bottom ?—Yes.

9776. That is the conclusion you came to at the time ?—Yes.

9777. Can you tell us how the sand accumulated across the mouth ?—The large sheet of water goes in over the Doom Bar, and for about one third of the tide it is dry.

9778. Has there been much alteration in it since your time ?—We sometimes found the Doom Bar raised a little, and extended, as if it were going in towards Hawkers Cove, and sometimes it struck off a little, but there is not any very material change, in my recollection.

9779. Then what do you think will be the effect of these two walls in improving the Doom Bar ?—We think it will drive the point off to the bar.

9780. And widen the channel ?—Yes, and widen the channel.

9781. For what reasons ?—It confines the water in the space. Of all the water that flows the weightiest would go all along the east shore.

9782. If brought up to low-water mark it would not have that effect, would it ?—About half tide the rise and fall is very great. The neap tides half tide in would be level.

9783. No doubt you consider that this bar was formed by certain natural influences, and so preserved in the shape you now find it ?—There are many ideas about how it was formed at first, but I do not know; there we find it.

9784. But you are firmly of opinion that by the addition of these two walls such an improvement as has been described would be effected ?—There has been a guide wall in the river, and it has been found to drive the sand from it, and give a clear channel. What has happened further up to the quay we think would happen down here. When the wall was first put, the sand was close in, and we could not lay two

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stones, and now the beach is open 200 feet outside. There is a gradual sinking towards the river.

9785. Supposing the entrance were narrowed, do you think there would be an equally deep channel with double the width ?—We imagine we should scour the sand, and find the channel deepened. There is depth there, if we could only get the sand clear from it.

9786. (*Mr. Coode.*) Do we understand you that the width of the channel about Stepper Point does not vary very much, but the principal variation is on the back of it ?—Not at Stepper Point. It is more particularly towards Hawkers Cove that there is an accumulation.

9787. Above Stepper Point, towardsHawkers Cove, does the width of the channel vary much ?—Not much.

9788. Is the chief variation at the bar ; does great sand accumulate at the bar ?—Yes; that is where it principally varies.

9789. You took charge of these boring operations? —I did.

9790. Will you cast your eyes over the chart, and see whether the figures are correct ?—I find a variation of half a foot in one place; the others are all correct.

9791. Are those depths from low-water mark downwards ? What is your standard ?—Sometimes three feet above low-water mark.

9792. What did you take for the standard of your borings ?—Three feet from low water mark.

9793. What kind of boring tools did you use ?—Two screw augurs and one or two pointed poles.

9794. Did you succeed in bringing up any material ?—I brought up some.

9795. Was it the same as on the surface ?—It seemed much finer.

9796. Is that one (*pointing to a sample*) ?—Yes ; this is from Horseshoe Bank and Brae.

9797. At what depth ?—One was 19 feet off Braehole.

9798. Can you leave that with the Commissioners ? —Yes.

9799. (*Chairman.*) Do the Harbour Commissioners receive any dues on vessels taking shelter at the lower part of the harbour ?—Not from a line drawn from St. Saviour's Point to Braehole.

9800. Have you read the report of the Committee of the House of Commons on Harbours of Refuge ?—I have read a part ; I cannot say I have read it all.

9801. Do you recollect the latter portion of it, in which is contained a recommendation of giving assistance to existing harbours by means of loans at a reduced rate of interest,—Government loans at a reduced rate of interest, repayable at the end of 50 years?—I did not take any notice of it.

9802. I will read you the passage:—"Your committee is therefore of opinion that it will be in every way consistent with sound policy to encourage local efforts for the improvement of such harbours, that is, of existing tidal harbours, by voting a moderate sum annually to be especially devoted to such harbours, on the same principle and under the same regulations as were applied to the large amount advanced for the purpose of drainage ; and looking to the great importance of the object intended, your committee recommend that such loans should be made at a rate of interest not exceeding 3 per cent. per annum, and made repayable by a sinking fund extending over a period of 50 years." Do you suppose that there are any local means available for the purpose of meeting the intentions of Government in that respect, or rather the recommendations of the Committee in that respect ?—I imagine there are not, except from vessels using this place for shelter.

9803. You imagine that there are no local funds, and there are no parties connected with the port who are prepared to come forward and meet this recommendation of the committee ?—I really cannot say. I should think if accommodation were given to vessels they would gladly pay for it, and this might very likely pay the interest on the advances.

9804. I allude to parties connected with the port, who would be willing to come forward, and by means of local efforts and local subscriptions be prepared to meet such a loan ?—I do not think there would be. At least I do not know that there would be. There have been local efforts made always.

9805. (*Sir F. Smith.*) What is the average revenue ?—Do you mean customs or port dues ?

9806. Port dues applicable to your own purposes ? —I think about 400*l.* a year.

9807. (*Capt. Washington.*) You are a shipbuilder as well as a shipowner ?—Yes.

9808. What is the largest ship that has been built here ?—The largest ship that has been built in the port is 600 tons register.

9809. Are many built ?—Yes, pretty many.

9810. Are many vessels repaired here ?—Yes.

9811. Are there facilities for repairing ships ?— Not ships of any large tonnage.

9812. Any patent slip or dock ?—No patent slip.

9813. And no dock ?—No dry dock.

9814. Is there a lifeboat belonging to the port ?— Yes.

9815. A good one ?—Yes ; supplied by the National Institution.

9816. Has it been tried ?—Yes.

9817. And proved a good one ?—Yes.

9818. Has it been tried by exercising, and has it saved the crew of any craft ?—It has saved a crew.

9819. Have you any buoy on the Ketch Point ?— There was one beacon and two moving buoys on Ketch Point. A beacon has been placed on Stepper Point.

9820. On the outer stones of Stepper Point ?—Yes.

9821. Is a buoy necessary there ?—No, I should not say it was.

9822. Do you consider a beacon or a buoy necessary on the Ketch Point ?—I do not know if there is very much occasion for it ; I do not think there is.

9823. Is the outer point of the Doom Bar a great danger or not ?—Yes.

9824. Is it not customary to mark all dangers by buoys or beacons ?—There are instructions for entering the port which are supposed to be known by every person.

9825. Has a master running for a harbour of refuge time to pull out instructions and see where danger lies ?—He generally looks to them before he is within six miles of the place.

9826. Will you say whether you consider a beacon buoy on that point necessary ?—It would be of service, but there would be great difficulty in keeping it there, and that is the reason it was discontinued.

9827. Was it kept by the local funds ?—Yes.

9828. And caused great expense, probably ?—I do not know.

9829. Supposing it were kept by a fund apart from the harbour, would you think then that it would be of service ?—It would be of some service.

9830. The last witness referred to a report made by me in 1851, in which I quoted the expense of dredging the bar at only 500*l.* Are you or are you not aware of it ?—No ; I am not aware of it.

9831. He did so state. Are you aware that it was one portion of the Doom Bar to which I referred ?—I did not hear the question asked at all.

9832. (*Capt. Sulivan.*) The former witness stated that there were 700 vessels belonging to the port, varying from 60 to 600 tons. Will you state what proportion of those continue to trade from the port, and what proportion are merely owned here, and are trading to other ports, and therefore not generally using the harbour ?—There are 200 vessels, I should think, owned in Padstow. The customs' authorities are the only people who can speak positively, but I should say 200 is the utmost number owned in the port of Padstow.

9833. To whom do the remaining 400 or 500 belong that belong to Padstow ?—I really do not know.

9834. Is it customary to build and own vessels here that do not trade to the port ?—Yes.

9835. And particularly large vessels?—They are the large vessels which are used in that way, and who trade to other ports.

9836. Of the 200 vessels which you know in the port of Padstow, what proportion do you think trades to other ports, and what proportion is engaged in the coasting trade?—Half of them, I should think, are coasters.

9837. That a hundred trade to the port of Padstow?—Yes; in and out every fortnight.

9838. (*Mr. Coode.*) You were asked a question as to a beacon at the Ketch. Do you think there would be any difficulty in keeping a beacon in position there?—I think there would be great difficulty.

9839. There is great probability of danger arising from its moving its position?—If it moves frequently, vessels are of course deceived.

9840. Were buoys placed here on two separate occasions?—Yes.

9841. How long have they been removed?—12 or 18 months; it may be two years.

9842. Who placed those buoys there?—I think they were given by the Admiralty, and afterwards kept by the local commissioners.

9843. The buoys are kept solely by the harbour board?—I spoke of the outer buoy on the Ketch.

9844. Do you think any improvement can be made in the mode of placing the buoy on that point?—I think the constant friction of the chain and the swerving of the buoy were the causes of its getting loose.

9845. Do you think it possible to place a beacon buoy so securely that the ordinary risk of its being removed would be done away?—I think you would have to replace them every 12 months.

9846. What would such a buoy cost?—I really do not know. One of the mooring buoys cost 20*l*. I suppose it would be made of iron.

9847. The Padstow Association was spoken of in the early part of your evidence. Are you a member?—Yes.

9848. What is its object?—They first cut a road leading to the extreme end of the point, and provided lines and capstans to assist vessels entering the harbour. It was found that the baffling winds came down on them, and they could not reach far enough to get into the harbour. The capstans were to enable them to get lines on board as soon as possible.

9849. Was that association formed with any other object than that of assisting vessels in distress?—Not that I am aware of.

9850. Whence were its funds derived?—It was chiefly supported by charges on vessels to whom assistance was given.

9851. How long has the association been established?—Perhaps 30 years; more than 25 years.

9852. Can you give any idea of the amount of money expended in carrying out the objects of the association?—I really do not know. I cannot say positively. The chairman is in the room. They are not very expensive.

9853. Do you know of any other local association formed specially to save life and property?—On this coast?

9854. Yes?—No, I do not.

9855. Then the formation of the society arose from the imperious necessity of something being done?—Yes.

9856. Was it solely owing to the loss of life in this place?—Yes.

9857. Was Captain Julian the originator of it?—Yes, I believe so. I was too young at the time to remember.

9858. Will any one give evidence to-day who can give us further information on this point?—Yes; Mr. Martin, the chairman.

Mr. Richard Blake Hellyer examined.

9859. (*Chairman.*) In what way are you connected with the port of Padstow?—I am sub-commissioner of pilotage.

9860. Are you a seafaring man?—No.

9861. How long have you been connected with the port of Padstow?—I have known it for 50 years.

9862. Are you aware of the object of this inquiry?—I am.

9863. Will you now state to the Commissioners your opinion as to the advantage or necessity of Padstow being so improved as to render it a subsidiary port of refuge to the passing trade?—The principal advantage would be the cutting down of the point. That is the first object. Afterwards those leaders which you have on the plan by which the Doom Bar can be carried away, I mean the point of the Doom Bar, so as to widen the entrance.

9864. Are the measures you have named necessary for the improvement of the port?—Yes.

9865. But my question refers rather to the advantage or necessity of improving it all. Can you give us any reasons why it should be done?—For saving life and property to a great extent. You could not do a greater benefit to the shipping interest which navigates this channel than by improving this harbour.

9866. Are you able to offer to the Commissioners any more detailed statement showing the reasons on which the opinion you have just given is grounded?—The north-west gale is the worst wind we can have on this coast, and we frequently find a great number of vessels embayed here, and they frequently go ashore near the east or west of this port. Some years since, before there was a lighthouse at Trevose Head, we had some vessels passing in the morning up channel, and those acquainted with the coast, if they saw a vessel so many miles off, could tell where she would go ashore in Bude Bay. They said she would either go ashore three or four miles to the east or to the west, according to the distance she was off when she passed this port. And some years ago 13 or 14 vessels which sailed from this place in the morning's tide got up to Bude Bay, when they were overtaken by a north-west wind. The seafaring people were very anxious about them, because it was known that they had not been gone long enough to get round Hartland Point, and if they did not come back to Padstow they must get ashore in Bude Bay. Many went and looked out for them in the afternoon. Fortunately all of them cleared the bay, and got in safe. The last vessel which got back was a brig belonging to Ilfracombe, and in Bude Bay the mate was washed overboard and drowned. If Padstow had not been so handy all those vessels must have been lost.

9867. What are your special duties as sub-commissioner of pilotage?—We see that the pilots do their duty.

9868. Are they licensed?—Yes.

9869. Licensed for the port?—Licensed for the port.

9870. Have you any reason to suppose that a considerable number of vessels abstain from taking shelter in this port in bad weather on account of the want of proper facilities for getting in?—Yes; many would run the risk of being wrecked rather than come to Padstow.

9871. Do you say that of your own knowledge?—Yes; I have known it. I have heard it expressed by captains. I have heard captains say, they keep off if they possibly can rather than run the risk. The danger is so great of entering the harbour.

9872. And are you able to state that this account will be confirmed by the pilots generally under your charge?—Yes.

9873. Do you know that vessels do not come in?—For many years I have heard it reported that captains of ships are afraid of the harbour; they will not come in unless they are compelled.

9874. Has any report to that effect at any time

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been made to you by the pilots under your charge ?—No.

9875. What are your heaviest gales here?—North-west.

9876. (*Sir F. Smith.*) You stated that vessels would rather run any risk than come to Padstow ?—Many of them that know the place will come ; but I have heard that masters of vessels who do not know it will not come.

9877. And are you of opinion that the alterations proposed would change that feeling ?—I have no doubt of it whatever.

9878. You state that on one occasion 13 vessels left Padstow and returned at night ?—Yes.

9879. Might I ask at what time of tide they left Padstow ?—About six in the morning.

9880. What time of tide ?—The tide was on the ebb.

9881. And what time of tide was it when they returned ?—Half flood, I suppose, or more.

9882. What was the heaviest tonnage of any of those vessels ?—From 50 to 100 tons. They were coasters bound up channel.

9883. What was the state of the wind when they left the harbour ?—Fair from the south-west. When they got to Bude Bay it fell out to north-west.

9884. They were suddenly taken by a change of wind ?—Yes.

9885. No lives were lost ?—Yes; one man was washed overboard.

9886. Supposing the tide had been out, and it had been low water, could they have got in ?—No.

9887. And if unfortunately it had been low water they would have been lost ?—The channel narrows down to the mouth, so that they could not come in two abreast.

9888. Will they be able to do so when the improvements are made ?—Yes; four or five ; I hope 10.

9889. What will be the difference in the breadth of the channel ?—I hope 100 fathoms from what it is at present.

9890. Is it contemplated to widen the channel 100 fathoms ?—We hope the alterations will have that effect.

9891. Is that the opinion of those who are projecting these alterations ?—I do not know. That is my opinion.

9892. Have you conversed with those who have projected these alterations?—I never heard it positively stated so.

9893. If the tide had been out when those vessels came abreast of which you have spoken, what would have happened to them ?—They would have been stopped at the entrance, because of there not being room for them.

9894. And would lives have been lost ?—Perhaps every soul would have been lost.

9895. In what year and what month was that ?—Thirty years ago.

9896. Has nothing of the kind occurred since ?—I do not recollect. I believe vessels have sailed and come back again ; but I recollect that time well, the 13 having sailed in the morning and come back in the afternoon.

9897. Have you been a seafaring man ?—No.

9898. (*Mr. Lindsay.*) You say that vessels would rather run the risk of being wrecked than run for this harbour, the dangers are so great ?—I have heard many captains of vessels say they would do anything they could rather than come in.

9899. What danger do they dread so much ?—In entering the harbour the sea on Stepper Point breaks ; they are afraid to keep as close as they ought to keep ; and they go to leeward. Then they endeavour to get under the wind, to come in ; the breeze out takes them back, and if they are not prepared to let go the anchor they are on the sand.

9900. Do you mean on the Doom Bar ?—They are on the Doom Bar in one moment.

9901. Then, unless the Doom Bar were removed, there would still be that great danger ? — Danger would still exist.

9902. Then, unless the Doom Bar were removed, Padstow would still be a place where masters of ships would always avoid running for ?—Yes, they have a dread of it now.

9903. Would the alterations proposed remove the Doom Bar ?—No doubt of it.

9904. Would the alterations proposed remove that dangerous bank at Ketch, and the sand to the south of it ?—I have not the least doubt they would, because wherever you see an alteration take place in the river, which happens very often, it sweeps out everything down to the bottom ; and why should it not sweep out that ?

9905. Then the sum and substance of your opinion is, that to make this a harbour which vessels would not be afraid of running for it is necessary to cut away a considerable portion of Stepper Point, and to widen the bar ?—Yes ; but if we cannot have both, let us have the cutting away the point. Give us that. It would be an immense advantage.

9906. That would be the first point ; but even if that were cut away the dangers which masters so much dread would still remain ?—No ; because they would have the true wind.

9907. But still they would not have a channel more than sufficient for two to come in abreast ?—Two or three ; something of the sort. It would not be sufficient for 13 to get into safety at once, and come to anchor. I have frequently seen six get in, although they may run foul of one another when the weather is bad.

9908. Then when there are six running in, is there not a good chance for the whole six to go on the Doom Bar?—Perhaps those belonging to Padstow would know the coast, and let go their anchors.

9909. But if they got foul is it not almost certain that they would be driven on the Doom Bar ?—No; a Padstow man knows how to come in, and always will come in.

9910. But if they get foul, what then?—They let go the anchor. Strangers keep too far off, from want of knowledge how to enter the harbour. That is how many are lost.

9911. Have you given consideration to the question of a harbour along the whole line of coast ? Say that one harbour only is to be made between the Land's End and Hartland Point, which is considered the most dangerous part of the Channel, do you think that St. Ives or Padstow should be selected ?—If you go to St. Ives it will fill the bay with sand.

9912. That is your opinion ?—Yes, I am sure of it, and I will give the reason for my opinion. The ground at St. Ives is sand, just the same as on the coast ; a sandy bottom. In a north-west gale the sea breaks very heavily, and as it breaks it stirs up the sand, and the next sea takes it up again. St. Ives Bay is sand and water together. If you make a harbour there, sand will flow into that harbour, the sand will settle, and in the course of a very few years you will have sand and very little water in it.

9913. That is your opinion ?—Yes ; I judge from the bay round Trevose Head.

9914. Then are you aware that St. Ives Bay has been silting up for the last 50 years ?—No.

9915. Are you aware that St. Ives Bay has silted up at all during the last fifty years ?—I spoke of what I know of the bay round Trevose Head. When the sea breaks, sand rises.

9916. Are you aware whether St. Ives Bay has silted up for the last fifty or hundred years ?—No.

9917. Then what you have said is a mere supposition on your part ?—It is my opinion.

9918. But is it borne out by facts ?—It is my opinion.

9919. As a harbour of refuge, which would be the most dangerous to run for, St. Ives or Padstow ?—St. Ives.

9920. You think there would be more danger in running for St. Ives in a west gale ?—Yes ; with a wind from north-west.

9921. But if there were a breakwater there, would there be greater danger in running for St. Ives in a north-west gale than in running for Padstow ?—Yes ; after you have made a harbour, St. Ives is worse to enter than Padstow altogether.

9922. We have had your opinion about the silting up, and we do not require you to speak further on that point. Say that a harbour were made at St. Ives so as to protect ships from north-west and north gales, to which St. Ives is now open, would there be greater danger in running for such a harbour than in running for Padstow ?—If you will give me the north-west point from the point of your breakwater I will give you an answer.

9923. We will say that a breakwater is run out from St. Ives Head in such a line as to protect ships from north-west gales ?—To north-east or east by south to come into the bay.

9924. It must go to the east to protect ships in north-west and northerly gales ?—Then, if a ship rounds the entrance to the harbour, a north-west gale is right on her, and with such a gale no vessel, in my opinion, would be able to get up to the anchorage. Not only that, but in running for St. Ives, if only 20 or 30 fathoms from the entrance, the only wind to take her in would drive her to leeward.

9925. But would a vessel be required to beat up in a north-west gale ?—Yes, as soon as she was able.

9926. Would Padstow Harbour be the best in north-west gales ?—No doubt of it.

9927. That is your opinion ?—Yes.

9928. Then, in your opinion, there would be greater danger in running for St. Ives Bay than for Padstow ?—Yes.

9929. Tell us why ?—A ship to run for St. Ives must close haul on the wind. A ship coming to Padstow runs before the wind.

9930. Suppose, just as she is entering St. Ives Bay, she splits a sail or carries away a spar, how can she fetch up ?—She goes to leeward.

9931. Suppose she goes to Padstow ; how does she get there ?—Right before the wind.

9932. Would she not, under similar circumstances, be likely to strike on the Doom Bar ?—You are forgetting the supposition of part being removed. Give her 100 fathoms and she would come in.

9933. Supposing she carried away a sail or lost a spar coming into Padstow, where would she go ?—Right up the harbour.

9934. Would not the Doom Bar be under her lee ?—If she got a fair wind she would run.

9935. Would she, or would she not, have the Doom Bar under her lee in a north-west gale ; yes or no ?—Yes ; but I tell you, with water above the town we have 25 feet at low water, and you would only have to remove the sand.

9936. I do not want to hear your opinion about the water up at the town. There is only one more thing I will ask you. If you had to spend half a million of money, would you spend it on Padstow or St. Ives ?—On Padstow, because it is the finest harbour that can be.

9937. (*Capt. Washington*). Do I understand that you are a sailor ?—No ; I never was at sea.

9938. As you have displayed considerable nautical knowledge, I will ask you whether you would desire to place a buoy on Ketch Point ?—The Trinity Board put a buoy there, and could not keep it there. It did not last three months before it went away on the rocks.

9939. When did the Trinity Board place a buoy there ?—Some years ago.

9940. Are you quite sure it was the Trinity Board ?—Yes ; they presented it to us.

9941. To whom ?—To the Harbour Association.

9942. How long did it remain there ?—It broke away three or six months afterwards. The thing is, that the sea is so tremendous it lifts the buoy to the full extent of the cable, sends it spinning round, and away it goes with a whirl.

9943. Can you tell us whether it broke away in three or six months ?—All I can tell you is that it was always breaking away.

9944. I understand you to say that it was given to the Harbour Association. Are you aware that the Trinity Board change the mooring chains of their buoys every six months ?—I suppose they do.

9945. Suppose the mooring chains were changed every six months, do you think the buoy would be removed ?—No ; it would not stand.

9946. From your nautical knowledge can you tell us why ?—The sea is too heavy. There was a barrel once put on the rock.

9947. Who put the barrel there ?—The Harbour Association.

9948. Has the Harbour Association any funds ?—I believe they have 30*l.* in hand.

9949. Might it not be that the chains were not large enough ?—They sent the chains from the Trinity Board. The chains were changed, but they could never keep the buoy there.

9950. Do you know where the life vessel is moored ?—Yes ; but there is no deep water there. The Ketch is shallow water. The chain is pretty long. When the sea takes it, away it goes.

9951. I think you said you were sub-commissioner of pilots ?—Yes.

9952. How many men are under your charge ?—Six.

9953. Do they pass every examination ?—Yes.

9954. Before whom ?—Before the collector of customs, Mr. Norway, and myself.

9955. Is the collector of customs a sailor ?—No.

9956. Is Mr. Norway a sailor ?—Yes ; and we have generally had the commander of the coast guard.

9957. Is there any want of lights in this neighbourhood ?—Not at present. A light upon the point would be a good thing.

9958. Which point ?—Stepper Point.

9959. Have wrecks decreased since a light was placed on Trevose Head ?—Yes.

9960. Very materially ?—Yes.

9961. Is it a good light on Lundy Island ?—I understand that it is.

9962. Is the channel at the entrance of the harbour mud, clay, or sand ?—Clay, I think.

9963. Are you aware that a bar exists between St. Ives and Ketch Point ; a bar with only 16 feet of water on it ?—No.

9964. Well, it does exist. Would it be desirable to dredge away to the depth of 20 or 24 feet ?—It would.

9965. And you think it would remain open ?—Yes, because the back water would keep it open.

9966. Is there a large amount of back water there ?—Yes ; sometimes very large.

9967. Is there a large rise of tide ?—Yes ; about 23 feet ; from 20 to 23 feet at spring tides.

9968. I see it stated in a report that there are 32 millions of cubic yards of tide which come into and go out of the harbour of Padstow at every spring tide ?—I have not made the calculation.

9969. Have you any reason to doubt that statement ?—I cannot say.

9970. However, you know that a large quantity of water as far up as Wadebridge falls and empties at every spring tide ?—Yes.

9971. You say that the scour of the back water would keep the bar clear. Is not the scour about two or three knots an hour in the spring ebb ?—It is about that.

9972. Can boats pull in and out of the harbour at spring tides ?—Yes.

9973. Do you feel sure of that ?—I do not mean in a gale of wind.

9974. Take a gale, if you like ; can a boat pull out of the harbour at a spring flood ?—Yes.

9975. In a spring ebb can a boat pull out of the harbour and pull back against the ebb ?—Yes.

9976. You still think there is sufficient scour to keep down the bar if it were dredged away ?—Yes.

9977. (*Capt. Sulivan.*) You spoke of the difficulties

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of vessels getting on the bar if they were thrown off it, first in rounding the point?—Yes.

9978. Can you state how far from the point they now meet that difficulty?—Outside the edge of the Ketch sand.

9979. If, before meeting that difficulty, from the baffling winds, they could get within the edge of the Ketch sand, would the great danger be over?—Yes.

9980. Then, supposing that from want of funds, or from engineering difficulties, these walls were not made, but the point was cut down above, would that give all the security necessary to enable vessels which are now thrown aback to get sufficiently far up to get hold of the shore?—Yes.

9981. You would then have a true wind in?—Yes.

9982. Then if the channel alluded to by Captain Washington were dredged away, would that reduce the sea rolling round the point, and make it less dangerous for vessels coming round?—No.

9983. You do not understand the question. I ask you if the 15 feet bar were removed, and the channel dredged to 20 feet, whether there would not be less danger to vessels rounding the point?—Yes.

9984. And they would be less likely to be thrown towards the Ketch sand?—Yes.

9985. If the point were cut down, would the entrance be comparatively safe in all weathers in which vessels require to take refuge in the harbour?—Yes, I think so.

9986. (*Capt. Vetch.*) How long have you been acquainted with the Doom Bar?—50 years.

9987. Have you seen any alteration in that time?—It changes now and then; sometimes higher and sometimes lower.

9988. Does it fall materially?—Not much.

9989. As far as its form is concerned, it is pretty permanent, is it not?—It extends out and in. You must recollect the sand will come in shore when the wind is off the land.

9990. You have seen it sometimes higher and sometimes lower; but, speaking generally, is there any material difference?—No; it is just the same.

9991. In a period of years you have seen it pretty constantly?—Yes.

9992. Did you ever consider how the accumulation of sand could take place there?—It was thrown in upon the coast. All sand comes in at different times. In some of the bays I have known the sand swept completely out by north-west gales. When the wind gets to the south, and off the land, the sand comes in.

9993. Taking the general feature of the bar, is it materially different from what it was when you first recollect it?—It has altered now and then; now higher, and then flatter.

9994. Then its extent and position must be owing to natural influences?—Yes.

9995. The wind driving the sand in, perhaps, and the tide driving it out?—It is the fact that it is sometimes higher and sometimes lower.

9996. Nevertheless it seems fixed by nature in its present position?—Yes, it has been fixed in its present position.

9997. Do you think, supposing that natural influences have constructed this bar, that it will all be removed by the construction of these guide walls?—Part of it will, no doubt.

9998. You think by making these two rubble walls up to low-water mark you will get a good harbour, and the Doom Bar will be removed?—Every fathom which you remove from the bar is of great consequence to the harbour, there can be no doubt of it.

9999. And can you see any certainty that such an effect must follow their construction?—I have no doubt it will, because nothing but back water will operate upon the sand at all.

10,000. Would that materially increase the back water?—You would have a better scour.

10,001. But it would not increase the back water?—No; it would only throw it on a certain point, instead of its coming out over the Doom Bar. It would throw it on the point.

10,002. And you conceive that the quantity of water which now flows over the Doom Bar at the time of high water, being then thrown into the channel, would be sufficient to excavate this large channel, and to maintain it?—Yes, I have no doubt of it.

10,003. (*Mr. Coode.*) What do you consider the greatest improvement that can be made in Padstow Harbour?—Cutting down the point, and widening the entrance.

10,004. You speak of two; but of those two which should you prefer?—To cut the point down.

10,005. Are you aware of the extent to which it is proposed to remove the point?—I am.

10,006. Are you satisfied that it would be sufficient to give a true wind into the harbour?—Yes.

10,007. You are satisfied of that?—Yes.

10,008. Do you not think the baffling wind inside Stepper Point is the source of many casualties?—Yes.

10,009. And more particularly to strangers?—Yes, more particularly to strangers.

10,010. When you speak of the removal of the Doom Bar, do you mean the whole, or only a portion?—The outer edge.

10,011. To give greater breadth to the channel?—Yes, to give greater breadth to the channel.

10,012. Have you ever known vessels get foul of each other in attempting to get into the harbour?—I saw a brig once lost in consequence of a vessel lying at the rings. A vessel came in that lay at the capstan and ring on the rock, and got warped to the ring, and anchored there. A brig came up round to the point, and when she saw the sloop in the way she took the circuit of the bay, and came to anchor off Hayle bay; and there she rode very well until near low water; as the tide ebbed away the sea broke further out, and the consequence was that just before low water the sea broke directly on her; she parted both anchors, came round to Stepper Point off Hayle bay, and went ashore.

10,013. Were many lives lost?—They were all drowned but one.

10,014. Do you remember how many?—Six or seven.

10,015. What induced the brig to put about?—She could not come in.

10,016. You said she attempted to enter the harbour?—She did; and when she saw that one vessel in the roadway she fancied there was not room for her to go in, and bore away for Hayle bay; she did not go into the harbour. During high water she rode very well.

10,017. Was that a Padstow vessel?—No; she came from Ireland.

10,018. And you think that if the channel had been wider she would have come in?—She would have come in.

10,019. What do you consider is the least amount of additional breadth which should be given to the present channel?—I cannot tell exactly; it is impossible to say.

10,020. Referring to that buoy on the Ketch, does the mooring drag, or do the chains break?—The chain breaks.

10,021. Upon every occasion?—Upon every occasion.

10,022. Was it a mushroom anchor, or a mooring block?—A mushroom, I suppose. It was a square lump of iron.

10,023. Do you know anything of this Padstow association?—Yes.

10,024. Are you a member?—I am.

10,025. How long have you been one?—From the year 1829 or 1830; from the commencement.

10,026. You heard the evidence given by the last witness as to the object of the association?—Yes.

10,027. Was that a proper description?—Yes; to save life and property from shipwreck.

10,028. Can you tell us the number of lives which have been saved by the direct intervention of the association?—We have saved several vessels.

10,029. Can you give a return showing the number of lives that have been saved?—I dare say we can.

10,030. Are such associations common in the parts along this coast ?—No, not generally.

10,031. Do you know of any that has been established solely to save life and property ?—No, I do not.

10,032. No local association with the same object ?—No.

10,033. Can you state the amount of money expended by the association since its formation ?—I will find the particulars, and furnish them.

Mr. NICHOLAS HORSEWELL examined.

10,034. (*Chairman.*) What is your occupation ?—Fishing, and working about the quay.

10,035. And are you a pilot ?—Yes, I was.

10,036. A Trinity pilot ?—Yes.

10,037. What was the district for which you were licensed ?—For Padstow Harbour and within 10 leagues.

10,038. Have you been present during the course of this inquiry ?—No ; I have not been here all the time.

10,039. What have you to say to the Commissioners as to the advantages of improving this port ?—It is my opinion that all you cut away from the point will give a true wind in with the wind north-west.

10,040. And from your experience as a pilot do you consider that a much larger number of vessels would come here if the facilities of access were greater ?—That is a certainty.

10,041. Do you know from your own knowledge many vessels which have refused you as a pilot because they would not come in, thinking the port too difficult ?—I have known hundreds that have come in by themselves after having refused a pilot.

10,042. Have you known many vessels refuse a pilot because they would not come in ?—I have known many who have refused pilots that got on the Doom Bar and have been lost.

10,043. Therefore you would be disposed to say that if vessels were more careful in taking pilots fewer wrecks would occur on the bar ?—There would be less wrecks, to a certainty.

10,044. (*Mr. Lindsay.*) Do you think there is a great risk in running for the harbour now in heavy north-west gales ?—There is a risk attached to it, because in heavy north-west gales a pilot cannot get out.

10,045. Is there a heavy sea from Stepper Point across to the Ketch ?—A very heavy sea. I have seen a boat knocked over the stern of a ship there.

10,046. Just as the ship was rounding the point ?—She was over on the Ketch ; she did not come close enough to it.

10,047. Did she go ashore ?—A man was thrown down, and his thigh was broken.

10,048. Considering what you have seen, do you think there is great danger in taking the harbour ?—There is not so much sea if you come closer to the point.

10,049. The distance from the shore to the Ketch is 80 fathoms, is it not ?—She must have been half a mile from the point when the sea struck her.

10,050. Half a mile from Stepper Point. Do you mean in an easterly direction ?—East-south-east when the heavy sea struck her.

10,051. Then, unless the Doom Bar can be removed altogether, there will still be great danger in running for the harbour in a heavy north-west gale ?—If there could be any of it removed it would cause it to be much better, because the further you are off the truer you would carry the wind in.

10,052. You say that the wider the channel the less the danger ?—Yes.

10,053. But unless the Doom Bar were removed there would still be that dangerous bank under a ship's lee in a north-west gale ?—Yes.

10,054. Did you ever go to St. Ives ?—No.

10,055. Did you ever take a vessel into St. Ives ?—No ; that is not our district. I have been there a number of times.

10,056. Say that a harbour was formed at St. Ives to protect ships in north-west gales, would you have any hesitation in running for it ?—I would sooner run over here.

10,057. Do you think there would be less danger ?—Yes.

10,058. Even as Padstow is now, you think there would be less danger in running here than in running to St. Ives, if a breakwater were at St. Ives to protect ships in north-west gales ?—I would sooner run for here, particularly if the ship were any way disabled.

10,059. Tell me why you would prefer to take a disabled ship into Padstow ?—In the first place, in going to St. Ives you would have to haul up four points to get into the breakwater, and when you came in there would be the wind abaft the beam.

10,060. That is one reason ?—Yes ; and I have known a vessel carry away both topmasts, and have her starboard main braces hove in, and still she came in here with a heavy gale from north-west and west.

10,061. Into Padstow ?—Yes. She brought up with a very heavy sea ; but there happened to be a person on board who knew the place. She had a rope handed her from the capstan house, and she was safe in half an hour.

10,062. Was the wind north-west at the time ?—North-west and west. If she had attempted St. Ives as she was she would have been lost to a certainty.

10,063. She would not have found shelter as St. Ives is now ?—She would not have got safe in out of the sea.

10,064. Then if you were caught by a gale of wind, more particularly if you were in a disabled ship, is it your decided and conscientious opinion that you would rather run for Padstow, even with all the dangers described of the heavy sea which breaks across the entrance, than run for St. Ives ?—Yes.

10,065. (*Capt. Washington.*) Do you think it would be desirable for a buoy to be placed on the Ketch Point, if it could be held there ?—It would be of no service at all.

10,066. Why not ?—I know a Dublin steamer that came up one time to Trevose Head, and thought to go to the east of the buoy. As the buoy was placed there was nothing to be seen but broken water between the point and the buoy. The consequence was she went to the east, and the sea went clean over her paddle-boxes.

10,067. All because one vessel made a mistake in passing on one side of the buoy instead of the other, you think all other vessels ought to do without a buoy ?—I have known many make that mistake.

10,068. Are the shoals in the Bristol Channel buoyed ?—Generally they are.

10,069. Are you acquainted with the Bristol Channel ?—I think there are more buoys now than there used to be. I have not been there for 20 years.

10,070. How many buoys are there that you know of ?—There is one on the Scarweather Bank.

10,071. If buoys are useful on other shoals, why not on the Doom Bar ?—Because the sea breaks over Stepper Point, and there is white water from that to the buoy. Vessels consequently consider they must go to the east of the buoy, and they get into difficulties.

10,072. In north-west gales does the sea break right across the harbour ?—Right across.

10,073. Is there a shoal off Stepper Point ?—There is, about 80 or 100 fathoms off. That was caused by cutting away the point ; the rubbish got there.

10,074. Was the rubbish from the point thrown into the channel ?—There was some.

10,075. Where was the rest taken ?—Out to the back.

10,076. Do you remember the year when that point was cut down ?—I think twelve or fourteen years ago.

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10,077. What is the nature of the bottom in the channel ?—Blue clay.

10,078. (*Capt. Sulivan.*) Even if a buoy would not stand on the end of the Ketch, do you think it would be useful to vessels if the channel inside were marked by a buoy off Capstan bollard and Hawkers Cove, so as to show strangers the limits of the two bars ?—It would be of no service whatever.

10,079. No service whatever ?—Not inside, because the sea shows you where the bar is.

10,080. Do you think that to a perfect stranger entering the port, even if the sea outside caused a mistake, a buoy inside would not be useful ?—Of course they would not do much harm, except to fishermen.

10,081. Would a buoy ride a little inside the Ketch and up the channel ?—To a certainty it would.

10,082. If the point were cut away, should you have much confidence that it would have the effect of bringing larger ships in severe weather to the harbour ?—So much of the point as is cut away, so much would vessels get further in.

10,083. And would that greatly assist all vessels coming up out of the dangerous sea at the entrance ?—Certainly.

10,084. And if that alone were done, do you think it would be of great advantage to the port ?—It would be of very great advantage.

10,085. Have you traded round the coast before you were a pilot ?—Yes.

10,086. Do you know Port Quin Bay ?—Very well.

10,087. Do coasters bound round channel take refuge in that bay ?—Very seldom.

10,088. Is there good anchorage there ?—The anchorage is very good.

10,089. Do you know the passage between Sevensouls and the island ?—Very well.

10,090. Does it allow vessels to pass ?—It is sufficient for small vessels.

10,091. Do you know why coasters do not use it more, when it affords shelter ?—There is nothing but an iron bound cliff to the leeward, so that if anything is the matter with the anchor, and you let go, you are ashore.

10,092. If a breakwater were carried from Mouls Island to the south-east, so as to shut in that corner from the north and north-east winds, would it be safe anchorage then ?—It would be safer then than it is now.

10,093. Would the passage between Mouls Island and the Sevensouls being open cause such a sea to be thrown that the harbour would be unsafe ?—I think it would.

10,094. (*Mr. Coode.*) How far do you get inside Stepper Point before you are liable to meet those baffling winds ?—With the wind at north-west ?

10,095. Yes ; with the wind at north-west ?—If in an ebb tide, and you intend to bring up, lay on all the canvas you can, and the vessel will come in 200 fathoms.

10,096. Would that be as far as the lower capstan house ?—No ; to the middle capstan house.

10,097. How far up would the vessel be subject to baffling winds, or how far up would she have to go before she got the true wind ?—At 100 fathoms she would get the true wind.

10,098. Then it is only to the extent of 100 fathoms that they are subject to these baffling winds ?—Yes.

10,099. You were asked a question with respect to the bar outside the Ketch, and you said it was owing to the rubbish which was thrown over when the bar was cut away ; are you quite sure of that ?—There are two or three fathoms of water less than there used to be.

10,100. But do you know whether it is owing to that rubbish being thrown in ?—It is considered so.

10,101. It is considered so generally ?—Yes, generally.

10,102. Did you see how the material was disposed of ; what was done with it ?—I have seen it coming down the cliff.

10,103. And going in the harbour side ?—Yes; and a vessel came ashore laden with a cargo of limestone, and that went there.

10,104. But independent of the cargo of limestone, do you believe that rubbish was thrown there from the former excavation ?—I do not know what else it could be.

10,105. It is a supposition ; you do not know of your own knowledge that it is as you have stated ?—No.

10,106. Have you ever had occasion to drop a vessel's anchor there ?—A thousand times.

10,107. Just at that particular spot ?—Yes.

10,108. What sort of ground have you found ?—No, not at that particular spot. Vessels come further in than that.

10,109. But have you had occasion to drop an anchor on that particular spot ?—Never.

10,110. Do you know whether the bottom is of stones or clay ?—Clay all the way out.

10,111. Do you think it necessary to attempt to remove the Doom Bar altogether to get a good entrance to Padstow Harbour ?—If it could be partially removed it would be better.

10,112. But it is not essential to remove the whole? If the channel could be made 200 fathoms.

10,113. What is it now ?—80 or 90 fathoms.

10,114. Then it would be better ?—Yes. The further you are to leeward the sooner you get a true wind.

10,115. Then you would not only get greater breadth, but the wind would be still truer ?—The wind would be still truer.

Mr. Archibald Hutchings examined.

Mr. A. Hutchings.

10,116. (*Chairman.*) In what way are you connected with the Port of Padstow ?—I have been master of vessels for 24 or 25 years, generally trading to this port.

10,117. Are you a shipowner ?—Yes, partially.

10,118. How long have you been a master ?—18 years.

10,119. What description of vessels have you commanded ?—From a schooner to a smack.

10,120. Never steam vessels ?—I was master once of an old steamer, up and down the river.

10,121. Are you acquainted with the subject of the present inquiry?—I suppose I know a little about it.

10,122. Will you state any opinion you may have to offer as to the advantage or necessity of improving this port of Padstow, so as to make it a place of shelter for the passing trade ?—I will answer any questions you like to put to me.

10,123. You would prefer that to making your own statement ?—I am not much of a speech man, to say much ; I may say a word or two.

10,124. To what class of vessels do you suppose this port would be useful ?—To coasting more than to foreign-going ships, because coasters hug the land, and in a north-west gale are often caught.

10,125. Are you acquainted with St. Ives ?—Yes.

10,126. Supposing a harbour of refuge were made at St. Ives, do you think additional shelter would be required here ?—My belief is that 99 out of 100 would be ashore trying for St. Ives when they might get to Padstow with a fair wind, if the true wind were made with a better channel.

10,127. You have been in and out of Padstow very often ?—For 18 years.

10,128. Are there any real difficulties for men who know the place, on account of the baffling winds ?—Yes. If you could carry a true wind you would get in ; whereas now you are very often caught, and driven out again, or driven to leeward, and can not get in.

10,129. Therefore, I understand you to say that on entering the port you have frequently met baffling winds, and been driven to leeward, and obliged to

bear up from the port ?—Yes, and have got so far to leeward to get the true wind that I have been just caught on the Doom Bar, and there lay. Sometimes ships get out again all right, but not often.

10,130. Have you a pretty extensive acquaintance with the masters of coasting vessels in this neighbourhood ?—Yes.

10,131. Can you speak as to their opinion ?—Every one expresses an opinion in favour of a central point.

10,132. Can you state to me, of your own knowledge, what is the general feeling and wish on the part of masters of coasting vessels ?—Vessels get caught in a breeze, and have to put back to the Mumbles. If there were refuge here they would come in.

10,133. Do you know cases within your own knowledge of accidents that have taken place to vessels attempting to enter the port ?—I have seen many lost, and many persons drowned. I saw a schooner come on the Ketch, and all were drowned. Another, a Jerseyman, came on, and the crew were taken out, because she was further out.

10,134. (*Sir F. Smith.*) What is the largest sized vessel that will be able to come in when the port is altered as proposed ?—A vessel of 2,000 tons or upwards.

10,135. What will be the depth of water ?—24 or 25 feet.

10,136. Then it would depend on the depth of water. How much sand is there with 18 feet ?—18 inches.

10,137. Can you make the depth of water 28 feet ?—Yes; 30 feet.

10,138. Would that be enough for vessels drawing 24 feet of water, and coming in with a gale of wind?—Yes.

10 139. Do you think it would be quite safe ?—Yes.

10,140. Supposing there were a harbour at St. Ives and a harbour here, at what other points would you recommend them ?—I do not know any other point between Hartland Point and here.

10,141. What do you think of New Quay ?—That is no place ; the water is shallow, and there is a heavy sea.

10,142. What do you think of Clovelly ?—That is no place. Ships generally get up channel if they pass Hartland Point.

10,143. Vessels outward-bound would not be able to come here ?—They would always be able to go up channel.

10,144. Supposing outward-bound vessels were to have a place on the coast of Wales, where would you say it ought to be ? Do you know the Mumbles ?—Yes ; I have had many a thrashing there.

10,145. Have you seen many vessels lying in the Mumbles ?—Yes, I have seen a 100.

10,146. Would it not be a good thing to give them some protection ?—It would not do any harm.

10,147. To which place would you apply money, supposing you had your choice, the Mumbles or Lundy Island ?—I should say Lundy Island.

10,148. Where would you place the breakwater ?—That I do not know. It is a very handy roadstead if made safe.

10,149. Why do you like Lundy Island better than the Mumbles ?—At Lundy Island you can lay afloat, but at the Mumbles you are all aground. On this account also there is danger in knocking about.

10,150. (*Mr. Lindsay.*) I understood you to say that a number of vessels put back that have been out almost to the Land's End ?—Yes ; they put back as far as the Nab. I have heard that if there were a harbour they would not go up channel.

10,151. Say there were a harbour at St. Ives, from your knowledge and experience do you think you would prefer coming to this place to going to St. Ives?—Yes.

10,152. Why so ?—Because I should fall in with the land better.

10,153. How fall in with the land ?—Trevose Head is a very good landmark.

10,154. Would it be easier made ?—It is not so far in.

10,155. But if a lighthouse were on St. Ives Head would not that difficulty be obviated ?—In thick dirty weather I would not run for St. Ives.

10,156. Should you say it was more dangerous there than here ?—I should say it was.

10,157. What dangers are there besides the stones ?—The stones are very bad.

10,158. What other dangers are there ?—There is the three oar stone. It is the stones that are the principal danger.

10,159. Are there not dangers between Trevose and St. Ives ? There are some shoals marked on the chart ?—What danger can there be between Trevose Point and St. Ives Point ?

10,160. Then there are no shoals ; no dangers ?—You very seldom hear of any vessel striking on any shoal or rock.

10,161. But are there no rocks or shoals on which vessels may strike ?—There is one rock, but it is only dangerous at dead low water.

10,162. Do I understand you to say that if a harbour of refuge were made at St. Ives a very large number of vessels would get ashore ?—I said that before they got to St. Ives, in a gale of wind, they would either founder or go ashore.

10,163. Are you alluding to that port being off the Land's End ?—I am alluding to ships caught in a north-west gale.

10,164. Why are the dangers so very great in attempting to take St. Ives Bay ?—I did not say the danger was so very great getting in. It is not after you get in, but to get there.

10,165. That depends on the position. Say a vessel was caught in a north-west gale to the westward ?—How many vessels are caught there ? Where one is caught off St. Ives 50 are caught off Padstow.

10,166. Then vessels leaving the Bristol Channel have not much chance of being caught to the westward, in your opinion ?—They have a better chance of getting to Padstow than to St. Ives. This is the centre part, where the Irish vessels generally fall in.

10,167. But is not St. Ives more in the track of vessels leaving the Irish Channel than Padstow?—No.

10,168. Do you mean that Padstow is more in the track ?—Padstow is more in the track of vessels than any other port.

10,169. Of those leaving the Irish Channel ?—Of those leaving St. George's Channel and the Bristol Channel, and of great part of those leaving Waterford and Cork. A great many have fallen in here, and been wrecked, as I have known.

10,170. You say that if the harbour were improved a vessel of 2,000 tons could find shelter here ?—Yes, or perhaps 3,000 tons.

10,171. Then before they could take the harbour it would require to be widened materially. To what extent ?—200 fathoms.

10,172. Do you think 200 fathoms a safe roadstead ?—I do not give any opinion on the roadstead.

10,173. Supposing the entrance were widened, how many ships of 2,000 tons could find shelter here ?—They could go further up.

10,174. You have not considered how many could find shelter ?—If the sand were taken away there would be room enough for 500.

10,175. That is conditionally upon the removal of the Doom Bar ?—Certainly ; if that were removed it would throw more water up channel.

10,176. Your idea is that to make it a harbour of refuge you must remove the Doom Bar ?—It would be more for coasting than for foreign vessels. Where we get one large ship we get 50 small ones.

10,177. Do you think there is any necessity for a harbour of refuge above Lundy Island ?—No.

10,178. You do not think there is ? Why so ?—Because when you get up to Lundy Island you can get away somewhere or other. You can get to Penarth, or to the Mumbles, or to King's Road, or somewhere.

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Mr. Lindsay.

10,179. Then you think a harbour above Lundy Island would not save life or property ?—It might save damage ; it would not save life and property.

10,180. Do you know Clovelly ?—Yes.

10,181. What should you think of that ?—I do not think much of Clovelly. There is very good holding ground.

10,182. Is there any difficulty in entering Clovelly ?—That would depend how the wind was.

10,183. Say the wind was from the west ?—With the wind from the west you would have a fair wind up channel.

10,184. In what wind now would you seek shelter at Clovelly ?—We can bring up there for shelter in west-north-west winds, but there is a nasty rolling sea.

10,185. A heavy sea rolls in there ?—Yes, a very heavy roll.

10,186. Then is it your opinion that if a harbour of refuge were made at Padstow this particular site would be sufficient for all the wants of the trade either of the Bristol Channel or elsewhere ?—I do not see any other in sight of it, unless you fill up the gap between the land and the Mouls Island.

10,187. Then it is your opinion, as a master of considerable experience, that one harbour of refuge is all that is necessary ?—I should say Padstow was the place to get to.

10,188. Quite so ; but you think one necessary between St. Ives and Hartland Point ; and you prefer Padstow ?—St. Ives is no place at all, in my opinion.

10,189. (*Capt. Washington.*) You are a seafaring man. How many years have you been at sea ?—About 24 years. Since I was a lad of 18 years of age.

10,190. You have heard what was said by the other witnesses with respect to the buoy or beacon on Ketch Point ?—I was not here to hear that.

10,191. Give us your own opinion whether it would be desirable for a buoy or beacon to be maintained on Ketch Point ?—I have known buoys there knocked away which had not stood long, since I was master of a vessel.

10,192. How long ago ?—Fourteen years ago.

10,193. That was the buoy maintained by Padstow ?—There was one on Ketch Point, and two in the channel.

10,194. Supposing one stood ; would not that be desirable ?—It would not bring a better channel or a truer wind.

10,195. (*Capt. Sulivan.*) You say that the vessels principally requiring refuge here are coasters ?—Yes.

10,196. Do most of those coasters know Padstow ?—Yes.

10,197. Do most of the coasters take refuge here, if they are to windward of Padstow ?—When it is safe to do so. That is not often, if it is not flood tide.

10,198. Supposing masters generally knew the place, do you consider that they could run for it in safety at present ?—No, except with a flood tide. The flood tide will bring them in in a north-west gale.

10,199. Have you ever run in in a gale of wind ?—I have come in when the hair stood on my head.

10,200. Did you ever hesitate to take the place, and keep off ?—We keep off until the flood tide.

10,201. Then for the whole coasting trade the harbour at present is sufficiently known to give them refuge ?—No ; as I said before, there are scores of vessels which go up channel, and are blown to pieces, because they will not come to Padstow, because it is not a safe place. I do not mean Padstow men.

10,202. Does a Padstow man run in, in all weathers ?—No ; not at the ebb tide.

10,203. Have you known many Padstow vessels lost ?—No; but many get into difficulties. They get on the Ketch, and get off again.

10,204. If the point were cut down, and there were a true wind as far as the upper capstan, would that enable vessels to run in which do not now ?—That is not far enough ; you ought to come to the valley.

10,205. If the vessel were brought as far as the upper capstan, would she be through the dangers of the entrance, and be able to drop her anchors in a place of safety ?—They might anchor, but it would not be far enough in.

10,206. But if they got to the upper capstan, would you consider them out of danger ?—I have known them, after they got to the capstan, get on the Doom Bar, and be lost.

10,207. To what point should you consider it necessary that the cutting down should be carried, in order to give a true wind in ?—To where there is a fall in the land.

10,208. Do you know the first bollard above the upper capstan ?—Yes.

10,209. Would that be far enough ?—I should say it would.

10,210. You would meet the steady wind there ?—Yes.

10,211. And you think if you could reach that you would get a fair wind over ?—Yes; if you get there you have a true wind to fetch up channel, and get right into the cove.

10,212. Do you know anything of the bar at the entrance, the 16 feet bar at the entrance, close to Stepper Point?—That is the Ketch, I suppose.

10,213. No. In the mouth of the channel, close inside Stepper Point, is there a bar with shallower water than the channel ?—I do not know much about that; I never met it coming in.

10,214. Did you ever sound there ?—No.

10,215. (*Mr. Coode.*) Have you traded much with the south of Wales; to and from ?—No.

10,216. More to Ireland ?—If you mean Newport and Cardiff, I have all my life traded there, and to other places down to Milford.

10,217. From what quarter do your heaviest gales blow ?—Generally from the north-west.

10,218. Which way do they generally first come on? —Generally by a dirty south-west wind, and then fall out to the north.

10,219. They begin at south-west, and then fall round to the north-west, do they ?—Yes.

10,220. There is a good deal of trade between Cornwall and South Wales, is there not ?—That is all the trade with the little vessels.

10,221. Suppose you were leaving Padstow, and half way across were caught in a gale from the south-west, what would you have to do ?—To run up channel.

10,222. Where should you run for under such circumstances ?—Coombe and Penarth.

10,223. Did you ever run into Caldy ?—I have been in, but not in a gale of wind.

10,224. Do any vessels run in there ?—Yes, but it is not a safe place.

10,225. Is not the holding ground good ?—Pretty good.

10,226. Why is it not safe ?—It is not safe in all winds.

10,227. Is it too much exposed ?—Yes.

10,228. Do you think that is a place which could be improved ?—No ; I do not think it could. Besides, there are not many vessels go there in bad weather.

10,229. Do you not think many might go there if shelter were afforded ?—No ; it is a nasty place to make in a gale of wind. With a north-west wind you cannot fetch it.

10,230. You said, I believe, that there was no shelter at the Mouls Island? Cannot shelter be made?—Yes; if the channel were filled up between the Mouls Island and the land.

10,231. And cannot vessels go into Port Quin Bay as easily as into Padstow ?—No; I would not go in.

10,232. But if shelter were provided there ?—It might hold a few ; but suppose it came on to blow from the east, how would you get out again?

10,233. I suppose it is sheltered from the north-west round to the north-east ?—Very little now.

10,234. But it would be, would it not, if you were to fill up between the Mouls Island and the land ?—Yes.

10,235. Is the holding ground good ?—Tolerably good.

10,236. You said there was good holding ground at Clovelly. Do vessels run there for shelter ?—No; only a few. Some that get caught.

10,237. If there were shelter provided, would many use it ?—No ; they would prefer Lundy Island.

10,238. If I rightly gathered your evidence in answer to a question about the channel, it was to this effect, that if there were a channel 200 fathoms wide at Padstow you could easily get in round the point, and there would be a large area of shelter ?—Yes; if you had a true wind.

10,239. Did you mean that it would be 200 fathoms across in reference to the place where vessels would get ?—I said 200 fathoms wide ; and if the point were cut down vessels could get into a place of safety.

10,240. But would they get into a place more than 200 fathoms in breadth ?—Certainly.

10,241. Do you mean that the channel would be 200 fathoms altogether, or 200 additional fathoms ?—Altogether.

10,242. Doubling the width of the present channel ?—And something better.

10,243. Are more lives lost from wrecks of large or small vessels on this coast ?—More by small vessels.

10,244. Can you give any instance of large vessels being lost ?—One got up to Boscastle, and there went ashore.

10,245. How long ago was that ?—10 or 12 years ago.

10,246. Was that the last occasion ?—I know of another.

10,247. How long ago ?—Eight or ten years ago.

10,248. Do you not know any case of the loss of a vessel within five or six years ?—I do not think I can name any later than that.

10,249. Then am I right in assuming that the loss of large vessels is not frequent ?—Not of large vessels.

10,250. You look to saving more lives and wrecks from small than from large vessels ?—A great many more.

Mr. Bryant re-examined.

10,251. (*Chairman.*) You wish to give some explanation of your evidence ?—I was asked a question as to the number of vessels belonging to the port of Padstow, and I said 700. I meant that more than 700 take refuge annually. The number registered is over 200. How many are owned out I do not know. There would be 700 taking refuge in the port. Captain Washington referred to an answer of mine as to the dredging away the spot at the entrance, which was misunderstood, if it is supposed that I referred to any part of the Doom Bar. I only referred to the spot which reduces the water from 20 feet inside to 16 feet over it, and the pilot who was examined supposes———

I cannot allow you to remark on a witness's evidence. You can correct your own evidence in any particular you please.

I was a party to cutting down the point. May I be allowed to state that ?

Yes.

That cutting down is subsequent to Captain Sherringham's survey of the harbour. You referred just now to the report of the Committee of the House of Commons, and you read a part of it in reference to Government grants for the improvement of harbours, and asked if there were any funds here which would be applicable towards repaying them. The harbour commissioners who levy funds in certain portions of the harbour do not receive the dues for the lower part of the harbour, where the bulk of the ships seeking shelter would bring up ; and of the number of vessels frequenting the harbour 19 are strangers to one Padstow ship. It is hardly fair, therefore, to expect the locality to stand the cost of what would be a public benefit. Captain Washington asked whether the Ketch buoy was under the direction of the harbour commissioners. It was under the direction of the association. The association and the commissioners are very different bodies. There is some confusion as to which of them the buoy was supplied to. The association was established in 1829, and the commissioners are only authorized by the act of 1844. The Ketch buoy was supplied to the voluntary association. I omitted to state that the cost of cutting down the point, which has been found of so much benefit, was very much less than 100*l*. I am desired by Captain Sherringham to say that there is one line in the plan which was not submitted to the House of Commons, and he will be very glad to make a remark upon it.

Mr. Silas Edward Martyn examined.

10,252. (*Chairman.*) This is your memorial ?—Yes.

10,253. Do you wish to read it to the Commissioners ?—If you will allow me.

Certainly.

The witness then read the following memorial :—

"The respectful suggestion of Silas E. Martyn, St. Minver, Cornwall, for the consideration of the gentlemen officers on the Royal Commission relative to the harbour of Padstow and its vicinity.

"1st. The necessity of a perpendicular building in the cove without the Boar Rock and first ring, as shown in section to an elevation of 24 feet ; the mason work by perch about 376*l*. The material to be quarried in excavation of a road to the outer capstan in line with the building (as dotted with red ink on the chart), so that a cable from the capstan to this spot may by a line be handed by apparatus to the ship running in, thereby to be secured before she be caught by either tide or flow.

"2d. The desideratum of a breakwater without the Doom Bar from the Trebetherick Bulwarks (well named some day when it prevented the sand from flowing into the harbour), taking the direction to the outer ring and building referred to, of the length of 440 fathoms or half a mile, as marked on the chart by red lines, leaving an entrance of 220 fathoms.

"3d. The accumulation of sand in this harbour being from the sea and roll from the west, it may be observed to be moving inwards at half flood close in with the bulwarks, to the bar, where, forming an eddy, it is deposited, as may be seen by the elevation of the bar southward.

"4th. It is presumed, should a breakwater be feasible and erected, that the sand from the westward will form on the back or north side to support the erection, and also on the inside or south have the effect to sluice the bar, make an open channel, and on the influx take the sand, and to deposit it in the open bay.

"Should my suggestions and corresponding evidence have weight in the balance with the sentiments of the gentlemen Commissioners in this important trust, to recommend and carry out the facilities in this harbour, or neighbouring roadstead at Pentere Mouls, it may be hailed, under the blessing of God, as "the one thing needful" to save lives and property, and prove a boon to generations yet unborn, and confer a lasting obligation on myself and friends.

"I beg to remain,

"Your obedient servant,

"Silas E. Martyn.

"St. Minver, Wadebridge."

10,254. Have you been present during the course of this inquiry ?—Yes.

10,255. Have you any statement to offer to the

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Commissioners in addition to what you have already read ?—I would refer to the building I have named. It would be in the cove at the end of Stepper Point, giving an opportunity of making a road at the end a whole cable's length from the front capstan, so that a vessel running in 40 fathoms, in proper tideway, if she could receive a line to make use of that distance further out would be hauled in in safety, because it would be 150 fathoms more to windward. At the extreme point the vessel would have a very narrow channel. If aided by a line from the house I propose, she would run up close to the west coast, and, supposing that building were there, a line might be handed so as to take a cable on board. That is the first suggestion. The second suggestion is, that of a breakwater outside the Doom Bar, and that would be the means of sluicing the point. I have seen the place now more than 60 years, and most days I am down on the Doom Bar fishing. I know the nature of the sand coming in. It settles on the Doom Bar, and raises the Doom Bar elevation to the south, whereas if a breakwater were erected there, where the red line appears on the map, the sand, instead of settling on the inside, would go outside, and give more room. I have been acquainted with the place a great many years, and I have seen a great many wrecks. Vessels struck with the sea tail away to the Doom Bar. There was the *William Pitt*, a vessel of 1,800 tons or 2,000 tons. She came in upon the bar, and came ashore, and 10 men were drowned. There was the *James Wilson*, I think, another large ship.

10,256. Have you any experience of harbour engineering personally ?—I cannot say that I have.

10,257. Have you had the opinion of anybody who has, upon the effect which your proposed breakwater would have ?—Yes ; a great number of people.

10,258. Of harbour engineers ?—I do not know about engineers. Some years ago, when the *Whiting* was stranded, a great deal was said about a breakwater on the Doom Bar, and the position in which I had put it on the map. It was then considered that if put there it would sluice the point off the bar. The *Whiting* is there now. She settled down on a point of rock.

10,259. I understand you have not had the opinion of any professional engineer as to the effect of your breakwater on the Doom Bar ?—Not any one that I can speak of at present ; but I have heard it spoken of at times by sundry people, and I believe it would have the effect which I have described.

10,260. (*Sir F. Smith.*) Are you a seafaring man ?—No.

10,261. What has induced you to turn your attention to the harbour of Padstow ?—For the sake of being of service to lives and property.

10,262. What has been your calling in life generally ?—A farmer.

10,263. On the coast ?—Yes.

10,264. Have you observed wrecks, and vessels in great peril ?—Yes ; many times.

10,265. Then it is a feeling of humanity which brings you forward ?—Yes.

10,266. And I understand your plan is, instead of cutting down Stepper Point, to put rings on the rocks further out ?—The building, I propose would be 150 fathoms to windward.

10,267. Then you give in this plan of a breakwater ?—Yes.

10,268. Have you any idea as to the probable cost of forming this breakwater ?—No.

10,269. You have not gone into that ?—No ; the breakwater would be a desideratum.

10,270. Have you any knowledge of any case at all similar to this where the effect you anticipate has been produced ?—No.

10,271. (*Capt. Washington.*) I understood you to say that the Ketch Point had grown out to that lately ?—No. I saw it at low water on Sunday. It was dead low water ; and I pointed out that I had never seen the bar open so far out within my remembrance as it was on Sunday.

10,272. I do not understand what you mean ?—The Ketch Bar was open considerably further out than the second capstan at low water.

10,273. I do not understand what you mean. Do you mean that the Ketch Point has gone south ?—No. I mean that I never saw the bar so far out at the entrance as I did on Sunday last.

10,274. Have you seen a plan for improving Padstow Harbour, which has been laid on the table to-day, and is, I believe, Captain Sherringham's plan? —I have seen it in your hand.

10,275. Have you examined it ?—No.

10,276. Have you any opinion to offer with respect to it ?—I do not think it would be adequate for what is intended.

10,277. Do you remember the plan of Mr. Thomas, in 1844 or 1845 ?—I have seen it.

10,278. Did he propose a breakwater from Trebethrick across the Doom Bar ?—Yes.

10,279. Do you think that would have answered ? I think all the sand would have come in to the westward.

10,280. All comes from the seaward ?—If you mark a stone of a cwt. you will find it has gone up channel 100 yards in the course of 12 months.

10,281. The strike of the sea is very heavy ?—Yes.

10,282. Suppose a breakwater were carried out, do you anticipate the Doom Bar would be thrown up against it ?—Yes ; after it was erected.

10,283. After it was erected is what I mean ?—Yes. My belief is that it would sluice out the sand, and the sand would come back on the breakwater, and the sand on the inside likewise would accumulate against the building, and ensure the depth on the north side.

10,284. And it would widen the entrance ?—Yes.

10,285. What to ?—That is my belief.

10,286. (*Capt. Vetch.*) You have been long resident here ?—Yes ; 64 years.

10,287. Then you have been frequently looking at the Doom Bar ?—Yes.

10,288. And Hoyle bay ?—Yes.

10,289. And you have been turning over in your mind how these things could be improved and mended ?—Yes.

10,290. Are you aware that a great deal of sand is thrown up into Hoyle bay ?—Yes ; but supposing the breakwater were there I think there would be a great deal more.

10,291. Do you find that the sand thrown up in Hoyle bay finds its way towards the harbour ?—No; we can generally see it moving at half flood.

10,292. What moves ?—The sand at half flood. It comes down, and moves away south, and settles on the south side of the bar. Over the bar it is all dead sand.

10,293. Then, on the other hand, the set of the ebb tide fills the bar the other way ?—Yes.

10,294. So one force drives the sand to the south and another force drives it to the north, and between the two it settles ?—Yes.

10,295. Your object, I think, is to throw out a pier from Trebethrick Point for the purpose of preventing the sand coming in and augmenting the height of the bar ?—Yes.

10,296. If that were done, then the incoming material would no longer do so, but the ebb tide would still continue to take away some portion of the bar ?—Yes.

10,297. And under these circumstances you expect the entrance would be very much improved ?—I think so.

10,298. I can only say your observations are very valuable ?—The building on the cove seems a feasible thing, in the first place.

10,299. Then, looking at the Doom Bar as a great interruption and interference with the harbour, and believing it has arisen from natural influences, you think the best way of correcting it would be to stop the inroad of sand from without ?—Yes.

10,300. It would then accumulate in front of Hoyle bay, instead of going to the bar ?—Yes.

10,301. (*Mr Coode.*) I understand your proposal to be to cut a road towards the outer end of Stepper Point, and give greater facilities for handing cables to vessels, to enable them to be hauled in and got into the channel ?—Yes.

10,302. Do you think that would be of any service in a dark night in a gale of wind ?—It might be.

10,303. Do not you think that to cut away Stepper Point would be better ?—I do not think that it was ever intended by Providence. It was put there as a breakwater.

10,304. And I understand that the sand is harder on the other side ?—The sand is harder on the outer side of the Doom Bar than on the inside.

10,305. Where would your breakwater point ?—Between the site of the breakwater piers and the north end of the Doom Bar.

10,306. The sand there is hard ?—When you come to those shoals all is safety further up. All running sand goes up into the channel, and settles in the eddy.

10,307. Then the sand within the line of your proposed work would be more solid than on the Doom Bar ?—Yes, and supposing the breakwater were made, that channel would deepen, and vessels could find their way, in the dark.

10,308. Has the depth of the sand been tried near the site of the works you propose ?—Yes.

10,309. It has been tried ?—Yes ; 25 years ago.

10,310. Do you know how deep they went before they met with the bottom ?—I believe 16 feet, or some such thing. Some holes they bored from the boat, and some on the bar.

10,311. Do you know what kind of bottom they found ?—No.

10,312. Do you know any one who can speak with confidence as to the borings ?—I should think Mr. John Treadwin.

10,313. You said that you never saw the Doom Bar so far out as you did on Sunday. Do you mean that you never saw the point of the Ketch so far to the north ?—I never saw it so far to the north.

10,314. Do you know whether it was in consequence of the low tide, or of an accumulation of sand ?—I was down on the rock on Friday, and it was a great deal out then, but it seemed further out on Sunday.

10,315. (*Capt. Sulivan.*) Do I understand you it is travelling sand ; that it travels over the whole flat of hard sand on the Doom Bar, and falls into the channel inside ?—Yes.

10,316. Do you consider it would be swept out by the ebb tide ?—It forms an eddy on the side of the east channel.

10,317. You do not quite understand me. The loose sand is always travelling over the flat hard sand?—Yes.

10,318. Then how do you account for it that the bank is not growing inside ? Isthat sand again carried out by the ebb tide, and so is always travelling ?—I suppose so.

10,319. Is that bank growing to the southward, to your knowledge ?—Sometimes it is further in, and sometimes it breaks away. I have seen it many times higher than it is at present. I have seen vessels strike there.

10,320. (*Chairman.*) May I ask what is your age?—79 years.

The Commissioners beg me to say to you that they appreciate the motives which have brought you here to give evidence to-day.

Captain William Lewis Sherringham, R.N., examined.

10,321. (*Chairman.*) You wish to tender evidence with respect to this inquiry ?—When I was examined before the Committee of the House, my plans did not embrace a portion of the sea wall or guide wall which appears before the Commissioners to-day, and although I always contemplated that addition, I think it might be relevant to the inquiry to state the reason that it should appear before the Commissioners. I believe that there are two objects in improving the harbour of Padstow; one to improve the entrance, and the second to improve the area of inner water, so that if a vessel ran into the harbour she should find sufficient water for her anchorage, which she has not now. To effect this I think it would be necessary to remove two middle sands ; one marked on the Horseshoe Bank and the other on the Middle Ground. It occurs to me that the readiest method of removing or helping to remove the Horseshoe Bank would be to form that continuation of sea wall which appears on the amended plan before you. That was my reason.

10,322. Is there anything further that you wish to offer to us ?—Yes. I think from the nature of some of the evidence that has been tendered here that it would be a desideratum to remove the Doom Bar, and I have heard that expression of opinion in a very general sense. I ought to state that in my opinion it would be a positive mischief to remove the Doom Bar, for I think it is evident at least, to every nautical and to every engineering mind that it is the only protection that Padstow has to rely on. The Doom Bar is the natural breakwater. I am not of opinion that the Doom Bar does undergo change ; but I am thoroughly persuaded that all sand of that description does undergo some change on the surface. But the absolute contour of the bank does not undergo any appreciable change whatever, and therefore my object in the construction of these guide walls is to confine the tide in the natural channel of the harbour, and to prevent any diversion of the back water. My reason for striking short to those small swashways on the east which are the termination of my wall was that when any great portion of ebb flows from those swashways, and finds its way into the channel, it is generally about the upper bollard, instead of being used as a useful agent for keeping the channel clear. And therefore I propose in this wall that it should have the effect, not only of preventing the return of the water from those swashways when it could be more usefully employed, but also of really projecting the tide over the opposite side, where there is already the natural scour for the ebb. I enter into no opinion as to the possibility, the facility, or the capability of building a wall at all ; but I see no reason why it should be impossible, for this reason ; I asked for borings to be made, which I think were made at a place marked on one of these plans ; we found at one of those borings, I think the upper one, a hard substance, whether indurated sand I am not prepared to say, at a boring of two feet. Now I apprehend that the Doom Bar is at present up to a certain extent a scouring power, and that is clearly manifested if you come to the narrow throttle, where there is deep water. Probably, as you have strengthened or narrowed that channel so you have found deep water just down to the town of Padstow. I therefore conclude from that throttle or narrow part there, that if you continue the scouring power there is every probability, by the assistance of those means, that without dredging you would deepen the middle of the Middle Sand, which would give valuable anchorage.

10,323. You have had many years experience of Padstow harbour ?—Not many years experience of Padstow ; I was one year only at Padstow.

10,234. (*Sir F. Smith.*) I believe, Captain Sherringham, you are the author of a project of cutting down Stepper Point ?—I believe I was the first who suggested it, and the section on the table is my original drawing.

10,325. Do you decide as to the exact distance to be cut down, or do you leave that an open question ?—I leave it an open question ; but this I am quite sure of, that exactly in the same amount as you reduce that point are you likely to get the true wind ; and I

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believe, at all events, you will ensure the true wind sufficiently to put any ship in safety.

10,326. We have heard a proposition for forming a road along Stepper Point, so as to throw a hawser from the extreme end. Do you think there is any merit in that?—No doubt there is anything to prevent her from breaking off to leeward she is safe, whether she warps up or is towed up. The effect is the same. But I think the great problem is, whether that is a sufficient amount of improvement which a few shillings will do at any time.

10,327. The guide walls are proposed by you with a view of improving the present passage, or keeping it as clear as it now is?—It is to improve the present passage, to improve the upper reaches, and to use every means of draining off the flood tide.

10,328. Do you imagine that that would tend to deepen the water?—I think there is very little doubt of that. I believe very great advantage has been found in the Tees, where the water has been deepened considerably by that means.

10,329. Do you think the walls would tend to remove these two banks, or must you dredge them?—I think they ought to be dredged, for this reason; what would otherwise take two years might then be done in one.

10,330. No doubt there is great force in your observation that the Doom Bar is a natural protection, but do you not think that an equally good protection would be afforded by the breakwater proposed by the last witness?—No; I cannot say I do. There might be a breakwater to break the water, no doubt; but I do not see why you require that breakwater when there is an area of dry sand which is already one.

10,331. On the supposition that the Doom Bar can be removed, would you not have a larger area of anchorage?—No doubt.

10,332. Would not that be an improvement? If the breakwater were to get rid of the Doom Bar, would there not be a large and spacious harbour?—That may be questioned. In heavy north-westerly gales, and in any gales at an open port, I think it a very dangerous thing to bring the sea home to your entrance, and run for that entrance; and it will be a question how narrow you intend to make the channel. My impression is, that if you left open something like 25 fathoms for the entrance, and you really suppose you have removed the whole Doom Bar, and brought it to an available depth, you would have a very heavy sea in the basin.

10,333. Would not that objection apply to many other harbours of refuge or proposed harbours of refuge?—No doubt it would.

10,334. (*Mr Lindsay.*) You have had very considerable experience in surveys round the whole of this coast?—Yes.

10,335. It has been stated to us that the most dangerous part of the coast is from Land's End to Hartland Point. Do you believe that is the case?—Yes.

10,336. Say that a certain amount of public money were placed at your disposal, and the object in view was not the local traffic in any particular place, but the saving of life and property, and the giving facilities to commerce, in which the whole public, to whom the money belongs, would be interested, at what particular port within the line of coast I have named would you expend the money?—That is a wide question.

10,337. Allowing it to be a wide question, what do you say?—If you mean for the local trade——

10,338. No. If the public money were to be expended on public grounds?—If it is merely to be a refuge for distressed ships, and kept to that point only without having reference to any other, it would be difficult to point out any position in the channel between Hartland Point and the Land's End for a national harbour or sheltered roadstead. But I do think it very important that there should be large harbours upon the threshold of all the great channels, and therefore there is no doubt that if a harbour was constructed at St. Ives it might really be a very valuable roadstead; but I do not think that large ships, either coming down the Irish Sea or coming out of the Bristol Channel, would be likely to be found embayed anywhere between Hartland Point and the Land's End, where it would be necessary for them to use the roadstead. I believe that no man in his senses would allow himself, if he could possibly help it, to be caught down on that coast. But I do think that for merely local trade, whatever harbour you make at St. Ives,—I mention St. Ives because it is a matter of history that St. Ives is a site proposed,—I believe that whatever harbour, and however valuable a harbour, you make it, St. Ives, the value of which I will not dispute at all, for I think it will be very valuable, it will not in any way obviate the necessity of improving a harbour in the bottom of the bay where Padstow is now situated.

10,339. You mean for the local and coasting trade?—Yes.

10,340. Do I understand you to say that the only point between Hartland Point and the Land's End suitable for the construction of a national harbour for all purposes is St. Ives Bay? Is that your opinion?—Yes, I think so, inasmuch as it embraces a large area of deep water. I offer no opinion on engineering points at all. I think St. Ives will be a most valuable harbour.

10,341. Then do you think any expenditure at this place would make Padstow a harbour of refuge, in the sense which I mean; that is to say, a harbour to receive vessels of all sizes at all times of the tide?—No; I do not think you would ever make it a harbour for any ship of the line.

10,342. You are aware that my question is, to make it fit to receive vessels at all times of the tide. Would any amount of expenditure do that?—I am not prepared to say that it would. I am rather disposed to think that it would not.

10,343. Then the substance of your evidence I understand to be this, that for the sake of the locality and the coasting trade it is desirable that something should be done for the harbour of Padstow?—Most decidedly.

10,344. (*Capt. Washington.*) Following up the last question put to you, are you aware whether it was the opinion of the last hydrographer of the Admiralty, Sir F. Beaufort, that it is a most desirable harbour to improve?—I know it, because he made a minute, and that minute is published; and I know it also from himself, for he has frequently written to me in that semi-official style which you know, Captain Washington, is the usual mode of communication between the hydrographer and officers under his command, and which is no state secret. He has frequently written to me to this effect:—Dear Sherringham, sooner or later we must consider Padstow, and therefore, however necessary and desirable it may be to have the whole coast of Cornwall surveyed, it is my desire that you point your attention first to Padstow, and furnish me with a chart.

10,345. Was the plan now on the table the result of that desire on the part of Admiral Beaufort?—It was.

10,346. I observed that you laid great stress on a harbour of refuge being placed at the bottom of the bay. Is it your opinion, after years experience, that a harbour of refuge should be placed on a salient point or in the bight of a bay?—I can only repeat the evidence which I gave before the Committee of the House of Commons, that that harbour of refuge is most efficient which can meet the greatest number of casualties; and I understand by a harbour of refuge really that port where a distressed ship that is not able to keep the sea can with the greatest amount of ease run for safety. From that it appears evident that a harbour of refuge cannot be placed at the entrance of a bay, because if a ship once misses, which they will do, as you know as well as I do, after she passes it the run of the bay prevents her from hauling round, and she goes to leeward. The tides are very strong

round the end of a bay. They generally meet there, and run very rapidly, but as the bay opens they tend in, really to take the line of the coast; and therefore a ship not well conditioned is very likely to be brought under the influence of that indraft. If she is under the influence of that indraft, it appears manifest to my mind that she has a greater chance of making the harbour if it is at the bight of the bay than if it is at the point.

10,347. To return to the plan of Padstow Harbour, which was made in 1839, have you any reason to suppose that the Ketch Point has grown to the north, or has extended since that survey was made ?—I am quite satisfied that all those spots undergo changes, and I think that must be the experience of every hydrographic surveyor. There is an instance which has occurred to my mind at Poole. There is what is called a fair-way buoy there, and they are always shifting that buoy. I have known the shoal 100 fathoms inside the buoy. Sometimes it is really desirable to mark every point of shoal; and I have drawn the attention of pilots, and of commissioners of ports, to the fact, that it is most necessary to watch closely the scour of those points where we may conclude the sands are always undergoing change.

10,348. I would ask you further whether you consider it desirable to place a buoy on the Ketch or on the point ?—There can be no second opinion, on the point. The clearer a danger can be defined, the greater is the advantage to the vessels navigating; and whether your buoy stood or not, whether it is washed away, as the buoy here has been, or not, be the cost what it may, I should be very pleased to see those dangerous shoals properly marked. I am thoroughly persuaded that if the buoys laid at Portsmouth were removed, with all their local knowledge not three gentlemen at that table could find their way into Portsmouth Harbour.

10,349. Would you extend the same remark to Liverpool, the Thames, and all channels where it is necessary to lay many buoys to mark out the shoals ?—Under certain circumstances, in those channels where there are a number of steamers travelling there across the banks, it becomes a question whether you have greater advantage than disadvantage in buoying the channel; whether the advantage overrules the danger of steamers fouling, but as a general rule I should say, mark your channel.

10,350. You anticipate that these guiding walls would give a greater scour ?—Most assuredly. I do not think there can be a second opinion on the point.

10,351. Is there a large amount of back water in the harbour ?—A very large amount.

10,352. And applicable for scouring ?—As you have stated, there are 33 millions of cubic yards of tide passing in and out at every spring tide.

10,353. What is the rate of the ebb ? Have you measured it ?—Yes; the strongest tide I could record was $2\frac{3}{4}$ knots an hour.

10,354. Then a large amount of the ebb must escape over the Doom Bar ?—No doubt of it.

10,355. Can you mark the datum on which you took these soundings on the chart ?—You have it in the office. I think it was the stone pier of Mr. Treadwin's yard.

10,356. (*Capt. Sulivan.*) Suppose that from any engineering or other causes the walls could not be erected, do you think that for the passing trade it would be a very valuable improvement if the point were cut down as far as the upper capstan ?—No doubt of it.

10,357. Do you think it would make it so much safer that vessels not very well accustomed to the place would be induced to take it who do not enter it now ?—Yes, I think so.

10,358. Would a vessel be able to fetch up sufficiently to do away with the danger of being thrown on the Ketch ?—Yes; I think she might. There are very few channels wider than this. I know very few wider tidal harbours. Certainly not the Tyne, or the Wear, or any of those rivers. There are very few harbours with that depth and width of available water in the channel.

10,359. Do you know anything of the nature of the bar at Stepper Point ?—No doubt it is sand. It is natural. The moment the stream has got rid of the scour, and the tide slackens, it deposits.

10,360. And the stream meets the swell round the point ?—Yes; it meets a swell round the point.

10,361. If so, would it not silt up again if dredged ?—I have no doubt that nature would resume her work, but I believe it would take time to do it; and I think dredging, a very small operation, if necessary.

10,362. Would you advise that the west bank of the Doom Bar should be more buoyed ?—Yes; the whole channel up.

10,363. Have you any doubt of a buoy standing well inside the Ketch ?—There is no reason why it should not.

10,364. With reference to the depth of the bay, do I understand that observation to Padstow, because of the bight of the bay ?—I mean it generally. The question was put to me generally.

10,365. With reference to Padstow, do you think there is very little difference in the depth of the bays of Padstow and of St. Ives ?—Is not Padstow the centre point between Bude Bay and Cape Cornwall ?

10,366. But Trevose Head outside projects quite as much as the point of St. Ives, does it not ?—It depends on the way you draw your line.

10,367. Take your line from Hartland Point to the Three Stone Ore Point ?—But if you take St. Ives you may go into Padstow, for here is the point for St. Ives, and there is the point for Padstow.

10,368. Do I understand you to say that you consider Padstow to be in the depth of the bay ?—I do. Whether it is a deep bay or not is another question.

10,369. Suppose a breakwater at St. Ives projected south-east from the head, would there be any difficulty in vessels taking it in north-west and north gales ?—That is a question very difficult to answer. I believe there are no north-west gales which would bring a vessel home to the entrance of your harbour. I know nothing about the plan of St. Ives, because I did not see it. Show me the plan, and I will give you the best opinion I can on the effect. But I see no plan; and I would rather not enter into the discussion of a plan which I really do not know.

10,370. (*Mr. Coode.*) I know you take great interest in all that concerns the surveying service. Perhaps you will tell us whether you have seen a chart made prior to yours ?—Yes; by the late Lewis Morris; and surveys by W. Mackenzie.

10,371. What is the date of Mr. Morris's chart ?—I think it is 1786.

10,372. Do you consider him an accurate surveyor ?—I cannot say that he was an accurate surveyor. No; I should say decidedly not. I happened to go over the ground where there were no alterations, and I did not find him accurate. But I think the chart was very creditable for the means he had and the state the science was in at the time.

10,373. Did you find any material difference in the Doom Bar as laid down in your survey and in his chart ?—Not in the contour, but he did not show the depth over it. Although the figures do not appear, I sounded the Doom Bar with the same accuracy precisely that I did the channel.

10,374. Do I rightly understand from you that there is no material difference ?—I think not. You have the channel in the same place.

10,375. The idea of the removal of Stepper Point originated with you. Did you suggest the extent to which it should be carried ?—Yes; I marked it on this plan.

10,376. It was your own plan ?—Yes; you have my section.

10,377. Did you determine by the experience of others where the baffling winds ceased ?—I took the

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opinion of every person of local experience, as I was bound to do when I drew the section. The longitudinal section of Stepper Point does not carry cutting further in, because I thought that would place ships pretty nearly in safety. But I quite own the great advantage of taking it further in. I think it would be a great improvement.

10,378. You speak both from your own experience and from that of pilots and others whom you know ?—Every opinion I gathered; but having so frequently run in myself in small vessels, and under circumstances of heavy gales, I can speak of my own knowledge. I have heard the evidence, and it is quite true that running in in a heavy gale of wind in a heavy sea breaking over the Doom Bar there is some danger. The difficulty they talk of arises from a danger of nervousness preventing masters of ships from approaching the rocks off Stepper Point sufficiently near. But I am persuaded that if you have sufficient nerve to scrape those rocks, you may get considerably further up. These people do not do it; in fact they give Stepper Point the berth which they ought to hug, and they get into danger.

10,379. If that is the case, do you not think instructions should be laid down in all the public charts ?—Yes ; it is in the directions.

10,380. But do you not think that many men consult a chart who will not turn to directions ?—I am really afraid that, lay down what rule or law you will, most men will be guided by circumstances in running in, and will not stop to consult directions or a chart.

10,381. But as the object is to convey to all these people the information that they should hug the west shore as closely as possible, do not you think it would be better to put it on the face of the chart, so that every man should see what he ought to do ?—That cuts two ways. Exactly in proportion as you hug the rocks, you find the wind baffles you, and so the further off you can keep in safety the better the chance of having a true wind.

10,382. But I thought I understood you to say that you ought to hug so closely as just to scrape the rocks ?—No doubt.

10,383. Then if you ought to hug the rocks so closely as to scrape them, would it not be wise to put that instruction in the chart ?—There can be no doubt that so it is.

10,384. You consider Padstow harbour desirably situated with reference to the bay from Hartland Point to the Land's End ? Should you not think the bay to the east, where the "Mouls Island" is situated, equally well placed, supposing a harbour could be made there at a reasonable cost ?—No, I do not.

10,385. Will you state your objection to that bay ?—I think if a ship is running into a bay of that kind, although you throw out a breakwater, the breakwater will not prevent the run of the race. It may break it, but you will have to run on shore ; and I believe that if you drop your anchor, and she did not at once bring up, there would be nothing for you on an iron-bound coast. Therefore I should say, as a nautical man, that nothing is more dangerous than forming harbours on iron-bound coasts like that as safe places for ships to run for where there is no beach to save them.

10,386. Having heard in evidence that there is capital holding ground there, do you not think it possible to provide sheltered anchorage in Port Quin Bay ?—Suppose the anchor went down foul, what would be the use of good holding ground ? Suppose it did not drop on the peak ? These may be extreme cases, but they are cases in point.

10,387. Suppose a vessel running for Padstow harbour lets go her anchor, and it does not hold, would she go ashore on Gun Point ?—I think she would be quite safe.

10,388. Are there no rocks there ?—It is quite safe. The north-west wind would not drive her upon them.

10,389. With any wind north of north-west ?—I should be sorry to pledge my word to that.

10,390. Are not the rocks there as hard as they are at Port Quin Bay ?—No doubt ; but if she were on the rocks she would be perfectly safe. She would always be lashed alongside.

10,391. Suppose a wind from north-north-west and north, and high water, would a vessel be safe on the Gun Point ?—It is difficult to say if you put a ship on a rock where she will be safe. I do not understand the gist of the question. You ask whether she would be safe on the rocks, and I tell you she probably would.

10,392. Did you ever hear of vessels being lost on Gun Point ?—I never heard of any.

10,393. (*Chairman.*) Were you present during the examination of Horsewell, the Trinity pilot ?—Yes, I was.

10,394. Do you recollect that portion of his evidence which related to the buoy upon the Ketch, in which he stated that from the way in which the sea broke right across numerous strange vessels had mistaken the intention of the buoy, and passed on the wrong side of it ?—Yes.

10,395. Are you disposed to attach any importance to that evidence ?—None whatever ; for if a vessel entering a harbour does not know which side of the bay to go in I do not know what you can do for her. With a chart given, and a buoy laid down, I do not know how they could mistake which side to go. I should take it that pilots would rather have no buoys.

10,396. But aware, as you must be, of the comparative ignorance of some masters of vessels, and perfectly acquainted, as he must be, with the entrance to the port in bad weather, do you attach any importance to that opinion ?—I do not think I do. I heard his evidence, and I think it was very bad evidence ; but as to that particular point I do not attach any importance to it.

10,397. Are you well acquainted with Milford Haven ?—Yes ; but I have not surveyed it.

10,398. Are you acquainted with the land about Milford Haven ?—Yes.

10,399. What opinion have you as to the land ? Is it easy to make in thick weather with the wind from south-west ?—St. Anne's is the only point, and the island of Seakum ; but of course, in thick weather, all land is difficult to make. That land is very frequently capped and clouded ; but I do not think there is any more difficulty there than in any other part of the channel.

10,400. In the evidence which we have received, it has been stated that the land about Milford Haven is particularly difficult to make in thick weather, and that the excellent harbour inside is comparatively useless as a harbour of refuge, in consequence ; will you state what is your opinion ?—I do not think so. I speak with some experience. I surveyed these shoals. Milford Haven is a harbour I have frequently run for, and I never recollect a case in which I had any difficulty in making it. No ; I should say not much importance was to be ascribed to that testimony.

10,401. It was described to us as very difficult to run for ; do you attach any importance to that ?—No, I do not.

10,402. (*Capt. Sulivan.*) Suppose a buoy would stand on the Ketch, would it be a very simple way of guarding the entrance to add on the board—"Keep close round the point inside the buoy" ?—It is done now.

10,403. But it is merely "Keep close inside the point;" would not mistakes be obviated by adding merely "inside the buoy" ?—Do you not think that if you keep close round the point you must keep close round the buoy ?

10,404. Would not that addition obviate any possibility of mistake ?—Every additional notice which you

get on entering a harbour must be of use, whether there would be any particular use in that notice, that vessels were to keep to the west of the buoy, at the same time that they are told to keep close round the point, I do not know; it might be put on the board, but I think the less you give them to read the better.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sitting at Padstow closed.

BIDEFORD.

Wednesday, 29th September 1858.

PRESENT:

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.

Mr. EVANS, Secretary.

Mr. WILLIAM YEO examined.

10,405. (*Chairman.*) In what way are you connected with the port of Bideford?—I am a shipowner and merchant.

10,406. Are you aware of the object of this inquiry?—I presume, to erect a harbour of refuge somewhere on the coast.

10,407. Will you now proceed to offer any statement which you wish to make relative to the subject of this inquiry?—Well, I think it is very desirable that a harbour of refuge, if one is to be made on this coast, should be near Hartland Point, because ships any way disabled or driven in generally keep in the latitude of Lundy Island or Hartland Point; consequently, if there were a harbour of refuge near Hartland Point, ships which were in a disabled state would immediately get into a place of safety.

10,408. Is there any particular site which you are prepared to recommend?—Ships coming up in heavy gales of wind from the south-west and west-south-west, which are the prevalent heavy gales, as soon as they make Hartland Point are round immediately, and the point forms almost a harbour of itself.

10,409. Are you prepared to name any particular part of the coast which you think most eligible?—I should think half a mile below Clovelly, or half way between Clovelly and Hartland Point. I think a pier should be carried off there which would form one point of the harbour.

10,410. Are you aware whether any plans or estimates have been framed for a breakwater at Clovelly?—There have been no estimates gone into, but there have been ideas thrown out as to the place where a breakwater should be constructed. No plans have been drawn up or estimates gone into.

10,411. Were you ever at sea yourself?—I was. I have crossed the western ocean forty-five times as master.

10,412. And for how many years were you at sea?—About 17 years.

10,413. And for how many of those years were you a master?—I was a master from 12 to 14 years.

10,414. What description of vessels did you command; of what size were they?—The last ship I had would carry about 1,000 tons.

10,415. And out of what port did you trade?—From the different ports of the Bristol Channel, and, in fact, from all the ports of the west of England, to America generally.

10,416. Ships outward-bound during the prevalence of westerly winds, that is, in winds from south-west to west-north-west, do they, in working down channel, keep either shore by preference?—They keep the south shore until they get to Hartland Point.

10,417. After they weather Hartland Point do they reach to the westward immediately?—Do you mean to the north-west?

10,418. Yes?—They do. Generally the wind comes south-west, and they cannot weather Hartland Point; they are driven up channel; but by keeping Lundy Island they keep the channel open, and are ready to take advantage of a change of wind.

10,419. And homeward-bound ships, what part of the land do they make?—They generally come in at the parallel of latitude of Lundy Island. They try to make Lundy or Hartland. If the wind is south-west they make the land above Hartland Point a mile or so; if north-west they try to make Lundy Island.

10,420. But always with a north-west wind they try to make Lundy Island; they do not go outside?—They never go on the other side unless they are obliged to go to the north of Lundy Island, but generally they go between Lundy Island and Hartland point.

10,421. Have you ever taken shelter under Lundy in strong south-west or west gales?—Yes; I was there in 1838 for three days; it was blowing very strong. The water is very deep there, and we dragged off considerably.

10,422. What do you call very deep for a ship of 1,000 tons?—We first brought up in fifteen fathoms of water, and then we could just see a glimmer of the light.

10,423. And while you lay in Lundy Roads did the wind back round to the north-west and blow hard?—No; it blew hard from the south-west and west-south-west, and then died away a calm; but all at once it went round to the east. We managed to get our anchors, but a ship which lay alongside of us could not; she went ashore and went to pieces. It was a ship belonging to Shields.

10,424. Then you have an objection to state to Lundy Island as a place of shelter?—Lundy Island is a place of shelter when you are well in; when you are close in you are protected from winds from the south-west round to north-west.

10,425. Did you state that a ship went ashore on Rat Island?—Not Rat Island. She went ashore on Lundy Island.

10,426. Is it a state of things which often happens, ships having a difficulty to get away?—If the wind shifts suddenly so that you cannot get your anchors.

10,427. And as it dies away to the south you cannot fetch out?—If the wind shifts the vessel goes ashore. The tide runs right in on the island.

10,428. You are well acquainted with the Bristol Channel, and the prevailing winds there?—Yes.

10,429. Are these sudden shifts of wind of common occurrence?—Yes. In the winter, very often it blows from the south-west, goes round to the west-south-west, and then flies round to the north-west.

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10,430. And from the north-west does it die away, and an east wind come in ?—Yes.

10,431. Have ships in an east wind a chance of getting away ?—Not generally; only sometimes. We find that the wind backs round to the south-south-east and south-east, and then you are ashore.

10,432. With the wind south-east, can you get away from Lundy Island easily enough ?—Yes ; you can fetch away.

10,433. Do you know Milford Haven ?—Yes.

10,434. What sort of a place is Milford Haven to make in thick south-west weather ?—It is a very blind place ; it is generally very thick. I was there once with a ship so close in that we caught a glimmer of the light, and we rounded more from chance than from anything else. It blew so very heavily, and the weather was so thick, that we saw nothing until we were alongside the lighthouse. It is a very blind place to make with a wind from the south-west.

10,435. Then you are of opinion that there is a difficulty about the use of Milford Haven as a harbour of refuge, from the difficulty of making out the land ? —There is no doubt great difficulty. In fact a man, unless he knows well where he is, is in great danger in running for Milford.

10,436. Why ?—If you should happen to go a little to the east or the west in your calculations, you get in among swells and islands there. If you are a little to the east, you get embayed round at St. Gowan's Head. Sometimes, in thick dirty weather, you can get no observations, and you are bound to go by the log.

10,437. Do you know Penarth Roads ?—I do.

10,438. What kind of anchorage is that ?—The anchorage is very good in the roads, but it is very narrow for large ships. If a ship drives between Penarth Head and the grounds only a very little, she is ashore on the grounds.

10,439. But is it a place to lie in during any wind or weather, with good ground tackle ?—We do not hear of any damage ; but I myself prefer lying above Penarth Roads.

10,440. Could a harbour of refuge be made in that part of the Bristol Channel, where ships, if so disposed, could run in, drop their anchor, and lay in safety ?—I do not see any place below Penarth Roads. You must go to Penarth or the Holmes.

10,441. The holding ground all over the channel is, I presume, good ?—Not all over the channel ; it is rocky in some parts.

10,442. (*Sir F. Smith.*) Are you of opinion that harbours of refuge in general are necessary ?—Well, I think they are, in localities of this sort, where we have no harbour that a ship can run for from the Land's End to Penarth Roads ; not on the west coast.

10,443. You talk of the locality ; my question was general. Do you think that harbours of refuge are desirable for the navigation of our coasts ?—I think so.

10,444. You think they are needed for ships trading foreign ?—I think it is necessary there should be harbours of refuge in case of need, to prevent wrecks.

10,445. Are you aware that during the last five years an average of 800 souls a year have been lost in vessels along the coast ?—I am aware there are great losses ; I did not know the extent.

10,446. You think it desirable that the nation should do something to prevent that loss of life?—Yes.

10,447. Do you know the Scotch fisheries ?—I never was in the north.

10,448. Do you know anything of the north-east coast of England ?—No. My business has been confined entirely to the west of England.

10,449. Have you sailed foreign from the Severn ? —I have.

10,450. From what port ?—Bristol generally.

10,451. Have you been to America ?—Yes, many times.

10,452. What course would a vessel going from Bristol to America take down channel in favourable weather ?—We keep the south side.

10,453. Why ?—It is more clear of danger.

10,454. But have you not a rocky coast in case of adverse winds ?—Rocky, but bold on the south side. On the north side we have sands.

10,455. Can you favour the Commissioners with your opinion as to the value of St. Ives for a harbour of refuge for outward or inward bound ships ?—I do not see it would be any good to foreign-going ships whatever, because if you could fetch St. Ives the chances are you could fetch round the land, and with winds west-south-west you can fetch out along.

10,456. Supposing the wind at north-west ?—If ships have any offing, they will fetch round the land.

10,457. Do you mean round the Land's End ?—Yes.

10,458. Supposing they wished to take an opposite course ?—If you have an offing, the chances are you will fetch Hartland Point.

10,459. I am talking of outward-bound ships ?— They generally keep the Bristol Channel open.

10,460. Have you ever been into St. Ives Bay ?— Never ; I have been off it.

10,461. You do not know it ?—I think it would be of advantage to coasters.

10,462. What description of coasters do you mean ? —Do you mean vessels bound for Hayle ?—I think a harbour would be an advantage for all vessels, instead of running back to Hartland Point. It would be a means of saving life. There have been several wrecks down there.

10,463. You think that if a harbour were made at St. Ives for coasters, many lives might be saved ?— Yes.

10,464. Do you know Padstow ?—I have ships that go there, but I never was there myself.

10,465. Have you ever conversed with other shipowners about that harbour ?—I have conversed with my own masters with reference to going to Padstow, and I understand it is a place difficult of access.

10,466. If that access could be made more easy, do you think it would be desirable to do so ?—I should think so.

10,467. For the benefit of coasting vessels ?—Yes.

10,468. You mentioned Clovelly ?—Yes; I think the neighbourhood of Hartland Point, as near as you can get it, the proper place to carry off a pier.

10,469. There is no place, is there, in the bay, but Clovelly ?—No.

10,470. Can anything be done to improve Lundy Island as a place of refuge ?—No doubt it can be made a place of refuge ; but the only doubt is whether there is capacity enough for the number of ships which require protection. I have known three or four hundred ships leave Penarth Roads at one time, get thirty or forty miles towards Lundy Island, and all be driven back.

10,471. That makes a good case for a harbour of refuge at Lundy Island, if you can get one, does it not ?—Not a fortnight ago I saw 300 vessels leave Penarth Roads.

10,472. What became of them ?—They had a fair wind, and made their passage.

10,473. If they had had an adverse wind what would they have done ?—Probably they might have got ten or fifteen miles below Lundy Island, and then they would have been driven back to Penarth Roads.

10,474. Would they have hesitated to go to Lundy Island, if it had been capable of receiving them ?— Oh yes.

10,475. Do you doubt the capacity of Lundy Island ? —Yes. The tide sets right in on the island, and there is not sufficient room for a quantity of ships. Very often a great number of ships from all parts stop at Lundy Island. We have had several ships wrecked in this bay ; ships coming from Liverpool, and driven up this channel.

10,476. Then Lundy Island is available ?—Yes.

10,477. Supposing you had the disposal of the public money, and might apply it either to Lundy Island or Clovelly, to which would you give the preference, for the benefit of trade generally ?—I think I should give the preference to Clovelly, because at Clovelly you can form a harbour which will hold a whole fleet going

up this channel, or to the north, and you have a clean bottom of clay, and an anchorage of twelve fathoms into three fathoms off shore.

10,478. And Clovelly is protected from what winds? —West-north-west and west, east-north-east, north-west, and by north.

10,479. Would it be easy to get out of the harbour if it were so constructed as to have two entrances? —Yes.

10,480. You would desire a breakwater with entrances at each end, and not connected with the shore?—I should not go into matters of this kind, because I am not an engineer. I think if a pier were carried off, leaving entrances, you would have large ships go there. If there were only one entrance, and the wind off shore, they would not fetch that part, and would go to leeward.

10,481. In what depth would the pier have to be constructed?—From the race of Hartland Point to Baggy Point ten fathoms of water; at the outside twelve fathoms.

10,482. Have you ever lain in the Mumbles?—I had a ship there ten or twelve weeks since.

10,483. What do you think of the anchorage?—I was on board there myself. She was obliged to lay to until the whole land was open to the west. She was exposed to every wind except north and north-east.

10,484. Is it not a fact that great numbers of vessels anchor there?—A large number bound there anchor there.

10,485. Do you not think a breakwater constructed there as well as at Clovelly would be of use?—I do not think you can construct a harbour at the Mumbles safe for a ship to run for, because there is no great margin afforded.

10,486. Why so?—There are those sands, the Mixons and the Skerweathers, and the tide setting over the whole of these sands.

10,487. In point of fact, in stress of weather, if you were in command of a ship, you would rather take any other course than go to the Mumbles, even if there were a breakwater?—If it were blowing hard, and my ship were in difficulties, I would rather run up channel to Penarth Roads or the Holmes.

10,488. Can anything be done to improve Milford Haven by additional lights?—I do not think lights would do it, because they are obscured.

10,489. It is the foggy weather, then, which makes the difficulty?—Yes. There is no difficulty, if you can see the lights, because there is plenty of water, and it is a splendid harbour.

10,490. (*Mr. Lindsay.*) I think you said that the most dangerous winds are from the south-west, which generally chop round to the north-west, and blow very strong?—Yes.

10,491. And these are the most dangerous winds? —Yes; from south-west to north-west are the most dangerous winds.

10,492. And do the south-west winds very often back round to the north-west and blow very hard?— Yes; and in north-west winds from the Land's End to Hartland Point is a dead lee shore.

10,493. You stated that ships keep the south shore because it is clear?—They keep the south shore to Hartland Point, and then sheer off.

10,494. They do not come down towards Padstow Head?—They go down channel in the parallel of latitude 51°.

10,495. There is a large trade from the coal ports in the Bristol Channel up the English Channel?—There is a large coal trade all round.

10,496. What course do these ships steer?—They go between Lundy Island and the Longships down channel. And after that, they go right down to Longships.

10,497. Then if the wind chops from south-west to north-west these ships are caught on a dead lee shore?—Yes.

10,498. That being the case, and no harbours where they can find shelter between Hartland Point and Longships, would it not be desirable that some place should be constructed where they could find shelter in north-west gales?—Yes; I think it would be desirable for vessels which come down the coast from Hartland Point to the Land's End. These vessels are generally of a small class. If Padstow were made a good harbour, no doubt a great many of these vessels would find refuge there when the wind was at the north and north-west; but large ships always go off in the parallel of latitude 51° due west, and from that a little more south; they never think of keeping into the south coast.

10,499. You have known 300 vessels leave Penarth Roads in one tide. Do you know of any case where those vessels, after they had got out to the chops of the channel, had been obliged to put back?—Frequently I have known it.

10,500. Where did they run for?—Lundy Island or Penarth Roads; and a few that know the place will run to Milford Haven.

10,501. Would they be able to reach Milford Haven in a north-west gale at all?—No; in a north-west gale they are driven back to Penarth Roads.

10,502. Would it not be a great convenience if there were a harbour on the south coast that they could run for in north-west gales?—Yes.

10,503. What point between Hartland Point and the Land's End do you think most desirable as a harbour of refuge for such ships?—I think Padstow, if Padstow could be made available.

10,504. But if it were not easy to make it at all times with safety?—I should say the neighbourhood of Padstow, because it is half way to the Land's End.

10,505. But supposing it could not be made there, at what point would you make it?—St. Ives is a very good bay; but if ships were at all off St. Ives they could fetch round.

10,506. You recommend a harbour of refuge at Clovelly; and at the same time you say that under Hartland Point is already a good harbour during south-west and west winds?—Yes.

10,507. Why do you recommend the construction of a pier; is it to protect it from the north-west?— I think a pier should be carried off to protect it in north-west winds.

10,508. But in north-west winds could vessels not find good anchorage under Lundy Island?—The anchorage is not good under Lundy Island.

10,509. Is not the water smooth there in north-west gales?—If you get very close in you get an anchorage, but not a good anchorage. I have a vessel which lost both cables and anchor. The anchorage is not good; not like the anchorage at Clovelly, which goes out gradually. At Lundy Island it is of a shelvy nature. Very close into the rocks at Lundy Island there is good anchorage, I have been told, but I was never there myself.

10,510. Supposing, for instance, there were only one harbour of refuge to be made between the Land's End on the one side of the Channel and King's Road, and between Milford Haven and Penarth Roads on the other side of the Channel, and supposing it were left with you to decide where the public money should be spent in the construction of that one harbour, and you had to consider not merely the trade of the Bristol Channel but the trade of England generally, the trade frequenting the Irish Channel going to Liverpool and bound round the Land's End, and all the trade bound south,—taking all these points into consideration, at what place do you think the construction of a harbour of refuge would do most to save life and property? —I should say that harbour should be made near Hartland Point. I would say Lundy Island, if it were at all capable, as Hartland Point is, because vessels generally make Lundy Island with the wind at north-west; and if Lundy Island had the capacity which Clovelly has, I would make the harbour there directly; but, as I have stated, there is the tide setting down very fast, which would make a pier very expensive; and there are tremendous gusts off the high land, so that there would be a difficulty in getting into the harbour; and

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likewise for letting go anchors such a bottom is unfit. There is no difficulty, in my opinion, in bearing up to Clovelly Bay. I would carry a pier out at Clovelly, to protect from the north-west, giving an entrance to the north, and another pier in front. Then the whole bay would be a harbour. You would then have a sufficient harbour for all the ships which go into the channel, and a place which any ship could run for in stress of weather, whether disabled or not.

10,511. If it were left to yourself you would choose somewhere in the neighbourhood of Hartland Point ?—I would.

10,512. But with the wind coming round to the north-east would ships entering a harbour constructed in the way you propose not find a difficulty in getting out ?—You should have an entrance at the west, and then they would fetch out to the east, because you would have a large bay and deep water. You would have three or four miles of a bay.

10,513. But such a plan as you point out would be a very gigantic one, would it not, and a very expensive one too?—The expense would not be near so much as forming a harbour of refuge either at Lundy Island or the Mumbles, because you would not have to carry it such a distance, and it gradually deepens ; for a long way off you would be in 12 fathoms of water.

10,514. (*Capt. Sulivan.*) You said the wind chops very suddenly from the south-west to the north-west ; does it go sometimes round to the north-north-west, and then round to the north ?—Yes.

10,515. Would vessels which took refuge in south-west winds generally want to sail with the wind at north-north-west and north to reach round the land ?—Not with the wind north-north-west. It would be a heavy sea. They would not attempt it before it moderated. They would have the whole west coast under their lee.

10,516. But with the wind at north ?—They would go directly then.

10,517. Would Clovelly Bay be dead to leeward with north winds ?—Yes.

10,518. And that is a wind they would want to sail with ?—They would fetch out of the passage.

10,519. But supposing it were blowing hard ?—A vessel could not get out.

10,520. If a ship were lying at Lundy Island, and the wind dropped round to north-west and north, would it be easy to leave Lundy Island, and reach out to the westward ?—I do not know. They would get out if there were a passage.

10,521. I am speaking now of a wind drawing from south-west to north-west, and round to north, which would be a fair wind to enable a vessel to sail. Would she go easily out of Lundy Island with that wind, and round the point ?—She would get out very easily.

10,522. Much more easily than from a harbour anywhere in Clovelly Bay ?—Yes ; but it is much farther to windward.

10,523. Have you been in the coasting trade much ?—No ; I never was in the coasting trade.

10,524. Never, under any circumstances ?—No ; always to America.

10,525. Do coasting vessels anchor often at Clovelly with south-west winds ?—Yes ; a good many coasting vessels anchor there.

10,526. Do many anchor under Lundy Island ?—Oh yes.

10,527. Which is most used by the coasting trade in south-west winds ?—I really cannot tell you. I think a good deal depends upon the local knowledge of the masters. Those who are acquainted with this bay come into this bay. Parties not acquainted with it go into Lundy Island. All parties knowing the facilities of anchorage at Clovelly come to Clovelly. I know that the Pitt pilots like to stay near Lundy Island, because it is near for boarding ships going up to Bristol, and coasters which do not know the coast well very probably prefer Lundy Island. It depends on the wind. If it is a fine wind they can bear up there. They anchor at both places.

10,528. Do small vessels in south-west winds find shelter in the Mumbles ?—Oh yes, a good many vessels, in the summer time.

10,529. In the summer time only ?—In the winter time they do not like it, as many are lost. In a gale about twelve months ago a great many were lost. It is a very wild place at the Mumbles. It is the worst place we have in the channel, there is no doubt of it.

10,530. Do you consider that when a ship has got above Lundy Island she is comparatively safe ?—Not until she is well up channel. She is not safe until she has got up to Penarth Roads.

10,531. In south-west winds, do ships bring up under the lee of Minehead ?—You cannot bring up there in a heavy gale of wind.

10,532. (*Mr. Coode.*) You spoke of the race of Lundy Island; do you know the rate at which the tide runs there ?—Four or five or five or six knots an hour.

13,533. Is that the rate of the race off Rat Island ?—Yes.

10,534. Do you know the race of the White Horses ?—No; I never was there. I always keep to the south.

10,535. Is there a strong run of tide off Hartland Point ?—Towards the point there is. The shoal rocks send the tide over to Lundy Island.

10,536. At what rate ?—Very fast.

10,537. Is it as strong as at Lundy Island, or stronger ?—About the same. It runs in between the two, comes right against the rocks, and shoots across towards Lundy Island.

10,538. Is there any danger of a ship being drawn into Clovelly Bay by the strong in-draught ?—With the wind north-west at the bottom of the bay there is little tide.

10,539. I spoke of the tide across the outer part of the bay ?—No. When the tide sets strong up, the eddy sets down, so that there is no tide in the bay, in fact, but an eddy tide.

10,540. Have you ever brought up off Clovelly yourself ?—Yes.

10,541. Did you find the holding ground good ?—I have had ships riding off there in very strong breezes.

10,542. Have you seen the material brought up on the anchor off Clovelly ?—Yes.

10,543. What is it ?—Blue clay.

10,544. Are there many fishermen employed at Clovelly ?—A good many.

10,545. Can you tell us how many ?—I cannot.

10,546. Is there frequent loss of life among the fishermen ?—There has been great loss of life among them.

10,547. Have you any facts to state as to the loss of life among the Clovelly fishermen ?—I cannot give you the minute particulars, but I know there have been a great many of them lost.

10,548. (*Chairman.*) You have an extensive acquaintance with shipmasters and shipowners in this part of the world ?—Yes.

10,549. Do you think that their opinion on this subject is pretty much the same as yours ?—I have not had much conversation with them, but I daresay some of them would be very happy to state their opinion. In fact, I had no idea myself that I should have been called before you gentlemen to give anything like evidence, or perhaps I should have been better prepared. None of those present knew until yesterday that anybody was coming here to go into this matter.

10,550. You could not be better prepared, with your long experience ?—We had no time to make any arrangement as to what was going to be done. In fact it appears that no one was here this morning to meet you gentlemen. We were not aware how matters were going. That will prove to you that I have not posted up my evidence, but what I have given is from experience and facts.

10,551. (*Mr. Lindsay.*) I see by the chart that at Hartland Point there is good shelter in west, south, and south-west winds. Going ten miles farther, I find at Lundy Island shelter from north-west winds. Going

across to the Mumbles I find shelter in opposite winds from the east. At Penarth Roads there is good shelter, and up to King's Road. You admit that there is good shelter at all these places. Do you think that any expenditure of public money at any places above Lundy Island, which includes Hartland Point, would to any considerable extent be the means of saving life and property; for these are the main objects which we have in view?—I do not think there would be any great service in saving life above Baggy Point.

10,552. I am speaking above Hartland Point. Do I understand you to say that no expenditure of public money would tend to save life and property?—I do not think it would above Morte Point, because you have got the land alongside.

10,553. I speak of the whole water from Caldy Island to Hartland Point?—I do not think anything is wanted above Morte Point.

10,554. I include Hartland Point?—I think there should be a harbour somewhere below Morte Point.

10,555. For the saving of life and property?—Thousands of lives and millions of property have been lost on or about this coast.

10,556. From your great experience of this locality, can you name any particular case where a harbour at Clovelly would have saved life and property?—There was an American ship went ashore not many months since, called the *Warden*. No doubt she would have been saved.

10,557. Where was she from?—Swansea.

10,558. Where was she bound to?—Portland in America.

10,559. How was the wind?—From the west.

10,560. Where was she lost?—Behind Baggy Point, on the sands.

10,561. How would a harbour at Clovelly have saved her, because, with the wind from the west, she could either have found shelter under Lundy Island or Hartland Point?—No. The wind was in towards the north-west, and when she reached over to the bay she was pretty well in. At Clovelly she reached out again, but was embayed, and struck; whereas if there had been a harbour at Clovelly she could have got in.

10,562. Did the ship become a total wreck?—Yes.

10,563. And were all hands lost?—No; the master and one or two more were saved; but with these exceptions all hands were lost.

10,564. Do you recollect any other instance in which a harbour at Clovelly would have saved life and property?—There are many instances.

10,565. Do you recollect any others at this minute?—We had two ships ashore at one time some years since, both from Liverpool.

10,566. Can you obtain a return at your convenience of the vessels which have been lost during the last five years, which in your opinion would have been saved if there had been a harbour of refuge at Clovelly, stating the names of the ships, when and where they were lost, and how they were lost, to the best of your knowledge?—I can get the particulars of vessels which have been lost here within the last twenty years.

Well, if you will make out a return with these details, and send it to our secretary, we shall be much obliged to you.

10,567. (*Mr. Coode.*) Do you know the number of lives that were lost when the American ship was wrecked?—No, I do not.

Mr. Joshua Williams examined.

10,568. (*Chairman.*) What is your occupation?—I am a shipowner.

10,569. Have you been at sea?—Yes.

10,570. For what number of years?—Between forty and fifty.

10,571. And for what number of years were you a master or in command of vessels?—For forty years.

10,572. What description of vessels did you chiefly command?—From 100 to 800 tons.

10,573. In the coasting or the foreign trade?—In the foreign trade.

10,574. In what trade were the ships chiefly employed which you commanded?—In the American trade and as transports.

10,575. Sailing out of what port?—Out of this port.

10,576. You are aware of the objects of this inquiry?—Yes; I presume respecting a harbour of refuge.

10,577. Will you state to the Commissioners your opinion as to the advantage or necessity of a harbour of refuge in this part of the Bristol Channel?—I think it would be a very desirable thing, for a great number of lives have been lost in this bay; from two to three hundred lives within my recollection.

10,578. And where would you place it?—I should say Clovelly.

10,579. Will you state to the Commissioners the reasons why you entertain that opinion?—In the first place, it is a very eligible place to make a harbour of refuge in. There is the best anchorage in the world there. You can go three or more miles off and not get more than eleven fathoms of water. You could shoot a marble at low water into three fathoms.

10,580. Do you consider that the most preferable point of the coast at which to place a harbour of refuge?—Yes, I do. When it blows strong from the south-west, after you round Hartland Point you are in the harbour itself. It is smooth water.

10,581. Is it much made use of at present?—Yes; I have been riding there in heavy gales of wind myself.

10,582. From what direction do the north winds blow?—West-south-west and west.

10,583. And if the winds back round to the north-west, what happens then?—I can ride there; there is a roadstead.

10,584. Do you know Milford Haven?—Yes.

10,585. You heard the evidence of the previous witness; do you agree with it?—It is a very blind harbour; you can see nothing of the harbour when you have come to it.

10,586. Do you know Penarth Roads?—Yes.

10,587. Is there good anchorage there for all vessels?—You must lay a long way out with a large ship. Small ships lay in the road. All the ground is ploughed up, so that you cannot depend on your anchor holding.

10,588. (*Mr. Lindsay.*) Do you concur generally in the evidence given by Mr. Yeo?—Yes.

10,589. Are there no points on which you differ from him?—No. I have been laying many times in Clovelly and many times in Lundy Roads. In Lundy Roads there is no holding ground.

10,590. Is the holding ground bad at Lundy Island?—I know it is, because I have been riding there or driving.

10,591. Is it owing to the great depth of water?—The ground is bad. When you are in 13 fathoms the best anchors will not hold. They drag about a mile, and then you get a sandbank, which is good holding ground, but there is a very heavy sea.

10,592. Is it your opinion that it is unadvisable to spend any of the public money in attempting to make a harbour at Lundy Island?—Yes. Running up with a west or south-west or a west-south-west wind a vessel can never get there. When the wind goes round it would blow the topmast off. I have been there myself when I could not carry a bit of canvas. If you could fetch into the roads it would be very well.

10,593. Looking to the general trade of the country, do you think it advisable to construct a harbour of refuge at St. Ives?—I am not much acquainted with St. Ives. It is very shallow water. It is a shoal bay, and very near the Land's End. Unless there was very heavy weather a ship could fetch round.

10,594. Then you think St. Ives is so near the

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Land's End that a harbour of refuge there would not be of any great advantage?—A great many ships coming out of Liverpool and the North Channel get into Lundy Roads.

10,595. Do you think a harbour at Padstow would be of any value?—No. Padstow is a very bad harbour to enter, and when you get in you have a blowing wind from the high land. Then there is the Doom Bar. There is no room to wear, and you are right on the angle of it.

10,596. Is there any information you would like to give beyond that stated by Mr. Yeo?—I think he was asked if he had any recollection of vessels being lost on this coast. There was the *Weasel* sloop, commanded by the Hon. Captain Gray. She was lost, and not a soul was saved.

10,597. How long ago was that?—13 years ago. The ship was in the bay; she missed stays, and went ashore.

10,598. How was the wind?—At north-west.

10,599. At what part of the bay did she go ashore?—Off Baggy Rocks.

10,600. Are many ships lost on Baggy Rocks during north-west gales?—Not many. I have seen ships anchor there when the wind was blowing north-east.

10,601. You say that in your time you know that 300 lives have been lost in the bay?—Not many years ago 37 fishermen were lost because they could not get into the pier at Clovelly.

10,602. Were they not able to get over Barnstaple Bar?—No. They made for the pier at Clovelly; it was low water; they were afraid to beach the boats; 37 lives were lost, besides all the boats.

10,603. When you say you have known 300 lives lost in your day, do you mean fishermen or seamen?—Particularly seamen, from wrecks in the bay.

10,604. Is it because ships get embayed, cannot fetch out, and have no place to run for?—Yes. The life-boat has saved a great number of men here.

10,605. (*Capt. Washington.*) When was it that these 37 fishermen were lost?—I think about 20 years ago.

10,606. About 20 years ago?—20 or 22 years ago.

(*Mr. John Dunsford.*)—It occurred in 1822.

10,607. Do you remember it yourself, Mr. Williams?—Yes, I do, perfectly.

10,608. Did it create a great sensation in the neighbourhood?—Yes, it did, for the ship was stationed at Appledore.

10,609. Are you referring to the fishermen or to the loss of the *Weasel*?—To the *Weasel*.

10,610. When the fishermen were lost was anything done towards improving the bay or harbour?—No, nothing was done. The bay belongs to Sir J. H. Williams, and I believe he always opposed making any improvement.

10,611. Improvement of what?—Of the pier.

10,612. Is Clovelly pier dry at low water?—Yes.

10,613. If a vessel is caught in a gale how does she steer?—She must keep out or beach.

10,614. What number of fishing boats belong to Clovelly?—I think from 50 to 60.

10,615. You said that from 200 to 300 lives were lost in Barnstaple Bay, within your recollection?—Yes.

10,616. Within your own recollection?—Yes.

10,617. Is there any return of these wrecks to be found anywhere?—Yes; in the National Lifeboat Institution.

10,618. Are there any lifeboats stationed in the bay?—There are three.

10,619. How long have lifeboats been stationed here?—I should think we have had lifeboats here for the last 40 years.

10,620. Have they been the means of saving life?—Yes, a great number. I have taken out 40 men.

10,621. You have saved 40 yourself?—Yes; in the lifeboat.

10,622. You yourself have been personally present at the saving of 40 lives?—Yes; perhaps one or two more or less.

10,623. I hope you have received a medal or some other acknowledgment?—Yes; two or three medals.

10,624. Are the lifeboats in good order?—Yes.

10,625. And there are the means of launching them?—Yes; everything complete.

10,626. You have said the *Weasel* was lost off Baggy Point?—Yes.

10,627. Any merchant vessel?—Yes; an American vessel was lost there not many months ago.

10,628. Any others?—Yes, a good many.

10,629. If a breakwater were placed in Morte Bay, would it be the means of saving life?—Yes. There is Baggy Wall dry at spring tides, and half a mile across the point.

10,630. Do you mean that a breakwater at the point or at Clovelly would be the means of saving life?—Yes.

10,631. Which?—At Clovelly. If I had the building of one, that is the locality I should fix upon to build it.

10,632. Rather than at Morte Bay?—Oh yes.

10,633. Why?—There is a great deal more sea there than at Clovelly, and a farther run up the channel.

10,634. Mort Bay is not naturally so well sheltered as Clovelly?—No; nothing like it.

10,635. Are you acquainted with the coast of South Wales?—Yes; from there up to Penarth Roads.

10,636. Do you know whether Caldy Road affords any place for shelter?—Vessels frequently bring up at Caldy, but there is little room and not much water.

10,637. Have you often been at Swansea?—Yes.

10,638. Have you ever seen many vessels lying in the Mumbles?—Yes; small vessels.

10,639. State what number?—I have seen 300 sail in among the flats at a time, during the prevalence of west winds in winter, which is frequently the case; but large vessels have to keep the west land open, and then they strike at low water.

10,640. Would it be an advantage to large ships to have shelter outside them?—Yes; but there are not the means of making the Mumbles fit for large vessels. It is shallow water.

10,641. Have you frequently seen as many as 300 vessels anchored in Swansea Bay?—Yes.

10,642. Then in fact vessels do go there continually?—All vessels from ports further up try to get down to the Mumbles.

10,643. Do you know if there is any other bay in the Bristol Channel where you have seen so many vessels?—Yes; I should say Penarth Roads.

10,644. Is Penarth Road entirely sheltered by the outlying roads?—Penarth is sheltered from west winds.

10,645. Do you think it advisable to place a breakwater anywhere to improve Penarth Road?—I do not think it would be much improvement to it as it is.

10,646. Is it necessary towards saving life or property?—No; I should say not. When you get up there you are safe.

10,647. When you get up there you reckon your ship in safety?—Much more so there than off Lundy Island.

10,648. Have no wrecks occurred in Penarth Road?—I have known ships go ashore, and I have seen many at flood tide strike heavily.

10,649. Of the 300 vessels you have seen lying in Swansea Bay, did any sustain damage?—Yes; small vessels only lay on the flats, and they strike and sink.

10,650. Is there much loss of property?—There is the cost of repairing, but I never heard of one totally lost.

10,651. Do you think a detached breakwater placed outside the Mumbles Head so as to shelter both coasters and foreign ships would be a great advantage to the trade in the Bristol Channel?—It would be some advantage.

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10,652. Only some advantage ?—I do not think it would be a great advantage.

10,653. Will you point out any spot in the Bristol Channel where it would be of more advantage ?—Yes ; at Oxwich Bay, that is, between Worms Head and the Mumbles.

10,654. What number of vessels have you seen anchored there at one time ?—I have seen 30 there at a time.

10,655. Do you think 30 vessels more deserving of consideration than 300 ?—No ; but if there was a breakwater there it would draw more vessels.

10,656. Is there any large trading place or town connected with Oxwich Bay ?—No, none at all.

10,657. Is it not more likely that vessels would go to a place where there is great traffic ?—Yes ; but coasters frequently bring up in Oxwich Bay, but not in the winter time. Only in the summer months they bring up there rather than go back to the Mumbles.

10,658. (*Capt. Sulivan*) Will you explain where this bay is ?—Between Worms Head and the Mumbles.

10,659. Is the anchorage in Oxwich Bay good ?—Yes.

10,660. Is it as well protected as the Mumbles ?—No.

10,661. Has it deeper water ?—Very little deeper. Perhaps there is three fathoms.

10,662. Is the holding ground good in Oxwich Bay? —Very good.

10,663. Have you anchored in both places ?—Yes.

10,664. From what you know of the two places, which do you think would be preferred if a breakwater were placed in the Mumbles and in Oxwich Bay ?—I think Oxwich, if the breakwater were carried out to a sufficient length.

10,665. Would a breakwater there of the same length as at the Mumbles make a better anchorage than at the Mumbles ?—Yes, I think it would.

10,666. (*Mr. Coode.*) Can you tell us the number of lives which were lost when the *Weasel* was wrecked ? —I think it was 130.

10,667. Are not three lifeboats an unusual number to have between Hartland Point and Morte Point ?—No.

10,668. How many life boats are there between Hartland Point and Morte Point ?—Three.

10,669. And the distance is about, what ?—About 20 miles.

10,670. Do you know any other part of the coast where we shall find three lifeboats within a space of 15 miles ?—No.

10,671. Nowhere we can find so many ?—We have got three. One is a large one in case of an emigrant ship coming ashore. The other two are for common purposes. The smaller are the better.

10,672. Do you know the reason why so many lifeboats are placed at this particular point of the coast ? —If a ship came ashore on the South Burrows the lifeboat could not get over from the north side ; if on the north side, the boat would not be able to get over from the south.

10,673. You account for the number of lifeboats by the difficulty of getting across the channel at the bar ?—Yes.

10,674. You were questioned with reference to a harbour in the vicinity of a town ; should you think a harbour of refuge better because it happened to be near a trading town ?—No.

10,675. It makes no difference, in your opinion ?— No. The object is to get a ship in safety ; to save life and property.

Mr. JOHN DUNSFORD examined.

Mr. John Dunsford.

10,676. (*Chairman.*) What is your occupation ?—I am a master mariner.

10,677. How long have you been at sea ?—Nearly 50 years.

10,678. And for what number of those years have you been in command of ships ?—About 38 years.

10,679. And what ships have you chiefly commanded ?—I have been in the foreign trade and the coasting trade ; the Mediterranean generally.

10,680. What sized vessels have you commanded ? —About 200 tons.

10,681. Sailing out of the Bristol Channel ?—Yes.

10,682. Outward-bound, how do you make the passage down with the wind westerly ?—We generally keep round to the south side.

10,683. And after passing Lundy Island you take your departure ?—It all depends upon the wind. We generally steer west with a fair wind, or reach to the north if we have a head wind.

10,684. And with the wind right up the channel below Lundy Island you do not think of working along the south shore, I suppose ?—No ; we work away, and we take the ship according to how the wind is.

10,685. You are aware of the objects of this inquiry ?—Yes.

10,686. Will you state to the Commissioners any opinion which you entertain upon the subject ?— I believe Clovelly Road one of the best places in the channel for a harbour of refuge.

10,687. Give us the reasons why ?—In the most common gales we find that the roadstead has the advantage of a tide always making to the windward, which is a great help for ships getting out of the bay.

10,688. Any other reason ?—That would save a great many lives. I have known many lost in this bay in my time, which would have been saved if there had been a harbour of refuge here.

10,689. Do you know the anchorage under Lundy Island ?—Yes.

10,690. What is it good for ?—The anchorage is not very good. It is all hard ground and deep water. If a ship drives away, and brings her anchor home she is off in deep water immediately.

10,691. In what winds do you find shelter under Lundy Island ?—West-south-west and south-west ; but with the wind north-west, it is right along the island.

10,692. Do you know the Mumbles ?—Yes.

10,693. What is your opinion about the Mumbles ? —It is a very good roadstead for small ships. There is no water there.

10,694. Do you know Penarth Road ?—Yes.

10,695. What is your opinion of Penarth Road ?— Penarth is very good for a small ship that lays in the road, but not for a large ship, because the navigation is very narrow.

10,696. Then is it difficult of access in blowing weather ?—Not at all, with the wind to the west.

10,697. Not from the narrowness of the entrance ? —It may be difficult to strangers, because the entrance is narrow.

10,698. Do you know Milford Haven ?—Yes ; it is a fine harbour.

10,699. Is it difficult to make ?—Yes, in thick weather, because half a point off you get on the Smalls.

10,700. How far down channel do you find good shelter if you are running up in stress of weather ?— Do you mean with the wind to the west ?

10,701. In a strong south-west gale, how far down channel do you find shelter ?—I should go into Clovelly Roads. I can lay there with the wind north-west.

10,702. (*Sir F. Smith.*) From what winds would you be sheltered in Clovelly Bay ?—All the way from south-east round to north-west.

10,703. And from what winds do you wish to be further protected in Clovelly Bay ?—I could not get protected.

10,704. If any protection were required, from what winds would that protection shelter you ; would it be from north-north-west to north and north-east ?— Yes ; if you are bound to the south, and had pro-

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tection so as to get to the south in case of a shift of wind.

10,705. You could get to the south in case of a shift of wind?—Yes.

10,706. (*Mr. Lindsay.*) Have you to offer any opinion in regard to St. Ives Bay?—Yes.

10,707. Do you think if a harbour of refuge were formed there it would be the means of saving life and property?—It is a very shallow bay, and I think when ships get down to St. Ives they generally get round the land.

10,708. Therefore you think it not necessary?—No; there is a very good roadstead there as it is.

10,709. Do you think that if a harbour of refuge could be formed at Padstow, which ships could take with safety in heavy gales, it would be the means of saving life and property?—Yes, if it could be made a harbour of refuge. With the wind north-north-west a ship cannot get in. She is taken aback, and she will go on the Doom Bar sand.

10,710. Are many ships lost in that way?—Yes.

10,711. Looking to the great number of places where ships can find shelter in almost every wind above Lundy Island, do you think a harbour of refuge really necessary to save life and property?—Yes.

10,712. You think so?—I do think so.

10,713. Is it not more necessary between Hartland Point and the Land's End?—I should say above Hartland Point; about Clovelly Pier.

10,714. Then you think a harbour of refuge above Hartland Point would tend more to save life and property?—Yes, I do. Many lives are lost in this bay; we have had seven ships ashore at one time.

10,715. (*Capt. Washington.*) I think you said you have been fifty years at sea?—Yes.

10,716. Were you long enough at sea to have sailed during the last French war?—Yes; in the transport service.

10,717. Did you sail under convoy?—Yes.

10,718. Where did the convoys collect chiefly?—At Portsmouth.

10,719. But where did the West India ships from Bristol, Gloucester, and all the ports in the Bristol Channel collect?—Above, in the King's Road. We used to have a brig of war stationed there then.

10,720. Did any privateer come up the Bristol Channel?—I think there was one.

10,721. Did privateers go to Bideford Bay?—I don't think they would venture there.

10,722. In the event of another war, do you think there would be privateers in the Bristol Channel?—I should think there would.

10,723. Do you think the trade of the Bristol Channel would want protection?—It would want it here.

10,724. Where would you station vessels to protect the trade against privateers?—The Mumbles is one place; something ought to be done there.

10,725. Where else?—Penarth.

10,726. Where else?—The Holmes.

10,727. Where would be a good point for vessels to assemble sailing under convoy?—At King's Road.

10,728. Not lower down?—No. I do not know of any harbour suited for men-of-war.

10,729. You say not lower down, because there is no harbour at present where ships of war could lie?—Yes.

10,730. But supposing deep water harbours to be made,—one or two of them,—where would be the best place for the collection of convoys to protect the trade of the Bristol Channel?—At Clovelly.

10,731. Are you acquainted with the north shore of the Bristol Channel?—Yes.

10,732. Are you acquainted with Penarth Road?—Yes.

10,733. Is the shelter available there?—Yes; very good for small ships.

10,734. What number have you seen in Penarth Road?—I should think I have seen three hundred vessels there.

10,735. Are you acquainted with Swansea Bay?—Yes.

10,736. What number of vessels have you seen in Swansea Bay at one time?—I have seen a very large fleet there.

10,737. Coasters or foreign vessels?—Coasters.

10,738. Is there no trade from Cobrador to Swansea?—Yes, a very great trade.

10,739. Where do these ships lie?—Off in the channel.

10,740. Is there no protection for them?—No; not until they are lightened.

10,741. Then do ships go there constantly?—Yes.

17,742. And are obliged to be lightened before they get sheltered?—Yes.

10,743. Is the value of these vessels sufficient to make it worth while to give them a breakwater?—Certainly it is.

10,744. Supposing a detached breakwater were placed at Mumbles Head, to protect all vessels lying there, would it be worth while?—I think it would be paltry, because the harbour is surrounded by shoals. There are the Mixons, the Skerweather, and the Greenground in Swansea Bay.

10,745. The Mixons are immediately at the back?—Yes.

10,746. They could be of course washed by a breakwater?—I suppose so.

10,747. Do you know the nature of the Greenground?—Sand.

10,748. Do you know the distance from the Skerweather to Mumbles Head?—About three miles.

10,749. You understand a chart perfectly well?—Yes.

10,750. Taking that chart in your hand, will you measure the distance from Mumbles Head to the nearest point of the Skerweather Sand?—It is five miles, I expect.

10,751. It is seven and a half miles on that chart?—I did not know it was so much.

10,752. How does the most westerly part of the Skerweather Sand bear to Mumbles Head?—South.

10,753. For vessels bearing up in south-west gales for a harbour of refuge under the Mumbles, what would be the course in?—About north-east.

10,754. Then would the Skerweather Sand be at all in their way?—If they fell to leeward of the harbour it would.

10,755. If they fell seven miles to leeward it would?—Certainly.

10,756. Do you know Milford Haven?—It is one of the finest harbours in England.

10,757. There is no difficulty in taking it?—No.

10,758. You heard the last witness mention Oxwich Bay?—Yes.

10,759. What is your opinion of it?—It is a fine bay, better than the Mumbles, because there is deeper water there.

10,760. Have you ever anchored there?—Many times. There is a good deal of trade from this place to Oxwich for limestone.

10,761. Is it a convenient place?—Yes, in summer time.

10,762. Would it be a great accommodation to all vessels about Bideford to have shelter there?—Yes, it would.

10,763. (*Capt. Sulivan.*) Have you much trade from Bideford to Swansea for coals?—We go to Newport generally to get coals.

10,764. Have you as much trade to Swansea as to Oxwich?—They are small craft generally of 60 to 80 tons which go to Oxwich.

10,765. Have you as much tonnage to Swansea as to Oxwich? To which have you most trade from this port?—Oxwich Bay.

10,766. Which would you rather run for, as far as the outside dangers are concerned?—When I run, I generally run for Oxwich Point, and make the west land.

10,767. Then is it much safer to run for Oxwich direct than for the Mumbles?—Yes; because there are no dangers.

10,768. Is the land well marked?—Yes; it is a fine point.

10,769. And there are no outlying dangers?—No, none.

10,770. Would you have the same shelter from south-west winds and as much depth of water in Oxwich Bay as at the Mumbles?—A great deal more water; there are three fathoms at low water at Oxwich Bay.

10,771. Have vessels ever anchored in Oxwich Bay?—Merely to stop a tide; small vessels.

10,772. Is there any shelter under Oxwich Sands?—No.

10,773. You say you would rather have a harbour in Barnstaple Bay than round to the westward at Hartland?—Yes, I would.

10,774. If vessels belonging to the coasting trade, bearing round Hartland Point to the Land's End, are caught in heavy gales and on a lee shore, would it be safe for them to try to get back to Barnstaple Bay?—They would try to fetch up, but the danger is they get embayed in this bay, and so are lost.

10,775. In north-west gales could coasters depend upon weathering Hartland Point if they once got round?—If they could carry canvas.

10,776. Is it not a dead lee shore?—They would not fetch up any more than down.

10,777. Then for vessels in the coasting trade down round Hartland Point would it be of any use whatever?—No.

10,778. Do you know any other spot west of Hartland Point which you would recommend for a harbour of refuge for the coasting trade bound round the land?—No, I do not know of any.

10,779. Many vessels bound round the land are prevented rounding, and obliged to bear up in west or south-west gales, are they not?—Yes; I have known vessels bear up and get near Penarth.

10,780. Would they be protected if there were a harbour at St. Ives?—Yes, I suppose they would, if there were a breakwater there.

10,781. With the usual shift of the wind from the south-west to north-west and round to north, would vessels easily get out beyond the breakwater?—Yes, if they could carry canvas, because they would have the weather tide.

10,782. Supposing it were necessary to bear up, would you prefer a harbour at Clovelly, or above, or on a line with Lundy Island seeing that in south gales the shift of wind at Clovelly brings you on a lee shore, or a north wind calms off a weather shore, and is not a fair wind to sail?—I should prefer down at Clovelly.

10,783. (*Capt. Vetch.*) Considering the great amount of trade from Bristol going down to the Land's End, where do you consider in time of war a ship would be best stationed for the protection of that trade?—At Clovelly Roads.

10,784. Then any number of privateers might come up as far as Clovelly without molestation?—Yes.

10,785. (*Mr. Coode.*) You referred to one occasion when seven vessels were ashore in Clovelly Bay?—No; in our bay.

10,786. What bay?—Barnstaple Bay.

10,787. When did that happen?—In 1848, I think.

10,788. Were many lives lost?—Yes.

10,789. Do you recollect how many?—I recollect two French vessels were lost, and all hands perished.

10,790. Do you recollect how many lives were lost altogether on that occasion?—I should say 20 or more.

10,791. Were you in this locality at that time?—Yes.

10,792. Would those lives have been saved by a harbour at Clovelly?—Yes.

10,793. All of them?—Of course. The *Weasel* was caught in a gale of wind from the north-west; she endeavoured to weather Baggy Point, but missed stays and came ashore.

10,794. (*Capt. Sulivan.*) Are you aware that vessels coming up channel steering to the east are often driven to the south of their reckoning by the compasses being out?—Yes; that is the way so many vessels are lost in this bay.

10,795. Then vessels so situated in thick weather bearing between Hartland Point and Lundy Point find themselves suddenly on shore?—Yes, with bad steering. They do not consider that the ebb tide coming down takes them on the weather bow.

10,796. Are they often south of their reckoning?—They generally are south of their reckoning.

10,797. And do not see the lights of Lundy Island or by day make Lundy Island, owing to the thick weather?—Yes.

10,798. So they find themselves close in upon the shore?—Yes; they get embayed.

10,799. Would any harbour at Clovelly save one of these ships so embayed?—Yes.

10,800. Then off between Barnstaple Bay and Morte Bay they could fetch Clovelly?—Not off Morte Bay.

10,801. They could off Barnstaple Bay?—Yes; there is plenty of room to reach to the westward.

10,802. With west gales?—Yes.

10,803. Would they clear better to the north or fetch back to Clovelly?—With the wind north-north-west?

10,804. No; west?—They would haul to the wind, and endeavour to get out if they could.

10,805. But would they have more chance of weathering Morte Bay than of getting back to Clovelly?—They would not be able to weather Morte Point at all.

10,806. In thick weather and south-west gales would they not pass Lundy Island without seeing it in the night or by day?—I should think not, in fair weather.

10,807. (*Chairman.*) I think in the previous part of your evidence you stated that Milford Haven was a good harbour to take?—Yes; in clear weather.

10,808. What do you say to it in thick weather?—If it were thick I should not like to run for it.

10,809. You heard the evidence of the previous witnesses with respect to Milford Haven?—Yes.

10,810. Do you entirely concur with their evidence in that respect?—Yes.

Captain RICHARD YEO examined.

10,811. (*Chairman.*) What is your occupation?—I am the quay master of Bideford, or the harbour-master.

10,812. How long have you been connected with the port of Bideford?—This is my second year as quay master, but I have been master mariner for a number of years. I have been at sea 50 years and odd.

10,813. For what number of years have you commanded vessels?—Thirty years or more; 30 or 40 years in the coasting trade.

10,814. To what places have the vessels which you have commanded chiefly traded?—To the different ports in Ireland, Wales, and London.

10,815. Generally sailing out of the Bristol Channel?—Yes.

10,816. You have heard the evidence of the previous witnesses; do you agree generally with all that you have heard?—Yes.

10,817. Are there any points upon which you are disposed to differ from the witnesses whom we have had before us?—No.

10,818. Is there anything additional that you wish to offer of your own?—No; I cannot say there is anything. I should just go in the same way as they have.

10,819. (*Mr. Lindsay.*) You say you have been master of a ship, and employed in the London trade?—Yes.

10,820. Have you ever known vessels get down almost to the Land's End and be obliged to put back?—Yes; many times.

10,821. A great many times you have known ves-

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sels get down to Cape Cornwall and be obliged to put back ?—Yes.

10,822. Would a harbour be of advantage about St Ives Bay ?—Yes, for vessels which get down as far as that; but, generally, vessels coming down from Penarth with south-east winds come down fair until between Hartland Point and Lundy. They might get down with south-east winds, but with the wind south-west or south-south-west, blowing hard, they are obliged to bear up.

10,823. Have you ever anchored in St. Ives Bay ?—I have.

10,824. Is there not good anchorage in south-west winds sheltered from the land ?—Yes.

10,825. If there were a breakwater to shelter the bay from north and north-west winds, would it save life and property ?—That I cannot say ; but it would be a very fine thing to have a breakwater.

10,826. Supposing there were to be but one harbour, would you have it above Hartland Point or between Hartland Point and the Land's End ? At what place do you think it would do most good ?—From the experience which I have had we generally steer to Hartland Point, where we bring up in thick weather.

10,827. Then do I understand you to be of opinion that a harbour near Clovelly would be of more service than one farther down ?—Yes. There has been a great increase of shipping since I went to sea. Cardiff and Newport, and the ports in the Bristol Channel, have opened up a great trade.

10,828. At what part of the bay do most of the vessels work to the east ?—About Morte Bay.

10,829. So that during north-west winds they get embayed ?—Vessels get caught in the bay in north winds. Persons not acquainted with Barnstaple Bay get ashore either at Baggy Point or Morte Point, or some other place.

10,830. If a harbour were made at Clovelly they could not fetch into that harbour in north-west gales, could they ?—Oh, yes. If there was a place of refuge made at Clovelly you could go in at any time. When ships bear up and make for Hartland Point they get smooth water from 17 to 18 points off.

10,831. Then there is very good anchorage in Clovelly Bay at present ?—Yes, fine anchorage ; it could not be better.

10,832. If you have good shelter as it is, why do you recommend an expenditure upon it to make a harbour at all ?—It is not safe when the wind comes on from the north and north-north-east.

10,833. Would not vessels find good anchorage at Morte Bay in north-east winds ?—No ; the strength of the tide is very great in Morte Bay.

10,834. Is the tide stronger in Morte Bay than at Clovelly ?—No ; but there is a heavy ground western swell in Morte Bay ; vessels would be exposed very much more in Morte Bay than at Clovelly.

10,835. (*Capt. Sulivan.*) If you merely want refuge above Lundy Island would you not rather have such a harbour on the north shore, that when the wind came round you would be to windward, and able to run out with a fair wind, than on the south shore, where you would have to work out off a lee shore ?—I would prefer the south shore. Vessels on the north shore going back to get shelter would be running through dangerous sands. There are the Mixons, very dangerous in thick weather, and the operation of the tide is strong just above the Skerweather. If there was a harbour inside Hartland Point it would be an advantage to get in upon a winter's night ; when the wind came fair vessels might make their course. Even in Plymouth Sound they must wait till they get an opportunity ; they cannot get out at all times.

10,836. When the wind is fair, can they not go ?—Oh yes.

10,837. Have you ever anchored at Lundy Island ?—Not many times. I have been always very timid of anchoring at Lundy Island.

10,838. Have you ever been well in under the shore at Lundy Island ?—Yes.

10,839. Is the anchorage better there than out farther ?—I should think it was.

10,840. Have you held on well there ?—Yes.

10,841. If the wind come round to north, would you think that a fair wind to go from under Lundy Island ?—Yes.

10,842. (*Capt. Vetch.*) Do vessels frequently anchor in Morte Bay ?—When the wind is east they have no place.

10,843. Do they anchor there in good numbers ?—Yes, because of the wind off the back.

10,844. I want merely to know the fact, whether vessels in great numbers do or do not anchor in Morte Bay ?—When the wind is east, blowing strong, and they cannot get up the Bristol Channel ; but the ground swell round the head renders it impossible to anchor except with chain cables, and even then they generally part. It is all very well when there is no ground swell.

10,845. (*Mr. Coode.*) You spoke of having known many vessels running back from Cape Cornwall to Penarth Road. You said that as many vessels when caught farther down could not get to St. Ives, a harbour there would not be of much service. Should you not think, if caught off St. Ives, they would incur greater danger in running up than running for St. Ives ?—In the present state of St. Ives pier it is not very easy to make it. If you go into St. Ives, the sea will tear your vessel to pieces, and therefore it is they go higher up for shelter.

10,846. But assuming that proper shelter were given at St. Ives by means of a breakwater, should you not think it better to run there than to bear up for Penarth Road ?—I should certainly then.

10,847. Do you not think that vessels getting as far as Cape Cornwall, and having to bear up for Penarth, would incur greater danger than vessels just below Hartland getting up to Penarth ?—Would not the danger be greater in the one case than in the other ?—If a vessel were down as far as Cape Cornwall, of course she might not come back. Now there is no place of safety, but generally in going up and down we are overtaken by strong west winds, so that we cannot get so far to windward.

10,848. You have spoken of many vessels getting down to Cape Cornwall, and having to bear up ?—Yes, sometimes.

10,849. Do they not encounter a much heavier sea in the lower part of the channel ?—Yes.

10,850. And would there not be greater danger in running back from St. Ives ?—It would take a longer time. As to danger, I would come back to a good place of shelter, and lay comfortably, rather than go into a worse place.

10,851. Would the sea be heavier in the lower part of the channel ?—Yes ; it is a very heavy ground swell.

10,852. (*Capt. Washington.*) You spoke of Baggy Leap ?—I have not mentioned it, but I know the rock.

10,853. Is there anything to mark that ledge ?—People trading to Bideford and Appledore know the mark, but cannot point it out to a stranger.

10,854. Do many vessels anchor in Morte Bay ?—Yes ; in strong east winds.

10,855. Is there any beacon or buoy to mark Baggy Leap ?—No.

10,856. Would it be useful if the ledge were marked by a beacon or a buoy ?—I think that every place that is dangerous should be pointed out ; but there is this disadvantage in too many marks, that strangers would take one for another.

10,857. How far does the ledge extend off the land ?—Do you mean Baggy Leap ?

10,858. Yes ?—I think nearly a mile. I have been up and down many times inside it.

10,859. You do think there is any necessity for a mark on the point ?—No.

Mr. SAMUEL TURNER examined.

10,860. (*Chairman.*) What is your occupation ?—Master of a ship.

10,861. How long have you been at sea ?—Since I was a boy of ten years of age.

10,862. How long have you commanded a ship ?—I took one in 1821.

10,863. What size ?—From 150 to 200 tons.

10,864. In what trade have you been employed ?—In the Mediterranean, and the transport service in the early part of my life.

10,865. You have heard the evidence of the previous witnesses ?—I have.

10,866. Do you generally concur in that evidence ?—I do.

10,867. Is there any point on which you differ from it ?—No ; I cannot say that I differ from it, except as to Hartland Point. Too near Hartland Point would not be a safe place.

10,868. Is there any other point on which you are disposed to differ from the previous witnesses ?—No.

10,869. Is there anything you wish to add to what they have stated ?—No ; I perfectly agree with them.

10,870. (*Sir F. Smith.*) If public money was to be expended with a view to save life, by the formation of a harbour of refuge, would you spend that money rather at Padstow than at St. Ives ?—Neither at the one place nor the other.

10,871. Will you tell us your reasons why ?—Because I consider Padstow is not a safe place for any man to run to.

10,872. Could it not be made safe ?—I have many doubts of that.

10,873. Have you been in there ?—Yes, many times.

10,874. What is the danger ?—The Doom Bar, and the vessel being taken all aback.

10,875. Is that owing to the height of Stepper Point ?—Yes ; and the entrance is very narrow.

10,876. Supposing Stepper Point were lowered to prevent the baffling winds, would not that make it a safe harbour ?—I have my doubts.

10,877. Is not the opening to that harbour as large as the opening to harbours generally ?—No ; it is very narrow.

10,878. What is the width of it ?—I think at low water not more than 70 fathoms.

10,879. Is not that enough to go in with a fair wind ?—It is very scanty to go in with the sea over the Doom Bar.

10,880. Supposing Stepper Point were taken away ?—If it were taken away altogether it would be a narrow entrance then.

10,881. Supposing the outer portion of the Doom Bar sand were to be removed, would that alter your opinion ?—No ; I think two or three vessels have been stranded there.

10,882. Are you quite satisfied that an expenditure of public money would be unwise there ?—Yes.

10,883. Now with regard to St. Ives, do you hold the same opinion ?—I have been to St. Ives many times in a gale of wind.

10,884. Supposing that a breakwater of a mile in length were to be made there, would not that make it an admirable harbour ?—I have been obliged to leave my anchor behind, and run.

10,885. For the general trade, would not a harbour at St. Ives be an admirable harbour ?—I have my doubts. The tide runs very strong there.

10,886. Then your objection is not to its near position to the Land's End ?—Yes ; it is too near.

10,887. At what rate does the tide run at St. Ives ?—Five knots an hour.

10,888. Are you sure it runs more than four knots an hour ?—I am quite sure it does.

10,889. Is there any point along the south coast where you think a harbour could be made with advantage to the trade, for the saving of life and property ?—Nothing, except in this bay.

10,890. Nothing between Lundy Island and Hartland Point ?—There is no place but in this bay.

10,891. Clovelly is a very good harbour ?—It is a very desirable place, but many times I would have given anything in the world for a harbour of refuge to run in.

10,892. Have you any idea of what would be the cost of forming a harbour at Clovelly ?—I remember in my boyhood, I heard of the brethren of the Trinity House come down to Clovelly, and the only objection then to a harbour, or the present pier being enlarged, was on the score of Sir H. Williams, who was afraid the sailors would come on shore and destroy the plantations.

10,893. What is your opinion of Lundy Island ?—I have no opinion of Lundy Island. I have been there in all weathers, calms and storms, and the ground is not good.

10,894. Do you say the ground is not good ?—Close in it may be, but outside it is not good. You get off in 15 or 16 fathoms.

10,895. Do you think a breakwater in Morte Bay would be of any use ?—No, I think not.

10,896. If it were at Clovelly you would consider it would answer all purposes ?—If it were at Clovelly and at the Mumbles as well.

10,897. (*Mr. Coode.*) You said you have been many times at St. Ives in gales of wind ; what took you there ?—I was wind-bound.

10,898. Did you run for shelter, or were you there bound in for Hayle ?—We were trading to Hayle with a cargo of coals.

10,899. Did you ever run for refuge to St. Ives ?—No. I have been close to the Land's End, and obliged to go up channel to the Mumbles.

10,900. Would not you have been glad of a harbour of refuge at St. Ives on that occasion ?—I should have been afraid. The ground is not so good. It is not tough holding ground, but sandy shell.

10,901. Is the sand of any depth ?—I cannot say.

10,902. Did you ever drag your anchor in St. Ives Bay ?—No, never.

10,903. But you said you had been there in gales of wind ?—Yes. I left my anchor once, and had to run.

10,904. Are you able, from your experience, to speak of the holding ground there ?—Yes.

10,905. Is it good or bad ?—It does not hold ; in general I do not think it good.

Mr. JOSEPH COX examined.

10,906. (*Chairman.*) What is your occupation ?—A pilot.

10,907. How long have you been a pilot ?—From 28 to 30 years.

10,908. Where are you licensed for ?—I have no licence. There is no such thing as a licensed pilot in this harbour.

10,909. Have you been present during the course of this inquiry ?—Yes.

10,910. Do you generally concur with the evidence of the previous witnesses ?—Yes.

10,911. Is there any point upon which you are disposed to differ from them ?—No, not any particular point. I do not know much of the coast below Lundy Island. For the last 20 years I have been entirely at home. I am the agent for the Trinity House, keeping buoys, and also superintendent of pilots. As to any part of the bay, Lundy Roads, or any place about, I think I could give you as good an explanation as most people.

10,912. Is there anything you wish to offer to the Commissioners ?—I have seen some of the coasting traders go ashore off Lundy Island, and I have also seen a great many vessels coming up from the Land's End,

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Mr. Joseph Cox.

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Chairman.

coming foreign. Clearing Hartland Point the tide is on the weather bow, and the vessels drop into this bay. That is the way I have known many lost. I knew a ship named the *Ness*, of Bristol, from the West Indies; she was lost here. Another ship, the *Elizabeth*, came from the East Indias; she was lost. There was the *John Lilly*; she was lost in the same position. Another ship, the *Glenallen*, came up and cleared Hartland Point, though she had all gone but the two lower masts; she was lost in the same position. If there had been a harbour of refuge at Clovelly every one of these ships would have been saved and their cargoes. I knew another; the *Edward Albert* of Galway; she was lost in the same position.

10,913. Any more?—Yes. I could tell you of a great many more, if I could remember their names.

10,914. Then if you knew of a great many vessels that have been lost here, perhaps you will furnish a list to our secretary?—Yes, I will do that.

10,915. (*Mr. Lindsay.*) You have stated that a great number of vessels have been lost in this way? How do you make out that a harbour at Clovelly would have saved these vessels?—When they came round Hartland Point they went there before the wind.

10,916. How was the wind?—North-north-west. If they could have tacked up to Baggy they would have fetched Clovelly going back there.

10,917. Was it blowing strong when these ships were lost?—Yes.

10,918. Vessels that had gone ashore where you say would have been inevitably lost, would they not?—They endeavoured to run for the buoy, and went the wrong side.

10,919. Vessels that had got to the east side of the buoy with a north wind, if they had gone about, and stood west, would they not have been saved?—No, they could not have weathered Hartland Point

10,920. Not from the east shore with north winds?—No.

10,921. Did they try?—Yes. They stood for the west. With the next tack they would have got clear; but they bore up, and ran for the bar.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sitting at Bideford closed.

SWANSEA.

Thursday, 30th September 1858.

PRESENT:

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.

Mr. EVANS, Secretary.

Mr. BENSON examined.

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Mr. Benson.

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10,922. (*Chairman.*) You are chairman of the Harbour Trust?—I am.

10,923. How long have you been connected with the port of Swansea in that capacity?—I think I have been in the Harbour Trust for upwards of 20 years (perhaps 25 years), and for above two (I am going on in my third year) as chairman of the Harbour Trust.

10,924. You are aware of the objects of this inquiry?—Yes.

10,925. Will you now proceed to make any statement which you would wish to bring under the consideration of the Commissioners?—I think it would be better that I should leave nautical points out of my statement, as the Commissioners will get that information much better from other witnesses. The first Act for the Harbour was passed in 1791, and further enlarged powers were given in 1854. I have the last tabular statement of the trade of the harbour up to the last return, which was in Christmas 1857, and by the return you will see that, taking 1851, the foreign trade was 60,000 tons, and the total tonnage 269,000 tons; in 1857 the foreign trade was 262,000 tons, and the total tonnage 537,000 tons; while the income, which was 4,000*l.* a year in 1851, is now about 26,000*l.* a year. The first float was opened in January 1852, and the floating accommodation of Swansea is now 11 acres. During the next year 21 acres of additional accommodation of extent of floating accommodation will be added to the port; also about two miles of river frontage will be made available for the trade. Perhaps I may make this remark, that all the Welsh ports being tidal harbours, the harbour of refuge is most important, because if vessels come to the ports at low water of neap tides they are not able to get in. They want some harbour to lie in until they can run to their respective ports; and I may also add, that, as the north wind would be generally a smooth-water wind, the winds from the south are those that make the heaviest sea, and therefore that a harbour of refuge is more necessary on the north coast than it can be on the south for vessels coming in. I also wish to remark, that no other port is so accessible at all times of the tide as the Mumbles. Its utility has been constantly shown by the number of vessels lying whenever the winds are from the west; and no doubt the number would be amazingly increased, if, by means of a breakwater, there was any protection from easterly winds, because the possibility of the wind veering from east to west and driving vessels ashore prevents vessels from venturing there which otherwise would. I would also remark, that the Mumbles is well lighted; and during the last year the Mumbles light and the Pier light, under the approval of the Trinity Board, were improved and new lights of the modern construction were adopted; and I believe that the Mumbles Lights are sufficient and can be seen as far as they ought to be seen, having reference to other lights at a distance. It will not be out of place to mention that there is telegraphic communication from Swansea to all parts, as well as railway communication to all parts and a cheap market for ships' stores, which is very important for a harbour of refuge, because taking Lundy Island there is only postal communication once a fortnight, and that subject to the state of wind and weather. At Lundy Island also there are no means of procuring provisions, and the Commissioners will be fully aware that with a coasting trade it is unusual to carry any stock; and if vessels are detained, as they often are at the Mumbles, probably most of them would have to return from Lundy Island to other ports to lay in other provisions. I do not know that

there is anything that I should wish to communicate, except that I omitted one point with respect to the trade of Swansea. Referring to the last return, the Commissioners will see that a large proportion of the trade is from copper ore, and to show the value of the trade I can only state that this town imports in copper and silver ore more than a million and a quarter annually. It often happens of silver ore there is 40,000*l.* and sometimes 70,000*l.* worth in one vessel. Perhaps there is nothing more that I have to state, as nautical gentlemen will give evidence, further than that I am requested on the part of the trustees, to state that we have requested the attendance of gentlemen who, from their official situation, are more thoroughly acquainted with the Channel.

10,926. Are you prepared with any detailed plan or estimate for a breakwater at the Mumbles ?—Mr. Abernethy, the engineer of the Harbour Trust, has been authorized to prepare everything which may be thought necessary for the information of the Commissioners.

10,927. I see that he is present ?—He is, and will be called before you.

10,928. (*Sir F. Smith.*) Have you any reason to believe that if a harbour of refuge were formed here the trade of this place would have been greatly increased ?—I do not know that the trade of the Mumbles would be increased by a harbour of refuge, but for the whole Channel it is most important. It is most important for all the ports in the Channel that a harbour should be formed here.

10,929. The great object which the House of Commons had, and upon which this Commission was appointed, was the saving of life ?—Yes.

10,930. Have you any reason to believe that a great amount of life would be saved on this coast if there had been a harbour of refuge at the Mumbles ?—I have every reason to believe so ; but statistical information, stating the number of wrecks and the loss of life, many of which would have been saved if there had been a harbour of refuge, will be handed in.

10,931. Will that statistical return be divided so as to show the number of lives which might have been saved from vessels coming to this port separate from the return of those lives which might have been saved from vessels going to another port ?—I have not seen the return, and therefore cannot answer ; but if that is not included, no doubt it can easily be inserted.

10,932. It is an important element, not only that we should know what lives might have been saved from vessels coming here, but from vessels trading to other ports in the Bristol Channel ?—I may mention that the vessels generally are driven on the mud, and there is not much loss of life. But the saving of life would be in vessels which are lost in the Channel, which if there had been a harbour of refuge would have come to the Mumbles and remained in safety.

10,933. Will you state from what winds you are protected already ?—The Mumbles is protected from west, and north, and south-west winds.

10,934. What further protection do you require ?—From east to south-east, I suppose, but I speak with some diffidence on that point.

10,935. As a merchant, have you, from inquiry that you have made, made up your mind or heard what the weight of evidence is with regard to any port on the south side of the Channel ?—All the evidence that I have seen is in favour of the Mumbles.

10,936. But that is on this side ; I ask with regard to the opposite side—are you aware what is the general opinion of mariners trading here as to what part they should like for a harbour of refuge on the other side of the Channel ?—The general opinion is that there is no port there which would answer, especially on account of the winds generally coming from the south. Therefore, in point of fact, vessels could not make it, if a harbour were there when it was wanted.

Mr. William Lowther examined.

10,937. (*Chairman.*) Are you connected in any way with the port of Swansea or its neighbourhood ?—I am harbour-master at Neath.

10,938. Have you been at sea ?—Yes ; for a great many years.

10,939. For how many years, and also for how many years master of a vessel ?—I have been 35 years at sea ; 27 years master of a ship.

10,940. And what description of ships did you command generally ?—Only two vessels, about 220 tons.

10,941. Were you engaged in the foreign or the coasting trade ?—In the coasting trade.

10,942. Are you well acquainted with the Bristol Channel ?—I am well acquainted with the Bristol Channel.

10,943. Are you aware of the objects of this inquiry ?—I am.

10,944. Will you state to the Commissioners your opinion as to the advantage or necessity of a harbour of refuge being constructed at the Mumbles for the passing trade ?—I consider it would be of very great advantage to have a harbour of refuge at the Mumbles in preference to Lundy Island or Clovelly Bay, the ports which have been named to me.

10,945. And will you state your reasons for entertaining that opinion ?—Well, with regard to Lundy Island no man will deal with Lundy Island. I think Lundy Island will answer its purpose as it is. No ship will come in under Lundy Island and anchor there, having to keep in so close. The draught of water is so great that vessels are scarcely able to keep up when it is blowing hard. I have known ships driven out;—I have been driven out myself. It does very well to keep off and on, but not to anchor there, because with a sudden shift of wind the ships would all be on the shore ; there is such a heavy throw of the sea, and from the deep water, 20 fathoms, the chances are you would never get your anchor, and many vessels have left their anchors behind them.

10,946. Have you any reason to offer why a harbour of refuge should be on this side of the Channel rather than on the other ?—Because you so often reach the Mumbles or Skerwether Sands when you cannot get any further ; and if there were a harbour of refuge at the Mumbles, ships would always keep it rather than run the danger of keeping the sea, and going back to Penarth of a dark night.

10,947. Have you at any time seen a large number of vessels taking refuge at the Mumbles during the prevalence of westerly winds ?—I have known a great many, and a great many have got up their anchors and gone up Channel, because it was so wild a place that ships would not lay to the ground.

10,948. (*Sir F. Smith.*) What course do vessels trading from other parts of the Bristol Channel, bound foreign, generally take ?—If the wind allows them they just come down mid-channel.

10,949. And coming down mid-channel, supposing they get abreast of Padstow, below Lundy Island in fact, would they be likely to run for the Mumbles or for Clovelly Bay ?—Foreign bound ships always keep the sea unless they have a very severe time of it indeed, or get disabled.

10,950. They can take refuge under Lundy Island?—Yes.

10,951. Would they be disposed to go to Swansea ?—Yes, decidedly so; the distance would be so short.

10,952. They would prefer that to going to Clovelly ?—Clovelly is a place you can scarcely get to.

10,953. Supposing there were a harbour of refuge at both places, what would they do ?—You would take the Welsh side ; because, with a fair wind, you

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Sir F. Smith.

could get to sea, but with a sudden change of wind you would get ashore at Clovelly ; it is, in fact, embayed.

10,954. Do you think Clovelly too much embayed ?—It is too much embayed ; it is only one well acquainted with the place and with a small handy craft which will make for it.

10,955. What description of breakwater would you place at the Mumbles ? How far would you extend it ?—I have never given that a thought. I suppose the breakwater would make the place always accessible, so that, if ships could not get into the harbour of Swansea, they would be more sheltered outside until a proper time.

10,956. Do you know St. Ives and Padstow ?—I know them well.

10,957. Supposing it were possible to make as good a harbour at Padstow as at St. Ives, to which would you give the preference ?—Either one or the other would be very good. I think a small outlay of 20,000*l.* would answer the purposes of the coasting trade ; foreign ships would never deal with it.

10,958. You think that the foreign trade does not require a harbour at all ?—No.

10,959. Not even at Swansea ?—No ; but the coasting trade would desire it no doubt.

10,960. And you think that a small outlay at either Padstow or St. Ives would answer the purposes of the coasting trade very well ?—Yes.

10,961. Looking at Padstow, and supposing that 50,000*l.* were placed at your disposal to improve that harbour, how would you apply the money ?—I have never turned my attention to that.

10,962. What is the great objection to Padstow ?—The very narrow entrance between the sandbank and the mainland, and the eddy wind which blows out.

10,963. If the headland were cut down, would that remove the objection of the eddying wind ?—I think you would require to take the flood tide with you.

10,964. There is not the same objection to St. Ives ?—No ; there is plenty of room to make it in at St. Ives.

10,965. What is the holding ground at St. Ives ?—Very good.

10,966. To what wind is it exposed ?—South-west to south-south-east.

10,967. From all other winds it is protected ?—Yes.

10,968. (*Mr. Lindsay.*) Which are the most dangerous winds in this Channel ?—South-south-west and north-north-west.

10,969. Is it the case that the wind often chops round from south-west to north-west suddenly, and blows hard ?—Not so frequently now as formerly. Many years ago it used to do, so but it is not so frequent now. I do not know what is the cause.

10,970. Still it does do so sometimes ?—Yes.

10,971. And therefore that wind becomes a dangerous wind ?—Yes, it does.

10,972. You have good shelter in the Mumbles from the westerly winds ?—Yes.

10,973. And also from a north-west wind ?—Yes.

10,974. So in the prevailing and most dangerous winds no breakwater could improve it ?—It would, because the ships would not lie with the ground, they would lie further out.

10,975. Is a north-west wind out of the bight of the bay ?—Ships going up Channel would take the Mumbles, which do not take it now, because with the wind north-west they would have to lie in on the ground, they cannot lie afloat.

10,976. With a north-west wind blowing off the land, would a breakwater be of any use ?—Yes ; vessels would be safe then with the wind blowing from the north-west. I have often seen sudden changes of wind, and vessels caught there.

10,977. I am speaking of its blowing north-west, and I ask whether any breakwater could improve the protection you already have at the Mumbles from these winds ?—No ; it is perfectly safe.

10,978. Is it open to south-east ?—To south-south-east and east.

10,979. Does a heavy sea tumble into Swansea Bay during these winds ?—There is a great deal of ground sea.

10,980. What is the distance from the opposite shore ?—I should say some 27 miles ; but there are the Skerwether Sands between, which act as a breakwater though they are not sufficient.

10,981. But 27 miles is not very great to raise a heavy sea ?—Half the distance will give a very heavy sea.

10,982. But you say there are the sands which break the sea ?—Which break the sea partially.

10,983. Therefore in Swansea Bay you cannot have a very heavy sea ?—A heavy ground sea is thrown up, which makes ships very unsafe.

10,984. Is it dangerous for ships to lie there ?—Yes.

10,985. Have you known many ships drag their anchors ?—Yes.

10,986. And been lost ?—Become stranded vessels, and full of water.

10,987. During south-east winds ?—During winds from south-east and south.

10,988. Do you think that if a breakwater were formed so as to protect vessels during those winds, there would be many vessels run here, not for convenience but for shelter ?—It is the only shelter they have, and they come here in great numbers. I have had occasion to take shelter at the Mumbles repeatedly ; and hundreds of times I have had to go further up the Channel, and have dreaded the coast of a dark night.

10,989. Is it often the case that there is a great crowd of vessels lying in Penarth Roads ?—A great number. They lie smooth on the mud.

10,990. Does much damage arise to those vessels from the crowded state in which they lie in Penarth Roads ?—Yes, often.

10,991. I presume you would advocate a harbour at the Mumbles, so as to relieve Penarth Roads ?—So as to relieve Penarth from vessels outward-bound ; for the homeward bound it is nothing.

10,992. You think that a great many vessels which lie huddled up together at Penarth, would then come down to the Mumbles ?—They would come down here.

10,993. Because there would be more room, and because they would be nearer to sea ?—Of course they would ; decidedly so.

10,994. I may remind you that the first question to consider in the expenditure of public money is the saving of life first, and of property next. Now, do you really think, speaking as a man of great experience, that a harbour of refuge in this immediate neighbourhood would tend materially to the saving of life ?—It would be the greatest boon that was ever done for the Channel ; no doubt of it.

10,995. You have been 27 years master of a vessel, and consequently you know almost all that has taken place in shipping matters about here. Can you tell me any instance whereby life and property would have been saved if a harbour of refuge had been constructed at the Mumbles ?—This last winter several vessels got full of water and knocked in their sterns, and like that, if they were north-country built ships, they would get full of water and become one mass of wreck. There was a great deal of damage done at the time.

10,996. I more particularly ask you as to the loss of life. Can you tell me any case whereby the breakwater, if it had been made as proposed, would have saved life ?—I have no doubt of it.

10,997. Can you tell me any case ?—If ships are lying in on the ground, the tide flows rapidly, and ebbs rapidly, and the crew can take to the rigging and hold on until the ship gets dry. Our ships are built very strong on purpose to lie in with the ground ; but if they could lie afloat they would be able to proceed on their voyage, which they cannot now.

Many which go out to the Mumbles have to return to Swansea. I have charge of a tug, and I have repeatedly to send the tug off to bring vessels back to Swansea, because they are afraid to lie in the roads.

10,998. That is not an answer to my question. I want to know from your long experience of this coast what lives there would have been saved if there had been a breakwater here?—We do not often lose lives; but we lose ships.

10,999. Do you know any instances of life being lost?—I do not know that I do.

11,000. You do not know of any instances of loss of life in all your experience?—I do not know as to life. My first statement was as to the locality of the ground. Ships which go on shore on long shallow ground where they are soon dry, have means of saving life, when on an iron-bound coast they would be a complete wreck.

11,001. Then you do not lose many lives?—As it is we do not often lose lives.

11,002. Therefore, a breakwater would not tend much to save life?—No; only with regard to property.

11,003. With regard to property, I know that there is an immense traffic from here. Tell me any cases where property would have been saved?—Every ship that gets ashore would be saved provided there were a breakwater. In one winter the weather was bad, and there were a great many vessels came ashore.

11,004. In what winds?—With the wind west and south-south-west vessels often break adrift at the Mumbles, and are taken into Swansea. Many have broken adrift, when, happening to be tide time and having a pilot on board, they have taken Swansea Harbour.

11,005. Do you know anything about a bay which we sailed round this morning, called Oxwich?—I do.

11,006. What sort of anchorage is there at Oxwich:—Not so good as we have here, though deeper water.

11,007. But what is the nature of the ground?—Clay.

11,008. What is the nature of the ground here?—Clay.

11,009. Therefore, the holding ground in Oxwich Bay and Swansea Bay is much the same?—Yes.

11,010. Are there many shoals in Swansea Bay?—There are the Green Grounds.

11,011. What besides?—We do not mind any other shoals except the Blackwater Patch.

11,012. Never mind what you do not mind, I want to know what they are; tell me what shoals you have in Swansea Bay?—The Green Grounds is the shoal which we particularly notice, because of the rise and fall of the water. We do not mind it at neap tides.

11,013. What water is there on the Green Grounds at high water of spring tides?—Seven or eight feet.

11,014. Has any ship been lost on the Green Grounds?—I have never known any lost; I have known them strike.

11,015. There has been no loss of life there?—No; no loss of life.

11,016. What other shoals are there?—The Blackwater Bank.

11,017. What is its position?—To the east of the bay; it would not be in the traffic from the Mumbles Head—it is outside the traffic. The Green Grounds is the only thing in dead low water that we notice.

11,018. Supposing that a breakwater were formed at the Mumbles, I presume you would require it to be carried in an easterly or a south-easterly direction from the Mumbles Head?—I should like to see an opening between the breakwater and the Mumbles Head.

11,019. If there were a breakwater, for what reason would you prefer an opening?—For ships to go through there sometimes.

11,020. But in carrying out a breakwater would it not leave a very narrow passage between the end of the breakwater and these Green Grounds?—Oh no!

11,021. Would it not interfere with navigating the Channel?—Not at all; we have always such accommodation here. If there were no wind, a tug might take a ship to sea if she wished to go.

11,022. What shoals have you in Oxwich Bay?—Only one shoal that I know of, and that is not generally known. I know of it because the revenue cutter struck upon it off the Three Heads.

11,023. What part of the bay?—Far up the bay.

11,024. Out of the way of ships entering?—Yes.

11,025. Oxwich Bay is pretty clear of shoals?—Yes.

11,026. Is it a bolder shore than at the Mumbles?—It is a bolder shore.

11,027. Supposing a pier of half a mile were made? From where?

11,028. I am just giving you an instance. Supposing a breakwater were made of half a mile in length, and put down off the Mumbles Head, or off Oxwich Head, in which bay would you have the greatest area of water of three fathoms and upwards?—I can hardly say; I think there is very little water in Oxwich Bay at three fathoms; I think there is very little room in Oxwich Bay at three fathoms.

11,029. Do I understand you to say that, with a breakwater of half a mile in length, there would be a larger area of water of three fathoms, and clearer ground at the Mumbles than as Oxwich Bay?—There would be much more room.

11,030. More area of three fathoms and upwards?—Much more room considerably; there can be no question of it.

11,031. Would you be surprised, if, upon measurement, you found that that was not so?—I should be surprised, certainly.

11,032. What ports do you say you have traded to?—All the ports in the Bristol Channel.

11,033. From the Land's End?—From the Land's End, upwards; all the ports in the Bristol Channel.

11,034. What course do Swansea ships take?—Between Hartland and Lundy Island west-south-west, until they round the land. If they go the other channel they go west.

11,035. You steer between Hartland and Lundy Island along the south shore?—Yes, keeping a good offing.

11,036. And round the Long Ships?—Yes.

11,037. Is that the course which all ships bound south take?—No, except they are bound foreign. Most vessels steer west-north-west course, so as to get the land from the starboard, and as the wind is, they vary their course a point or two.

11,038. Is it the case, that, by far the larger portion of the trade in the Bristol Channel is in ships going south?—Yes, decidedly.

11,039. Consequently, their course is along the south shore, keeping a good offing?—Yes, west and west-south-west.

11,040. Do you think that a harbour of refuge at St. Ives Bay would be of much value, looking at it in a national point of view, for the saving of life and property, for the facilities of trade, and not considering the Bristol Channel only, but the ships of England and the trade of England?—It would be very desirable indeed.

11,041. Have you known in your experience many ships which have got down to the Chops of the Channel, and had to put back again?—I have, hundreds of times; when if there had been a harbour of refuge at St. Ives the ships could have taken it, but they could not go there because it was bad shelter.

11,042. Then I understand you to say that had there been a harbour of refuge at St. Ives Bay, where vessels could have found shelter in north-west winds, they would have gone there?—Yes.

11,043. Is that the case with many ships?—I have

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seen 200 ships at anchor in Widemouth Bay, with the danger of losing their anchors.

11,044. Do many ships put back ?—Yes, a great many.

11,045. Where do they run to ?—To the Mumbles principally.

11,046. Do they not take shelter behind Lundy Island ?—Not in the winter time. Lundy Island is only a stopping place for a tide or two.

11,047. They are afraid of Lundy Island ?—Decidedly ; many times captains, who have run there, get up their anchors and go back to the Mumbles.

11,048. Are they obliged to put back all the way to the Mumbles ?—Yes. I have known vessels to be so far down as Mount's Bay, and yet have to put back.

11,049. Do you think that many ships founder in putting back ?—Many.

11,050. Consequently for want of shelter a great many vessels are lost, and a great deal of property ?—No doubt of it.

11,051. That is your opinion ?—There is no doubt of it.

11,052. From your great experience, treating the matter calmly and impartially, and throwing aside all consideration of Swansea or anywhere else, supposing that the Government were resolved to spend a certain amount of money, and that that money was to be spent only at one place, and to be spent between the limits of the Land's End to the south, and St. David's Head to the north (from Milford Haven to Chepstow on one side and Bristol to the Land's End on the other), and taking into consideration that as it is national money it ought to be spent for the benefit of the nation ; that is, in saving the lives of English seamen, whether they belong to the Bristol Channel or not, and English property, whether belonging to the Bristol Channel or any other ports in this country, at what particular point, supposing there was only one port, would you spend it—at St. Ives, Clovelly, Lundy Island, Swansea, or at what other place ?—That is a very large question to answer.

11,053. It is, and a very important one ; and unless you can answer it conscientiously, I would rather not have you answer ?—I think if a few thousands were laid out at St. Ives it would answer its purpose, and be very desirable to have such a place as that ; and likewise it is very necessary we should have such a place as the Mumbles for another harbour of refuge, where of course a much larger amount of money would be laid out ; but small amounts laid out along the coast would be a great benefit, instead of laying out the whole at one place. I would rather lay out half at the Mumbles and half at St. Ives Bay. It often happens that ships cannot get the length of St. Ives, and are driven back again, when they might get to Padstow, supposing Padstow were accessible, but now they have to drive all up here without perhaps a strip of canvass with the prevalent south-west winds and heavy gales.

11,054. Then, in your opinion, a sum of money such as I have referred to would be better divided amongst more places than one ?—It should be divided certainly.

11,055. And do I understand that you would have it spent at two ports, at St. Ives and at Swansea ?—Yes.

11,056. Supposing, however, the Government did not adopt the views which you hold, and they said the sum was to be spent at one point, at which would you rather spend the whole ?—I can hardly say ; I should look at home, of course. There is a large trade going to Liverpool ; they all come up with the wind north-north-west round the Nash Sands. I know that a month ago there were 300 sail at the Mumbles, principally from Cardiff and Newport, and they had to lie there two or three days, and then went to sea. More than half the trade is round the Land's End and the Bristol Channel.

11,057. You gave us in answer to a previous question that the great bulk of the trade from the Bristol Channel went south ?—There is a large trade going each way, I can hardly say which is the most.

11,058. Do you wish to correct your answer, and now say that you are hardly prepared to say that the larger proportion of the trade is going south ?—Yes. I cannot say which is the larger of the two.

11,059. You said also that vessels caught in westerly gales were obliged to put back, that a great number of ships you believe foundered, and consequently that many lives were lost ?—Yes.

11,060. You gave in reply to another question, that you did not think if a harbour of refuge were constructed at the Mumbles, that it would be the means of saving life ?—Yes, because of the locality, a ship may be lost and the lives saved ; a ship will not break up. The lives get ashore before the flood takes the ship again. That is owing to the position of the bay, and the great rise of the water. The ship will not break up, for she will be dry. When a ship falls on an iron-bound shore, there is no saving life, because she goes to pieces immediately.

11,061. Consequently, above Lundy Island there are facilities for saving life in the great rise of tide, and the sandy beach, which do not exist on the coast between Cape Cornwall and Hartland Point ?—Yes.

11,062. But you are not prepared to answer where, if one harbour of refuge only was to be made, you would have it made ?—I should rather put it in two places decidedly.

11,063. About Clovelly, what is your opinion about Clovelly candidly ; are there many ships which go there to take shelter ?—None whatever, scarcely at any time.

11,064. Are many ships lost in Barnstaple Bay ?—A few.

11,065. But vessels keep the Channel open unless they are bound in ?—I have known vessels bound to Barnstaple come to Swansea Pier and Swansea Dock.

11,066. During westerly winds ?—Yes.

11,067. Do they prefer coming in ?—Yes. I have known a timber ship last winter come in.

11,068. Did she come to seek shelter in a westerly wind ?—She could not get over Bideford Bar, there was so much sea. There is no stopping at Lundy Island with vessels in a winter's night. Clovelly is a place embayed, so that if a breakwater were made few ships would take it.

11,069. Do you think that if there was shelter at Clovelly from north-west winds large ships would take it ?—No large ships would take it. They would rather come up Channel ; they would be so embayed when they were in.

11,070. Lundy Island affords shelter from west and north-west and south-west winds as it is ; but, supposing that a breakwater were put there to protect ships when the wind chopped round to north-east and east, what would be the effect of that ?—I do not think that ships would even take it then.

11,071. You do not think that ships would even take it then ?—No ; because there is very great danger in a vessel bringing up, the water shelves in very close. She must keep smart canvass to shoot in and take occasion to let go an anchor only half a cable's length from the breakwater.

11,072. She would be on the breakwater before she could be brought up ?—There would be much danger of that.

11,073. Then you think a breakwater at Lundy Island would do more injury than good ?—With a breakwater Lundy Island would be much less use than it is at the present time.

11,074. And there is a difficulty in getting away from Lundy Island when the wind is fair ?—Ships cannot get away. Unless they leave their cables and anchors they cannot do it.

11,075. (*Capt. Washington.*) I think you said you are well acquainted with the trade of the Bristol Channel ?—I am with all parts. I may have forgotten a little, any nice point.

11,076. Can you give the Commissioners some

notion of the proportion of trade from the north shore and the south shore ?—There is considerably more trade from the north shore.

11,077. As much as three to one ?—More than that I should think.

11,078. Do you think it would be more than three to one ?—I think it would be more.

11,079. Well, let us suppose that outward-bound vessels are leaving Bristol, Cardiff, and Newport, how far down do they reach in a tide ?—It depends on the wind ; what wind will you have?

11,080. Suppose it were a wind in which a vessel might start ?—Often with a westerly wind, which is a fair wind, she might get as far as the Nash light.

11,081. As far as the Nash light ?—With a light wind. With strong winds she would get further.

11,082. Supposing she were taken back, where would she run for ?—They often go back to Kings Road. If there is not a pilot on board the captain will stand to sea until he has no canvass left. All Bristol ships, however, keep pilots on board until they are clear of Lundy Island ; they are bound to do it.

11,083. What is the greatest number of vessels which you have seen anchored at the Mumbles at any one time ?—A good many times I have seen 200 or 300 sail of vessels there.

11,084. Where you there in September 1856 ?—Yes.

11,085. In that south-east gale did any vessels go ashore in the bay there ?—Yes. I think they did.

11,086. Do you remember the circumstances of 27 vessels going ashore in September 1856 ?—I believe so ; but vessels are often run ashore. If they were not so strongly built they would all get full of water and all become wrecks. I believe you are aware that all ships about here are built strong purposely to bear to lie aground.

11,087. They are built on purpose ?—Yes.

11,088. Is it not the case that if there was a more sheltered place to lie in, that extra strength and extra expense would be unnecessary ?—That is the case certainly.

11,089. Do 200 or 300 vessels lie in the Mumbles exposed to great risk ?—They are, indeed, exposed to great risk. I never allow a vessel of mine to go at all to the Mumbles. I prefer their coming back either into Swansea or back to Neath. I never allow any ship to start to go there. I consider that foreign ships lying there during the winter run more risk than they do in all their passage previous.

11,090. You think that they incur more risk than during the whole of the voyage from South America? —No doubt of it in the winter season.

11,091. Are the ships very valuable ?—They are very valuable.

11,092. Do you know the value of any one of them ?—I know they are worth between 30,000*l.* and 40,000*l.*, ship and cargo.

11,093. Did they ever bring silver ore from South America ?—Yes ; but that is in larger ships.

11,094. What is the value of ships bringing silver ore ?—70,000*l.*

11,095. And for want of shelter these ships are exposed to great risk ?—Yes.

11,096. You have been asked a question about Oxwich Bay. Is it frequented much ?—Very seldom. Reaching in on the latter part of the ebb tide you may stop there until the flood.

11,097. Are there limestone quarries there ?—Yes.

11,098. Do many vessels go there for limestone ?—All along the coast up to Worms Head they go for limestone. In fact, where they ship limestone most is in there within the point.

11,099. If Oxwich Bay afforded good shelter would it not be frequented ?—It would be frequented, but not so much as the Mumbles. I think the Mumbles shelters a great number of ships really bound to the ports of the neighbourhood, to Neath, Port Talbot, Porthcawl, and other places. In the night time ships cannot take their harbours, and are obliged to wait for the day tide ; of course, they will not stop down at Oxwich when they can come and lie off at the Mumbles. Looking at trade, I should think the Mumbles very desirable in preference to any other place.

11,100. It was stated in evidence yesterday before us that nearly 9-10ths of the trade of the Bristol Channel pass through Lundy Race to the south of Lundy Island, and to the south of Hartland Point ?—I should say that no ships bound to Liverpool and the Irish Channel take that course, but only ships bound down Channel, and many ships bound down Channel go between Hartland Point and Lundy Island. A foreigner will go to the north of the island and go down that way.

11,101. Would ships starting from Penarth Roads with a north wind try to hug the weather shore ?—Yes, they would keep close to the shore. If it came on to blow they would run to the north of Lundy Island. Those who are well acquainted with the place would go south of the island, but those not well acquainted with it would go to the north.

11,102. Do you say that there is more trade from Bristol to Liverpool, the Clyde, and so on, than bound south ?—Not from Bristol.

11,103. Well, from the Channel generally ?—Yes, there is a very large trade from the Channel to those parts.

11,104. Taking the whole of the wants of the trade into consideration, where would be the best place for a refuge harbour in the Bristol Channel ?—I believe the Mumbles would be the best place, because it is such a good stopping point. Ships bound upwards always get to their ports in one tide—the flood tide—which is a great advantage in the winter time.

11,105. Have you known vessels between Hartland Point and the Land's End obliged to take refuge ?—Yes, many.

11,106. Where did they run for ?—Padstow or St. Ives. If they cannot take them some run across and take Milford Haven.

11,107. Is Milford Haven a good harbour to take ? —Not with the wind south-south-east. Bell Roads are the best. I have known vessels drive up there, when they thought they could get shelter, but drive considerably to leeward. There is a good deal of wisdom in the maxim that, if a man makes up his mind to run he should run at once.

11,108. Do you think the neighbourhood of the Skerwether Sand any objection to placing a breakwater in Swansea Bay ?—I think not, but I think a light ship would be very serviceable at any time.

11,109. Even in its present state ?—Yes; even at the present time.

11,110. Are not the Nash lights near at hand ?—Yes; but there is great difficulty in making them out.

11,111. Is not the Bristol Channel well buoyed and lighted ?—At the time I knew it there were neither lights nor buoys in it; and we have a great dread in going up Channel, even now, of a dark night. There is a difficulty for strangers not well acquainted with it.

11,112. (*Capt. Sulivan.*) You said that the worst winds in the Mumbles Road were those from south-south-east to west ?—From south-south-east to west-south-west.

11,113. Can vessels of any draught of water, foreign-going, get shelter under the head of the Mumbles now with these winds ?—No.

11,114. From what you know of Oxwich Bay, can vessels of the same draught get shelter within the head of that bay ?—I think not with those winds.

11,115. I am speaking of winds from west-south-west or south-west. Do you know Oxwich Bay ?—I do. I have been at anchor there many times.

11,116. Can you get further in with a deep ship than at the Mumbles ?—You can.

11,117. Therefore, naturally there is more protection under the Head in Oxwich Bay than at the Mumbles in a south-west wind ?—There is no protection to the wind at south-west in either of those bays.

11,118. Can you get in further ?—From south-west

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to south-south-west there are two points of the compass different.

11,119. Can you get in further in Oxwich Bay with a deep ship?—Yes, but still it would not be safe.

11,120. Would you then be more safe from the greater protection of the point by anchoring at Oxwich than at the Mumbles?—I do not think you would.

11,121. Would you not be further inside?—You cannot go sufficiently far enough in to get shelter.

11,122. With a ship drawing 16 to 18 feet of water what bearing must she be in at the Mumbles Head?—I believe she must keep the westerly land just open.

11,123. And it is not safe for any foreign-going ships to go further in?—She might at neap tides, but not at spring tides; but the Mixons break the sea more than at Oxwich.

11,124. Then all vessels of that draught of water would require the protection of a breakwater at the Mumbles, extending the whole way outside where they could anchor?—I do not know that they would require a breakwater so very far out as that, because if they got within the breakwater the sea would be smooth. With very high spring tides and with low water they would not injure if they took the ground, if by chance they might take the ground.

11,125. You do not quite understand my question. Take a south-south-west gale or a south-west gale, a ship would require the breakwater between her and the winds. She would be deriving no shelter from the point?—No, not much; but the Mixons are a a kind of breakwater.

11,126. But could she get anywhere under the shelter of the point itself?—No.

11,127. In Oxwich Bay, if the water is deeper and the ship can get in further, can she not be partly sheltered by the point and partly by the breakwater?—Yes, but Oxwich would scarcely accommodate many vessels. You might bring up one or two, and could accommodate them; you could only accommodate very few, because the water deepens all at once.

11,128. Do you know the Outer Grounds?—No, I do not.

11,129. The Outer Grounds in Swansea Bay, which are two shoals marked in the chart?—Are there two marked in the chart? I have not noticed them.

11,130. There are the Green Grounds and the Outer Grounds?—Yes; the Green Grounds I know; we are obliged to pay attention to them.

11,131. If a breakwater were extended to the east of the Mumbles Point, would it be narrowing the passage very much for vessels to enter between the Mumbles and the Green Grounds?—I think not, because it is only at dead low water that the Green Grounds are of any consequence. The moment there is one hour's tide you never give the Green Grounds a thought; the Green Grounds are not noticed after one hour's flood.

11,132. But at low water?—At low water of spring tides we are obliged to keep clear of them.

11,133. With the wind at south-east, have you much protection from the sea in Swansea Bay by means of the Skerwether Sands?—We do not get so much sea as we should if we had not the Skerwether and the banks above.

11,134. Your vessels from Neath are ordered not to put into the Mumbles on their outward passage?—Yes; it is a standing order that they shall not put into the Mumbles unless they are obliged to put back.

11,135. What are the vessels which lie at the Mumbles?—They are driven out of Swansea Harbour to wait for the wind to get to the west.

11,136. Would they leave when a gale was blowing outside to make it dangerous?—If it were protected with a breakwater.

11,137. But at present?—Foreign-going ships will go if steamers haul them out.

11,138. Do many vessels put back after going some way on their voyage?—Some ships, if they can get hold of Milford, take hold of Milford.

11,139. Are the vessels which take shelter at the Mumbles generally those which have proceeded a short way on their voyage and put back, or are they direct from the harbour to the Mumbles Road, waiting for the wind to the westward?—They go direct to refuge when the wind is blowing against them.

11,140. If vessels have gone any distance at all before meeting with bad weather, would not Oxwich Bay be as good as the Mumbles?—I think not. It is exposed much more to the south-east and east than in the bay up here, and should they be caught they would stand a chance of getting full of water.

11,141. I suppose, if a harbour were made it would give protection against those winds?—I think you can hardly give protection with half-a-mile of breakwater there.

11,142. Why if it is a deeper bay, should not the breakwater give protection quite as well as at a point where there is less water inside it?—If the expense is not valued you might go further out at the Mumbles, where the water is deeper. There is no room to move about in that small space of deep water at Oxwich Bay.

11,143. Look at the chart, and take the space from the point of Oxwich into the bay to the three-fathom line, and then take the Mumbles Bay into the three-fathom line, and tell me which has the largest space?—I tell you a great proportion of the vessels lie aground at the Mumbles, but it would not do to lie aground at Oxwich.

11,144. I understood you to say that a harbour was wanted that ships might not have to lie aground?—Yes.

11,145. Supposing three fathoms to be a safe depth for vessels to anchor, look at these two lines on the chart, and tell me which has the largest space of water with three fathoms?—Looking to this, I think there is more space inside Oxwich Bay.

11,146. Looking to the line to the east, what is the deepest mark on the chart?—Seven and eight fathoms.

11,147. Look at the east of the Mumbles in the same line, what is the depth—is it not nine fathoms there?—Yes; still there is not that protection in east and south-east gales which there is at the Mumbles.

11,148. Can you tell any instances of these homeward bound valuable ships being lost after they had entered the Mumbles Roads—ships, I mean, bringing home the silver and copper ore?—I have known a vessel go ashore.

11,149. Have you known any case where there was loss of life?—No loss of life.

11,150. Nor destruction of their cargo?—Neither one nor the other; only ships go ashore, and their bottoms being good they lie there for a tide, and are got off by lightening.

11,151. You are not aware of any cargo or life being lost in one of those homeward-bound valuable ships?—No, not in the bay; but I must tell you that the risk is very great.

11,152. Will you look at the chart of Lundy Island, and show me where you allude to the 20 fathoms of water Look at tbe bank eastward of Lundy Island, and show me where this deep water is?—I thought there might be 15 or 20 fathoms of water, but I see there is not so much, but you must go very close in to get anchorage there.

11,153. You see that for a mile off there is good anchorage?—A mile looks nothing by sea.

11,154. If a harbour were constructed anywhere, must not vessels going in haul round much closer than a mile?—I do not know, with such a sea, that they would. I do not know that they would do so at Lundy Island, but if they can see something to steer for they will.

11,155. But supposing vessels were to haul round close under the land, would they not find much shallower anchorage than you said?—I do not think

any ship would come to the shoal water so close in. I had an opportunity of spending a night on the island last summer. I went all round the island with the Trinity Board, and I can only say, with all my experience, I was surprised to see how close the men took us in; but still there is such a roll of the sea that though Lundy Island may answer very well for ships under canvass to sail forward and back, waiting for the wind to change, or to pick up a pilot, I am sure they never think of coming to anchor there.

11,156. From what you saw, do you think that if vessels which are caught with south-west and west winds chose to draw round where there is seven and ten fathoms of water—do you not think they might use it as it is, as a natural harbour of refuge?—They do not do it.

11,157. I do not ask whether they do do it?—I never attempted it, and I know no one who has.

11,158. You see there is shallower water than you thought there was?—Looking at the chart I see there is.

11,159. Do the winds go round from south-west, north-west, and north?—Sometimes the wind backs round the other way.

11,160. As the wind comes to north, can a vessel run out under the south end of Lundy Island, and go on her voyage?—With a sudden shift of wind by night I do not think they would. I have known ships chance Lundy Island in a summer gale, but no ships will take Lundy Island to remain to ride there in the winter season; none whatever.

11,161. You said that Clovelly was in a deep bay?—Yes.

11,162. With the wind drawing round in the way described, do you not think it would be very difficult for ships to get out of Clovelly, if a harbour were provided there, and they wanted to go on their voyage?—They would go up Channel.

11,163. I am speaking of outward-bound ships?—No.

11,164. They would be embayed?—Yes.

11,165. Do you think it desirable to place a harbour of refuge where, with the prevalent change of the winds, the vessel would be on a lee shore? Would it be desirable for a ship to have that difficulty?—I have scarcely ever known of an accident happening there.

11,166. Would it be desirable to have a harbour of refuge in such a bay that when the wind became favourable the vessels would be unable to get out? Would that be a desirable thing?—No, it would not.

11,167. Do you consider that if a harbour of refuge were necessary, it would be most desirable to have it on the side where it would be a fair wind to enter with the wind driving the ships back, and when the wind went round to north-west it would be a weather shore to proceed on the voyage?—I think so.

11,168. And do you think it desirable to keep that rule in view as much as as possible when selecting places for harbours of refuge?—I should say that was a matter of engineering skill.

11,169. (*Capt. Vetch.*) You know Penarth Roads very well?—I do.

11,170. Do you consider that a good roadstead?—Good to be taken in on the mud; but not the outer road.

11,171. Is it very much frequented?—It is very much frequented.

11,172. What course do vessels take frequenting Penarth Roads and going round Cape Clear?—West or west by north till they get to Ilfracombe.

11,173. If they reach Lundy Island and are met by adverse winds what do they do?—Some fetch Milford or run back to the Mumbles. Some small craft take Ilfracombe.

11,174. And take refuge under Lundy Island?—Not in the winter months. Not one ship out of a thousand. You must take into account winter months and summer months.

11,175. Do vessels leaving Swansea, bound round the Land's End, leave Lundy Island to the south?—Sometimes they go to the south and sometimes to the north.

11,176. Does it depend upon the tide?—It does depend upon the tide.

11,177. You do not think Lundy Island good shelter in adverse winds?—None whatever; it only answers the purpose for stopping a few hours.

11,178. Looking to the advantage of the trade, and supposing that a single harbour only was to be made, where would you propose to place it?—My opinion would be at the Mumbles because of the great trade here.

11,179. Do you think that by a breakwater at the Mumbles a greater amount of trade would be protected than anywhere else?—Yes, than anywhere else. It would protect a good deal of trade going up Channel.

11,180. Supposing two were to be constructed, where would you place the other?—I should like to go down to St. Ives. With a harbour at St. Ives, and another at the Mumbles, there would be two at the extreme ends.

11,181. Do you know Padstow very well?—I do.

11,182. Do you think it possible to make a harbour there?—I cannot say; but I think they might improve it by laying out 20,000*l*. It would be only ships caught about there that would take it sometimes.

11,183. (*Mr. Coode.*) You spoke of many ships being damaged last winter can you tell us the proportion of those which ran for shelter and the proportion of those belonging to the trade of the port?—I cannot tell. The greater portion had been laden at the port, and were gone out, waiting for a wind.

11,184. Can you furnish such an account?—I was not prepared for the question. I cannot say to what vessels the greatest amount of damage was done.

11,185. Perhaps you can prepare such a return?—The Custom House can; but I do not know that I can.

11,186. Have you ever known the case of a cargo of silver ore being lost?—Never.

11,187. You said that you had anchored in Oxwich Bay?—Yes; stopping a tide.

11,188. Did you ever run there for shelter?—Never; I have never known vessels take shelter at Oxwich Bay. They only stop a tide there in summer time, but not in the winter time.

11,189. But do you think that one harbour would suffice to meet the wants of the Bristol Channel? I am not asking you as to the position, but whether one harbour would be sufficient?—I should like to have two, if I could have them.

11,190. Viewing it upon the broad principle of necessity, do you think one would suffice?—I do think a harbour of refuge at the Mumbles would do.

11,191. Do you think a harbour at the Mumbles would suffice for those vessels which are driven back from the Land's End?—Yes.

11,192. Do you think it would suffice for them?—Yes; where there was no other harbour to the west. If there was a harbour at St. Ives, they would take that, and no doubt that harbour would be very desirable.

11,193. Do you say that large ships would not take Clovelly; can you tell me why?—Men not accustomed to narrow waters, do not like to deal with so close a shore.

11,194. Is not the Mumbles narrow?—Clovelly is very different. You can always take the Mumbles, except in a violent wind.

11,195. But in the view of saving life?—If a man does not know what to do with a ship, he will take any place. But nobody would go to lie windbound. A man would say, I would rather keep to sea as long as I can, because, as soon as the weather moderates I can get on my voyage.

11,196. You are speaking of ships windbound. I am asking you as to ships requiring refuge; would

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there be any difficulty in taking Clovelly ?—Men will run everywhere, because when a man requires refuge he looks out for the best creek or the best beach that he can see.

11,197. You say, that the trade of the north shore is about three to one that of the south shore. Do not vessels require refuge after they have put to sea ?—Yes ; after they have put to sea.

11,198. (*Chairman.*) You are well acquainted with Milford Haven ?—Yes.

11,199. And the land in its neighbourhood ?—I am not so well acquainted with that.

11,200. What style of place is Milford Haven to make in dirty weather with the wind from south-west? —We generally make it bold, having two lights and a bold land.

11,201. Then you do not call it a difficult place to make in thick weather ?—In thick weather, if it is very thick, we rather run, because of the strong tides, and we do not like to run across tides.

11,202. Then, though the harbour is very good there are certain impediments in the taking of Milford Haven which diminsh its value ?—Not only that, but also in leaving you do not like leaving when the wind is dying away. You are hurled about with a strong tide from the islands.

11,203. Suppose a foreign ship in distress, not very well acquainted with the Bristol Channel, in a heavy south-west gale running up, is there any place beyound the Flat Homes, where she could drop her anchor in safety and hold on ?—Scarcely in safety until she got up to King's Road.

11,204. Why ?—Because the tide is so strong it makes a heavy sea, and it is bad holding ground with the sand. The Trinity Board do not allow any ship to bring up below the light ship; they compel the pilots to run the ships to King's Road.

11,205. Therefore there is no portion of the Channel between the Flat Holmes and King's Road to be viewed as refuge ?—I am speaking from my own personal knowledge. I happened to go with the tug to bring a Bristol ship down. After we were half way down the wind became adverse, and I wanted the pilot to anchor, but he said no, he should lose his license if he were to, he must go back to King's Road. The ship was bound to Swansea ; and that circumstance came within my own knowledge. I am aware that there are some large American ships which anchor about the Spit, but they do not ride there easily ; it is no place to ride in safety.

11,206. (*Capt. Sulivan.*) I think you said that the Mumbles light is maintained by the Harbour Trust ? —I think it is.

11,207. Is there a small toll levied on it for shipping ?—Not now ; they formerly did so, but it was illegal.

11,208. Is it paid for out of the harbour dues ?—It is paid for from the harbour dues.

11,209. You said that a light on the Skerwether Sands would be very valuable ?—It would be very valuable.

11,210. You are aware that all light ships lead to a small toll on shipping ?—I am aware of it.

11,211. Do you think that the trade of Swansea would object to pay the small toll necessary if a light vessel was placed on the Skerwether Sands ?—I should say that they would be very glad to pay it.

11,212. Has any application been made to the Trinity House, or to the Board of Trade, upon the subject ?—I think not.

11,213. But do you think that the general feeling of the trade is that a light vessel is necessary ?—I should think so.

11,214. Do vessels making for the shore in south-west gales meet with thick weather ?—Sometimes we get it very thick.

11,215. Then it is so common to have thick weather with south and south-west gales that a vessel might be on the Skerwether Sands before she made the Mumbles or the Nash light ?—Yes ; because they are eight miles apart.

11,216. When vessels run back for the Mumbles, what part of the land do they generally make ?— They generally make the Welsh land below the Head. If the wind is south-south-west they make the Head, if north-west they make the Welsh land.

Mr. William Llewellyn Powell examined.

Mr. W. L. Powell.

11,217. (*Chairman.*) You are a seafaring man, I think ?—I have been to sea all my life until the last 10 years.

11,218. And how many years were you in command of a vessel ?—I was in command from 1819 to 1852.

11,219. In what trade were the vessels in which you commanded principally employed ?—Principally in the Mediterranean, but since that in the Channel here.

11,220. You are aware of the objects of this inquiry ?—I am.

11,221. Will you now state to the Commissioners any opinion which you may entertain as to the advantage or necessity of a harbour of refuge being formed at the Mumbles ?—I am decidedly of opinion that the Mumbles is the proper place to choose for a harbour of refuge, and for this reason ;—the prevailing gales in the Bristol Channel are from the south-west to the west-south-west ; those do the most damage ; and the reason I prefer the Mumbles is, that as the wind generally backs round to the north-west, the ship is ready to take her departure for sea when the wind falls round, as it generally does, to northward. You are then prepared, being on the weather side of the channel, to go out to sea ; whereas, if you had to start from the other side, you would be down upon a lee shore. That is one of my reasons. Another reason is that vessels starting from Penarth are very often caught down here. If the wind is south-west they do not like the roadstead, and run back to Penarth, and even up to King's Road.

11,222. (*Mr. Lindsay.*) Have you been long connected with this quarter ?—Yes ; in command of a vessel going out of Falmouth for upwards of 20 years, and generally knocking about Oxwich Bay, the Mumbles, and Cowes.

11,223. Looking to the saving of life and property, at what point of the Bristol Channel do you think a harbour of refuge ought to be made ?—I am decidedly of opinion that the Mumbles is the place.

11,224. In your long experience, do you know of any case of loss of life which would have been saved by a harbour such as is proposed ?—I recollect an instance of a ship laden with timber coming ashore by Carenth Sands, which if there had been a harbour of refuge she would not, and the crew would have been saved, whereas they were all lost.

11,225. How was the wind ?—The wind was blowing hard from the south-west.

11,226. Could she not have found shelter in the Mumbles Bay as it is now ?—She let go her anchor and it parted, it is understood, but the crew being lost it could not be ascertained. The hull afterwards came ashore, and from the manner in which it was destroyed it would seem that both anchors had been let go, and that they had sawn the stem in two. One side came ashore, and the other was in pieces.

11,227. Please to be distinct upon this point, and tell us how a harbour of refuge could have saved that ship ?—She would have brought up in the Mumbles, where she did bring up ; but for want of protection her anchors parted.

11,228. What was her draught of water ?—14 or 15 feet of water.

11,229. And you are decidedly of opinion that if there had been a harbour of refuge as proposed, that ship, with all the lives that were lost, would have been saved ?—I believe so.

11,230. How long ago was that?—12 years ago.

11,231. Do you know of any other instance?—There was a little Irish sloop, the *Hook*; she came ashore, and two men were lost. I believe that if there had been a refuge she would not have come ashore.

11,232. Any other instance?—No; in fact I have not paid attention to the subject, I was merely answering from my recollection.

11,233. What is your opinion of Lundy Island as a roadstead?—A very bad one. I do not think any vessels will bring up there unless it is moderately fine weather. The gusts come down so hard from the shore that vessels drag their anchors and often leave them behind.

11,234. What is your opinion of Clovelly?—I am surprised that the idea of Clovelly is entertained for a moment, because it is upon the English side of the channel.

11,235. Do you think a harbour at St. Ives would be of much value to the trade of England?—I do not know much about St. Ives. I have been there once or twice, but I would rather not give an opinion upon it.

11,236. Have you often been into Milford Haven?—Yes, often.

11,237. Is it difficult to make?—The difficulty is making St. Ann's lights, but when once you have made them, you can run in at all times.

11,238. In thick weather?—Yes; I found no difficulty. It is one of the finest harbours in England.

11,239. When once in?—Yes; when once in. The circumstances may be peculiar. The land clouds in with haze from the north, but if you have seen the land in good time, there is no difficulty.

11,240. In cruising about the Channel, have you seen many ships putting back that have got down as far as the Chops of the Channel?—No; generally speaking, they clap on the larboard tack, and go into Milford Haven. If the wind is north-west, they fetch down, and go round the Long Ships.

11,241. If they have sufficient offing with the wind north-west, they fetch round the land?—Yes, they fetch round the land.

11,242. (*Capt. Sulivan.*) Do you know Oxwich Bay?—Very well indeed.

11,243. As it is at present, can large vessels get shelter with the wind more round to the south than they can at the Mumbles?—You can, certainly. There is no doubt of it; but there is an objection to Oxwich Bay, which perhaps you will allow me to state;—I have been lying in Oxwich Bay for nearly two months at a time, with the wind at west-south-west; it is all very well if the vessel is of light draught, but if the wind is south, they generally get under weigh, and run to the Mumbles. The reason is, that after you have left Oxwich, you find the sea invariably calmer. As you run up, you invariably find the sea calmer, until at last it is only a high wind billow.

11,244. With a southerly gale?—With a south-south-west gale.

11,245. That is south true?—I am speaking of south-south-west true.

11,246. Have you more protection under the Mumbles Head in a south-west gale, than under Oxwich Head?—No, decidedly not; but for the reason I tell you, that the sea is more heavy round Oxwich Head than round the Mumbles Head.

11,247. Supposing a breakwater to be run from the east of Oxwich Bay, and another in the same direction and of the same length, east of the Mumbles; which would enclose the greater space of more than three fathoms water?—Oxwich Bay, decidedly.

11,248. How many times as much?—Than three fathoms?

11,249. I am speaking of three fathoms outwards?—But the space enclosed in Oxwich Bay would be hardly worth your noticing, unless you carried a breakwater to the eastward.

11,250. But a similar breakwater at the Mumbles would be no use at all?—In my opinion, it would, if you were to run it due east.

11,251. Then, supposing for the same sum of money you might run a breakwater from Oxwich Bay, and from the Mumbles Bay in an easterly direction, you think there would be less shelter, in proportion to the sum laid out, at Oxwich Bay?—Do you mean to run a breakwater from due east?

11,252. I mean a breakwater of a given length, to shelter from southerly gales in whatever line it would be necessary to shelter from southerly gales. I ask, then, with a breakwater of the same length would the water be a fathom deeper in the line from the Mumbles than it would be in the line from Oxwich Head? If you run a breakwater from either of those two Heads of the same length, and at the same expense, would not there be much less depth and space afforded at the Mumbles than at Oxwich Bay?—Certainly.

11,253. Then to carry one further out, to a greater extent and deeper water at the Mumbles to be of equal depth and extent with a harbour at Oxwich, it would require a larger amount of money, would it not?—I do not think it would. That is an engineering question, upon which I am not competent to give you an answer, but I think it would cost a great deal more for Oxwich Bay.

11,254. Do you know the depth of water east of the two heads?—I cannot immediately call my mind to it.

11,255. If the chart shows nine fathoms east of the Mumbles, and seven and eight east of Oxwich Head, have you reason to doubt it?—Nine fathoms from Oxwich, and seven fathoms from the Mumbles is it not.

11,256. I am reading from the chart, if the chart shows nine fathoms east of the Mumbles, and seven and eight east of Oxwich Head, have you reason to doubt its accuracy?—None whatever, but that must be some distance off from the Mumbles Head.

11,257. (*Chairman.*) You have stated that Milford Haven is an easy place to take in bad weather, do you mean in a thick south-westerly gale?—I have stated that I never found any difficulty in going there.

11,258. Do you suppose that others not so well acquainted with the place would find difficulty or not?—Vessels coming in from sea would find difficulty, I have no doubt, but they generally run from the Channel, having a point of departure to start from; but no doubt running in for the intricate navigation about St. Ann's Head, they would find it difficult.

11,259. Is there any anchorage between the Flat Holmes and King's Road which may be considered a safe place to bring up in in heavy weather?—I do not like to answer that question, because I have not had sufficient experience above the Holmes. There is one observation which I wish to make. If a breakwater were made at the Mumbles it would make the flats perfectly safe, on which ships could run. It would be a perfectly dry harbour; you would have the flats on which vessels could run perfectly dry, and they would be saved from the damage which they now receive in southerly winds.

11,260. (*Capt. Sulivan.*) In a statement which has been handed in I see one witness says "I have observed that running for the Mumbles in a heavy gale there is no high sea. As the roadstead is protected the sea becomes calm, until at the anchorage it is not more than a high wind billow?"—That is a fact.

11,261. That being the case, do you consider that it lessens the necessity for a breakwater or not;—as the sea becomes calm and less dangerous, do you give that as a reason for running from Oxwich to the Mumbles?—I do not quite understand.

11,262. You say that as you approach the Mumbles, the sea becomes calm until it is only a high wind billow; is that a reason for or against making a

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breakwater there to give additional shelter?—I do not think it is an argument either for or against making a breakwater. It shows the facility for making a harbour there.

11,263. Which shows the most necessity for protection, the fact of the heavy sea coming in a bad wind, or from natural causes the sea going down until it is nothing but a high wind billow?—I do not think it does away with the necessity; I only mention it to show the facility with which a breakwater could be made.

11,264. The less the sea, the easier the breakwater can be made?—Yes, the less the sea, the easier the works can be carried out. At present the difficulty is the strong ebb tide. Ships roll about and break adrift.

Mr. JAMES ABERNETHY examined.

Mr. J. Abernethy.

11,265. (*Chairman.*) In what way are you connected with the port of Swansea?—Since 1847 I have been engineer-in-chief of the Port of Swansea.

11,266. Are you prepared with any plan or estimates showing the mode in which a breakwater may be constructed at the Mumbles?—I am.

11,267. Will you now lay before the Commissioners any plans, and make any statement in reference to them which you like to offer?—The first plan which I will produce before the Commissioners is a plan which was made out for the Select Committee of the House of Commons. That plan, as you will observe, shows a breakwater of some 1500 yards in length, enclosing a considerable space of deep water anchorage. Upon further consideration of the matter, and upon reference more particularly to the soundings recently taken by Capt. Aldridge, I am of opinion that if a breakwater was constructed at the Mumbles, it should be projected further seaward than is shown on the plan which I submitted to the House of Commons. I have therefore prepared another plan, showing the position of the breakwater and the extension of the area enclosed, which I now beg to hand in. The green shows the position of the breakwater, and the red shows it considerably further to leeward.

11,268. Is there any further statement which you wish to make relative to these proposed breakwaters?—The principle of both is the same, but I think it is desirable, if a harbour of refuge is to be constructed at any one point, such as the Mumbles, for the whole trade of the Bristol Channel, taking into account the great increase of that trade, particularly of the Welsh ports on the north coast,—I think it desirable to have a more extensive plan than that which I proposed to the House of Commons. The amount of the acreage is shown in a tabular statement at the corner of the plan.

11,269. What would be the expense of the breakwater which is shown upon the plan in red?—Constructed upon the same principle and in the same mode as I proposed to construct the former breakwater, viz., by a mound of copper slag, creosoted timber, and rubble, I estimate that breakwater at 650,000*l.*

11,270. And the inner portion, how much would that cost?—The green, do you mean?

11,271. The inner portion of the red?—That is the cost of the whole of the breakwater shown on the plan.

11,272. The question which I now ask, is how much would the inner portion of the red, divided by the two entrances, cost?—The inner portion I should estimate at 350,000*l.*, including a small patch connecting the Cherrystone Rocks with the mainland.

11,273. And in the average, how many vessels per acre do you calculate it would shelter?—I have found it difficult to arrive at any distinct number of vessels anchoring in a roadstead; I should suggest two and a half acres to each vessel, and I think that would render it perfectly safe.

11,274. (*Sir F. Smith.*) I heard your evidence given before the Committee of the House of Commons, and very interesting evidence it was. Have you at all changed your principle of construction to what you then stated to the Committee?—I have not; and I should mention that probably hereafter, when the Commissioners visit the northern ports, they will see a breakwater constructed upon a limited scale upon that principle, and I shall submit to them drawings and a model to show one on a more extended scale. They are not fully prepared at present, but they will be handed in to the Commissioners.

11,275. When will they be prepared?—In a fortnight or three weeks. When the Commissioners visit Northumberland there is a breakwater constructed upon that plan there, which I should like them to see.

11,276. I understand that we shall see at Swansea the mode of preparing the blocks?—Yes, I have some upon the ground.

11,277. Can you describe in some detail your system of construction?—There are two modes which I will state generally. The first is, to tip a rubble or copper slag mound in the usual way, say to the level of 12 feet below low-water level, where the disturbing action of the wave ceases. Within and above the rubble mound there is a timber framework, extending to the height of about 10 feet above high water of the highest spring tides. These frames are generally about eight to 10 feet apart; and behind or within the frames, both seaward and landward, there are half logs of creosoted timber. The whole space within, landwards and seawards, is faced by being packed close either with rubble stone or copper slag. You have then a breakwater, in some respects similar to the breakwater at Holyhead in its present state; but with this advantage, that the quantity of material being confined within the timber face work it is considerably lessened; and as creosoted timber is, in my opinion, of great durability, you would have an efficient breakwater for a long period of time, which could be constructed much more rapidly and much more easily than a rubble mound, with a stone superstructure, and at considerably less cost; and if it should be determined afterwards, as the Government may have funds at its disposal to complete a permanent structure for future generations, you have the staging for the whole length of the breakwater, and the means of depositing or setting a permanent stone face work on both sides, imbedding the first-constructed breakwater within it.

11,278. Making the first work a core, is that what you mean?—Yes, making a core of the first structure.

11,279. Then your view is in making it a permanent structure, (which you do not expect this to be,) to make a facing to the core, which you now propose to construct?—Yes; but as it is of great importance to the shipping interest that the shelter to be afforded should be afforded within the shortest possible space of time, I think this mode of construction has obvious advantages. It is not more expensive than the usual mode of constructing a timber platform for the mere purpose of depositing the material.

11,280. In fact, you think a platform or framework necessary, whether you applied it as a means of construction or as the means of making a more permanent work?—I do. It would form an efficient breakwater for half a century at least. It would therefore afford shelter for shipping, and you might carry on the permanent structure from time to time, as funds at the disposal of the Government may permit.

11,281. Your object is for the purpose of despatch?—For the sake of despatch.

11,282. Then you consider this a case of great imminence?—I do. My attention was first called to the subject in this way:—At Blythe, in Northumberland, it was proposed to make docks, and before the necessary works could be commenced it was necessary to protect the harbour entrance by a

breakwater of upwards of 4,000 feet. It was manifestly impossible that any company could construct a permanent stone breakwater of that length. It would have been an unproductive work, commercially speaking, and therefore it occurred to me that I could construct a breakwater of the character I have described rapidly and economically, and also one that would last at least half a century; we might then be able to commence our dock works, &c.; if the revenue arising from these works should hereafter enable us to construct a more permanent work, we could do so *pari passu*, with the increase of trade.

11,283. What is the economy of material which you estimate would be made, as compared with the allowing stones to form themselves *en masse*?—Without comparative drawings I cannot show you that.

11,284. Do you not know what is the comparative sectional area?—It would be considerably less.

11,285. Would it be considerably less than one half?—You have put it high; it would be a saving in the cost of the timber, considering the more permanent character of that wooden structure.

11,286. The wooden structure becomes eventually part of your structure, and with reference to the first cost, it would be less by your estimate?—It would.

11,287. Do you know what proportion?—I shall be prepared to go minutely into these details when I produce the plans before the Commissioners. The breakwater at Blythe of 4,000 feet has cost 28,000*l.*

11,288. Is the material copper slag?—Copper slag and mountain limestone combined.

11,289. Do you consider copper slag more economical than stonework?—Yes; it can be furnished in any quantity, carried out and deposited on the site of the breakwater.

11,290. Do you not propose to use your wooden structure in the first place?—Not in the first place. I should deposit a portion of copper slag, using the wooden structure for the upper part of the breakwater.

11,291. Your only object, by your increased plan, is to include a large area?—Yes.

11,292. No other advantage? Do you get upon less soundings by your new plan?—The soundings are somewhat increased.

11,293. (*Mr. Lindsay.*) I will not trouble you at any length, but just one question, Mr. Abernethy. What breakwater was that to which you referred as being 4,000 feet in length, and having cost 28,000*l.*?—Blythe.

11,294. What is the depth?—Only two feet at the extreme end of it. Of course it is only to a limited extent an example of what would be required at the Mumbles; where, of course, I should have to provide for additional depth. That will be chiefly done by the rubble mound. At Blythe there is no rubble mound required. The rubble is entirely encased within the timber. The principal addition in this case would be rubble in addition to a wooden superstructure.

11,295. What is the depth at Blythe?—Only two feet below low water.

11,296. What is the rise and fall of the tide there?—13 feet.

11,297. Then the cost has been about 7*l.* per foot. What would a stone breakwater, constructed at the same place, have cost?—If I had had to construct a stone breakwater, I do not think I could have done it for less than 60,000*l.* or 70,000*l.*

11,298. Then the cost is less than one half considerably; and instead of completing the work in two years it would probably have taken six.—The last witness made a remark which struck me that if the breakwater were formed certain banks would become dry to protect the harbour; did you notice that?—I did; and I do not agree with him. At present the tide passes over the Mixon shoal. In constructing the breakwater I propose to leave an opening between the mainland and the north end of the breakwater for the free ingress and egress of the tide, so as not at present to interfere with the Mixon Shoal, because if the tide is arrested we have a right to expect the Green Grounds and the Mixon Shoal would materially increase.

11,299. There is such a great extent of shoal water that I will ask whether you can say that this bay is silting up or not?—From all the information I can obtain I think it is not.

11,300. How many years do you go back?—As far as 1847.

11,301-2. Have you no correct charts of older date than that?—Captain Denham's is the only chart I have any confidence in; and now the Commissioners have the advantage of Captain Aldridge's, which will show any alteration. My impression is there is no alteration.

(*Capt. Washington.*) Captain Denham's chart was in 1831.

11,303. (*Mr. Lindsay.*) Has there been any shoaling since 1831?—I am not able to give precise information, but from information from parties on the spot there does not appear to have been any shoaling.

11,304. What course does the tide take in this bay?—One portion goes off the Mumbles Point and comes round the bay. There is a constant circular motion that defines the low-water mark, and as long as that is not interfered with I believe the soundings will not materially vary, but any work which would tend to interfere with the flow of the tide would inevitably tend to fill up the roadstead.

11,305. Then, if the proposed breakwater were connected with the mainland, the inevitable consequence would be that the bay would silt up?—I think it would.

11,306. But do you not think that the throwing out of this breakwater would have a tendency to cause the bay to fill up?—No, I think not. I think there would be a more rapid tide round the Mumbles Point than at present.

11,307. But would not the inner breakwater prevent the tide sweeping out the sand in a circular course?—I think not.

11,308. Would not the tide be caught within the breakwater?—I think not.

11,309. Nor within the outer breakwater?—I think not.

11,310. Then the tendency would not be to fill up?—No.

11,311. Would the effect be to deepen the water?—No; I do not think it would materially affect it one way or the other.

11,312. (*Capt. Sulivan.*) You have said, Mr. Abernethy, that your estimate is 650,000*l.*?—Yes.

11,313. But that is for a breakwater which is only to last for 50 years?—Yes.

11,314. Will you state to the Commissioners the probable additional cost of the two stone walls hereafter to enclose that breakwater so as to make it permanent?—I should estimate the cost of the two walls at 250,000*l.* additional.

11,315. I think you said your piles would go 12 feet below low water and 10 feet above high water?—Yes.

11,316. What is the rise and fall of the tide?—About 30 feet.

11,317. That would give 52 feet for the walls?—Extending from the rubble mound to the summit.

11,318. Would they require foundations in the rubble?—They would.

11,319. Then there would be 52 feet of masonry?—There would.

11,320. Of what thickness do you think it would be necessary to make the containing walls?—Taking the seaward face, I should propose to carry the walls upon the top of the rubble mound by blocks built on land prepared for one or two years before they were used of twenty to twenty-five tons in weight each.

11,321. I do not wish to go into detail?—I should make these lower blocks at least 20 feet in thickness. The top portions of the wall, say 10 feet.

11,322. A medium of 15 feet?—A medium of 15

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feet. The outer wall 52 feet, besides foundations, and a medium of 15 feet.

11,323. And allowing also for the cost of the inner walls, do you think those walls could be constructed for 250,000*l.* ?—I do.

11,324. What is the size of this copper slag ?—Generally it is of small size, but I should mix the copper slag and the mountain limestone together. The copper slag is obtained of the smelters, and it is, generally speaking, of small size ; it is very heavy, very angular, and lies at a steep slope.

11,325. Then the large material necessary to be put with it you intend to take from the mountain limestone ?—Yes, from the mountain limestone.

11,326. Have you ever seen piles of wood embedded in a harbour breakwater of that kind ?—Of course at Holyhead it is so.

11,327. Is it the case that the stones rapidly wear away those piles at the edge of the mound where the sea moves the stones ?—I have no doubt of it ; but in this case I do not propose to carry the rubble mound higher than 12 feet below low-water mark, where the disturbing action of the sea is not felt, but at Holyhead it is carried higher ; there the material is disturbed and the piles wear by the action of the sea on the rubble.

11,328. Are you aware that the material has been carried over the slope to a much lower distance than 12 feet by the action of the sea ?—I think it very probable that the upper portion is carried by the back draught of the sea beyond the 12 feet, but that is the action of the sea above that level.

11,329. Will you please to mention the whole length of your structure ?—About 2,300 yards.

11,330. Then instead of 650,000*l.* for a temporary breakwater, we must take 900,000*l.* for a permanent structure ?—You may.

11,331. You stated something which I did not quite understand as to the difference of depth. Do you mean that the breakwater is moved out to a greater depth, or that the difference of the depth in the bay has obliged you to move your breakwater further out ?—It is moved to a greater depth—to six fathoms.

11,332. You said that it was moved out in consequence of the depth discovered by Captain Aldridge's soundings. Was your first drawn breakwater in not so great depth as you thought ?—It is so ; I found that Captain Denham's and Captain Aldridge's soundings did not agree.

11,333. Then there was less extent of water than you supposed when you first drew your plan ?—Yes.

11,334. Then is it not certain that taking both these charts to be correct, that there has been a decrease of water to the eastward of the Mumbles Head ?—Comparing some of the soundings of Captain Aldridge with Captain Denham, I find that some are less and some greater.

11,335. But you have had to move your breakwater out because there is less depth than you first supposed, does that show a less depth now than there was in the former chart ?—At some points the depth seems rather increased.

11,336. But if, on the average, the depth had increased, would you have considered it necessary to remove your breakwater ?—I should have removed it independent of the variation of the charts, because I think the area is not sufficient, treating it as a harbour of refuge for the whole Bristol Channel, and that a greater area is required for the trade.

11,337. Taking the depth at the corner, is it a fact that the depth is one fathom less by Captain Aldridge than as laid down by Captain Denham's chart ; I allude to a kind of hole eastward of the Mumbles Head; in Captain Denham's chart is there not 4½ and 5 fathoms eastward of the Mumbles Head, when by the recent chart it appears that hole has filled up, and there is the shoal water ? — There appears close to the Mumbles Point a difference of a fathom. Then immediately within the point, Captain Aldridge's soundings are fully as deep as Captain Denham's. At one point the bay appears to have shoaled, but, as I have stated, at another to have deepened.

11,338. Is not the depth supposed to be shown on your inner breakwater eight, nine, and nine fathoms according to your first plan, and does not the survey now show eight, seven, and six fathoms ? Is there not a decrease under the line of your first breakwater of a fathom ?—Not for the whole length.

11,339. No, but in that part ?—Along that part there is.

11,340. Which is the deepest part of the whole ?—It is about the deepest part of the whole ; but still I cannot imagine any general decrease.

11,341. With reference to the shoal known as the Inner Green Grounds that reaches almost to the edge of your breakwater, I see there are only 2¼ and 2¾ round the end, and very shoal water immediately inside. Do you think that would be a safe passage for a large ship to take in a heavy sea when the wind might throw her off to leeward ?—I might mention that this is not intended for a passage.

11,342. I see immediately to leeward two and three fathoms only, and a narrow opening to windward, but supposing the entrance should be passed by a ship in a heavy sea, or that it should be too narrow a passage for a large ship to take, do you think that the end of your breakwater is at all in a safe place for large ships to enter ?—Seeing that after a vessel passes this entrance there is a distance of 1,200 yards from the tail of the Green Grounds, I think there is plenty of time for a vessel to come to anchor under any circumstances.

11,343. That is not my question. I am asking if a vessel should miss the entrance, being disabled, would it be safe, in its present position, to run to leeward and to enter at the east end of your breakwater ?—It would not.

11,344. Will you be kind enough to look at that chart about where the line of your proposed breakwater will be, and also to the space between it and the three fathom line in the old chart, and also to an imaginary space which would be enclosed by a circular breakwater in Oxwich Bay, and then tell me which would contain the greatest space of water at three fathoms ?—Undoubtedly the chart shows that a larger space would be enclosed at Oxwich Bay.

11,345. Would the breakwater not be in water of less depth ?—In the same depth I imagine.

11,346. Then, for the saving of life and property, would the same money spent upon a breakwater at Oxwich Bay give a larger area of protection than at the Mumbles ?—In south-west winds that would be the case ; but I think, in looking at the chart, you will see that Oxwich Bay is completely open to the south-east, and the Mumbles Bay is protected by the Skerwether Sands. Therefore, I think the comparison in favour of the Mumbles.

11,347. Setting aside that point, merely in reference to a breakwater of equal length in that depth (whether it would afford protection or not, being a different question), I ask you whether a breakwater would or would not give a greater area of anchorage ground if run off from Oxwich Head, than if run off from the Mumbles Head ? — Undoubtedly it would be a larger area of deep-water anchorage ground ; but there is a very large proportion of ships which require refuge in the Bristol Channel of a small class, and there is an immense range of shallow water and beaching ground in Swansea Bay, which, as far as I know, they would not find in Oxwich Bay.

11,348. If small vessels can lie afloat instead of running the risk of grounding on their anchors, is it not very desirable that small as well as large vessels should lie afloat if possible ?—It is so.

11,349. If the Mumbles Road was protected against the action of all sea, would any great number of small vessels beach in preference to anchoring ?—I cannot say.

(*Capt. Vetch.*) I doubt whether this is the proper time or occasion to go into the minutiæ of

Mr. Abernethy's plans. Of course it must require a great deal of time in going through these details, and I think we should be losing time to do it at this moment.

11,350. (*Mr. Coode.*) The cost of your breakwater, according to the red plan is 900,000*l.* ?—It is.

11,351. And the length is 2,370 yards ?—Yes; about 8,000 feet.

11,352. Will you put in evidence the cost per lineal foot of that breakwater?—About 112*l.* per foot.

11,353. And the cost of your breakwater at Blythe, was about 7*l.* per foot ?—Yes; but of course there is no comparison between the constructions; the one not 20 feet in height altogether, and the other a deep water breakwater.

11,354. I should have asked you questions as to the details of your construction, but perhaps it will save time if you furnish us with the sections, as you propose ?—I will.

11,355. I will ask a general question as to the width at the top of the rubble mound, which you form ?—That is a matter of minute detail.

11,356. What do you propose to be the height of the work—10 feet above high water of spring tides ?—Yes; at the highest spring tides.

11,357. Is that the height of the timber structure ?—Yes; to the top of the timber structure.

11,358. What height do you propose for the horizontal portion of the timber framing?—Do you mean the portion which is embedded in the rubble mound ?

11,359. I speak of the horizontal portion of the timber framing ?—I assume 15 feet below low water at spring tides, but that is no part of the superstructure.

11,360. Of course not of the masonry superstructure ?—No, what I call the timber superstructure.

11,361. Then are we to understand that the timber commences at the top of the rubble mound ?—A portion, part being carried to the bottom of the rubble mound. Some portion commences at the top, some at the bottom.

11,362. Do your piles all commence at the bottom, or are they put in as standards ?—That will depend upon local circumstances. I would rather furnish you with these details hereafter.

11,363. Having given an estimate of the total cost, I thought you might be able to tell us the length of your piles ?—Quite so; but I would prefer giving you the drawings.

11,364. Do you propose to use mortar or cement below the level of low water ?—No.

11,365. Do you propose to use mortar or cement above the level of low water ?—No, not at all.

11,366. Are you aware of the cost per lineal foot of the breakwater at Portland ?—I have heard it stated, but I am not aware of the cost.

11,367. Have you the means at hand for giving the cost per pile of those piles which are to go to the bottom ?—No.

11,368. You spoke of there being a considerable saving in point of time, will you tell us within what period you propose to construct this work ?—That would require some consideration. I am not prepared to define the time. I have no doubt that when I furnish detailed drawings to the Commissioners, I can state the time within which it may be estimated the work will be finished.

11,369. With regard to the rubble mound which you propose to form, is it to be composed entirely of slag, or of slag and limestone blocks mixed ?—The larger portion of mountain limestone, and the smaller portion of copper slag. The smallest in point of size of copper slag, and the large blocks of mountain limestone.

11,370. In about what proportion, in point of quantity, would you use the two ?—That is a detail which requires some consideration. It depends so much upon the supply which can be obtained of one or the other. There may be some difficulties in getting a supply.

11,371. Will you give an explanatory statement to the Commissioners of the mode in which you intend to proceed in order to construct your breakwater ?—I will; and I should like to consult the authorities at the copper works before going into these details.

11,372. You will not only give a section, but a statement as to the time, and a more complete estimate as to the cost ?—Yes.

11,373. Perhaps you will separate the time within which you would propose to complete the first portion of the work, and the time within which you would propose to complete the second portion which you spoke of, that is, the masonry walls ?—Quite so; I will separate the one from the other.

11,374. (*Capt. Vetch.*) Supposing the outline of your plan were approved, I suppose you would like the greatest possible amount of time for maturing all the details, and not to be restricted to the minutest particulars?—No doubt. I find in my engineering practice that I am constantly obliged materially to change my plans, and the mode of executing the works.

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11,375. (*Chairman.*) Are you a shipowner ?—Yes.

11,376. Where do you reside?—At Padstow, in Cornwall.

11,377. Have you been long connected with the port of Padstow?—Yes.

11,378. And for what period have you been connected with the port of Padstow?—I was born and sailed out there in my boyhood, and I have gone to and fro there at intervals.

11,379. How long have you been at sea?—About twenty-two years.

11,380. And during that period, for how many years in command of vessels?—For fifteen years.

11,381. You are acquainted with the object of this inquiry?—Yes.

11,382. Will you state to the Commissioners your opinion as to the advantage or necessity of making the Mumbles a harbour of refuge?—My opinion is, that it is the best place in the Bristol Channel for a harbour of refuge. From my experience of the Channel, many times coming up I have wished to get to a refuge. If large vessels could bring up there, they would not have to go to Penarth or King's Road; and very often they get a certain eddy ebb by the ebb tide which hangs to the south, and stretches the flood tide against the weather bow, so that they could get into the Mumbles when they cannot get anywhere else. But knowing that there is no safe anchorage there, they put about, and the flood tide takes them up almost as much as they gain on the ebb.

11,383. And therefore, for an outward-bound ship working down Channel with a westerly wind, it would be a very great advantage?—It would be a very great advantage. There is no calculating the advantages it would be to outward-bound ships.

11,384. Would it be any advantage to the homeward-bound ships?—Yes, I think so.

11,385. In what respect?—Most homeward bound vessels make the north of Lundy Island. If dirty weather springs up, there is no harbour to run to, and no doubt many would seek a harbour if there were one, instead of passing a dirty night in the Channel.

11,386. That is, homeward-bound ships ?—Yes, homeward-bound ships.

11,387. After taking your departure from Hartland Point, do you keep either shore by preference?—No; we generally keep mid-channel going outward bound. We seldom go to the south of Lundy Island, except it is to take advantage of the wind.

11,388. You of course have a good knowledge of

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the Channel between the Flat Holmes and King's Road ?—Yes.

11,389. Is that a place where you would run a vessel up ?—Yes, as good a place as any part of the Bristol Channel.

11,390. Between the Flat Holmes and King's Road, is there any place where a ship can run up and drop her anchor in safety, and ride, supposing she has good ground tackle ?—Not a place in a heavy gale of wind, because bringing up she might carry away something, but when she has brought up she will ride pretty well, because the holding ground is good.

11,391. What is your opinion of Penarth Roads ?—It is quite a safe place, though it is filling up very fast. There is not so much water there as there used to be.

11,392. Is it an easy place for a stranger to make at night ?—It is not particularly easy to a stranger, because the tides are so strong. Strangers are not thoroughly acquainted with them.

11,393. Therefore you would say that it is not a very good place for a stranger to run to—for a stranger who went by the chart ?—No ; not at all a good place, unless he were well acquainted with the charts, or had a pilot on board.

11,394. Is there heavy weather sometimes, so that pilots do not succeed in getting on board ships ?—Generally there are pilots to lead a ship, but I have gone up at night and not seen any one.

11,395. Do you know Milford Haven ?—Yes.

11,396. You have heard the evidence of the previous witnesses ?—No, I have not.

11,397. Well, what is your opinion of Milford Haven as a place for a vessel to run in from sea in dirty weather ?—The harbour of itself there is none better. To a ship that has not made the land it is not particularly safe to run for in foggy weather, though the harbour is so fine that no harbour can be better.

11,398. If you were in a ship which had been without observation for three or four days you would not like to run for Milford in foggy weather ?—I should not like to run for it ; by no means.

11,399. (*Mr Lindsay.*) Have you known many ships put back which have got down as far as the chops of the Channel ?—Yes, many. I have myself been obliged to put back after I got inside the Longships.

11,400. Where did you run to up to Penarth ?—I did.

11,401. Why did you not anchor at Lundy Island?—Because it is not a desirable place to anchor. In the first place, there is very bad holding ground ; the water is deep, and many times an anchor there will drag. I would rather keep at sea.

11,402. Why did you not anchor at Clovelly ? there is shelter there in westerly gales, is there not ?—Yes, but if the wind comes round north-west it is very poor shelter with iron-bound cliffs.

11,403. You do not consider there is any safe place until you get to Penarth Roads ?—No ; there is no safer place in the Channel than Penarth Roads.

11,404. But if there had been a roadstead further down Channel between Hartland Point and the Land's End, would you have gone there ?—Decidedly I would have gone to the first port which was a safe one.

11,405. In your experience, do you think there is great loss in vessels which are obliged to put back ?—Yes, a great many are lost, especially running up the Channel and up to the Mumbles, the tide is so strong.

11,406. In that case, do you think that a harbour at St. Ives would be the means of saving life and property ?—I have little doubt that it would ; but I have doubts whether it is a place for the position. Vessels, when they get there, are not generally close to the land, and very few vessels you will find embayed in St. Ives Bay, unless a few of the coasting vessels are caught there when the wind chops round to the north-west suddenly.

11,407. Supposing there was only one harbour to be made along the whole line of coast, do you think that a harbour at the Mumbles would be the means of saving life and property more than at any other place ?—I should think it would.

11,408. Do you know in your experience of any ships or lives being lost which would have been saved if there had been such a harbour ?—Oh yes, many. I have known a man, one of my own relatives, founder in the Mumbles, running in, in consequence of the shoal water, and all hands drowned.

11,409. Will you name the case ?—Yes; it was the *Friendship*, and I had some relations on board of her.

11,410. Were all hands lost ?—Yes.

11,411. All hands were lost ; when was that ?—In 1833.

11,412. How was the wind ?—From the south.

11,413. Where was she lost ?—I think off the Mumbles head. She brought up to her anchor, and the sea was so very heavy she foundered at her anchors.

11,414. The sea was so heavy that she foundered at her anchors. Now can you give me the particulars of any other case you recollect at this moment ?—No ; I cannot say more than that a few of the coasting vessels had some lives lost. I was not aware that I was going to be examined.

11,415. I simply ask, if you recollect any other instance ?—I do not know of any other particular instance I can mention, so as to name the ship.

11,416. I asked the question because you, as a seafaring man, when you hear of a great disaster at sea, such as loss of life and property, it naturally makes a considerable impression on your mind ?—Oh yes ; it makes an impression, but we cannot always go into these things, unless we have them down in the log.

11,417. Do you remember any other case beyond the one you have mentioned ?—I remember men being drowned because they could not get into the Mumbles, and vessels being lost, but I cannot say any particular vessel.

11,418. (*Capt. Vetch.*) Do you know Penarth Roads ?—Yes.

11,419. Is there very good anchorage there ?—Yes, very good anchorage there.

11,420. Is it extensive ?—Well, not extensive ; not deep water anchorage. There is plenty of safe anchorage on the mud to lie aground.

11,421. Is it sufficient for the vessels which frequent it ?—No ; I do not think that it is. Ships are often getting foul of one another, not being able to lie in deep water.

11,422. The ships are rather crowded there, are they not ?—Yes.

11,423. Are vessels obliged to go up to Penarth ?—Yes ; I have had ships bound to Swansea obliged to run for Penarth.

11,424. Have vessels going down Channel ever been forced up to Penarth Roads ?—Yes ; very frequently. I have been myself.

11,425. If there were a harbour at the Mumbles you would not have been under that necessity ?—Very frequently with the wind from south-west we are obliged to run back to King's Road, and there lie wind bound for a month.

11,426. If there were a breakwater at the Mumbles, would it relieve Penarth Roads of its crowded state ?—I think it would relieve Penarth of one half of the large ships lying there.

11,427. Have you ever taken shelter under Lundy Island ?—Yes ; and been at anchor there.

11,428. What is the inconvenience of Lundy Island ?—The anchorage is small, and the water is deep. You have to anchor so close into the shore to get anything like a reasonable holding, and the gusts come off the land when the wind grows heavy, the anchor is sure to come home. Anchors hold no time, and very frequently ships are driven to sea.

11,429. Do you think it would be any advantage to have moorings laid down at Lundy Island ?—It would

be an advantage, but not for vessels resorting there in westerly gales.

11,430. But still it would save a vessel now and then ?—Yes, now and then.

11,431. Therefore you think that Lundy Island should be placed in the best possible position for saving those vessels ?—Yes ; I think the moorings would be a very great advantage. A ship could get away from moorings before she could get her anchor. Till you are round you are almost under the height of the cliff.

11,432. (*Mr Coode.*) You said that Penarth Roads were silting up ; do you speak of your own knowledge ?—I speak of my own knowledge. There is not the same space of depth of water as there was 20 years ago.

11,433. How long have you known it ?—For the last twenty years.

11,434. Has it been silting up the whole of that time ?—Yes ; I think so.

11,435. To what extent has it been silting up ?—Some places that I know have lessened six feet.

11,436. You feel confident as to that ?—Yes ; I feel quite confident.

11,437. You said that you were afraid of running to Clovelly, lest the wind should come round to north-west ;—if shelter were provided at Clovelly against that wind, should you have the same dread ?—No ; of course if there were shelter I should run for it.

11,438. Then if that objection were done away with, you would have no hesitation in running for Clovelly ?—No ; but very few vessels get on that track. The large ships generally go to the north of Lundy Island ; when it falls out, that if they are at the north of Lundy Island in a north-west gale, they are in a fair way to run up.

11,439. Are you aware of the proportion of life lost in large foreign going ships, and in coasting vessels ?—I cannot say as to that fact. I have some idea.

11,440. As a native of Padstow, and having a knowledge of the Bristol Channel, where, should you say, a harbour was most required for the saving of life first ?—In what district ?

11,441. Take from the Land's End upwards—draw a line from the Land's End to St. David's Head—what site would you name that should save live to the greatest extent ?—I suppose that you are aware that, being a native of Padstow, I may perhaps speak in a prejudiced way for my own place, if I said my own place was the place.

11,442. I should like to ask you the question, setting aside any prejudice which you may have for Padstow ?—Of course, as far as I know practically as to the saving of life, from St. Ives to Hartland Point, most of the loss of life occurs, and taking into consideration its position, Padstow would be the best position, because it is in the depth of the bay.

11,443. Do you think that Padstow could be improved, so as to make it an efficient harbour of refuge ?—As to its being efficient, I think it could be so improved that you could make a harbour of refuge of it as it is. Seeing that there is 18 feet of water at low water, by spending a small amount to make a true wind in, vessels could run in as it now is. To make it efficient for a great number of ships, probably not. But I may also observe that where you have one large ship embayed you have 50 small ones.

11,444. And out of the 50 small ones, a great many lives are lost ?—I have seen many myself lost, and I have saved many myself.

11,445. The great difficulty at Padstow is the want of a true wind to get in, is it not ?—It is.

11,446. And if that difficulty were removed, many lives would be saved ?—Yes ; I have not the least doubt of it. Ten vessels the other day were driven in from Pentire Point to Trevose Head.

11,447. And do you think every one of them would have been saved ?—Every one—and every ship, because I saw them running for the harbour myself, and I saw them go ashore ; I was in the life boat, and I went to pick up some.

11,448. Then, if I understand you rightly, you conscientiously believe that more lives would be saved at Padstow than at any other point along the shore ?—Yes ; I speak of my own knowledge.

11,449. You spoke of the *Friendship* being wrecked : can you tell us whether she was coming in the ordinary course of trade, or running back to the Mumbles for shelter ?—Running back for shelter.

11,450. Had she had a cargo on board?—Yes, coals.

11,451. Where was she bound to ?—Swansea.

11,452. Do you recollect how far down she had got ?—We were down at Lundy Island. I was a boy at the time. I was in the fleet at the time when we ran back to Penarth.

11,453. Do you know how many lives were lost ?—Eight or nine, I suppose, judging from the size of the vessel.

11,454. Do you know Port Quin Bay near Padstow ?—Yes.

11,455. Do you think that if a harbour of refuge were made there, much life and property might be saved ?—No doubt of it.

11,456. Is not its position very nearly identical with that of Padstow ?—Of course the position would not make any material difference.

11,457. Do you apprehend that if there were a harbour of refuge made in Port Quin Bay, there would be any danger of its sanding up ?—I should think there would be.

11,458. Do you know the shores of that bay ?—Yes.

11,459. Is there much sand within ? Are there any coves along the shore filled with sand ?—Yes ; they are all filled with sand.

11,460. Do you mean to say that all the coves within Port Quin Bay are filled with sand ?—In the ledges between the rocks the sand accumulates along the shore.

11,461. Is there any extent of sandy beach within Port Quin ?—Yes.

11,462. Any great extent ?—No, not any great extent.

11,463. (*Sir F. Smith.*) I have before me a statement of yours, and in the last paragraph I find you say, " With respect to Lundy Island and Clovelly ; I know both places well ; the former could not be made a harbour of refuge except at a great cost, and if made would not be a useful one ;"—that is your opinion ?—Yes.

11,464. You say nothing as regards Clovelly ; I presume your opinion as to Clovelly is the same ?—I do not consider Clovelly at all so good as Lundy Island. When vessels get so far down, few get embayed in Clovelly, and if they get out they can get into Lundy Island.

11,465. And when you say that you think Lundy Island not a useful harbour you think Clovelly not a useful harbour too ?—Yes.

11,466. What course do vessels generally take from the upper part of the Bristol Channel going outwards ?—It is so long ago since I steered one that I have forgotten ; we generally make the north end of Lundy Island.

11,467. Then if the Commissioners have been told that the practice is to keep to the south of Lundy Island, and along the south coast, that is not correct ?—As far as my practical experience, unless there is some advantage of wind, it is not so. If there was a fair wind I should not take that course.

11,468. Have you ever been to Milford Haven ?—Yes, many times.

11,469. Do you think it a difficult place to make in thick foggy weather ?—There is no difficulty only returning from sea.

11,470. (*Capt. Sulivan.*) You know the first capstan house at Padstow ?—Yes.

11,471. It is well inside the end of the Ketch ?—Yes.

11,472. Suppose the point were got rid of so that you could shoot in as far as that first capstan, would you have got rid of the danger ?—Decidedly. We have cut down a small portion of the point, and we

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find that a great advantage to vessels; but that is only a very small portion. If it were cut down level, so as to give a true wind to the capstan house, no doubt any vessel could run in and anchor in safety, and anchor at low water.

11,473. I think you said that you were one of the Harbour Commissioners at Padstow. Can you tell us the extent to which the point has been reduced?—About 100 yards from the outer point.

11,474. How much further can you now carry the true wind than before the excavation was made?—I think about a good cable's length. Any vessel of moderate size can enter in safety.

11,475. Then the effect of cutting down the point for about 100 yards has been to enable vessels to carry a true wind a cable's length further in?—Yes, so that whether it is low water or not, a small vessel can get inside the harbour, and anchor in safety.

11,476. A small vessel can now get in, and an additional quantity of the point is required to be removed for large vessels?—Yes.

Captain Crewe Read, R.N., examined.

Capt. C. Read, R.N.

11,477. (*Chairman.*) You are Inspecting Commander of the Coast Guard at Swansea?—Yes.

11,478. How long have you held the appointment?—For two years.

11,479. You have been present during this inquiry?—Yes.

11,480. Will you be kind enough to furnish the Commissioners with any opinion which you may have formed upon the subject?—I was requested by the Harbour Commissioners some time ago to give my opinion, and I made a little draught of what my opinion was. It is still the same, and perhaps if you will allow me I had better read it.

11,481. Certainly?—"I am opinion, that supposing the several difficulties can be overcome which present themselves at present from the shoalness of water, strength of tide, heaviness of the sea, and being open east-south-east and south-west, from whence heavy gales frequently blow. This position is the one which would be the most accessible and advantageous in the Bristol Channel. In working down Channel the severity of the gale is felt most when you get down to the Nash (on either side), a few miles lower down, and you could then fetch in to the Mumbles, during the ebb about 18 feet, from mid-channel, the same distance dead beat to get so far as Morte Point, if intending to try for shelter in Clovelly Roads, with a lee shore from the point to the anchorage of about 12 feet. I have known numbers of vessels run back to Penarth Roads from abreast of the Mumbles, because of no other safe anchorage and unable to contend longer with foul wind, &c. [September 12th, 1858, nearly 500 sail left Lundy Roads, Penarth, having been three weeks and upwards at anchor there. [I have seen several hundred sail weigh from Penarth Roads, 'East and West Mud Banks,' having been wind-bound for many weeks. Occasional slants would have taken them from the Mumbles during that time, and many would also have reached so far down Channel as to have been in a position to have taken advantage of them, had that roadstead been safe and commodious, and, above all things, possessing the confidence of their masters. The most considerable trade is from the Welsh ports, and, the greater part by means of small vessels, and despatch being of so much consequence to the trader, the great temptation which now exists to remain wind-bound in the upper part of the Channel would be taken away were such confidence given to the masters of vessels that at the Mumbles they would be as safe or safer, and from thence could take advantage of a favourable change of weather, which frequently happens, lasting but a short interval. During a foul wind, if fresh, the Mumbles Roads now are crowded, and much risk and many casualties have occurred there by collisions, parting from anchors, taking the ground heavily on tide ebbing, striking the ground in deep water from the heavy cross sea which comes into the bay, especially on the ebb. The Mumbles possesses a very important advantage in being near to a railway station and telegraph (electric) station at Swansea; also a coast-guard signal station for vessels wishing to be reported in shipping lists, or for the information of those concerned. A good town near where every kind of store can be readily obtained, provisions, good water in the neighbourhood, which could be brought to the spot. The nature of the ground also is good holding. It is most admirably adapted, in point of position, for a naval station, the only want being a safe anchorage in bad weather. Not only in reference to the present organisation of the coast-guard and regular naval coast volunteer services, so far as making them more available on an emergency as a national guard and coast defence, but also in carrying out fully and more effectually the whole duties now devolving upon them." Since writing this, about three days ago, I received a report from the officer at Penarth, stating that, on September the 12th, there were nearly 500 sail which got under sail, having been upwards of three weeks waiting for a slant of wind.

11,482. Does anything further occur to you to state, besides what you have written?—I think not, I can think of nothing else.

11,483. (*Sir F. Smith.*) You think that the vessels which assemble in Penarth Roads are vessels from the north ports of the Bristol Channel?—Yes; from Newport, Bristol, Gloucester, and Chepstow.

11,484. They must be a very short time out from their ports to take refuge at the Mumbles?—They are obliged to go out to allow others to come in. I have known great inconvenience in consequence of vessels not going out. They would rather sometimes pay demurrage than go out.

11,485. Then in point of fact, they congregate in Penarth, because they cannot stay at their ports of departure?—I have known also great numbers which have gone from the Mumbles and Neath, and all parts, having nowhere to anchor. I have known several go back from abreast of Lundy Island.

11,486. If they could have got back to the Mumbles, they would have preferred that to Penarth?—Yes; small vessels.

11,487. If they had to go round the Land's End, they would have kept a more southerly course?—I suppose they would.

11,488. Then they would be much more likely to desire a port on the coasts of Cornwall or Devonshire than in Wales. Would not such a port be more in their track?—I suppose so.

11,489. (*Mr. Lindsay.*) I see in the statement handed in, one of the reasons given for recommending the construction of a harbour of refuge at the Mumbles is, that it would be a suitable place for a naval station. Do you think it would be the best site for a naval station in the Bristol Channel, or between this and the Land's End?—Yes.

11,490. For all purposes do you think so?—Yes; the other side you could not get at all near in winter time, there is so much sea, and no distinctness in the land; it is so difficult to make.

11,491. Looking to the great objects which we should have in view in the formation of a naval station, do you think the Mumbles a better point than St. Ives, Padstow, or Clovelly?—I do not know Padstow or Clovelly.

11,492. Speaking only of sites, do you think the Mumbles better than either of these places I have named?—I think it would be very far better than Clovelly.

11,493. Do you think it would be better than St. Ives?—I do not know St. Ives.

11,494. Do you know the site of St. Ives?—Yes; I know the site.

11,495. Do you think it would be better than St. Ives?—When I speak of a naval station, of course, I have reference to the particular protection of Wales and the Welsh ports. I do not know that a naval station at Padstow would be applicable to Wales.

11,496. Then you are speaking of a naval station, as far as regards the coast of Wales?—Yes.

11,497. This is an important question, if I can get an impartial answer from you. Supposing that there was only one point in the whole range of coast between the Land's End right up to Bristol, and from Penarth Roads right down to Milford Haven on the other side, where the public money was to be expended, (the object of expending that public money being the saving of life and property, and the facilities of commerce and making a rendezvous for ships of war in time of war,) at what point do you think now it would be best to expend that money?—I do not think that either place would answer the end required.

11,498. You think not?—I think not.

11,499. You think it would be better to have harbours at two points?—Yes, at two points.

11,500. And what two points would you recommend?—The Mumbles and St. Ives.

11,501. (*Capt. Washington.*) You spoke of a station for defence in time of war; is it probable that war would be carried on by means of steam privateers?—I should think so.

11,502. Would ships laden with copper and silver ore, and 300 vessels on the beach, offer a tempting prey?—Very much so.

11,503. Do you know any means by which those vessels can be protected, unless there is a place for the vessels to lie in?—I think scarcely any shore capable of defence, unless you have a floating defence in conjunction with what you can have on land.

11,504. Could a vessel of war lie at the Mumbles without being driven from her anchorage?—I should think not.

11,505. Would a steam vessel of war stationed at the Mumbles be a sufficient defence for the Welsh ports?—I should think so.

11,506. Do you know the proportion of trade from South Wales and that of the coast of Cornwall or Devonshire?—No, I do not.

11,507. Is the trade of the coast of Cornwall or Devonshire very much less than that of South Wales?—I should think the trade of South Wales was very much greater.

11,508. In time of war would vessels require convoy?—I cannot say; steamers have made such an alteration, they ought to be able to defend themselves.

11,509. Do you expect merchant vessels and coasters to defend themselves?—Not coasters.

11,510. Would the Mumbles be a good station for convoys of vessels to assemble?—I think none could be better for the purpose of convoying the copper ore vessels, the silver ore vessels, and the large vessels.

11,511. Is it your opinion that a sheltered roadstead at the Mumbles would be the means of relieving Penarth Roads to a great extent?—It is.

11,512. (*Capt. Sulivan.*) I think the reasons you gave for a harbour being constructed at the Mumbles rest chiefly on the advantage of the trade bound down, being able to get in with the tide, and save going back to Penarth?—Yes.

11,513. Taking that and all the reasons you have given in favour of the Mumbles, do you consider those reasons would apply to any place in the neighbourhood of the Mumbles; any place which was almost the exact spot of the Mumbles Road, supposing that place were selected for the harbour?—Every thing must be taken into consideration—the duration of the tide. Vessels coming down Channel must think of the tide.

11,514. Do you mean that those reasons are in favour of some safe harbour somewhere in or exactly at the Mumbles Point?—I think, perhaps, the neighbourhood of the Mumbles.

11,515. Supposing there were any point where the same outlay of money would obtain a larger area and a larger outside space, beyond the three fathom line if it could be sheltered, would that be better or worse?—Naturally better, supposing what you said about the ground is correct. Taking into account the duration of the ebb tide, you cannot work up against the ebb flood.

11,516. I am taking all that and all the objects you may have in view into consideration, and supposing that a harbour equally safe and of larger area could be obtained near the Mumbles, though not at the Mumbles, would you consider it better or worse?—Yes; but always supposing that provisions and water and conveniences, which are at the Mumbles, could be procured there.

11,517. Exactly, all other things being equal?—Yes.

11,518. With respect to a naval station, supposing a port to the westward of Swansea, should you consider a few miles further down the Channel equally good as the Mumbles in the direction the enemy would be likely to come, supposing he were to come up Channel?—I think that an enemy knowing that there was a naval station a few miles to the west of the Mumbles would avoid it by keeping on the other side.

11,519. If there were good anchorage would ships go there without naval protection?—Yes.

11,520. Supposing you were going to station ships to defend the Bristol Channel against an enemy, do you not consider a most important point for watching the Channel would be at Lundy Island?—Yes, I should certainly have a cruiser cruising about in the neighbourhood of Lundy Island.

11,521. In connection with a signal station?—Yes.

11,522. Considering that Milford protects to a certain extent Swansea, would you next have a good naval station at the south entrance of the Channel to cover that line of coast?—That would be gained by the cruisers at Lundy Island.

11,523. With Milford on the north, do you not know there should be a naval station on the south side to protect that side still more?—Yes, perhaps in the neighbourhood of St. Ives.

11,524. Then with a naval station at Milford and another at St. Ives, and a cruiser at Lundy Island, you would consider the general trade of the Bristol Channel pretty well protected?—I do not think Swansea would be looked after.

11,525. Swansea I particularly alluded to. Would not these valuable cargoes which come to Swansea be sufficiently guarded from the enemy and steam privateers?—I think not.

11,526. If vessels can lie in the Mumbles Road, and enemies' vessels came there, cannot we have a vessel there to protect them?—No; I think a privateer can come in under steam, when a vessel would not be able to lie at anchor there, when she would not be safe.

11,527. Do you think, from what you know of French vessels, that they would easily come in and destroy the ships here?—I consider they could fire shot and shell, and do a great deal of damage, when it was not safe for an English vessel to lie at anchor.

11,528. If she could do that, could not an English vessel be coasting about at the same time?—I am speaking of the possibility. I am taking into consideration the risk which all vessels are running, particularly men-of-war; and I am looking at a place where they would be liable to part from their anchors, or be obliged to keep the steam up.

11,529. Is it not very different with a steam man-of-war, which can steam out at any time, to protect merchant vessels; if merchant vessels can lie there, cannot steam men-of-war lie there too, with equal

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safety?—The merchant vessel is there from necessity. She is obliged to lie there waiting for water to come into Swansea; she has to lie there sometimes for days, sometimes for weeks, with a valuable cargo, before she can come in.

11,530. But if she can lie there with safety, is there anything to prevent an English man-of-war lying there for her protection too?—No, of course not.

11,531. (*Capt. Vetch.*) Which is considered the port of the greatest trade on the north side of the Bristol Channel?—The greatest trade is, I think, from Cardiff.

11,532. Which is the next port of importance?—Swansea.

11,533. And the third port?—Newport.

11,534. Do you know Penarth?—Yes.

11,535. Is it more than sufficient to give accommodation for vessels arriving and sailing from Newport and Cardiff?—No; Penarth Roads is not sufficient, but the east and west mud banks are very desirable places where vessels can lie?—They can lie there with perfect safety, from the nature of the mud.

11,536. But you mentioned that you had heard of vessels being obliged to go out of the docks at Newport, and which could not find accommodation at Penarth?—No; because there is always a nasty sea, and they would not run the risk of lying too close. The traders are on the increase, and there is more difficulty in picking up a berth. I have known vessels sunk on Cardiff Sands.

11,537. Do vessels in Penarth Roads get in collision with one another from the insufficiency of space?—Yes; because they cannot get down Channel.

11,538. Does it happen that vessels from Swansea go down Channel, and are sometimes under the necessity of putting back to Penarth Road?—I am not quite certain about Swansea vessels, though I think I have seen Swansea vessels go back to Penarth roads. When I speak of Swansea vessels, I mean vessels which have loaded at Swansea.

11,539. Does it ever happen that they go down Channel, and are obliged to put back to Penarth?—If a vessel gets as far as Lundy Island, there are no hopes of her coming back again, unless she lose some spars or sails.

11,540. Then if Penarth Roads were relieved of ships belonging to Swansea, it would be a great accommodation to the trade further up?—I think so.

11,541. And if the trade of Swansea got protection for its own vessels, it would be a great benefit to the trade of that port?—Undoubtedly.

Mr. JAMES RICHARDSON examined.

Mr. James Richardson.

11,542. (*Chairman.*) You are Chairman of the Swansea Mercantile Marine Surveying Association?—I am.

11,543. How long have you been connected with the port of Swansea in that capacity?—In that capacity simply for about 12 or 15 months.

11,544. And with Swansea otherwise?—And with Swansea for the last 30 years.

11,545. As a shipowner?—As a shipowner 15 years.

11,546. You are aware of the objects of this inquiry?—I am.

11,547. Will you now make any statement which you may wish to offer relative to the advantage or necessity of a harbour of refuge at the Mumbles?—I can only speak as a shipowner. I am not acquainted with nautical affairs, but having resided here so long, and being the owner of a large class of shipping, I must confess that when my vessels have arrived in the Mumbles Roads, I have been always in a great deal of fear for them. The Mumbles, as it is at present, is a very open roadstead, and when large vessels do come up, as they frequently do, with strong south-west winds, they are obliged to bring up so far out in consequence of the heavy sea there, that they do not derive much protection from the Head, or from the Nash Sands outside. I think if there were a breakwater, it would cause very great protection to shipping of that class which are bound in here with exceedingly valuable cargoes, and would prevent many calamities which at present happen. I myself (in 1852 I think it was) lost a vessel in Swansea Bay. She was called the *Harriet*, of 500 tons. She drove from her anchors in the Mumbles Roads. Of course she had no other refuge but the beach, because, being low water in Swansea Harbour, and it being a dry harbour, she could not get in. She therefore had to take the beach; and the gales of wind continuing for some days afterwards, she became a total wreck on Swansea beach. That is rather an extraordinary instance, inasmuch as she would not have become a total wreck had it not been for the terrific hurricane which happened a few days after she came to the ground. Another vessel of mine (in 1856 I think it was), called the *Richardson*, was coming in from Coquimbo with a valuable cargo of copper ore; immediately she came to the roadstead, with a strong wind from the west, she brought up with one bower anchor; after paying out 70 fathoms it parted; another anchor was paid out 80 fathoms before the anchor held. She was nearly on the tail of the Green Grounds; but though unfortunately she went on shore, we ultimately got her off by means of four steamers. Another vessel, the *Minnow*, (in 1852, I think that was when vessels were riding very dangerously indeed in Mumbles Road,) I watched her for several hours with great anxiety. At last I found that she had slipped from her anchors. She drove round the sands. I immediately went out with two steamboats, and got her into the piers, and saved her. These are all matters which make me feel, as a shipowner, not only that ships but that the lives of the crew are imperilled by the Mumbles as it is. In the case of the *Minnow*, she actually picked up her anchors in 10 fathoms water, low water, or rather the cable was in 10 feet at low water. Had the cable parted, the vessel would have been lost, and I have not the slightest doubt every soul would have perished. These are strong reasons for additional protection at the Mumbles, not only for vessels trading to Swansea only, but trading to the Channel. Our tides are exceedingly strong up to the parallel of the Mumbles, and the navigation is extremely dangerous. Bound down the Channel, we all know the anxiety of captains to put to sea, and sometimes they incautiously put to sea from Penarth Roads or King's Roads, and, as is frequently the case, meet with adverse winds and strong gales when abreast of the Mumbles, or perhaps it may be a little further down, and then they have no resource but to go back to King's Road, or Penarth Roads, or proceed on their voyage, if possible, under very disadvantageous prospects; but if a place situated like the Mumbles were made so that they would have some place of refuge without being obliged to go back through that dangerous navigation it would be a great advantage. I think in every possible respect the locality of the Mumbles Road is the best that there is on the Bristol Channel for the general trade, and I must say the flats afford a very great accommodation for vessels of a smaller class. I can confirm what has been already said, that the small class of shipping appear to me to prefer to run in on the mud, and if they did so when the harbour was made, they would leave greater accommodation in deep water for the larger class of vessels.

11,548. Do you think that if a harbour such as is contemplated could be constructed at the Mumbles, it would be useful as a place of call for orders?—I do not imagine that it would.

11,549. (*Mr. Lindsay.*) Mr. Richardson, I know you are a very large shipowner. Are those ships which come from Coquimbo and other places—your

large ships I mean—are they able to go right into Swansea, or must they deliver a portion of their cargo in the bay?—They generally wait for the spring tides. It is a very bad place for delivering a cargo in the bay. The cargo may be wetted, and it is very awkward sometimes to get lighters alongside.

11,550. Then your vessels are obliged to wait in the bay at times for a considerable period?—They are obliged to wait a considerable period.

11,551. Therefore during that period you feel considerable anxiety?—I do.

11,552. What is the longest time which you have had a ship lying there?—She may lie there 10 or 12 days.

11,553. Have you had one lying there 10 or 12 days?—Yes, if she comes late enough to lose the tide.

11,554. How was the wind when the first vessel to which you alluded was totally lost?—It was a little to the southward of south-west, I think.

11,555. And if there had been a harbour of refuge at the Mumbles that ship would have been saved?—They all would have been perfectly safe.

11,556. (*Capt. Sulivan.*) Have you known any life lost in your own time within the last 20 years in any of those over-sea ships arriving here from South America with copper ore?—I do not of my own personal knowledge, but I have heard of lives being lost.

11,557. Recently, within the last 20 years?—Not recently.

11,558. Has the trade of Swansea increased within the last eight years?—Very much.

11,559. Have you known, during those eight years, any vessel in which there has been loss of life in Swansea Bay?—I cannot remember any at present, but I think I have heard of a considerable loss of life further up the Channel. If there was a sort of half-way house provided to turn into, instead of going through that difficult and dangerous navigation, many lives must have been saved.

11,560. You are alluding to outward-bound ships having to put back to that roadstead?—Both those who have necessarily to put back, and likewise vessels bound up channel which do not like to take the Mumbles, and therefore go up to Penarth and King's Road.

11,561. My question referred more specifically to that class of vessels which you own?—I have not known, of my own personal knowledge, of any lives being lost on those occasions.

Mr. JOHN ROSSER examined.

11,562. What situation do you hold here?—Deputy harbour-master.

11,563. For how many years have you held that situation?—Nearly three years.

11,564. Have you been present during the course of this inquiry?—Yes.

11,565. And you have heard the evidence which has been given by the previous witnesses?—Yes.

11,566. Do you concur generally in that evidence?—In some points.

11,567. And in what points do you disagree from what you have heard?—As to the protection you have here. The Skerwether Sands bearing south seven miles distant, the roadstead is protected from south right round to west. With a south-east wind there are eight miles drift, but it is not a heavy sea, and generally speaking, vessels driving from half-flood to half-ebb meet no injury if they go ashore. If it is low water they very seldom beat in. Ships which go in from half flood to half ebb will never hurt.

11,568. Is there any other point upon which you are disposed to differ from the previous witnesses?—The great advantage is, that it would tend to relieve Penarth Roads. A ship from the tail of the Skerwether Sands always works down to the Mumbles Head, and there are frequently 200 or 300 vessels lying here aground and afloat.

11,569. You are well acquainted with the Bristol Channel?—Yes.

11,570. And as you prefer the Mumbles as a site for a harbour of refuge, give me your reason why you prefer it?—Take the Bristol Channel between Hartland Point and the Holmes. In the first place you can always get into the Mumbles with the tide going out of Penarth Roads, unless the wind should be north, when you can proceed on your passage. In an average tide vessels can make from Penarth Roads down to the tail of the Skerwether Sands, and make Swansea Bay. There is nothing to pick up a ship after she gets round the tail of the Skerwether Sands.

11,571. Do the coasting trade round the Land's End and to Ireland keep the north shore, if they can, in westerly winds?—A ship generally works the first tide to the Mumbles, and from there she gets 15 miles round the light ship just into Carmarthen Bay. She works down to above Caldy, and then works away in that course.

11,572. (*Mr. Lindsay.*) Where does a ship like to sight the land when she is running back for the Mumbles?—To the westward.

11,573. Whereabouts?—Between Oxwich Bay and the Mixons. There is a bold shore there.

11,574. Do they like to sight that point because it is bolder and clearer?—Yes.

11,575. How is the land about Oxwich Point?—It is the worst point to contend with. It stands off ragged.

11,576. Do you mean that there are some shoals running out from the point?—There are.

11,577. To what distance does the point run off ragged?—To a quarter of a mile. Oxwich Point is a very flat point and dangerous.

11,578. You stated that you have known 300 ships at anchor at the Mumbles?—Not altogether at anchor, aground and afloat I said.

11,579. You said that should a breakwater be constructed as suggested by Mr. Abernethy, 700 sail of vessels might lie within it in safety, afloat and aground; how much room would you have for vessels afloat?—At low water I should say for 200, by shortening their cables at low water.

11,580. I ask the question because by the plan I see there would be 330 acres of three fathoms of water and upwards, would that hold 200 vessels afloat?—Well, generally speaking it would; there is a good mile distance between the lower part of the Green Grounds and the Mumbles Head, and you will find better than three fathoms there.

11,581. Consequently if this breakwater were carried out a great number of vessels could lie afloat—200 of the usual class of ships?—Oh yes; and if they can lie aground they like it better than afloat.

11,582. Do you think there is any necessity, as a nautical man, to have a harbour of refuge to protect vessels at the Mumbles while lying aground?—In many cases they prefer lying afloat, but where the anchorage is much crowded they prefer lying aground, because at half-tide they are dry.

11,583. Then if the anchorage was crowded you would prefer lying aground?—Yes, I should.

11,584. (*Capt. Washington.*) How long have you been acquainted with Swansea Bay?—I have been to sea for 20 years.

11,585. Trading to Swansea?—For 15 years a master trading from Swansea.

11,586. Frequently anchoring in the Mumbles?—Yes, frequently.

11,587. Have you reason to suppose that the bay has silted up?—Very little; I know that we have more water in the harbour than ever we had.

11,588. Do you know the nature of the Green Grounds?—Partly boulder stones and partly large black round pebbles.

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11,589. Can they be picked up without any difficulty ?—Yes, I should say so.

11,590. Do you know the nature of the Outer Green Grounds ?—Similar ; but I have not taken much notice of them. The lowest depth on the Outer Green Grounds is three fathoms.

11,591. You do not think there would be any difficulty in picking the stones up, and dredging the shoal away ?—I should not think there would.

11,592. Has dredging been used here much ?—It has a little, but nothing to speak of.

11,593. Has any benefit arisen from it wherever it has been used ?—Oh yes ; between the dock head and the pier entrance there is much more water.

11,594. De you think that two dredgers instead of one could be applied to Swansea bar with advantage ?—Yes, I do not see why they should not.

11,595. And get away the oyster bed ?—Yes, we might have a little more tumbling sea, but we have capital anchorage all the way up, and it would then be better. It is such holding ground that I have never known a ship drive with westerly winds.

11,596. Is there good holding ground further up to the east ?—Yes.

11,597. From what wind do you want to be sheltered ?—South and by east, along to south-west.

11,598. How is the tide ?—The tide always sets out nine hours close under the point at the head.

11,599. Are all dangers marked by buoys ?—There are buoys on the Green Grounds and the Mixons.

11,600. Have you a bell-buoy ?—Yes, on the Mixons.

11,601. Is it useful ?—Not very ; we seldom hear it when to windward of it.

11,602. It is not a powerful gong ?—No ; with an east wind and a light draught off the land you hear it, but not with a strong south gale.

11,603. Is that the time of fogs ?—We have fogs, generally speaking, when the wind is off the land, and there is not much danger.

11,604. Do you know the amount of accommodation in the docks ?—11 or 12 acres, and we shall soon have more.

11,605. Is there every facility for repairing damage to ships at Swansea ?—Yes.

11,606. Large lifting cranes ?—Yes.

11,607. And a patent slip which will take up a ship 200 feet long ?—Yes.

11,608. (*Capt. Sulivan.*) You say that the bay is not silted up much ?—I will not say positively, but nothing to speak of.

11,609. Will you say whether, within your own knowledge, the deep water at the back of the Mumbles has decreased ?—It may a little, but nothing to speak of. I will not be positive as to an inch or two ; a foot perhaps.

11,610. Can vessels go in without grounding near the Mumbles Head as far as they could when you first knew this place ?—Yes.

11,611. They can ?—Yes.

11,612. Do you know anything of the coast below Hartland Point ?—Yes; I am very well acquainted with it.

11,613. You said, I think, that you would prefer the Mumbles to any place before you got to Hartland Point ?—This side of Hartland Point, I would.

11,614. Supposing you had to choose a place, including the coast on the other side of Hartland Point, where do you think would be the best place to provide refuge for vessels bound south, bound round the land ?—Certainly I should give it in favour of Padstow and New Quay.

11,615. Do you know New Quay ?—No ; but I have been to Padstow at different times.

11,616. Do you think if the entrance to Padstow were improved it would be very valuable ?—Yes.

11,617. Did you hear what the previous witness said ?—I heard part of the evidence.

11,618. Is the principal difficulty at Padstow the eddying winds ?—With a square-rigged vessel there is great difficulty.

11,619. If a true wind were carried 200 or 250 yards further in than vessels can carry it now, would that obviate the difficulty of rounding the head ?—It would make a wonderful difference in the harbour.

11,620. (*Chairman.*) Then I understand you to say that you are decidedly in favour of Padstow as a harbour, on the other side of Hartland Point ?—Padstow or New Quay, or somewhere in that direction.

11,621. Speaking of Padstow, especially, do you think it would be a good place for ships to run for in stress of weather, if the point were cut down ?—Yes.

11,622. (*Sir F. Smith.*) Do you prefer it to St. Ives ?—Yes.

11,623. Tell me why ?—Vessels generally come in best round the Long Ships ; and, generally, running with a south wind, give the shore a good berth. If they can get up above Hartland Point they are all right. If they get an offing they get round the Land's End, or back into St. Ives Bay.

11,624. Supposing an outward-bound vessel got as far as St. Ives, and met with adverse winds, what would she do ?—A foreign vessel would keep to sea, and, if the wind were north-west, it would be a fair wind out of the Channel, between the Scilly Islands and the Long Ships.

11,625. But going to America ?—If they meet with adverse winds when bound for America, they never come back here, they put into Falmouth.

11,626. So you think St. Ives would be of no use ?—It would be of use as well as Padstow, like any other harbour of refuge.

11,627. (*Mr. Lindsay.*) Do you mean that if the improvement named was made in Padstow it would be used by all vessels, or do you look only to the coasters ?—I think it would be good for all vessels, supposing there were sufficient room and sufficient water.

Mr. JAMES WATT examined.

Mr. J. Watt.

11,628. (*Chairman.*) You command the tender the *Adder* ?—I do.

11,629. Are you well acquainted with the Bristol Channel ?—Yes.

11,630. What number of years have you known it ?—I have known it for the last 28 years ; but previous to the last six months I was five and a half years continually cruising up and down both sides of it.

11,631. Have you been present during the course of this inquiry ?—Yes.

11,632. And you have heard the evidence which has been given ?—Yes.

11,633. And you are aware of the objects of the inquiry ?—I am.

11,634. Now give us your opinion upon the subject? —I am very well aware that a harbour of refuge is very necessary in the Bristol Channel, very necessary indeed in the Bristol Channel. For five and a half years I have been cruising and sailing with coasters up and down, and from Penarth Roads down to Lundy Island. I have seen most vessels put back to the west of Lundy Island, and the west of Hartland Point; and I have generally seen them run for the Mumbles or Milford Haven, if they could fetch it ; and I believe the reason they run for the Mumbles, more than any other place, is in consequence of being small vessels, and good ground when they get round the point of the inner harbour, they put them on to the stiff mud. That is the only reason which I can assign for vessels using the Mumbles more than any other place.

11,635. Well, above the Flat Holmes, between that and King's Road, what is your opinion ?—I am not acquainted with that. My district did not go any further than Penarth Road.

11,636. Tell me what kind of a place is Penarth Road to run for at night by a stranger ?—Very good, you make the Holmes and steer south-south-west. You cannot go wrong in that direction.

11,637. Do you know Milford Haven ?—Very well.

11,638. You have heard the opinion given, that it is a bad place to make in thick weather ?—I do not hold with its being a bad place to make, I think it is very good to make if you can see the lights at all, and they are very good lights, not over high. You can see St. Ann's light further than any of the lights in the Channel, even in hazy weather.

11,639. But for a ship coming in from sea, having had no observations for three or four days, with thick south-westerly weather ?—If she misses Lundy Island, my advice would be not to try.

11,640. Why ?—Unless a vessel knows her position, I would not advise her to run for that harbour ; for although the harbour is good, and the water is good, the entrance is not over wide.

11,641. What do you say about Padstow ?—I was there once, and I hope I shall never go there again.

11,642. Will you tell me, as you were there only once, whether any special circumstance induces you to say you hope you will never go there again ?—From the locality of the place, from the accommodation it gives when you are in, and from the narrowness of the entrance. There is no room to accommodate but a few coasters, it won't hold above a dozen ; and there is a very dangerous bar on the east—the Doom Bar ; a very dangerous sand, where a great many men have lost their lives, as I see by the gravestones in the churchyard at Padstow. The entrance is remarkably narrow, and very baffling winds.

11,643. And what do you say about Lundy Island? Lundy Island is very well as a shelter from the wind at south-west to north and by east.

11,644. But with reference to the evidence as to the necessity of anchoring vessels very close in, and the difficulty of getting away upon a shift of wind, what do you say about that?—A square rigged vessel in 13 fathoms of water, particularly with a strong north-north-west or west-north-west wind, would never get out there.

11,645. What would she do ?—She would come on the island. I have had occasion myself to get a boat ahead ; but I anchored nearer in, not in 12 but in 9 fathom of water.

11,646. Do you know Clovelly ?—Yes.

11,647. What do you say about Clovelly ?—I am inclined to think it is too far embayed. All along the coast from Hartland Point there is a nasty off tide, and at all times a heavy swell flows in. There may be a harbour of refuge made in Clovelly, but I do not think that many people would attempt it in thick weather. It is a very bad place to make. The land is very high. I have been along the coast, and I could not see anything down to the water's edge.

11,648. (*Sir F. Smith.*) Are you an Ayrshire man? —I am a Banffshire man. I have been there once or twice since I left it. I think I should know it again if I saw it, but I do know the coast from John-o'-Groats' House to the Land's End.

11,649. Have you any opinion as to Peterhead as a harbour of refuge ?—Not at present.

11,650. May I ask you another question about St. Ives ?—I have never landed there, but I know the bay very well.

11,651. Do you think that a harbour of refuge constructed there would be more likely to save life and property ?—Occasionally life is lost. It has been lost latterly, but that may not happen for years again I really should not like to offer any opinion.

11,652. (*Capt. Sulivan.*) Is your vessel a sailing vessel or a steamer ?—A sailing vessel.

11,653. Did you ever go into Oxwich Bay ?—Very frequently.

11,654. What do you think of it as an anchorage in its present state as compared with the Mumbles in its present state ?—The Mumbles is much better ; it lays away two points more off the west. There is shelter in Oxwich Bay in 2½ fathoms of water, but the moment the flood makes, a heavy swell comes round, and it is most puffy and rotten ground.

11,655. Besides the bearing of the point, can you go much farther into the depth of the bay than you can at the Mumbles ?—Two points.

11,656. That is the bearing, I mean without grounding ?—No, I can come nearer the Mumbles Point. I have rode in the Mumbles four winters' gales of winds ; and frequently I have left Oxwich Bay and ran along to the Mumbles in gales of wind from west and west south-west.

11,657. (*Mr. Coode.*) You say you know Penarth Roads very well ?—Yes.

11,658. Did you hear the evidence given by a former witness as to its silting up ?—I did not.

11,659. Have you reason to believe that any change is going on in the depth of water there ?—I did not see any difference during the four years I was there, but what has happened lately I do not know.

11,660. How long is it since you were there ?—About 10 months.

11,661. Do you think that there are many others of the same opinion as yourself as to Padstow ?—I have heard many say that a smart, free, and fast vessel will go in very well, but for square sails it is no good.

11,662. You say you have seen the graves in the churchyard of the seamen who have been lost on the Doom Bar. Should you not think that was a reason for improving the entrance to the harbour ?—That remains for your judgment to say. I merely spoke of the dangerous state of the harbour at present.

11,663. You said that no man would go there who could help it ; I presume you were in that position when you went?—They get good frieghts for going to Padstow ; they get more for Padstow than New Quay.

11,664. Then you think that the wrecks are not wrecks of vessels which trade to Padstow, but vessels running in for shelter in gales of wind ?—Not so ; vessels will not run in in gales of wind ; if they can get to any other place they will not go there.

Mr. Joseph Hood Simpson examined.

Mr. J. H. Simpson

11,605. (*Chairman.*) In what capacity are you connected with the port of Swansea ?—The managing agent of Sir W. Hall and Co., of Sunderland, who have a fleet of vessels trading to this port.

11,666. What description of vessels are they generally ?—Vessels generally of 400 or 500 tons trading to Cuba and Chili for silver and copper ore.

11,667. Have you been present during the course of this inquiry ?—I have.

11,668. And are you aware of its object ?—I am.

11,669. Do you concur generally in the statements of the previous witnesses ?—In most of the evidence.

11,670. Are there any points upon which you differ from them, and state to the Commissioners what they are, if any ?—I have only heard Mr. Rosser say that small vessels prefer lying aground to lying afloat. I am rather of a different opinion from him. I should rather have a vessel lie afloat. I think, if a breakwater could be so constructed so as to keep all vessels afloat in the Mumbles roadstead, it would be much more preferable for them to lie afloat than to lie on the ground.

11,671. Is there any other point to which you wish to draw our attention ?—Nothing particular just at present.

11,672. Have you ever suffered any inconvenience from vessels having such indifferent anchorage while waiting to go into the harbour ?—I should also state that I have made about 20 voyages to the West Indies. I have experienced rough weather off the Mumbles, especially in winter time, and with large vessels I found it very heavy riding sometimes.

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Chairman.

11,673. Have you ever witnessed vessels part from their anchors?—Yes, I have.

11,674. And has any loss of life ensued in consequence, within your knowledge?—I have heard of such things, but not to my own knowledge.

11,675. Has the firm with which you are connected suffered any pecuniary loss from the circumstance of the anchorage of the Mumbles being so indifferent?—I cannot answer as to that.

Mr. GEORGE GRANT FRANCIS examined.

Mr. G. G. Francis.

11,676. (*Chairman.*) In what capacity are you connected with the port of Swansea?—I am a merchant here connected with the steam coal trade, and also one of the Executive Committee of the Mercantile Marine Association.

11,677. And for what number of years have you been connected with Swansea?—All my life. I was formerly in the Harbour Trust, and Mayor of Swansea. I have held various appointments also. For several years I acted as secretary of the New Swansea Docks, and I was one of the early promoters of it.

11,678. Is there any information which you can furnish us with respect to the statistics of the port?—I have a few statistics, but they are not quite so complete as I could wish, from the difficulty of getting the last returns of the Board of Trade; but I have a few which I can furnish to the Commissioners, and I think in the course of their inquiry one of the Commissioners asked for some information as to the loss of wrecks between given lines in the Bristol Channel. I have taken the best scale I can get—the Wreck Chart issued by Parliament for 1852, 1853, 1854, 1855, and 1856. From Hartland Point across Lundy Island to Caldy Point the total loss in the Channel appears to be 75, from Ilfracombe to the Mumbles 46 below, and therefore 29 above it. Those which are marked with a cross and severely damaged 78, 39 below Ilfracombe and the Mumbles, and 39 above it. Those marked as collisions and severely damaged are 7 in the gross, 4 below Ilfracombe and the Mumbles, and 3 above it. Collisions and total loss marked with black figures of 8, one above and 7 below. I have also taken the trade of the Bristol Channel, and I find that for the last year it claimed 65,213 vessels; that the coal from the five ports of Gloucester, Bristol, Newport, Cardiff, and Swansea exported was 3,362,000 tons, out of the gross total of 5,000,000 tons; and taking those five ports it must be remembered that Gloucester and Bristol are small exporting ports, and therefore there must be something about 3,000,000 of tons exported from the three Welsh ports of Newport, Cardiff, and Swansea. I find also that nearly one-sixth of the ships and one-tenth of the entire tonnage of the United Kingdom are given by the ports of the Bristol Channel. (*Vide Appendix.*) I thought that important in dealing with the question of probable traffic, and I have appended a plan for the purpose of showing that with the enormous coal fields of the South Wales Basin (which is comparatively only just opened), that as internal facilities are increased so will the traffic over the waters of the Bristol Channel increase, as it has already increased to an enormous extent. When attention was drawn to the importance of having some place of refuge for vessels in the Bristol Channel, I was selected to go as a delegate from Swansea to the eastern ports, to consult with them as to the best course, and to see whether we could agree which really eastern, was the best place. Having been so requested, I went to the English ports, and I found that with almost every official person with whom I communicated there was a similarity of opinion with that of persons in this locality in favour of the Mumbles. Having prepared a petition to Parliament from Swansea, it was adopted, as well as others of a similar spirit, by the Harbour Trustees and the Marine Association. I was anxious to have the accord of the Bristol Channel ports. I found at first a common desire among all, but as soon as it was found a Commission was to issue, a difference arose as to where the place should be. I said distinctly, as I was authorized to say, that we at Swansea did not look at it as a local question. It did so happen that the Mumbles roadstead was near Swansea, but I was authorized to say that if Cardiff, Newport, or Gloucester would satisfy us that Clovelly, Lundy Island, or any other place would be of more benefit if a sum of public money were expended upon it, we would honestly and anxiously go heart and hand to have that one place improved for the common good of all. I had the advantage of consulting gentlemen who, from their official position, were not swayed by prejudice, and I found nearly all in favour of the improvement of the Mumbles roadstead, but when I came to mix with merchants and other individuals having a local interest, then not unnaturally I found out a difference of opinion; the fear being, that if this roadstead were improved, although it might benefit the Channel at large, that Swansea would be benefited in a much larger proportion. The petition was prepared and signed at Newport, when at some sudden and hasty meetings it was determined to go for another place than the Mumbles. Bristol, Gloucester, Newport, and Cardiff joined in opinion that Clovelly was the best place. I found petitions to that effect were sent, but I now learn, that having made inquiry and having discovered that Clovelly is not a desirable place, they have shifted from Clovelly, and now desire some other place. Having also attended a harbour meeting at which a petition was adopted, it appears to me, that there is no difference whatever as to the desirability for the general traffic, that the Mumbles Roadstead is, above all others, the best locality judicious for an outlay of the public money. To show the enormous amount of the tonnage and the value of the exports and imports from this district, I may say that something more than 3,000,000 tons of coal are exported from the three ports of Newport, Cardiff, and Swansea alone; that the copper ore brought in foreign and home bottoms must in value be more than 3,000,000*l.* sterling per annum; that the silver ore brought in foreign and home bottoms must be something like half a million; and the development of the coal trade, which is already a great one, must tend to largely increase that trade. It must be remembered, that the Marquis of Bute created a dock out of a mud bank at Cardiff, and has gone on increasing the facilities for trade at that port. Probably some of the Commissioners will have an opportunity of seeing these things for themselves. I recollect what this port was not long ago, and the growth of its trade has been something almost incredible. I may mention that my firm, who have shipped this month between 3,000 and 4,000 tons, have been obliged to refuse large contracts for want of facilities to execute them. Looking to that, and not to the local interest, and believing that other facilities would tend to diffuse equally large supplies over the whole world, I think we are entitled to claim the aid and assistance of Parliament, to have a harbour of refuge for this Channel at the Mumbles, if anywhere. But if it should be found that some other place is better, we shall not be anxious, because the Mumbles is here, to have that selected. We do want, however, one harbour which shall suffice for the whole channel, whether near or far off. I may mention also, that not being a sailor, but taking great interest in these matters, I ventured to lay before those gentlemen in the eastern part of the Channel this important item connected with the Mumbles; that if Government intended to create defences to which the trade must look for protection in time of war, there were great facilities for the erection of batteries, and it was said that Government had determined upon the Mumbles for the site of such defences, and had ordered their construction. (*See Appendix.*) The Mumbles also affords a lighthouse, and is situated in

a thoroughly well-known locality. Another point of considerable importance to the merchant is, that if he has a ship damaged, and brought to a harbour of refuge, requiring repairs, there should be facilities for the rapid supply of such articles as may be necessary. The supply here of anchors and spars, and everything required by a ship, is most ample ; and I venture to submit to you, that this is a point which does affect the question of Clovelly, a little village on the abrupt side of a hill difficult of access, and Lundy Island, where there is no access at all. For ships that may occasionally in times of pressure require supplies and repairs, it is of the utmost consequence that they should have them promptly. They cannot have them at Lundy Island, because there are no slips or docks, or gridirons to repair ships upon, or stores to obtain supplies from. (*See Appendix.*) As to whether this mode of constructing a harbour of refuge, or another mode, is the best, is nothing to me ; but looking at the question at large as a citizen, as to which would be the most prudent and the best, I feel that the Mumbles is the most proper place for the outlay of the national funds. The question of water again is, we know, to shipping, of the greatest importance, and any deficiency of such a supply must be a difficulty for any locality. With regard to the advantage of the Mumbles as a place for ships to loose from easily, I heard what has been stated by some of the witnesses illustrated in a curious manner, and some years ago I took the trouble to ascertain all the facts. Two ships belonging to the same owner, laden with the same cargo, namely, coals, bound for the Island of Cuba, and of the same tonnage, curiously enough left the two roadsteads of Penarth and the Mumbles at the same time. You will notice that they were two vessels belonging to the same owner, going to the same place, laden with the same description of cargo, and of the same tonnage, and leaving at the same time those two roadsteads of Penarth and the Mumbles. The one which left the Mumbles roadstead reached Cuba, brought back a cargo, and found the other had only got down as far as the Mumbles. She had frequently tried to get away from Penarth, but by the state of the winds had been prevented. There she was when her fellow ship had carried her cargo to Cuba, and returned back again. As gentlemen are looking to the facilities of Penarth as compared with the Mumbles, I think that is a fact of some value. I only regret that I have not got the letter challenging anyone to contradict the points of the case as I have stated it.

11,679. Perhaps you will allow me to stop you for a moment to ask if you can, at your convenience, send a copy of the letter ?—I am sorry to take up the time of the Commissioners with so long a statement.

11,680. Pray do not misunderstand me. I only stop you to ask you to send a copy of the letter to the Commissioners ?—Yes. (*Vide Appendix.*) I hope I may not be out of order in referring to the suggestion for carrying a harbour of refuge down to a place further westward, Oxwich Bay. Probably the Commissioners are not acquainted with the interior difficulties of the country. I can assure them that there are great difficulties. There is a ridge of mountain, and the access to the coast is over a private road, through very difficult ground ; I mention that, in order that the difficulty of access may have such weight with the Commissioners as it is worth. From what has been said on the commercial aspect of this question, it is worthy of consideration in that way, because it is very fair to suppose that the cost of supply would be increased, if carried over a country of considerable difficulty. I have a number of statistics in reference to general matters, but I would rather not trouble you with little points. If there are any questions which you wish to put to me, I shall be very happy to answer them.

11,681. Any of these statistical returns, if you wish, you can leave with the secretary, and then they will come under our consideration ?—I shall be very happy to do so.

11,682. Perhaps it will be more convenient for you to take a little time to put them in a shape that will render them more easy of reference ?—I should desire that they should be correct, and to put them in as simple a form as possible to be read.

11,683. Is there any remark which you would like to make upon the evidence you have heard ? You have heard the whole of the evidence, is there any further remark you would like to make upon it ?—As I remarked, not being a seaman, I do not wish to touch upon the nautical question, but I can only repeat my opinion from long experience, having been connected with nearly all the railways proposed for this part of the country, and its dock accommodation, I think it is of vast importance to the whole of the Welsh ports that a harbour of refuge should be made at the Mumbles. There was one question at an early period of the inquiry which I heard, in relation to an additional light, but that touches more upon the nautical necessity, though I believe, speaking from my knowledge of the opinions here, there would be no objection whatever—if the nautical opinion was, that a floating light would be advantageous,—there would be no objection whatever on the part of the shipping interest to contributing, when that light is put up ; still, that is a matter of nautical knowledge, and it is not for me to say whether it should be put up or not.

11,684. (*Mr. Lindsay.*) You have made a statement which has been to me exceedingly interesting, and from which I have derived great instruction. You referred to certain vessels lost in certain districts of the Bristol Channel ; do you think it possible for you to send, among these returns which you have promised to send, a statement showing how many vessels which have been wrecked would have been saved if there had been a harbour of refuge at the Mumbles; do you think it possible to get that information ?—I can only say, that if, taking one or two persons most skilled in the neighbourhood, with such local knowledge as I may have, I can at all gain an approximation to the truth, I shall be happy to give the information to the Commissioners ; but if, in the absence of Parliamentary returns, I find that it is impracticable, I should not like to send any statement upon which the Commissioners could not depend.

11,685. You may be able to collect the facts from local information ?—Yes.

11,686. And will you endeavour to do so ?—I will endeavour to do so.

11,687. When you desired to have the opinion of all the parties interested in the trade of the Bristol Channel, did you confine your inquiry to sites above Lundy Island, or did you take into consideration sites still further down Channel, being of benefit for the saving of life and property ?—We discussed that question on several occasions, but we came to the same conclusion, which was, that we should confine ourselves to the Bristol Channel proper, or so much of it as lies above Hartland Point and Caldy. In this locality we have determined to confine ourselves to the Bristol Channel, strictly speaking. I recollect that it was very largely and fully talked over with Mr. Clegrann at the canal navigation office ; we had the charts out, and after a long conversation it was determined that the legitimate course was to confine our consideration to where vessels came from or went to. That was thought to be the principle upon which we ought to proceed, and upon that our conversation was confined to the Channel above Hartland Point.

11,688. You did not arrive at any conclusion as to the necessity of a harbour of refuge below Hartland Point ?—We considered the bulk of the trade was from the Bristol Channel proper. To deal with the Land's End was a question so wide from us, that we thought we had better limit our efforts to information which should apply east of Hartland Point.

11,689. (*Capt. Washington.*) As I see you are familiar with statistics, do you think it possible to

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obtain a return, or an approximate return, of vessels which go to the north, and those which go to the south of Lundy Island ;—those which pass between Lundy Island and the Welsh coast, and those which pass between Lundy Island and Hartland Point ?—I do not see where I could obtain that return, because it depends on the state of the wind. If I wanted information there would be no difficulty in getting it, if it were not so wide a subject ; but I shall be exceedingly happy to take a note of the question, and see if I can succeed at all in supplying that which you require.

11,690. One important item for you to consider, in compiling such a return, will perhaps be the number of vessels trading to Liverpool, the Clyde, Ireland, and north about ?—If there is any possibility of arriving at a satisfactory conclusion, I shall certainly attend to your request.

11,691. Do you think that the trade of Swansea would be disposed to contribute towards the expense of a breakwater at the Mumbles ?—You are alluding to a passing toll.

11,692. No ?—Then in what way ?

11,693. To contribute in any manner ?—In what way would it be levied ?

11,694. Through the Harbour Trust; are there any funds available ?—They have no funds for such a purpose ; they are bound to expend their funds on particular objects named in their Act of Parliament.

11,695. What is the revenue of the Harbour Trust ? —26,000*l.* a year.

11,696. Is there no margin out of which something could be devoted to so useful a purpose as erecting a breakwater at the Mumbles ?—We have so many large works going on now in the harbour for its general improvement, we must presume that the available income is entirely absorbed.

11,697. Perhaps you are aware that on the Tyne they are contributing very largely ; in fact, that from their own funds they are erecting very large breakwater piers ?—The question may be answered, indirectly, by our having considered the question in reference to a passing toll.

11,698. I said nothing about a passing toll ?—I will say nothing then about a passing toll ; but I may venture, on the part of the local trade, to say, that what other ports may do Swansea will do. If Bristol, Gloucester, Cardiff, and Newport will all do something towards it, I should imagine that Swansea would not be backward in public spirit in doing what her neighbours wished to effect.

11,699. (*Capt. Sulivan.*) Will you be kind enough to explain some objection which you made to some returns of the Board of Trade ?—Not objections to the returns ; but that I was unable to obtain them. To my great mortification there was a large blue book to which I wished to refer, and there was not one in Swansea, and our member regretted that his copy had been sent off to a friend and not returned.

11,700. I thought you meant you had applied to the Board of Trade for returns and could not get them ?—No ; I never applied.

11,701. With reference to the supplying ships, do you or do you not believe that an outlay by Government of 900,000*l.*, when made in any place, even if there was not a house in it before, if by that outlay large numbers of shipping would be brought there,—do you not believe that men and capital would be found to go there and supply the wants which would spring up ?—That opens a wide question, which may admit of discussion. We do find, that where large sums are expended the neighbourhood soon contains a large population ; but I do not think that applies entirely to a harbour of refuge, which may have a large number of ships in the month of March and none in July ; and, unless there was a continual demand, I think prices would range very high.

11,702. (*Capt. Vetch.*) Assuming that the breakwater would be very useful in a national point of view—supposing that it would be equally beneficial to the trade of the port ;—do you not think it a fair proposition that the trade of the port should assist in the execution of the works ?—I think, speaking for myself only, that if it can be shown that any large increase and benefit would arise to the locality, and were certain to accrue by the outlay of money in that way, and in reference to what others are doing, then it is fair to call upon those who are likely to derive the great benefit and advantage, to contribute to that advantage. I believe it is not generally considered at most of the large ports, that if anything is done, they will be expected to contribute.

11,703. Supposing this proposed outlay by Parliament were held out with conditions of the kind to which I have referred, namely, that local parties should contribute,—what do you say ? — Then I can only repeat, that my belief is, Swansea would act quite as liberally as any other port in the kingdom.

Commander George Manly Aldridge, R.N., examined.

Commander G. M. Aldridge, R.N.

11,704. (*Chairman.*) You are in command of the surveying vessel here ?—I am.

11,705. How long have you been employed on this part of the coast ?—Seventeen years in the deep sea surveys of the Irish Sea, and the various ports of the Bristol and Irish Channels.

11,706. You have been present during the course of this inquiry ?—Yes, I have.

11,707. And you are aware of its objects ?—I am.

11,708. Will you now proceed to give your opinion on the different ports which you have heard mentioned ?—I would not wish to waste the time of the Commissioners ; I will, therefore, as briefly as I can, state my opinion as to the necessity of a harbour of refuge at the Mumbles. I do not know any more desirable spot in the Bristol Channel for a harbour of refuge. I have been engaged in surveying for several years, and I have seen the necessity for shelter for the immense mass of trade which there is in the Channel. During my stay this summer I have known numbers of vessels lay in the Outer Green Gounds in south winds and blowing strong, severely exposed to loss entirely of vessel and cargo. I have seen a vessel also which has been obliged to anchor in the Green Grounds to take a cargo in there, and been unable to do so, from there being too much sea. I have seen the risk incurred. If a southerly gale had come on, the vessel might have touched. It was impossible for her to make sail or beat off the shore when there was not sufficient water, even at the time of high water, to enter the harbour of Swansea. Therefore there was nothing for her but to run ashore, and, in all probability, if she had broken from her anchors she would have been lost.

11,709. Taking the general question of the outward bound trade—the foreign trade—do you view the Mumbles as a port upon which it would be most desirable to expend public money, in order to save time in the passage when they meet with bad weather, and also to save wear and tear ?—I do, for several reasons. The outward-bound trade from Bristol, Cardiff, Newport, and so forth, generally encounter southerly gales before they can reach Lundy, generally below Swansea or near Swansea. Vessels leaving Bristol, and the other ports, always leave their ports about the time of high water. From Bristol they might reach the Mumbles in one tide. From Cardiff they are sure to be down, and Newport also ; therefore if caught below the Mumbles, the Mumbles is the nearest place to make, provided a harbour of refuge were built there.

11,710. And when the weather breaks are you disposed to say, taking a general view of the most prevalent winds, that the Mumbles is the best point of departure ?—I think it is.

11,711. Taking the inward-bound trade, is it an easy place to run for in bad weather, when a ship is coming in from sea and has had no observation for three or four days? Should you consider Swansea as easy or easier to make than any other port?—It is certainly not an easy place to make, if you have had no observations; but provided you are sure that your vessel has passed the Worms Head, there is no difficulty in making Swansea.

11,712. Is there anything in the character of the soundings which renders it easy to be done?—The soundings are always a guide, but they run in even depths in the right course.

11,713. There is nothing sufficient to guide a vessel until she reaches into bay?—No, I think not.

11,714. (*Mr. Lindsay.*) You surveyed the Mumbles Bay. Have you surveyed Oxwich Bay?—No.

11,715. Then you cannot speak on that point?—No, I cannot.

11,716. (*Capt. Washington.*) You have just completed the survey of Swansea Bay?—I have.

11,717. Have you had occasion to compare it with any former survey?—I have.

11,718. With whose?—With the Admiralty Survey, made in 1831 or 1832 (it bears the date of 1832) by Captain Denham.

11,719. Is there anything that arises out of the survey which renders it unadvisable to erect a breakwater in Swansea Bay?—No.

11,720. Do you know the nature of the Inner Green Grounds?—Yes; large and small boulder stones and oysters.

11,721. Would there be any difficulty in picking up the stones, and dredging away the oyster banks?—I think there would be no difficulty. The other day, when they let the dredger drive, they brought up a dredger full of boulder stones.

11,722. Is that the general character of the other shoals of Swansea Bay?—Yes; they are all composed of stones or boulders.

11,723. Then they are not accumulations of sand?—They are not.

11,724. If they were dredged away, there is no reason to suppose they would return?—None.

11,725. In preparing a harbour of refuge, is it not advisable to use the dredger very liberally?—I think it is.

11,726. If a depth of water is gained, does it signify in what manner it is gained?—I believe not.

11,727. You would recommend the use of the dredger also?—I should.

11,728. As a seaman of 30 years or so, have you any doubt that a harbour could be constructed in Swansea Bay to take in large vessels?—I feel satisfied it can be done, and that it would confer the greatest boon that could be conferred on the whole trade of the channel. Since I have been here I have seen over a hundred vessels at anchor at the same time, and holding on in a south breeze at great risk. Some of them had nothing to trust to but their anchors, and had their anchors parted they must have been wrecked.

11,729. Do you consider that it would also, besides being a refuge harbour, be a great assistance to the trade of Cardiff and Newport?—I am fully satisfied that it would.

11,730. Have you seen any rich foreign ships laden with ore lying exposed in Swansea Bay?—Several; and on many occasions.

11,731. Considering, then, the value of the trade to this port, and that assistance would be afforded to Newport and Cardiff, are you of opinion that it has a claim on some public funds to shelter the bay?—I do decidedly. I do not think that money could be better laid out than at this place.

11,732. (*Capt. Sulivan.*) Supposing it were possible to find a place in the neighbourhood of the Mumbles in which a larger area of good anchorage could be made safe without dredging, would you consider it preferable to the Mumbles?—Certainly not. The Mumbles itself and the natural formation of the bay offer great advantages, I think, for forming quays and erecting stores. The Mumbles has great advantage over any other place I have seen in the neighbourhood.

11,733. You see no reason to think that a difference in the charts renders it unadvisable to lay out money in Swansea Bay. I see that the three fathom line is further out in your chart than in Captain Denham's?—It is.

11,734. Is the four fathom line also further out in your chart than in Captain Denham's?—I have not marked the four fathom line.

11,735. Is the five fathom line further out in your chart than in Captain Denham's?—They do not agree, but it is right I should mention that the survey at the time it was made, though no doubt accurate according to the means employed, was like others made at that time when they had not the facilities of obtaining a number of soundings, nor of running over the ground with the same certainty I can do now with a steamer and a staff, examining every part.

11,736. I am not alluding to any superiority in your survey over Captain Denham's, I merely ask do you find less water in the Bay?—Very nearly, in some places, they agree; in others there is a difference. In many places I have shoals which do not appear on Captain Denham's chart. But they are on blank spaces, showing that Captain Denham had not made soundings there.

11,737. I allude to the clear ground under the Mumbles Head. On Mr. Anderson's chart it appears to be 9, 8, and 7 fathoms. I take Captain Denham's chart, and there is 8, 8, and 7?—I have not compared the two, nor have I seen Mr. Anderson's.

11,738. From a comparison of Captain Denham's and your own, can you say that there is no decrease in the depth of water in the Mumbles Roads?—I have not compared them sufficiently to be able to state positively; I have not the elements by which I can compare. Where there is a shoal which is not put on Captain Denham's chart, it does not come under any of his soundings.

11,739. (*Capt. Vetch.*) Do you attribute the discrepancy in the surveys to the change of depth or to the want of attention in the former survey?—I cannot state, because I am unaware to what zero Captain Denham reduced his soundings. What was his standard?

11,740. But allowing for the increased accuracy and precision of charts in later years, might the difference arise in that way?—I do not think there can be any accumulation, because there is no deposit to speak of in the water. There is no sand—no sandy deposit. The water is nearly clear in the bay, unless it is disturbed by strong winds, and holds very little deposit in suspension.

11,741. Then you assume that the difference is more likely to arise from the want of precision in the former survey than from any change of depth?—I do.

Mr. Matthew Jones examined.

11,742. (*Chairman.*) What has been your occupation?—For the last eight years master of a steamer in the Channel.

11,743. For how many years have you been at sea?—17 years.

11,744. And in command of a vessel for how many years?—A master of a ship for eight years.

11,745. Have you been present during this inquiry?—Most part of the time.

11,746. And you are aware of the object of it?—Quite so.

11,747. Is there anything you wish to offer in addition to the statements you have heard made by the different witnesses?—I think it is almost a mere

SWANSEA.

Mr. M. Jones.

30 Sept. 1858.

Chairman.

recapitulation of what you have heard, what I might wish to say in the matter. There is nothing but three places named as eligible, and I should wish to give my opinion in favour of the Mumbles as much more preferable to the three named. In the first place, vessels getting under weigh at Penarth in the ebb tide get down a certain distance, they often get aslant from the south and get down to Ilfracombe; the wind then comes more up, and if there were a harbour of refuge they would fetch here, and be in a better position to loose than if they ran back to their old anchorage, because after a continuation of westerly winds the wind generally flies out to north-west, and if they are at the Mumbles it is a fair position to get to sea. If they were at Penarth they would be wind-bound of course.

11,748. And of your own knowledge you are able to tell us of large numbers of vessels being congregated at the Mumbles, when the wind blows up the Channel?—Oh yes.

11,749. You have seen that often?—Yes; and at Penarth too.

11,750. And to a greater extent at the Mumbles, than any other place in the Channel?—No, Penarth; I have seen more there after west gales.

11,751. Does it arise from the Mumbles not being safe anchorage at present?—I have no doubt Penarth is a more safe anchorage than the Mumbles at present.

11,752. (*Mr. Lindsay.*) Where do you trade to?—From Bristol down to Swansea and all ports.

11,753. Is your trade confined within the Bristol Channel, properly so called?—Yes.

11,754. You do not go to the west of Lundy Island?—No.

(*Chairman.*) Mr. Benson, there was a paper which you wished to tender in evidence.

(*Mr. Benson.*) It is a report of Capt. Claxton. It corroborates very much what Mr. Francis states as to the two vessels which belonged to the same owner, and left at the same time Penarth and the Mumbles for Cuba. It also shows that a breakwater was proposed at Swansea at that time, and as it may be of use, if you will allow me I will put it in.

(*Chairman.*) If the Comptroller of the Customs is present, perhaps he will also put in his return as to the trade of the port.

(*Mayor.*) I will hand it over and guarantee its accuracy.

(*Mr. Benson.*) There is another paper referring to the trade of Swansea Harbour in 1857 which I wish to put in.

(*Chairman.*) Then do I understand you to say that, as one of the parties interested in this inquiry, you are satisfied with the extent of the evidence which has been tendered, because you have more witnesses. The Commissioners are satisfied that they have obtained all the information which they require; therefore if you are satisfied we will not prolong the inquiry.

(*Mr. Benson.*) The evidence of the witnesses which have not been called would be to the same effect.

(*Chairman.*) Are there any other parties interested in this inquiry who wish to tender any further evidence on the subject?

No answer.

Sitting at Swansea closed.

CARDIFF.

Friday, 1st October 1858.

PRESENT:

Admiral Hope (Chairman).

Mr. Lindsay.
Captain Washington.
Captain Sulivan.
Captain Vetch.
Mr. Coode.
Mr. Evans, Secretary.

Mr. J. Croft Williams examined.

CARDIFF.

Mr. J. C. Williams.

1 Oct. 1858.

11,755. (*Chairman.*) Are you the Mayor of Cardiff?—I am.

11,756. Will you now proceed to make any statement which you may wish relative to the subject of the inquiry?—On behalf of the town of Cardiff, I may state that when we received a notice intimating that there were three classes of evidence which the Commissioners wished to have laid before them, namely, that of mercantile men, that of shipowners, and that of shipmasters and other seafaring men, we thought you would not receive any engineering evidence as to the capabilities of any port or ports. That is the reason we have no engineering evidence to tender. Perhaps I may also be allowed to state, with respect to the Bristol Channel, that the trade of the Bristol Channel altogether in the year 1856 as made up from the the returns to the Board of Trade, shows that one-sixth of the number of vessels frequenting the ports of England belong to the Bristol Channel, and that the tonnage of those vessels is one-tenth of the whole tonnage. The returns show that 398,540 vessels entered and cleared from the ports of the United Kingdom, and that the total tonnage was 52,119,977 tons. Taking the whole trade of the Bristol Channel, it shows a gross tonnage of 5,666,336 tons, and a proportionate number of vessels. This statement shows the extent of the traffic in the Bristol Channel, and we thought that in conjunction with the fact that a Royal Commission was to be sent down, it would show the necessity of harbours of refuge being formed in the Bristol Channel. I may also state for the four ports of Bristol, Gloucester, Newport, and Cardiff, the returns show that in the whole year 1856 the number of vessels entered and cleared from these four ports amounted to 37,897, their tonnage being 3,763,306 tons. I believe that the trade of Newport and Cardiff alone will show that 23,653 vessels with a tonnage of 2,545,287 tons entered and cleared from those ports. The trade of Cardiff alone for the last year showed the gross number of vessels to be 9,343, of which 3,087 were foreign, and 6,256 coastwise. I shall put in returns of the trade in the year 1835, in the year 1840, in the year 1845, in the year 1850, and in the year 1855, and for the last two years which will show the gradual increase of the trade. In the year 1835 the number of foreign vessels was only 195. In the year 1857, as I have stated, the number of foreign vessels was 3,087. In 1835, the number of coasting vessels was 2,586, it is now 6,256; showing a gradual increase of the trade of the port of Cardiff, and it is now increasing in a much greater ratio. I need scarcely mention to you the great extent of the coal and iron fields, and the increase of the population. Our imports are in-

creasing annually both as to green timber, and almost all other articles. I shall put before you the number of vessels which have entered inwards for the purpose of showing the amount of the import trade, and that return will show a greater increase than in the coasting trade. I may also be allowed to state that the foreign trade of Cardiff is one-third more than that of the coasting trade; and if we deduct 1,053 vessels which left for ports in Ireland, it will show that the largest number of vessels that have made for the English coast have come here. I think that all the vessels bound for Cork even, have made either the mid-channel or the English coast. You will have before you mercantile men, shipmasters, who have spent the larger portion of their life in the Bristol Channel, and who have been constantly up and down it; pilots who have weathered and buffeted the seas about here during the whole of their time, and they will give you the benefit of their experience, from which you must form your own conclusions. But I think you will find from their evidence that most of them are in favour of the English coast. I am happy to say that the same class of evidence which will be put before you, the evidence of men who have spent the greatest part of their lives in the Bristol Channel, will show not one tittle difference of opinion, and that they will declare that the best and most efficient harbour of refuge in the Bristol Channel would be in Lundy Island. I will now put in a statement of the export trade. In 1845 there were only 31 vessels. In 1857 the number was 165, being an increase of more than five to one. The tonnage in the former year was 1,020 tons, and in the latter it amounted to 2,358 tons, entered inwards and coastwise. There are a great many vessels coming in with iron ore, brought in from the south part of Devonshire. All these vessels must come up on the English shore. I will now just bring under your notice what may appear to be almost fabulous. The export from Cardiff of coal alone in one year amounted to 1,442,938 tons, whilst in the year 1831 there was not a single ton sent foreign. In 1857 the number of tons sent foreign was 912,000. I am not aware that I am able now to put in any further evidence with regard to the statistics of trade, but if I have omitted anything, perhaps I shall hereafter be allowed to supply it.

11,757. Certainly.—Perhaps I may add from my own evidence, that I have no doubt all vessels make Nash Point coming up the Channel. After a long continuance of westerly winds, a great number of vessels are in Penarth Harbour. At a quarter past one o'clock on Sunday fortnight, I reckoned, standing in the same spot, 194 vessels, which left Penarth Harbour. Out of that number not one came to the Welsh shore. Every one of them went to the English shore. Afterwards, later in the day, there were some 45 or 50 vessels, and not one of them came to the Welsh shore. Every one of them hugged the land, and went down to the English shore.

CARDIFF.

Mr. J. C. Williams.

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11,758. You have no further statement to offer with respect to the subject of our inquiry?—I will merely put in a return of the trade of the port of Cardiff, officially obtained from the Customs. We thought it would be a more official and correct statement, if we obtained a return from the Custom House than if we obtained it from the different merchants.

11,759. (*Mr. Lindsay.*) Do I understand you, Mr. Williams, to say, on the part of the inhabitants of Cardiff, that they consider a harbour of refuge necessary in the Bristol Channel for the saving of life and property?—We do.

11,760. Did I understand you further to say, on the part of the inhabitants of Cardiff, that they consider Lundy Island to be the most suitable place for a harbour of refuge?—The whole evidence which will be put before you, and the general opinion of every person I have spoken to in the town is in favour of a harbour of refuge at Lundy Island.

11,761. Considering the necessity for a harbour of refuge and the site for a harbour of refuge, do you confine yourself to the Bristol Channel proper, that is to say, from Hartland Point upwards, or do you take into consideration any site below that?—We considered the Bristol Channel alone. The evidence which will be given before you to day, will have reference to what we call the Bristol Channel proper, from a little below Hartland Point upwards.

11,762. (*Mr. Coode.*) What was the direction of the wind upon the occasion you spoke of, when the vessels made for the south shore?—I was standing by the sea shore, and the wind was coming from the east, and the wind had so shifted that the vessels which were formerly wind bound at Penarth, were able to go down Channel.

(*Chairman.*) Before calling the next witness, I wish to make one observation with respect to a remark of the Mayor, relative to our having requested only the evidence of mercantile men generally, that is to say, of shipowners, shipmasters, and other seafaring men, and our not having required engineering evidence. The character of the evidence which we intimated our wish to obtain was the evidence to be had only on the spot, and which is not of an expensive character; but if we had called upon the port to give us engineering evidence, we should have put the port to considerable expense. Whenever we want engineering evidence we shall summon engineers before us; but that will not preclude any party who has had detailed plans and estimates of a breakwater prepared from laying those plans and estimates before us. It is left for the port to judge whether they will bring engineers before us or not, and that is completely covered by the terms of our notice, where we say that we shall be prepared to receive further evidence, in addition, which it may be thought fit to offer. Therefore any port wishing to bring forward engineering evidence is perfectly at liberty to do so.

Mr. Samuel Humphrey examined.

11,763. (*Chairman.*) You are connected, I believe, with the port of Newport?—Yes.

11,764. You are aware of the objects of the inquiry?—Yes, I am.

11,765. Have you read the report of the Select Committee of the House of Commons upon Harbours of Refuge?—I have not read the whole of it, but I was up there during a considerable part of the time when the evidence was taken in relation to the Bristol Channel.

11,766. Will you favour the Commissioners with any opinion which you may entertain relative to the advantage or necessity of establishing a harbour of refuge at any point in the Bristol Channel?—I am not able to give a decided opinion myself, but from what I have collected from those parties who go up and down the Bristol Channel, bound foreign or coastwise, I believe that the most desirable place for the service of the whole trade would be Lundy Island.

Mr. S. Humphrey.

11,767. And can you state any special reasons which your informants have given you for the selection of that site?—From its being an island from which vessels can at all times loose with a change of wind; and likewise from there being deep water on the coast of the island, large vessels are able to run there as a place of safety without being endangered by going towards the shore.

11,768. Do you think Lundy Island equally useful to the coasting as to the foreign trade?—I think it would be so generally. But there are other gentlemen connected with the port who will be better able to speak to that point.

11,769. Are they seafaring men?—Yes, seafaring men.

11,770. I omitted to ask whether you had ever been a seafaring man yourself?—No, never.

11,771. Are you aware whether any estimate or plan has ever been formed of a breakwater at Lundy Island?—No, I am not.

CARDIFF.

Mr. S. Humphrey.

1 Oct. 1858.

Chairman.

11,772. You are not aware of that ?—No.

11,773. (*Mr. Lindsay.*) Have you any nautical gentlemen from Newport able to speak to that ?—Yes.

11,774. Then I will not trouble you on that point. The Mayor of Cardiff having put in statistics of both the ports of Cardiff and Newport, if you have a return for 1856 for all ports in the Channel, each of them separate, be kind enough to put it in evidence ?—The sum total is the same, 5,677,183 tons for the Channel, both inwards and outwards. That for Newport during that period was 912,000 tons, being nearly one-sixth of the whole. The return shows each of the towns separated, both inwards and outwards.

11,775. (*Capt. Washington.*) Is that a Custom House return ?—It is compiled from the Board of Trade returns.

11,776. Does it apply only to loaded vessels ?—To vessels which come to Newport and go out.

11,777. But only to vessels in cargo. It does not include vessels in ballast ?—I do not know whether it includes vessels in ballast or not. It may include the vessels entered, but not the tonnage of the ballast.

11,778. But do not vessels in ballast require a harbour of refuge ?—Certainly.

11,779. Then really for the purposes of this inquiry we may almost double that tonnage ?—No, not so much as that.

11,780. Can you obtain the proportion of the vessels in ballast to the vessels in cargo ?—I can ascertain it for you.

11,781. You will see the object with which I ask for this information. It is most important in getting a return, that the vessels in ballast as well as those that are loaded should be included ; otherwise it would be hardly a correct return of the vessels in the Bristol Channel.

The witness, after a conference with some persons interested, said—I am informed that it does include vessels in ballast.

(*Capt. Washington.*) For all the ports ?

(*Mr. Robert Galley.*) For Newport the return includes vessels in ballast as well as loaded, but for the other ports it only includes loaded vessels.

11,782. (*Capt. Vetch to Mr. Humphrey.*) I should like to have your definition of the limits of the Bristol Channel. On the south shore, from what point do you take it ?—From Hartland Point.

11,783. Then on the north shore ?—Down to Milford Haven. In fact any part about there.

11,784. Then I understand from your definition of the Bristol Channel that it is bounded by a line drawn from Hartland Point to Milford Haven ?—I believe so.

11,785. (*Chairman.*) Have you any personal interest in the shipping of Newport ?—None. I do not know whether I may state that hearing an account of the evidence at Swansea of the value of the cargoes in the ships bound there, it would seem to me to be a very large estimate. But these vessels with copper ore are not coming up the Channel for any port, but are going direct to Swansea. This shows that these vessels are not going there calling for orders, but that that is their port.

Mr. JAMES N. KNAPP examined.

Mr. J. N. Knapp.

11,786. (*Chairman.*) In what way are you connected with the port of Newport ?—I am a shipowner. I have, in the former part of my life, been a seafaring man. I have been 17 years at sea, and seven years master of a ship. I have for many years represented the corporation at the Harbour Commissioners. I have been a pilot commissioner, and for the last 13 years I have been in business as a shipbroker at Newport. Almost every day of my life I am in communication with shipmasters in the foreign and in the coasting trade, and also with pilots ; and many times I have been up and down the Bristol Channel as master and mate.

11,787. And when you were at sea what description of vessels did you chiefly command ?—Foreign-going vessels.

11,788. And what size ?—From 300 to 600 tons register.

11,789. You are aware of the objects of this inquiry ?—I am.

11,790. Will you now proceed to offer any statement which you may have to make relative to the advantage or necessity of a harbour of refuge for the trade of the Bristol Channel ?—I am of opinion from my own personal observation and experience that a harbour of refuge is necessary. I have known several cases of loss of life in the Channel which I think would not have taken place if there had been a harbour of refuge at a proper place. With regard to the position in which I consider a harbour of refuge to be most desirable for the general purposes of the Channel, I greatly prefer Lundy Island, and for this reason, because it is in the principal track of inward and outward bound vessels, of coasting vessels as well as of foreign vessels. The Commissioners are aware that for a great portion of the year the wind in the Channel and on the coast prevails from the west, and going down the Channel with a westerly wind shipmasters naturally keep to windward, they keep on the coast of England. They would naturally do so, even if there were no particular shoals or dangers on the coast of Wales ; for a man in charge of a ship with a head wind aims to keep to windward generally, and it is customary, almost invariably the custom, for vessels leaving Newport, Cardiff, and Bristol if they proceed as far as the Nash light to reach after that towards the English shore ; and vessels bound for Ireland, for instance the great body of the Irish traders, not only sight Lundy Island but go close to Lundy Island before shaping their course for the Irish coast.

11,791. Is there anything else which you would wish to offer ?—Not anything more. I can give reasons for preferring Lundy Island to either the Mumbles or any place which I have heard named for the general purposes of the trade of the Bristol Channel.

11,792. We shall be glad to hear them.—My reason is that the Mumbles is situated in a bay surrounded by shoals, so that even if a harbour of refuge were made there no proper person, no sensible shipmaster would venture to run for such a place in the dark with a heavy-loaded ship, especially if she were disabled ; because, supposing he were to miss the entrance and drive to leeward there would be nothing but certain death and destruction to life and property. There is no remedy in such a case as that I have put ; but if you have a harbour of refuge at a point short of the Mumbles you have room to drive up ; and that is why I certainly prefer Lundy Island to any other place. All up the Channel there is plenty of room until you get to the Holmes, and there is excellent anchorage before the Holmes and the Tail of the Spit ; there is room for 1,000 sail of ships which could lie in perfect safety above the Holmes. As regards vessels seeking refuge at the Mumbles, I have never known any except small craft bound round the land. If there had been a place of refuge in Lundy Island they would have gone there, for you can generally reach Lundy Island when you get into the Mumbles.

11,793. Do I understand you to say, that above the Holmes there is anchorage so good that in heavy weather from the west with good ground tackle you can lie there in safety ?—Decidedly. Every day in the year there are ships of a large class lying there. All ships leaving Newport get out and anchor there to avoid the expense of dock duties and to keep their crew. In fact it is a common practice. I have seen a dozen vessels lying at anchor above the Holmes at one time.

11,794. What is the character of the ground ?—It is a clay bottom.

11,795. Is it good holding ground ?—Yes. I have

never known a vessel drag there unless her anchor got foul. I have never known any accident there.

11,796. It has been stated that the Trinity House will not allow vessels to bring up between the Holmes and King's Road?—That is a mistake. Parties invariably bring their vessels up there. It is a common every-day practice to bring vessels up there. There is not a better anchorage in the Channel than there is above the Holmes in westerly wind.

11,797. Then I understand you to say, that the Bristol Channel above the Holmes is a very good harbour of refuge?—Yes; it is.

11,798. In any wind or in any weather?—If you anchor there I have known the wind chop round to the east, but I never knew a ship drive ashore.

11,799. Are the tides very strong?—They are.

11,800. And does the weather tide make an uneasy sea for a ship to ride in?—Not under the Holmes.

11,801. As respects Lundy Island, taking it as it at present exists, what is your opinion of it as a place of shelter?—As it is now, a great many ships of the largest size anchor at Lundy Island bound out. They get out that far with westerly winds and bring up. At the same time, it is not a desirable anchorage owing to the sudden shifts of wind. Shipmasters do not like to bring up there; they frequently prefer to run back to Penarth.

11,802. If a vessel is anchored at Lundy Island and the wind changes to the east, is there any difficulty in getting away?—The holding ground at Lundy Island is very good indeed, and therefore it is very difficult sometimes to get your anchor. There is that danger, no doubt, if the wind should chop round suddenly.

11,803. I understand you to say, that vessels making their passage down the Bristol Channel with westerly winds keep the English shore in preference?—Invariably.

11,804. For what reason?—To keep to windward, and avoid the dangerous shoals on the Welsh coast. There are the Nash Sands, and the Skerwether Sands, and many others. Men keep away from them from the natural abhorrence which seamen have for things of that kind.

11,805. Then I understand you to say that down to Hartland Point the south shore is a clean shore?—It is a clean shore.

11,806. Is there any reason from the run of the tides to render one shore preferable to the other?—I conceive there is. I cannot speak positively, but from the nature of the two shores I should think the tide makes down on the south.

11,807. Is there anything like the tide and half tide in the Bristol Channel that there is in the English Channel?—I do not understand exactly with regard to the tides.

11,808. When a ship takes her departure from below Hartland Point would she keep down the south shore, or stretch across towards Ireland?—Where bound?

11,809. Outward-bound.—Of course she goes towards Cape Clear, there is plenty of room there.

11,810. Therefore the outward-bound trade, taking their departure from Hartland Point reach away north and west?—North-west and if the wind is to the south.

11,811. Bound round to the Land's End do they keep down the south shore?—Oh yes, if the weather is not too heavy.

11,812. Do you know Milford Haven?—I do.

11,813. Running in from the sea, expecting to make Milford Haven, after having had no observation for three or four days in thick weather, what kind of land is it to make?—I have never run for it myself. I should think it was good clear high land.

11,814. You would think it a good place to run for?—Yes; I should think so.

11,815. But you never have run for it?—No. I have been inside the Smalls up past the land there, more than once.

11,816. (*Mr. Lindsay.*) What do you say are the prevailing winds in the Channel?—South-west.

11,817. South-west?—Yes, southerly and westerly.

11,818. Is it the case that all the shipmasters with whom you have come in contact prefer Lundy Island as a site for a harbour of refuge?—I have never heard a place named in comparison with Lundy Island. When the Mumbles has been brought up, it has been condemned out and out from its very position.

11,819. Does the wind generally chop round from south-west to north-west?—That is the most common course.

11,820. Therefore south-west and north-west winds are the most dangerous?—Sometimes they go direct north-east and east, and blow furiously from the eastward.

11,821. Do you mean shifting round from south-west?—Yes; I have known it do so in the Channel. I do not know that I ever experienced it anywhere else.

11,822. And then you say when the wind gets round to north-east and east it blows strong?—Yes; very strong.

11,823. At Lundy Island, as you are aware, and as you have stated, there is good shelter with the wind west, south-west, and north-west; therefore, for the prevailing winds you have already shelter at Lundy Island?—There is shelter, but at the same time it is not perfect.

11,824. You stated that it was an excellent anchorage, and that that made the difficulty of getting the anchor after it was down?—There is good anchorage there.

11,825. But could any breakwater which could be constructed at Lundy Island make the anchorage better in west, south-west, and north-west winds than it is now, because it is itself a breakwater to these winds?—The island lies north and south, but the wind is a very uncertain thing. When the south wind springs up it sometimes goes round the compass, and when it gets at south-west it generally flies to north-west.

11,826. Would the construction of any breakwater at Lundy Island make the anchorage better than it is now during these winds?—I think it would.

11,827. How?—If it were to run out to a breakwater from the easterly end of the island in a semicircular form.

11,828. Would that improve the shelter during westerly winds?—No, the wind from the west is right off the land.

11,829. Then during these winds the breakwater would not make the shelter better?—No.

11,830. Then you want a breakwater to protect the ships when the wind comes round to the eastward or north-east?—Yes.

11,831. Have you considered how such a breakwater can be made and the effects of such a breakwater?—No.

11,832. How would you make a breakwater at Lundy Island?—I would run off a pier from the Gull Rock in an easterly direction, then I should leave a sufficient opening; then I should run a pier or breakwater from the breakwater round towards Rat Island.

11,833. Would you run a breakwater in an easterly direction, leaving a passage of a quarter of a mile, carry the breakwater round in the direction of Rat Island, and leave a passage between Rat Island and the main breakwater?—I have not gone into the engineering points. I have not given that so much attention as I have the necessity of having a harbour of refuge there.

11,834. I need not state to you as a nautical man, that there are other considerations, commercial considerations, besides affording a safe shelter. Now when the wind chops round to the eastward, which is the wind you fear, and from which you only require protection, how would ships get out of the harbour it formed as you propose?—There would be an entrance both ways. If the wind went to the north and east ships would go out south, and if it went to the south they would go out at the north.

11,835. Supposing the wind to be due east, could

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they weather the pier at Gull Rock or Rat Island ?—The weather must be very heavy indeed if a ship could not make sail with eight points on her beam.

11,836. Look at the chart and see whether the construction of a pier at the Gull Rock and Rat Island would not completely embay ships in easterly winds ?—With the wind on a beam surely they could fetch out.

11,837. You know they would have to lay up many points to weather the Gull Rock on the one hand and Rat Island on the other ?—I cannot see but that a vessel would fetch out either way. If you give a good pull to your sails, what is there to prevent you from going out ?

11,838. Would the breakwater which you purpose to run out from the Gull Rock about a quarter of a mile not go out about 14 fathoms of water ?—Not so far as that, I should say.

11,839. You would propose a breakwater of a quarter of a mile, you would run it along depths of 14, 15, or 10 fathoms at the shallowest part, and would require another breakwater to make it complete about another mile and a quarter in length, so that you would have to make a breakwater and pier of full a mile and a half to provide what you consider a safe anchorage at Lundy Island ?—I will not say that ; I have not gone into the exact measurement. I run that breakwater out with my finger without any consideration at all. My opinion is, that a breakwater to be of any service should be a mile in length, and carried off from the Gull Rock so as to give protection for small vessels. I do not think you would require to carry it out a quarter of a mile. There are a great many small ships now which find shelter under the point in north winds.

11,840. Then the breakwater as proposed by you would leave little more than half a mile between the shore and the breakwater ?—I think it could run off much further than that.

11,841. But the further you run off the breakwater the deeper the water into which it would run, and the larger the breakwater you would require. Now have you any idea at all as to the cost of what you propose ?—I am not prepared to go into that. But one mile off the island there are shoal banks not with 14 or 15 fathoms of water, but with 10 or 11 fathoms.

11,842. About a mile and a quarter due east there is a small bank with only 6½ fathoms, but that is only a patch. The depth on it ranges from seven to eight fathoms, but I would have you to notice that you would require a much more extended breakwater than that which you have named, and I wish to ask whether you have considered the cost of all this ?—It would be an expensive matter, I should say.

11,843. Do you think 1,000,000*l.* could do it ?—I am not prepared to give any figure.

11,844. Do you think 1,500,000*l.* would do it ?—It would depend on how you did it. Could you not do it with convict labour ?

11,845. But do you not think, from your own great experience, that when the people of Newport recommend unanimously one particular site, they ought to have taken into consideration, first, the facilities for construction, and secondly, what would be the cost ?—The matter of expense has been frequently named, and no doubt a breakwater at Lundy Island would be an expensive matter.

11,846. Have the people of Newport had any estimate made of what they would like ?—No ; they have not.

11,847. As you have good anchorage during the prevailing winds at Lundy Island, looking also to the fact that anchorage during westerly winds could be obtained under Hartland Point along that bight, looking also to the good shelter at the Mumbles, looking too at the magnificient roadstead here, and considering also that there is above, the Holmes, a place where vessels can anchor at all times, and in all weathers, protected from all winds, do you really think that the construction of a harbour of refuge within the limits of the Bristol Channel proper would do much to save life and property ?—I do.

11,848. Can you, from your own experience, tell me any instance where a harbour of refuge would have saved life and property ?—I can.

11,849. Well, then, repeat it.—Two years ago an American ship, the *Warden*, sailed from Newport with iron. She got as far as Lundy Island. The weather became heavy from the west. She was driven ashore in Barnstaple Bay ; three or four of her crew were drowned, and she became a total wreck.

11,850. How would a harbour of refuge at Lundy Island have saved her ?—If she had got so far, she would have reached in and got to anchor.

11,851. But Lundy Island is a harbour of refuge at present in westerly winds ; is it not ?—It is not a harbour of refuge ; from the nature of the case it is exposed. It is not a place where a man likes to run in and drop anchor ; he might just get his anchor down when the wind would veer round to the north. He would rather keep his vessel under weigh.

11,852. You stated just now that no expenditure of money would make Lundy Island better than it is now during westerly winds ?—As long as the wind remains due west.

11,853. You mentioned an American ship which was lost. How could a harbour at Lundy Island have saved that American ship ?—I think she would have made it, and been safely anchored, instead of being kept at sea, getting disabled and driven ashore.

11,854. Do you think the captain of her was afraid to go in and anchor there for fear of the wind chopping round ?—Very likely he was. I should consider that was the reason.

11,855. Do you remember any other instance, at the moment, where a harbour of refuge at Lundy Island would have saved life and property ?—No ; I do not.

11,856. Have you turned over in your mind the desirability of having a harbour of refuge somewhere between Hartland Point and the Land's End ?—I have thought of it, and I do think a harbour there might be of great benefit to coasting vessels, but for the general purposes of the Bristol Channel I think not.

11,857. Then do you think that a harbour between Hartland Point and the Land's End would not be of much service to ships frequenting the Bristol Channel ?—I think not, if there was no place at Lundy Island.

11,858. Then do you think a harbour along that line of coast would be of much value to the general trade of the country ?—I do not think it would be of much value to the general trade. There are the Scilly Islands if you are caught at the Land's End with easterly winds. There might be circumstances when a harbour of refuge at St. Ives or Padstow would be very useful, but generally I do not think so, especially ships coming in from the Western ocean in a disabled state. I do not think they are likely to run for St. Ives or the Land's End. It is too narrow a point. If they could have the range from the coast of Ireland to the coast of Cornwall, and put into Lundy Island, it would be preferred.

11,859. You mentioned the Scilly Islands, do you therefore say there is a good anchorage there ? Are you aware whether that is the case ?—A great many vessels go in now in easterly winds.

11,860. American vessels ?—No ; more coasting vessels.

11,861. Among a large cluster of small islands, is the navigation considered dangerous ?—It is by strangers—by strangers more than those who are acquainted with the place.

11,862. Therefore in distress you think strangers would be afraid to run for it ?—Yes.

11,863. Then it is taken only by coasters ?—By coasters ; and some foreign Mediterranean ships go in.

11,864. Do you know whether many ships have put back after they have got as far down as the Chops of the Channel ?—It is very seldom that if vessels get as far as the Chop of the Channel they come back to the

Bristol Channel, unless there are reasons. But very often vessels get caught west of Lundy Island; if a vessel gets her cargo shifted she is obliged to run back to Penarth or King's Road, whereas, if there were a harbour at Lundy Island, she would go in and restore her cargo, and often thereby prevent damage.

11,865. Has any American ship ever taken refuge at the Mumbles ?—I never heard of any one in my life.

11,866. Supposing that a harbour were constructed at the Mumbles, to give six or seven fathoms of water at low water of spring tides, do you think that many large vessels would avail themselves of it ?—No ; it is too dangerous to run for. You have the Mixons just to the westward, with the Skerweather and Nash Sands, with a deep bay, all to leeward. A stranger would not run for it by night, and would be very careful how he ran for it by daylight during the last period of the year. I think myself that it would be very little used.

11,867. You think it would be very little used by large ships ?—It would not be used by large ships ; and the smaller class of ships, such as go there now, might avail themselves of it.

11,868. That is, small ships ? — Yes, small ships would take the ground, and are bound round the land.

11,869. (*Capt. Washington.*) I think I understood you to state that the greater part of the trade from Newport, Cardiff, and Swansea goes over to the English coast, and goes down the Channel ?—Yes.

11,870. Does it pass the north or the south of Lundy Island ?—All vessels bound west, and those round the Land's End go to the south. The Irish traders go to the north.

11,871. Does that include American ships ?—Yes, bound for Boston, Canada, the East Indies, the West Indies, and the Mediterranean.

11,872. Do ships bound for Canada, Boston, and New York go north or south of Lundy Island ?—I consider they go south, if they have a pilot, he is generally landed at Ilfracombe or about Lundy Island, and if the winds are favourable they stretch down the south shore.

11,873. Are the prevailing winds to the south ?—Yes.

11,874. I think you stated that the south-west winds commonly chop round to the north-west ; would a ship under these circumstances, rather be on the leeward or the weather shore ?—On the weather shore. But the wind does not chop suddenly. There is ample time to get to windward far enough.

11,875. You mentioned an American ship having been lost in Barnstaple Bay. Do you recollect where she was bound to ?—I think she was bound to Cuba.

11,876. Supposing a vessel was opposite the north of Lundy Island, would she be embayed ?—She might have to drive up again.

11,877. Would you as a sailor prefer passing to the southward of Lundy Island ?—I would, because the shore is better. With a fair wind I would certainly go to the south, if I were bound to the west.

11,878. Do you know the proportion of ships which pass either to the north or the south of Lundy Island ? —I cannot tell.

11,879. Are there any means of obtaining that information ?—It might be obtained from the Bristol pilots.

11,880. They would know ?—I should say so.

11,881. How far do the Bristol pilots go ?—They are paid to Lundy Island ; if there is a heading wind, they get out at Ilfracombe; the Newport pilots generally get out at Ilfracombe.

11,882. That is the first place ?—Yes ; it is the only place to land. They would rather get rid of the pilot there than chance having him out all night at Lundy Island.

11,883. Supposing you were caught below Hartland Point in a westerly gale, where would you run for ? —I would run back to King's Road and Penarth. I have known the same ship run back two or three times before she could get her passage.

11,884. What, all that distance ?—Yes.

11,885. Nearly 100 miles ?—Yes.

11,886. But supposing it were possible to construct a breakwater at the Mumbles, would not vessels rather run there than to Penarth or King's Road ?—No ; I do not think they would. There are a great many dangers with the strong tide which sets there.

11,887. Do you know Kingstown Harbour ?—Near Dublin, in the Irish sea ?

11,888. Yes. Is Kingstown Harbour commonly resorted to ?—Yes ; vessels bound from Cumberland, and some of the vessels occasionally put in there.

11,889. Do you know the distance from the Mumbles Head to the Skerweather Sand ?—It is six or eight miles I should think.

11,890. It is seven and a half miles. Now, bearing up in a south-west gale, what would be the course to the Mumbles ?—From where ?

11,891. Say mid-channel, for a vessel caught between Hartland Point and the Land's End ?—They would sight Lundy Island, and shape a course to the Mumbles about north-east.

11,892. How do the Skerweather Sands lie to the Mumbles ?—South-south-east.

11,893. There is a passage there of seven miles ?—Yes, a passage, but on a lee shore. It is no place to bring up to anchor, or for vessels struck in a south-west wind.

11,894. We were speaking upon the supposition of a breakwater being erected at the Mumbles?—To run to what distance ?

11,895. I said a vessel meeting a contrary gale half way between Hartland Point and the Land's End, where would she run for, and you, if I understood you, said Penarth or King's Road. Now, supposing there were a breakwater at the Mumbles, why should she not run to get under the lee of that breakwater ? —I consider it a very dangerous point to run for, because if a man misses the entrance and does not get in, his ship runs ashore.

11,896. I think you said the entrance would be seven miles wide ?—The entrance ought to be, but I do not know, if a breakwater were constructed to protect vessels from south-west winds, how much that would occupy.

11,897. You have suggested a mile breakwater. Let us suppose it were made to cover, to the greatest advantage, Swansea bay, what would be the difficulty of running there to get that shelter ?—If a breakwater were run south, due south, for a mile, it would be easy enough to run round and get to anchor. But what is to be done with the ship, if the wind chops to the north.

11,898. I suppose she would get her anchor, and sail with a fair wind ?—She would have no chance.

11,899. You do not think she could do it ?—No.

11,900. (*Capt. Sulivan.*) Do you consider it very desirable that a harbour of refuge should be in such a position that if a vessel in thick weather runs for the entrance and misses it, she can haul off and run seaward ?—I do, if she can haul off in safety.

11,901. Do you think that very desirable in any harbour of refuge ?—Yes.

11,902. If a vessel were running into the Mumbles, a little to the south-east of the breakwater, could she weather these shoals and save herself ?—Not the Skerweather Sands.

11,903. With a westerly wind and tide ?—I don't think she could.

11,904. Where would she go?—She would go ashore on the Skerweather Sands, or in the bight of the bay.

11,905. Supposing it were necessary to construct a harbour of refuge somewhere near Swansea Bay on the north coast, and putting aside all consideration of Lundy Island as the best position ; and supposing you had the choice of putting a breakwater at Swansea Bay or at Oxwich Bay, which is seven miles to windward, with no shoal near the entrance, so that a vessel missing would have seven miles more to weather the Skerweather Sands, where would you rather run for ?—Oxwich Bay, by all means.

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11,906. Before leaving Swansea Bay, will you tell me whether the Cardiff trade would consider it very desirable to have a light on the Skerweather Sand ?—I should think it very desirable to put a light on that sand.

11,907. The Nash light is 10 or 12 miles to the east ?—Yes.

11,908. In thick weather is it very easy to run in between the Nash light and the Mumbles, without seeing either of these lights ?—Yes, it is quite possible.

11,909. Would not a vessel doing so go right upon the Skerweather Sands ?—Yes, she would.

11,910. Do you know any shoal like that without any light vessel upon it ?—I cannot call one to mind.

11,911. Do you think the trade of Cardiff would consider it worth the small toll which is levied for all light vessels, or would they object to have a light placed on it because of the toll ?—I do not think they would object. It is certainly a very dangerous place.

11,912. You say that vessels keep along the south shore generally ?—Yes.

11,913. You say that, owing to the wind prevailing from the south, they keep the weather shore ?—It is a better shore, the weather shore.

11,914. As the wind draws round, is it customary to stand to the northward ?—As the wind holds they must stand across the Channel, of course.

11,915. Do you know whether vessels find the wind too baffling under Lundy Island to haul close in?—Yes, with strong west winds. For close to the island the puffs come off.

11,916. Would that add to the difficult of hauling inside a breakwater placed off that island ?—There would be that difficulty.

11,917. Would they be liable to be thrown to leeward of the breakwater ?—I do not think it would be experienced to that extent. Under high land baffling winds cannot be avoided.

11,918. Do you know if vessels are afraid to haul round close under Lundy Island ?—I cannot call to mind many vessels under Lundy Island bound up.

11,919. I speak of vessels which put back in south-west and west gales, I presume they would round the south end of the island. In hauling round it, do you know whether they would find a difficulty from the form of the coast and not fetch the anchorage ?—It might be so.

11,920. Do you think that a small light on Rat Island would assist ?—I am not speaking of a sea light but of a small light to mark that island, to enable vessels to haul into shallower water to anchor ?—Yes.

11,921. Do you consider that if a harbour were made there it would be more necessary to keep to windward of the breakwater ?—Yes.

11,922. Supposing the expense prevented the construction of a harbour, would it obviate the difficulty of going in too close to the anchorage if large buoys were put to warp to and slip from when vessels made sail ?—Yes, certainly.

11,923. Would it be more advantageous than disadvantageous to have buoys in the way of coming to anchor ?—It would be decidedly an advantage if you could run and moor to the buoys so as to be able to slip away.

11,924. Do you think that a small light on Rat Island, and mooring buoys such as I have described, would make Lundy Island a better place of refuge than it is at present ?—Yes.

11,925. Do you know anything of Padstow ?—I do not from personal experience.

11,926. Do you know St. Ives Bay ?—Not from my own observation, I have never been there.

11,927. Have you ever been in trade round the land ?—I have been round several times.

11,928. Would it be a great point if a vessel were unable to get round the land but were able to take St. Ives to have a refuge at St. Ives where she could go instead of driving back to the Bristol Channel ?—Yes, I believe that.

11,929. More especially for the coasting trade ?—Yes.

11,930. Is there a large coal trade round the land ?—Yes, there is, from Cardiff and Newport.

11,931. And of copper ore back ?—Yes, but the coal is the principal trade.

11,932. Do you know Barnstaple bay and Clovelly road ?—Yes, I have been at Clovelly.

11,933. Supposing a harbour were made at Clovelly, if the wind shifted to the north-west being in the depth of the bay, would it not be difficult to get out ?—They would be embayed, and with heavy weather they could not start, but in ordinary weather they would tack and get out.

11,934. Do gales generally blow equally strong from the north-west when the wind comes round from the south ?—Yes.

11,935. Do you think that one point is desirable with regard to all harbours of refuge that ships should be able to go to sea as the wind draws round ?—That would be the case with Lundy Island.

11,936. With Lundy Island of course, and would it not be the same as to Oxwich bay ?—It would be an easy matter enough to get out of Oxwich bay.

11,937. Would a ship to windward be able to make a reach down Channel ?—With north winds she would.

11,938. Or north-west winds ?—Yes, north or north-west winds.

11,939. Supposing a breakwater were made at Lundy island as you propose, do you consider that if any demand arose for anchors, cables, sails, and stores for numerous vessels which put back there for refuge, that men of capital would be found to keep these articles at Lundy Island ?—There is no mistake about that, I should like to have the chance myself.

11,940. And do you consider it at all a strong point in favour of a harbour of refuge, that it should be near a place where supplies can now be found, or do you consider that if a place or harbour of refuge were established in an entirely new place the trade would follow the harbour and ships ?—The trade will follow the ships.

11,941. (*Capt. Vetch.*) With respect to Penarth, do you consider it a very good anchorage ?—It is very much cut up. For a heavy ship I prefer the east of the Holmes to Penarth.

11,942. Do collisions ever take place at Penarth ?—They do, owing to the great number of vessels lying there.

11,943. You have not room enough for the trade ?—No.

11,944. Does it ever happen that ships bound down the Channel are obliged to come back to the Mumbles ?—They come back to Penarth ; I never heard of a vessel of large size putting into the Mumbles.

11,945. Does it ever happen that a vessel from Swansea has gone down, and meeting adverse winds has been obliged to put back as far as Penarth roads ?—I think so. I have a notion in my mind that I know cases of that kind.

11,946. But as Penarth Roadstead is too small for the present number of vessels, there is great inconvenience, is there not ?—They will not come back if they can help it, and a Swansea man can come back to the Mumbles when a stranger cannot.

11,947. Supposing they cannot get shelter there, do they ever come back to Penarth ?—Yes, they are bound to come back.

11,948. (*Mr. Coode.*) Will you be good enough to mark on chart 1180, the position above the Holmes where ships can anchor in the manner you have described ?—I have done so.

11,949. The line which you have marked embraces the area within which ships generally bring up ?—I have marked it in a rough manner.

11,950. Have you ever anchored at Lundy Island ?—I have never had occasion to anchor there.

11,951. How do you know that vessels are in the habit of leaving their anchors there ?—I heard yesterday that a man found an anchor come up with his own.

He found his anchor rather hard, and when it came up there was another anchor fastened to it.

11,952. You spoke of the heavy puffs coming out of the high land of Lundy Island, and being felt only within a certain distance. How far off must a ship anchor to be free from the influence of these puffs?—I did not say "heavy" puffs; but as you approach the island the wind begins to baffle, and sometimes it veers several points.

11,953. Within what distance must you come to meet with these puffs?—Within a quarter of a mile.

11,954. They will not extend beyond that?—I do not think they will extend beyond a quarter of a mile.

11,955. Have you been dodging about there?—I have myself.

11,956. Then you speak of that fact from your own knowledge?—Yes, I do.

11,957. (*Chairman.*) Until to-day your attention has not been drawn to the facilities of Oxwich Bay as a harbour?—I have not heard it mentioned before.

11,958. Does it alter your opinion as to Lundy Island being the best site?—It does not—not for the general purposes of the Channel.

11,959. Now with reference to the business which you said you would be glad to undertake at Lundy Island. If a good harbour of refuge were there, would there be any material difference in the charges made for materials at Lundy Island and the charges made at Cardiff?—I think that matter would remedy itself unless a man obtained a monopoly.

11,960. You think that competition at Lundy Island would be sufficient to bring the charges down to the same or pretty much the same rate as at Cardiff?—I suppose there always may be some difference between a place of that kind and a place where there is open competition, but I presume that with boats and tugs no man will be able to charge an extreme or exorbitant price.

11,961. But would not the position of Lundy Island render it necessary to make some different charge on various articles?—It might. At the same time you would have house rent very cheap which might compensate for the position.

11,962. So that upon the whole you are disposed to say as a man in business, there really would not be any material difference in the prices charged at Lundy Island and the prices charged at Cardiff or Swansea?—I do not suppose there would be. I suppose that a telegraph would be laid down immediately. If a vessel got dismasted she might send to Swansea, and any articles required might be sent down in a pilot boat or tug boat, if she would rather do that than purchase the articles in the Island.

11,963. And that would not materially increase the price?—I should not think it would, not materially; but a person would be willing to pay more to have things on the spot than have to get them elsewhere. It would not materially affect the price I consider.

11,964. (*Mr. Lindsay.*) You mentioned your being at Clovelly, but you did not express any opinion as to its suitableness as a site for a harbour of refuge?—I think that a very excellent harbour might be made there, and that it might be rendered valuable for many purposes, but at the same time I do not think it would be equal in point of position to Lundy Island. The arguments in favour of Lundy Island preponderate.

11,965. But if it rested between Clovelly and the Mumbles which place would you prefer?—Clovelly, by all means. There you have a fine bay, and the water shoals gradually.

11,966. And if you had the choice between Clovelly and Oxwich Bay which would you choose?—Why, Clovelly. I would still give the preference to Clovelly. There is one thing, I have never been into Oxwich Bay, but the thing is narrow to my eye.

11,967. I understand you to say that you would give the preference to Lundy Island over Clovelly, and to Clovelly over the other places?—I do.

11,968. (*Capt. Washington.*) Do many vessels come up here which receive damage?—Yes; to Cardiff and Newport.

11,969. Are there both at Cardiff and Newport facilities for doing repairs, a patent slip and graving dock?—There are graving docks but no patent slip. There is a gridiron at Cardiff, and one is in the course of construction at Newport.

11,970. And they have been found useful?—Yes.

11,971. I think you said you would be glad of the chance of sending supplies to Lundy Island. Would you be equally glad to have the chance of placing a dock there?—That is not the same thing. The ship would be temporarily repaired, and then come up to one of these ports.

11,972. Have you ever been at Lundy Island?—I have never been ashore there.

11,973. Are you aware that the sides of that island are precipitate?—Not precipitate.

11,974. Is there any flat land on the shore?—I do not think there is much.

11,975. You were asked by Capt. Sulivan whether warping buoys for mooring to, would be advantageous?—I think he asked me about mooring buoys.

11,976. (*Capt. Sulivan.*) I meant buoys sufficiently strong to warp to, and to slip from?—I understood buoys sufficiently strong to moor ships to. But merely to assist a ship in getting her anchor, I do not think that is much of an object. If buoys could be put down to moor ships to, I think it would be an advantage.

11,977. (*Capt. Washington.*) Would mooring buoys be very useful in Lundy roads?—Very useful.

11,978. How many pairs would you put there? would you put 20 pairs?—I should think that would be more than is required.

11,979. Would 20 pairs be a great assistance to the trade at Lundy Island?—I should think they would be more than is required.

11,980. Well, say 10 pairs. Do I understand you to say that to slip from the shore it is very difficult to get your anchor? Slipping from the mooring would be a very simple affair, would it not?—Yes.

11,981. Then 10 pairs of mooring buoys would be a great benefit?—Yes; it would be a great assistance as far as that goes.

11,982. Your last answer to Capt. Sulivan was very distinct, that the trade would follow the ships?—Yes; that is my opinion.

11,983. Supposing, then, that there was a harbour in Oxwich Bay, do you think the trade of Swansea would flit to Oxwich Bay?—No; what I understood by the trade, was the ordinary supply to ships. I do not say that if you establish a harbour at Oxwich, the trade of Swansea would go there, after docks, and warehouses, and all other facilities have been provided at Swansea.

11,984. You only meant that supplies would follow the ships?—Yes; supplies was what I referred to.

11,985. (*Capt. Sulivan.*) Do we understand that your remark only refers to those supplies which would be necessary for vessels taking refuge?—Yes.

11,986. And nothing else?—Yes.

11,987. Supposing a harbour were made at Oxwich enclosing a larger area than at the Mumbles, do you think there would be the least difficulty in obtaining from Swansea or some other port supplies of anchors or cables, when vessels coming back have need of them?—There would be no difficulty. But I do not wish to be understood as speaking in favour of Oxwich.

11,988. I quite understand you. We are supposing that Oxwich is better than Swansea. But I will now ask you, would you prefer Oxwich, which is seven miles more to windward of the shoals and clear ground, to the Mumbles?—I should prefer Oxwich.

11,989. But your answer has no bearing at all upon Lundy Island?—Just so.

11,990. You say that you prefer Clovelly; but leaving out Clovelly or Oxwich Bay, or any place, if with equal facilities of making a harbour, you had the choice of putting one on the south side near Barn-

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staple Bay, or on the north side near Oxwich Bay, having on the north side the advantage of the weather shore, when the wind was round to the north-west, and a fair wind to go down Channel, and on the other side having a lee shore, on which side would you put the harbour, all other things being equal ?—I think the south shore is the weather shore the greater part of the year.

11,991. Is a harbour of refuge wanted more on the lee shore or weather shore in the prevailing winds ?—A harbour of refuge is wanted on a lee shore.

11,992. With a south-west wind prevailing would ships want to go into a harbour of refuge on the south shore, or would they prefer a port where, when the wind changed, it would be a fair wind out of port, and to windward to reach down the Channel ?—I think they would prefer to go on the weather shore.

11,993. (*Chairman.*) Do ships ever call for orders at the Mumbles ?—Very seldom. I have ascertained, and find it very difficult in chartering a ship to get a provision inserted that she shall call at the Mumbles for orders. They do not mind her calling at Penarth. And I have had it from some of the principal merchants that they have experienced the same difficulty.

11,994. Can you state the reason for that ?—The danger on bearing up off the Mumbles, surrounded as it is by shoals to the west and to the east.

11,995. And supposing a good harbour of refuge at the Mumbles, would the difficulty still continue to the same extent as at present ?—Pretty much the same. I do not think a harbour of refuge could be constructed at Swansea to gain the confidence of the public ; that is my own opinion.

11,996. Are you at all acquainted with the road-stead of the Mumbles ?—I have never anchored there, but I have been there, and I know the place very well.

11,997. Can you state whether Swansea Bay has silted up ?—Not from my own observation, but I have understood that it has silted up.

11,998. You have understood so, but not from your own experience ?—Yes.

11,999. Did the corporation of Newport petition in favour of a harbour at Clovelly and Bideford Bay, as best adapted for the general interests of the ports in the Bristol Channel ?—I believe they did, but I believe that was rather hastily considered ; and when Lundy Island was mentioned the expense of construction was considered ; and therefore when it was first brought before the corporation of Newport, Clovelly was urged.

12,000. I think you stated in a previous part of your evidence that the opinion of everybody you had talked to was in favour of Lundy Island ?—No, I will not say everybody. I have never heard anyone speak in favour of the Mumbles. I have heard several gentlemen speak in favour of Bideford ; they prefer Clovelly because they are at home there, and that gives the basis of their judgment.

12,001. You think the idea of Lundy Island as a harbour of refuge is rather damaged by the idea of the great expense it would involve ?—That is the only argument which I ever heard against Lundy Island as a place of refuge for the purposes of the Channel.

12,002. And putting that aside, it would be the general opinion that it is the best site ?—Yes, decidedly.

12,003. (*Capt. Sulivan.*) Would not Clovelly have exactly the same objection as the Mumbles, that if a ship missed it in a westerly gale she would get to leeward in Mort Bay, and would go ashore ?—Not to the same extent.

12,004. Not to the same extent ?—No.

12,005. (*Capt. Washington.*) We have heard it stated that two ships started together bound to Cuba. That they started from Penarth together. That one was able to reach into the Mumbles and that the other put back to Penarth ; that the one made her voyage to Cuba, and came back and found the other at Penarth or the Mumbles ?—I have never heard it in that shape exactly. I recollect reading in Adam Smith's "Wealth of Nations," that one vessel made a voyage to the West Indies and came back before another had got on her voyage. But that was merely for want of perseverance.

12,006. The shoals and the tides had nothing to do with it ; it was merely the want of perseverance ?—Just so.

12,007. (*Capt. Sulivan.*) The story we have heard is that one vessel sailed from the Mumbles and that the other sailed from Penarth, that they were driven back, the one to Penarth and the other to the Mumbles, and that the Mumbles ship being able to loose with a slant of wind, when the Penarth ship was windbound, the Mumbles ship was able to make her voyage and return and found the Penarth ship had only reached the Mumbles. But supposing a harbour were constructed would that make the least difference ?—Certainly not. A harbour would make no difference so far as the voyage is concerned.

Mr. Wm. C. Webb examined.

Mr. W. C. Webb.

12,008. (*Chairman.*) In what way are you connected with the port of Newport ?—I am a ship-owner, a pilot commissioner, and I have been in the coal trade for 20 years.

12,009. Were you ever at sea ?—As a boy, for about two years.

12,010. You are aware of the objects of this inquiry ?—Yes.

12,011. Will you now proceed to state any opinion which you may entertain as to the advantage or necessity of a harbour of refuge in the Bristol Channel, and where in your judgment would be the most eligible site ?—I have had considerable experience in the trade of the Bristol, the North, and the English Channels, and I think it most desirable that a harbour of refuge should be formed in the Channel ; and after giving the matter great consideration, I think Lundy Island would be a most desirable place; nearly all ships make that a starting point, and returning home bound for this Channel they always round for Lundy Island, that is the rule. They try to make Lundy Island because it is a bold clear open place; men are not at all timid in making for it, because if they happen to miss there is plenty of room to come up Channel. Most vessels take it going down Channel, all vessels which make a quick passage, and which make the best passage. I have had a good deal of experience in the north trade, and I have always found that when vessels have kept to the south side they have made a better passage to Liverpool than if they had kept the coast, and I have laid it down as a rule to my captains that when they have left Penarth they are to get away to the south, and I have always found they made a better passage. Assuming that when they were returning they made the point, I have recommended them to try to stretch across to Lundy Island or in that direction; and where I have had ships bound foreign, where I have had heavy ships, I have started from the tail of the Spit above the Holmes. I have always calculated that with moderate weather ships will get away from Lundy Island. I have never had but two come back ; one of them was dismasted and the other with a cargo of iron had her cargo shifted. By forming a harbour of refuge there, ships would have greater advantages than in any other part of the Channel; they would have a long drift and a bold shore, if they missed the harbour of refuge, which would sometimes be the case I suppose in thick weather.

12,012. What became of the vessels in the two instances which you have named ?—One of them anchored in Penarth outer roads ; the ship carried 900 tons, and her mast was put in there. The other anchored at the Spit, was brought up to Newport, and sent to Bristol to be repaired.

12,013. And what was the state of the vessel whose

cargo shifted ?—She lost a good deal of her bulwarks, and stern, and her jib-boom, and things of that sort.

12,014. From your knowledge of the Bristol Channel in running in heavy weather from the south-west, should you have any hesitation as to the safety of the ship if you anchored on the tail of the Spit ?—I have had ships of 1,500 or 1,600 tons with one of the heavy gales from the south-east shifting round to the north-west riding there with a single anchor.

12,015. What sort of a cable had she ?—A chain cable.

12,016. What quantity of cable had she out ?—I never fear when my ship is there ; it is the best of holding ground, I never knew a vessel start her anchor there.

12,017. Then you are disposed to say that it is a capital natural harbour of refuge ?—It is a good holding ground ; I have never known any accident happen, because at half tides ships are sheltered by the sands in a great measure.

12,018. Do you know anything of Milford Haven ?—I do ; I know something of that haven.

12,019. Have you ever had occasion to run for it in thick weather from the sea ?—Yes ; I have had occasion to miss it and pass by.

12,020. Give us your opinion as to what sort of a place it is for a ship to make which runs in from the sea after having had no observation for a few days, and in thick weather ?—I should hardly risk it, because there are so many rocks in the neighbourhood of it and at the entrance of the harbour. There is the Cross Rock, and even those who are best acquainted with it, have been known to strike upon it.

12,021. (*Mr. Lindsay.*) Have any of your ships ever had occasion to take shelter at the Mumbles ?—Some small coasters have done so occasional, but very rarely, because I have always endeavoured to make them avoid it. I object to taking shelter at the Mumbles.

12,022. If a harbour of refuge were constructed at the Mumbles, so as to give seven fathoms of water within the breakwater, would you restrict your large ships from running for it when in distress ?—I would.

12,023. Why would you do so ?—Because they are surrounded with so many dangers and shoals, that if they miss there is nothing for them but going ashore.

12,024. Is it your opinion, as a large shipowner, that if a harbour of refuge is to be made in the Bristol Channel, Lundy Island is the best site for such harbour ?—I think it is.

12,025. Taking into consideration the cost ?—I suppose that is for some one else to consider.

12,026. Do you think that a harbour of refuge at Clovelly would be of great advantage to you as a shipowner ?—I believe it would be of great advantage.

12,027. More than one at the Mumbles ?—Decidedly ; there is a better outlet.

12,028. Do you know Oxwich Bay ?—No ; I should not like to speak as to Oxwich Bay.

12,029. Should you think a harbour of refuge at St. Ives would be of advantage to the shipping frequenting the Channel ?—As I have said before, when a ship gets moderate weather at Lundy Island, she generally wishes good-bye to the coast.

12,030. Did you hear the evidence of Mr. Knapp ?—I did.

12,031. Do you agree generally in the evidence which he gave ?—I do, generally.

12,032. Is there any point in which you differ from him ?—No ; but I hardly know what to make of those buoys in Lundy Roads ; how you are to moor to them in bad weather. It is a very good refuge place to run for, but I am afraid it is too much to say that you can get in, drop your anchor, and moor your ship to a buoy.

12,033. Then you think the mooring buoys would be of very little value, simply because of the heavy weather ?—Yes ; we don't want ships to go in there in fine weather ; they don't want to go in except to idle away their time, and we don't wish to encourage them to do that.

12,034. Do you think that a light on Rat Island would be an advantage ?—Do you mean after a harbour of refuge was formed ?

12,035. No ; supposing that no harbour of refuge was formed ?—It would be even now of advantage, because of the variable winds ; vessels want to know how to go to it.

12,036. You have no doubt given this question great consideration, considering that you are a shipowner ; do you really think that a harbour of refuge from Lundy Island upwards would do much to save life and property ?—I think it would at Lundy Island, and for this reason, the best of reasons. I am consul for Norway and Sweden ; and a Swedish brigantine, laden with coals, went down to Lundy Island, to the windward of Lundy Island; the ship sprang a leak and came back here, thinking she could come to the Spit or to Newport, and she sunk, and there she lies between the Holmes ; whereas if there had been a harbour of refuge at Lundy Island she would have gone in there and have been saved.

12,037. (*Capt. Sulivan.*) Were the lives lost ?—The lives of the persons were saved in a boat, and they were landed at the Holmes.

12,038. If the ship could not keep afloat under the Holmes, could she have kept afloat under Lundy Island ?—Perhaps she would have had some assistance, and perhaps there would have been some beach to put her upon at Lundy Island.

12,039. Do you think it desirable that a harbour of refuge should have a clean beach at the bottom of the bay, in addition to a good anchorage ?—It would be desirable if it could be had.

12,040. Which do you think the most dangerous bight to run for in thick weather, Swansea Bay or Carmarthen Bay ?—Swansea Bay, because it is the worst of the lot, in consequence of its being surrounded by so many dangers.

12,041. Can you find a more dangerous place for a ship to run to for shelter in a south-west gale ?—No, I cannot.

12,042. You have heard Mr. Knapp's opinion as to the necessary supplies being always likely to be obtained whether in a town now existing or in a new one ?—Yes.

12,043. Do you concur in that evidence ?—Quite so ; there is no difficulty at all at Lundy Island. Plenty of people would be glad to have the chance of supplying the stores.

12,044. Have you, in your experience, known any case in which a vessel having passed Lundy has afterwards been lost with any destruction of life ?—The vessel I just mentioned was lost.

12,045. But you told me, also, that no lives were lost. Do you know any vessel a portion of the crew of which was lost after she had put back for refuge in the upper part of the Channel ?—I have known vessels driven up to King's Road and above the Shoots and lost there.

12,046. Were any lives lost in these ships ?—Yes, I think lives were lost.

12,047. But with respect to vessels from Newport, which might have used a harbour of refuge if there had been one there, having been driven back and wrecked, have you known a portion of the crew lost by the wreck afterwards ?—I cannot call any instance to my memory just at this moment.

12,048. (*Chairman.*) Supposing there were a harbour of refuge at Lundy Island, what is your opinion as to the necessity of there being another also between Hartland Point and the Land's End ?—Not if there were a harbour of refuge at Lundy Island, because ships would not start from Lundy Island unless it was a moderate day, and if it was a moderate day they would get clear of everything.

12,049. Are there not a considerable number of traders round the Land's End which keep close in to the coast ?—Probably coasters.

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12,050. Is not the coasting trade very considerable ?—It is considerable in the Channel.

12,051. Do you think anything is necessary for the saving of life in addition to a harbour of refuge at Lundy Island ?—I think it would be desirable if anything could be done.

12,052. Where would be the most eligible site in your opinion between Lundy Island and the Land's End?—I should not like to speak to that, because I am not well acquainted with the place, but I think somewhere in the neighbourhood of Padstow.

12,053. Although you are not able to speak from your local knowledge of any precise site, do you think a harbour somewhere about there would be useful ?—Yes; because as the south-west winds generally fly to the north-west, coasters cannot clear the Land's End, they cannot get up to Lundy Island; and if a place not of so much magnitude as the other could be made, I think it would be very desirable for the coasting trade.

Mr. Jenkin Jones examined.

Mr. J. Jones.

12,054. (*Chairman.*) Are you a seafaring man ?—Yes.

12,055. How long have you been at sea ?—40 years

12,056. And of these 40 years, how many years were you in command of vessels ?—37 or 38 years.

12,057. And what description of vessels, generally speaking, did you command ?—The first I commanded was a schooner, then a brig, then a barque, then a ship. I have commanded large schooners.

12,058. What sized vessels have they been which you have chiefly commanded ?—I have now a schooner of 120 tons; the first was 100 tons; the brig was 210 tons.

12,059. What is the size of the largest vessel you ever commanded ?—540 tons.

12,060. And in what trade were you chiefly employed ?—In the American trade.

12,061. Have you been present during the course of the inquiry ?—No, not the whole of it.

12,062. You know the objects of it ?—Yes.

12,063. Will you give any opinion which you may entertain as to the necessity of a harbour of refuge for the Bristol Channel; and where you think it should be placed ?—I have had a good deal of experience in going up and down this Channel; and frequently I have got down to Lundy Island and have been obliged to turn back. I have been down and come back, and gone down again, and I have anchored under Lundy Island for six days, during which time there was great uneasiness here as to what had become of the ship. I have frequently dodged under Lundy Island both with east and west winds. I was under Lundy Island with it blowing a heavy gale from the west when the masts were cut away. I have laid there with the wind from the east the whole night. I have not frequently run back, but I have often spent a day under Lundy Island and anchored there.

12,064. Therefore, in your experience, you have found Lundy Island a most useful place of shelter ?—Yes, it is the only place of shelter. On one occasion I was nearly down to the Land's End and had shifted my cargo; I came back to the Mumbles, where we generally anchor our ships, and I was never there afterwards, not with a vessel wind bound. I loaded a vessel at Swansea four years ago, and came to the outer road and lay there; she drove from her anchors, got foul of another vessel, and I had to pay for the damage. A chain anchor of 35lbs. did not hold at all.

12,065. Have you ever anchored above the Holmes in heavy weather ?—No. I have anchored in the bay up there, but I am very little acquainted with the Holmes.

12,066. Do you know Milford Haven ?—Yes.

12,067. Have you ever run for it in bad weather ?—Yes, I have.

12,068. And when you run for it, did you know its exact position ?—Well, we did, or we should not have attempted it.

12,069. (*Mr. Lindsay.*) You said that you anchored to the west of Lundy Island ?—No, I did not. I said I had laid there.

12,070. Is there any anchorage to the west of Lundy Island ?—I have never seen a vessel at anchor there.

12,071. If a harbour of refuge were to be constructed in the Bristol Channel what site would you consider the most advantageous ?—I should say Lundy Island, taking all winds into consideration. Lundy Island is a place you can start from whether you are bound for the west or round for the north. It is certainly the best and most advantageous place in the Channel.

12,072. Does the wind ever chop round from the north-west to the east ?—Sometimes. I have come from forty to fifty times from America, and I have had occasion to notice that the wind will fly out from the north-west sometimes to the east, but not as often from the south-west. The south-west is the dangerous wind in the Bristol Channel.

12,073. Have you found good shelter under Lundy Island ?—Yes.

12,074. With the water smooth ?—Yes, close in. There is a roll coming in but no sea that would break. There are rollers there.

12,075. And if a harbour of refuge were made at Lundy Island the object would be a protection from east wind?—We very seldom want shelter in east wind. I scarcely ever have sailed with an east wind, but generally when I have done so, I have beaten up.

12,076. Can you have good anchorage at Lundy Island during south-west and north-west winds?—Yes.

12,077. What protection, then, do you require ?—It is not a place that a stranger would like to take.

12,078. Why so ?—Why, a stranger does not know and cannot find out the anchorage.

12,079. Would a breakwater lead to improve the anchorage during westerly winds ?—Decidedly. Ships have great fear of going in now, lest the wind should chop round to the east.

12,080. If a breakwater were made, would it not increase the difficulty of ships being able to get away ?—I do not think it would. Any ship could get away in east winds.

12,081. But supposing there were a breakwater ?—It would depend upon whether there were one or two passages, but I think a ship could always get away.

12,082. Could ships get away with as much facility, even if a passage were left to the north and to the south, as they do now ?—I should think they would. The harbour is most convenient to go out. The tide is a great assistance there at any time.

12,083. Do you know the coast between Hartland Point and the Land's End ?—Not very well.

12,084. Is there any necessity for a harbour of refuge there ?—A good many ships have been lost in running for Padstow.

12,085. At what point of the coast do you think such a harbour would be most useful ?—I should think by the vessels being lost, whether running for Padstow or being driven in, Padstow would be better than St. Ives. A good many vessels are lost on these shores. I have seen a three-masted vessel strike there myself.

12,086. Have you ever been to St. Ives ?—No.

12,087. Would you consider St. Ives of much avail as a harbour of refuge ?—No. It is very rare that ships go down so far as that but that they get round the land.

12,088. Do you know Clovelly ?—Yes.

12,089. Do you think that a good site for a harbour of refuge ?—It is a sheltered place, and gives an offing to ships bound either westward or round the land, but in a north-west gale you could not take it.

12,090. Which do you prefer, Clovelly Bay or the Mumbles ?—I would give the preference to Clovelly Bay. I am not favourable to Swansea. I have had some trouble there with a ship. I am generally afraid to run for it.

12,091. If a harbour of refuge were constructed at

the Mumbles would that ease your mind in running for it?—No. I think it would make the matter more difficult because you would carry the breakwater eastward, and render the passage narrower between the breakwater and the sand.

12,092. Then it is the danger of the Mumbles that you fear as a nautical man?—There are dangers all round there.

12,093. Do you know Oxwich Bay?—Yes.

12,094. Have you ever anchored there?—No, but I have been there dodging the tides.

12,095. Taking Lundy Island, Clovelly Bay, and Oxwich Bay, which would be the best site for a harbour of refuge?—Lundy Island is the place to which I would give the preference in the Bristol Channel. When I have put back I have gone under Lundy Island and have remained there a day. I have had to stop the day under Lundy Island. But I never think of taking a ship to the Mumbles, because of the danger of going ashore. I have known a ship drive away from the Mumbles with two cables and anchors.

12,096. Is Lundy Island a point which homeward bound ships steer for?—Yes, always.

12,097. And do they always take their departure from Lundy Island?—Yes; and they always make for Lundy Island.

12,098. When bound for America, do they keep the mid-channel or the south shore?—They go right away on a north-west course.

12,099. You mean right down Channel?—Yes, that is the usual way.

12,100. (*Capt. Sulivan.*) You say that you have stood into Oxwich Bay for shelter?—Yes.

12,101. Have you ever been behind the Mumbles Point for shelter?—No.

12,102. Supposing nothing were done to either the Mumbles or Oxwich Bay, which would you prefer? which gives the most space outside the three-fathom line?—I should say there was better shelter in Oxwich Bay.

12,103. If you had to decide between Oxwich Bay and the Mumbles, putting aside all other places, and if they could be made equally available for the same coast, considering that there is clearer ground at Oxwich, and that it is seven miles more to the west of the shoals, which would you prefer to run for?—Oxwich Bay.

12,104. Do you think that every sailor unconnected with the port, would consider Oxwich Bay the best to run for?—I should say they would; every man in command of a ship would say so.

12,105. Could a ship missing the harbour of the Mumbles, get out of the bay again?—Do you mean if it were made a harbour of refuge?

12,106. Yes. Supposing that a harbour were constructed there, if a ship missed the entrance running down, and got to leeward, and then tried to haul off, could she get out of that bay again?—I do not think it would be possible to do so.

12,107. Do you think a harbour of refuge should be placed in a bay so dangerous?—I should say it ought not be there at all, to induce vessels to run for it.

12,108. (*Capt. Vetch.*) I think you mentioned that you had a vessel at the Mumbles, and that she drove from her anchor?—No; she met with considerable damage, we tore the ship's jib-boom away.

12,109. Do you not think that where the natural protection is defective, that is a place to apply artificial aid?—I do not think it is, if it is a place for a harbour of refuge; my idea of a harbour of refuge is a place where a person can run when he cannot make his voyage.

12,110. Should not artificial aid be applied to a place which is now to some extent a place of refuge, particularly when there is a great trade there; would you not prefer to make a harbour of refuge where nature has done so much of the business?—If I understand you rightly, you speak of a harbour for the general trade where ships can run back if they get below Lundy Island.

12,111. If there had been artificial protection at the Mumbles, your ship would not have been driven from her anchor, would she?—It would make but a rough shelter after all.

12,112. How many ships which have no business at Swansea at all come back there for shelter?—They do not go to the Mumbles.

12,113. Supposing it is too crowded at Penarth, do they not go down to the Mumbles?—They never do so.

12,114. We have had evidence that they do?—I have been 40 years at sea, and I have not known any ship go into the Mumbles for shelter.

12,115. But your ship went once?—I went once, but never afterwards. I was a young man at that time.

12,116. Is it not a fact that vessels from Penarth Roads do come back to the Mumbles occasionally?—Not vessels of any size, they never do.

12,117. But would it not be desirable if they could put in there?—If it were a place at all they certainly would go, but it is a very dangerous place at night to enter.

12,118. If we could make it a safe place, would it not be beneficial to the trade?—I do not see how it could be made a safe place at all. Running up you would have to go round the breakwater, and beat to the west, and how could you do that without masts or sails.

12,119. But supposing it can be done, and that it will save running back to Penarth Roads, would not that be a benefit to the trade?—It might be, but I do not think it could be done. I have known vessels lying under Lundy Island till daylight when they run for the Mumbles, and one or two of them got ashore.

12,120. But if money were spent to protect the shipping would it not be a good thing for that place?—Certainly, for the trade of that port, but not for the trade of the Bristol Channel.

12,121. You do not think the Mumbles could be made a harbour of refuge for the Bristol Channel in its present position?—No; nor would I recommend it as a harbour of refuge, but for the trade of the place itself.

12,122. If an equally good site could be found near, do you think that would be a benefit for the local trade and the passing trade?—The distance is so little between Cardiff Road and Swansea. To get away you must beat out, and then you must get back to Swansea; but if you get down to the westward as far as Lundy Island, a small change of wind sets you clear; but if the wind is south-east in Swansea Bay you cannot get out of it.

12,123. But is it not the fact, that ships do leave Cardiff road, go down Channel, and are obliged to put back again?—Very often.

12,124. And does not that happen at Swansea?—Occasionally, but not so often.

12,125. And do they not come back to Cardiff Roads?—Yes.

12,126. Would it not be a benefit to the trade if they did not come back so far?—Certainly, but if we get down to the Mumbles we have more room.

12,127. Is it not a fact that the other roadstead is too much crowded with vessels?—What roadstead?

12,128. Penarth?—Yes.

12,129. Is it not the case, particularly when vessels run back to Penarth, that they foul one another, and that damage is done because of its crowded state?—I believe that does happen, but not often.

12,130. Would not that be avoided if they could get down to the Mumbles, and not be obliged to put back again?—It might. But a vessel below the Mumbles would not run for the Mumbles at all.

12,131. Not in its present state. But if you had a breakwater as is proposed, would they not?—I do not know how that is to be done, because the difference is very small now between the sands and the tideway, and with the tide there is a very heavy run. I am not very well acquainted with Swansea. I have brought a ship from London, and was the pilot on board; until nearly high water we could not gather any way to windward. We anchored in seven or eight fathoms, and I was quite surprised at the safety with

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which vessels took the ground. That was four years ago.

12,132. But if a breakwater were provided it would prove of some benefit, would it not?—Yes, but you cannot get ships to windward without its being high water.

12,133. (*Mr. Coode.*) As a sailor of 40 years' experience I should like to ask you whether if it rested with you to select a site for a harbour of refuge, you would not choose that which would be most likely to save life and property without any consideration of trade?—Yes, I would do it.

12,134. I believe the whole of your experience to be confined to the Bristol Channel?—A good deal, but not the whole of it. I have come here very often.

12,135. Speaking only of position, can you tell us at what point between Hartland Point and the Land's End a harbour of refuge would be most likely to save life and property?—I am not sufficiently acquainted with the shore to point out any particular part, but as far as I recollect, the greatest loss of life has been in the neighbourhood of Padstow and St. Ives.

12,136. Supposing the question lay between Padstow and St. Ives, which would you prefer?—I do not know, perhaps I should prefer the deepest bay, I would say Padstow. Having been mostly in the foreign trade we generally avoid that part of the coast.

12,137. Do the greatest number of shipwrecks happen with north-west gales?—Yes, with north-west gales.

12,138. Then, having reference to that fact, do you not think a harbour of refuge the furthest to the eastward the most favourable for the saving of life and property?—The furthest to the westward.

12,139. I am speaking of the coast between Hartland Point and the Land's End?—Certainly a harbour of refuge would be very useful in that deep bay in the neighbourhood of Padstow. Very few vessels get round Hartland Point when the weather is bad. Vessels which generally get lost are vessels which run for those places with which I am not acquainted.

Mr. GETTINGS examined.

Mr. Gettings.

12,140. (*Chairman.*) You are the harbour-master of Newport?—Yes.

12,141. For what number of years have you been connected with the harbour of Newport in that capacity?—For nearly 12 years.

12,142. Are you a seafaring man?—I am.

12,143. How long were you at sea?—For 30 years.

12,144. And how long were you in command of vessels?—For 24 or 25 years.

12,145. And in what trade were the vessels which you commanded chiefly occupied?—In the Mediterranean, the Brazilian, and the Newfoundland trades.

12,146. And what were the sizes of the vessels which you commanded?—They were of a small class, about 200 ton register.

12,147. I think you have already given evidence on this subject before a Committee of the House of Commons?—I have.

12,148. Will you now give us your opinion, refraining from repeating anything of which we are in possession from the evidence which you give before that committee?—You say that I must not repeat what I said there?

12,149. It may be a little difficult altogether to avoid repetition, but we wish you as much as possible not to repeat evidence of which we are already in possession. You wish to speak as to a harbour of refuge?—It is very much wanted indeed for the Channel. We constantly experience the want of it, and my opinion and the general opinion is, that the best site is Lundy Island. There is but one objection you can point out, and that is the depth of water. Lundy Island is a salient point which can be always reached and always left with perfect safety. I have heard the evidence and there is one point which I do not think any of my friends have touched upon, which is this, no man will dare to run in for the Mumbles however a harbour might be constructed; no seaman, I say, will run for that harbour of refuge on a dark night with a south-west gale, no man dare do it; it would be like completely running into the lion's mouth.

12,150. You say that no man dare run for the Mumbles in bad weather, will you state your reasons?—There is such a constant haze hanging over the Welsh coast with a south-west wind that even now vessels are often close in under the Mumbles Head before they can make it out. The holding ground also in the Mumbles is bad and vessels are often injured. It is very heavy riding there, it is very bad holding ground.

12,151. You have heard the evidence with respect to Milford Haven?—Yes.

12,152. Do you concur in it generally?—Milford is a very dangerous harbour to run for unless you know your position very, very correctly, because the tide is in strong, and in the dark there are many dangers. There would not be the same objection to Lundy Island, because you can at almost all times run.

12,153. As to the anchorage between the Hartland Point and King's Road, can a strange vessel run up and drop her anchor and lay in safety?—The holding ground is very good, but it is rough riding in a gale of wind. The tides are very strong. We have very few casualties above Hartland Point among the vessels which bring up, but I have known vessels break away and run ashore.

12,154. But have these instances been frequent?—No, they have not.

12,155. Have a large number of vessels anchored in that ground?—Oh dear yes, hundreds really.

12,156. Then arguing from experience, you would be disposed to say that you can ride there perfectly safe?—The anchorage is good.

12,157. If there are a large number of vessels which anchor there and the casualties are few, that is a proof that the anchorage is safe?—The anchorage is safe, no doubt of it. It is rough but safe.

12,158. Are you acquainted with the coast between Hartland Point and St. Ives Bay?—I have very frequently been up and down on the coast, in and out of Padstow, and I have also been into St. Ives.

12,159. Will you give your opinion as to a harbour of refuge there for the coasting trade, treating it as an entirely distinct question from a harbour of refuge for the Bristol Channel?—I have been driven into St. Ives by stress of weather by the wind north-east, when I could not get the Channel. I never was caught on the coast between Hartland Point and the Land's End, but it is dangerous. No doubt if a harbour were made, it would be the saving of ships and lives.

12,160. But you are not in possession of any local knowledge to enable you to give a very strong opinion as to the precise site?—No, but I should think St. Ives would be preferable.

12,161. Will you state your reason?—I think it is more accessible; I should think it preferable to Padstow, because it is more accessible.

12,162. (*Mr. Lindsay.*) Is it the case that many ships frequent the Bristol Channel, the masters of which are directed to come to Cardiff, Newport, or Swansea, for a load of coals?—I think a good deal of that is done with coasting vessels. With coasting vessels the masters generally have a liberty of that kind.

12,163. Are they at liberty to put in at either of the ports they can fetch with the greatest facility?—Yes.

12,164. Would a harbour of refuge tend to induce masters to run for a particular port more than another if the site of the harbour were at that port?—I have no doubt if there was a harbour of refuge at Swansea, it would induce many small coasters to run for Swansea.

12,165. Consequently a harbour of refuge at Swansea, would materially increase the trade at that port?—It would materially increase their trade.

12,166. And detract from the trade of Newport and

Cardiff?—It might only for a certain description of coal; people come to me who will not go to them.

12,167. Do you think that a feeling that a harbour of refuge might take away the coal trade from the ports of Newport and Cardiff and send it to Swansea has had any weight with the gentlemen interested in this place in recommending a harbour at Lundy Island in preference to the Mumbles?—I have said before that we produce a coal quite different from that at Swansea, and I do not see that it would affect us.

12,168. Is the coal entirely different?—Yes, it is entirely different.

12,169. What is the difference? Is it house coal or steam coal?—Most of the coal shipped at Swansea is steam coal. It is a different coal to that shipped here and at Newport.

12,170. (*Capt. Washington.*) You have stated the extreme difficulty of taking either Milford or the Mumbles?—Yes.

12,171. What place do ships run for?—Ships bound into the Channel run for Lundy Island.

12,172. Do they always run for Lundy Island?—Invariably.

12,173. Then at times there are a great number of ships anchored under Lundy Island?—Not a great many, but they do anchor there.

12,174. Then what do they do?—Vessels bound for Liverpool and up the Channel on a winter's night, generally lie out till daylight, and then they come up the Bristol Channel.

12,175. Do you know where they lie out?—Anywhere between Lundy Island and Morte Point.

12,176. In the south Channel?—Vessels above Lundy Island, if the night is coming on, generally lie out.

12,177. Do ships in the gales you speak of from the south-west ever run for Penarth Roads for refuge?—Oh, Yes; I have myself in a very heavy gale of wind had to run up Channel.

12,178. Do you speak of going to the Holmes or to Penarth?—The roadstead is more open, but you can anchor under the Holmes when a great number of ships are at Penarth.

12,179. Then do I understand you to say, that you cannot run for Penarth?—Constantly there are fleets of vessels there.

12,180. Are there fleets of vessels there by night as well as by day?—By night and day, but of course if you are bound westward, you keep as far down as you possibly can.

12,181. Are you personally acquainted with Swansea Bay?—Yes.

12,182. Have you laid at the Mumbles?—I have.

12,183. Lately?—Yes.

12,184. Can you tell us the distance between the Point and Cardiff Road?—A quarter of a mile.

12,185. And do you think they would run that quarter of a mile if you placed at the end of it a refuge harbour?—The large class of vessels invariably go above the Holmes.

12,186. What is the course?—They can go up north, and anchor under the Flat Holmes, or between the Holmes, whichever they please.

12,187. Do they ever pass to the north of the Flat Holmes?—Yes, frequently.

12,188. Do you know a rocky shoal that is marked by a buoy, and the distance that is from the Flat Holmes?—I suppose a quarter of a mile.

12,189. Do they pass between that shoal and the Holmes?—They pass to the north of the shoal.

12,190. Between that and the Flat Holmes?—between that and Latty Point.

12,191. What is the distance?—About a mile.

12,192. If they pass between the Holmes, what is the distance?—Two miles or two miles and a half.

12,193. And then all is clear?—Yes, all is clear.

12,194. Then if I understand you rightly, if the vessel runs to Penarth she runs through shoals a quarter of a mile apart; if she runs to the north of the Holmes, she has a channel a mile wide; if she runs between the Holmes, she runs through a channel two miles and a half wide. Can you tell us any place where there is a quarter of a mile or two miles to pass between a breakwater and a shoal?—I do not understand your question.

12,195. You have shown that vessels must pass through a channel of a quarter of a mile. You have stated that the difficulty of going to the Mumbles is that it is encumbered with shoals, with the Skerweather and others. Tell me the breadth of the channel between the Mumbles and the Skerweather?—I think it is about six miles, as near as may be.

12,196. Then in thick weather you would prefer to bear up and enter Cumberland Roads with only a quarter of a mile space, and you would not run to Swansea Bay where there is an entrance of six miles?—For this reason: in running to Cumberland Roads there is nothing to pick you up to leeward. Above the Nash light you keep a continuous sight of the land, but if you are running for the Mumbles you run across the tides and may come right in on the shoals.

12,197. You were speaking of misty or hazy weather; can you keep a continuous sight of land in that kind of weather?—You might approach so near that you could see it.

12,198. What land?—The land from Nash Point all the way up to the Holmes. It must be a very, very dark night indeed that you cannot make the land all the way up.

12,199. Where do you propose to make the land with a ship running in a south-west gale?—A ship would rather run up than run for Swansea Bay. She would run up east till she got to the foreland. She would make land to the east of Nash Point.

12,200. Suppose she did not make the land?—There is the possibility of anchorage. Some of the heavier ships anchor down between the Scilly Islands and Burry. Many ships have anchored there and rode out a gale of wind.

12,201. (*Capt. Sulivan.*) If you had got opposite Lundy Island in a ship from Cardiff, and it blew heavily from the south-west, and there was a harbour in Swansea Bay, but the weather was thick, and the sea was heavy, what would you do? Would you anchor under Lundy Island, or hang to windward toward the English shore, or run for Swansea Bay?—Some large vessels of 1,000 or 1,100 tons have been lost, and I believe I am right in saying that not one of such ships would go to the north shore.

12,202. That is, I think, not quite an answer to the question which I put. I say, supposing you were in command of a vessel which had to bear up, which should you consider it the safest thing to do—to anchor under Lundy Island, or the south shore, or risk running for the Mumbles?—I should stop short, and keep under the English land if I could. Anything would be preferable to going in there.

12,203. I suppose Lundy Island would be equally available for all the Swansea trade, as well as all the Cardiff trade?—I think it would.

12,204. The Swansea vessels would have gained a little on their voyage. They would be more to the westward?—That would depend on the wind.

12,205. In foul winds?—In foul winds they would be a little more to windward.

12,206. And if the wind went round to south-east they would stand a much better chance of getting away, than if they started from Swansea?—Yes, but in a north wind Swansea would have the better chance.

12,207. In what wind do vessels take refuge at the Mumbles?—Vessels take refuge at the Mumbles with a north-west wind, and they generally stop there till a change takes place.

12,208. But on the voyage, would vessels from Swansea Bay be as far to the west of Lundy Island, and require to put back as much as vessels from Cardiff?—I should think not, because if I put out and got away I should be more to the east. There would just be a difference of 60 miles.

12,209. Then a Swansea vessel would meet a south-west gale further to the west than a Cardiff vessel?—Of course.

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12,210. It is quite as likely, then, that she would avail herself of a harbour of refuge at Lundy Island, as a Cardiff vessel ?—Yes.

12,211. Then supposing it were possible to make a harbour of refuge at Lundy Island, it would be equally available to the whole of the Bristol Channel ?—It would be more available to Swansea than to Cardiff.

12,212. If it were made at the Mumbles, do you consider that it would be principally available to the Swansea trade ?—I do.

12,213. Do you think that money should be expended for the benefit of the whole Channel, and not for the benefit of one place ?—I think it should be spent where it would be generally beneficial.

12,214. You were asked whether Swansea would not draw more trade in consequence of having a harbour of refuge. Do you think that the trade of Swansea will stand still because it has not a harbour of refuge ?—No, I should think not.

12,215. Do you know the Skerweather Sands ?—I have seen them. I have seen the sea breaking on them.

12,216. Do you think for the trade of the Bristol Channel, that a light vessel placed on the west extremity of these sands, would add to the safety of the navigation ?—I am certain it would.

12,217. Do you think that the trade would object to the small toll which is levied by the Trinity House for light vessels ?—No.

12,218. Are you aware of any parties interested having made application for a light to be placed on the Skerweather Sands ?—I never heard it mentioned.

12,219. Did you hear what was said about buoys at Lundy Island ?—Yes.

12,220. Supposing a vessel had to sail with the wind on shore, although moderate weather to start with, might she have a difficulty in heaving her anchor in time to clear the land ?—That is possible. These buoys you mention would be very serviceable.

12,221. Supposing buoys were put rather to the east, could they be in a position to run hawsers, so as to make sail slipping from the buoy after the anchor was got up, and if that could be done, do you think it would obviate some of the difficulties which exist under present circumstances ?—It would obviate almost entirely the difficulty. It would very materially obviate the difficulty to have buoys there that you could make fast to.

12,222. Do you think that a small harbour light on the island, to show how close you could round to, to fetch out a good anchorage, would at all assist vessels in making that refuge harbour ?—No doubt it would.

12,223. (*Capt. Vetch.*) You consider Lundy Island the best shelter ?—Yes.

12,224. How many vessels have you seen take shelter there at any one time ?—I have never seen many vessels there myself. I was interested in the inquiry some time ago.

12,225. How many do you believe take shelter there at a time ?—Some six, eight, or 10 may be there occasionally. I do not think there are many.

12,226. Did you ever observe at any time vessels to windward take shelter under the Mumbles ?—Yes, a great number of small vessels.

12,227. How many vessels have you seen taking shelter at the Mumbles at one time ?—I have seen 30 or 40, or as many as 50 small vessels lying on the shore.

12,228. Not more ?—No, I do not think I have seen more.

12,229. If these 50 vessels which have taken shelter at the Mumbles are wind bound, and cannot get shelter there, they must come to Penarth roads ?—Yes.

12,230. Is it not a fact that Penarth Road is very much crowded ?—It is very much crowded.

12,231. And to prevent that, as much as possible, vessels do not leave the docks until they are almost ready to sail ?—Yes.

12,232. If an artificial work could make the Mumbles a very good shelter, would not that be a benefit both to the trade of Swansea and also the trade here ?—My opinion is that if you were to construct a harbour of refuge at Swansea no large ship, during the night in a gale of wind, would dare to run for it. It is a very difficult place.

12,233. Supposing a talented engineer could show you what could be done ?—Engineers make very bad shipmasters, some of them.

12,234. Do you know what the Green Grounds are composed of ?—They are quite hard. I do not know exactly what they are composed of. They are hard grounds.

12,235. We are told that they consist of loose boulders and shells ?—I never was on them.

12,236. (*Mr. Coode.*) You told us that the holding ground at the Mumbles is very bad. Do you speak of your own knowledge ?—I have been at anchor there three or four times, and I know the anchorage is bad.

12,237. Is it bad holding ground ?—It is.

12,238. Have you known ships driven from their anchors ?—We have heard of them being driven by the wind off shore across the bay, and lost.

12,239. Is that a matter of common occurrence ?—I cannot say it is of common occurrence, but it has occurred.

12,240. Can you tell us any case within your own knowledge ?—I did not see the ship, but a vessel was driven out in that way.

12,241. Was any life lost ?—I rather think there was. I think the whole of the lives were lost.

12,242. Do you remember the name of the vessel ?—No ; but I remember the circumstance very well.

12,243. What way was the wind ?—About west-north-west.

12,244. In speaking of St. Ives and Padstow you said you preferred St. Ives because it was more accessible. Will you explain a little more clearly what you meant ?—We know that at present Padstow is very difficult of access unless the wind blows right into it. A ship cannot take it with safety, and I do not know what kind of improvement you can make so as to obviate that difficulty, unless you make a harbour of refuge outside of it altogether.

12,245. You spoke of the difficulty of getting in. Supposing a site equally accessible as St. Ives were close to Padstow, which should you prefer then, the site near Padstow or St. Ives ?—The more central the better. I think if there were a site half-way between Cape Cornwall and Lundy Island it would be better.

12,246. If you found two bays equally good in all respects, except that one was situated nearer Cape Cornwall, as St. Ives is, and the other nearer Padstow, which would you prefer ?—I should prefer the central one.

12,247. Why so ?—Suppose a ship were caught on a lee shore, if there were a harbour at St. Ives she would have to go all that distance to get to it, whereas in the other case she would only have to go half the distance.

12,248. Do you think a site at or near Padstow preferable to one at St. Ives, all other things being equal ?—I should think so.

12,249. (*Chairman.*) Have you ever heard of many vessels being ashore at the Mumbles when the wind changes to east or south-east ?—That is a common occurence with small vessels anchored on the shore. If it comes to blow hard they cannot get away.

Mr. Edward Hill examined.

Mr. E. Hill.

12,250. (*Chairman.*) In what capacity are you connected with the port of Cardiff ?—I am a partner in the firm of Hill and Son, shipbuilders, shipowners and merchants, interested in many vessels trading

from the port of Bristol to all parts of the world. I have some knowledge of the Channel, having navigated it for the last six years, and resorted to most of its ports.

12,251. You have been present during the course of this inquiry ?—Yes.

12,252. And you are aware of its objects ?—I am.

12,253. Will you make any statement which you wish to the Commissioners ?—I have for some time given the subject, as to the best position for a harbour of refuge, my attention, having an opportunity of obtaining information from captains of foreign-going vessels and coasting vessels, both one and the other, and I have come to the conclusion that the best site for a harbour of refuge is Lundy Island, because it is better for vessels wishing to enter the Channel in bad weather in a gale of wind, and it is also better for vessels going from the Channel; for instance, in strong south-west winds, supposing a harbour were constructed at Lundy Island which you could enter at all times without a pilot, when the wind changed you would be able to get out again. There are no sand-banks or rocks more than in the immediate neighbourhood of Lundy Island itself, and I think that vessels going out of the Channel, starting from Penarth or King's Road, get down beyond Lundy Island and are forced back again, and they generally come to King's Road or Penarth ; whereas if they could go to Lundy Island, when the wind chopped round they could start from Lundy Island and get a sufficient offing to make their voyage, but higher up the Channel they could not do so. I recollect a vessel of our own lying in King's Road eight weeks wind bound. She made four attempts to get to sea. Upon each occasion she got to Lundy Island ; and it is quite certain that if there had been a harbour there she would have got there the first time, if there had been safe holding ground, and with the next change of wind she would have got to sea and made her voyage.

12,254. Have you considered the question in this point of view, that the south-west gales generally come round to the north-west, and that at the Mumbles a vessel would be considerably more to windward ?—She would ; but Lundy Island is sufficiently to windward.

12,255. Do you know the coast between Hartland Point and the Land's End ?—I have been down it ; but I have not visited any of the ports.

12,256. Perhaps you know that there is a very strong opinion as to a harbour at Padstow for the coasting trade ?—I know there is a very strong opinion in favour of Padstow, but I rather imagine that St. Ives would be the best place. You might get into St. Ives when you might not get into Padstow.

12,257. You have heard the evidence as to the anchorage above the Holmes. Do you agree with it ?—Vessels do frequently anchor above the Holmes, and it is a safe anchorage. I do not recollect any accident. It is of very rare occurrence that even any serious damage is sustained.

12,258. Have you ever had occasion to run for the Swansea land in bad weather, so as to form an opinion as to its facility of access ?—I never ran for it in bad weather, but I have been there very frequently, and I found that it was always necessary to exercise great caution in navigating because of the outlying vessels. If I were caught in a strong gale of wind down Channel, I should not think of running for the Mumbles.

12,259. (*Mr. Lindsay.*) Do you lay any restriction on the masters of your ships, as to running to the Mumbles ?—No.

12,260. You do not restrict them ?—No.

12,261. If a harbour of refuge were constructed at the Mumbles, which was close to that particular coast where you are obliged to exercise great caution, do you think, as a shipowner, that you would have any objection to your ships going there ?—Do you mean close to.

12,262. You stated just now that a vessel of yours was detained for eight weeks, that she got as far as Lundy, and then had to go back again. She would be off the Mumbles in putting back ?—No ; she would be further down, more towards the English land.

12,263. If there had been a harbour at the Mumbles, would your vessel have put in there ?—No ; certainly not, in her case, because she was at Lundy Island when she was driven back.

12,264. But if there were a harbour of refuge at the Mumbles, would you have any objection to allow your ships to go there ?—I certainly should, because I consider it a very dangerous thing to do ; of course daylight she might.

12,265. Of course we are speaking of a harbour under the circumstances of gales of wind and thick weather ?—Precisely so.

12,266. Under such circumstances would you allow any of your masters to run for the Mumbles if a harbour were constructed there ?—I should say certainly not.

12,267. Then your orders would be that if they could not make their voyage, and had to run back, they were to run to King's Roads ?—We do not give our captains orders what they should do. The master of a vessel ought to be the best judge of the place to run for. But if he asked my opinion, I should say he would risk his life and the ship in running for the Mumbles.

12,268. Even if a harbour were constructed there ?—Unless you removed all the sand and oyster beds. If the sand could be removed then I think there could be no objection to the Mumbles.

12,269. (*Capt. Sulivan.*) The weather that vessels generally run back in, is, when the wind is from the west, round to south ?—Yes.

12,270. Are these winds generally accompanied by thick weather ?—I believe they are accompanied by rain.

12,271. If you were in a vessel under Lundy Island, or short of Lundy Island, which had to run back somewhere, and supposing that a harbour were in Swansea Bay, would you consider it safest to run up for the Holmes or for Swansea Bay, with the shoals that are there, and with the certainty that if she misses the harbour she must be lost ?—I should consider it by far the safest thing to run for the Holmes.

12,272. (*Mr. Coode.*) As a yachtsman and living in the neighbourhood, I presume you cruise frequently in the Bristol Channel ?—I do.

12,273. Will you tell us from your experience near which shore most vessels lay ?—The south shore. I mean more on the south shore, particularly near Lundy Island. They generally come between Lundy Island and the English land to the south.

12,274. Can you tell us the proportion in general terms ?—From what I have seen I should say four-fifths of them. I have no means of giving any definite information.

12,275. But in general terms you say about four-fifths ?—From what I have seen, I should fancy so.

12,276. (*Chairman.*) How do ships bound foreign generally make their passage during the prevalence of westerly winds ?—They would scarcely do so at all with the wind due west, but with a slant from the north-west they keep as near as they can to the north shore, and make a long reach on the other tack to weather Lundy Island at the south, but with a southerly wind they keep the south shore because it is a smooth water, and they keep as close as they can in order to weather Ireland.

12,277. With winds to the west do they take advantage of the tide ?—Large ships do not do so generally. We had not long ago a large ship starting for Australia. She was towed down below the Nash light. When they get below Lundy Island we consider their passage made. They always make out to sea.

12,278. Then with the larger and more valuable vessels, does the use of tugs make a difference ?—When passengers are on board, or there are any particular reasons we use tugs. Otherwise the large expense induces shipowners to wait for a favourable change of wind.

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Chairman.

12,279. Then as a general rule they are not towed down, but wait for a change of wind ?—Yes.

12,280. (*Mr. Lindsay.*) As you are fond of yachting, which I am glad to hear, and as you have given considerable attention to this subject, I will ask you whether you know Breaksea Point ?—Yes ; I have heard of vessels being lost there.

12,281. Would a lighthouse be an advantage there ?—I think a lighthouse would be an advantage, but I do not think that ships have any business there with ordinary caution. I think most of the accidents arise from want of caution.

12,282. Do you think that, as there is a light on Nash Point, and only eight miles distant, another light is not necessary ?—I should say that the Channel generally is beautifully lighted.

12,283. Have you ever been to Clovelly Bay?—I have never been in there.

12,284. Do you know Oxwich Bay ?—I have not anchored there, but I have hung a tide there.

12,285. Would it be a better site for a harbour than the Mumbles ?—I should think it better than the Mumbles, because there are no sands.

12,286. Which is the better, that or Clovelly ?—I should be inclined to give the preference to Clovelly, because it is further down Channel, and if you get a little slant of wind, you are at sea at once, and it is better to run for.

12,287. You give a decided preference to Lundy Island over all other places ?—Certainly. In my opinion Lundy Island is the most suitable.

12,288. (*Capt. Sulivan.*) Do you think a light vessel on the Skerweather Shoal would conduce materially to the safety of vessels going up and down the Channel ?—I am almost of opinion myself that there are sufficient lights already in the Channel at the present time.

Mr. Thomas Steel examined.

Mr. T. Steel.

12,289. (*Chairman.*) What is your present occupation ?—I have retired from the sea but I have been a shipmaster for 16 years, and for the last five years a pilot for the port of Cardiff.

12,290. You have been present during this inquiry ?—Yes.

12,291. You have heard all the evidence that has been given on the subject ?—Very nearly all.

12,292. Does it occur to you to offer anything which we have not heard from the previous witnesses?—There may be a few things upon which I can throw a little light, but I do not know.

12,293. Will you now make any statement upon the points you have not heard ?—Yes ; as regards a harbour of refuge, it is my candid opinion that Lundy Island is the most preferable point that I have heard spoken of ; I prefer it to any other that I have heard mentioned during this examination. From my own experience in going up and down the Channel, I have always found Lundy Island the resort of all ships. It is the point always made for and kept from both shores. Let the wind be any way, we always endeavour to make for Lundy Island ; it is a central position to make way from either up or down.

12,294. Therefore you entertain a very decided opinion, that Lundy Island is the most proper place?—It is the most preferable place that has been pointed out.

12,295. Do you know the coast between Hartland Point and the Land's End ?—Yes.

12,296. Have you any opinion as to the best site there for a shelter for the coasting trade ?—I had on one occasion to go in a very heavy gale of wind for the harbour of Padstow—in a very terrific gale—with little or no canvass set, we had to make for there for our lives ; we did go into Padstow, but not keeping sufficiently clear of the Doom Bar, we got on the Doom Bar, but eventually we got off and into the harbour in safety ; after we got off the Doom Bar we saw a vessel sink a little up the harbour. A vessel sunk at the same time going from Cardiff with iron, bound for Newport.

12,297. Having had occasion to go to Padstow, do you think it could be made available ?—Most times you can get back, and anchor under Lundy Island.

12,298. Having had experience of the Channel, do you think Lundy Island is the place for a harbour of refuge ?—Most decidedly, because it is the centre part. There are two deep bights to contend with, but at Lundy Island you have the centre part, and you escape the two bights. There is the bight of St. Ives Bay and Bude Bay ; a great number of lives have been lost in St. Ives and Bude Bays, and if there had been a harbour of refuge at Padstow they might have escaped ; we cannot say for certain, of course ; but they would have endeavoured to make for Padstow, no doubt.

12,299. (*Mr. Lindsay.*) What is your cruizing ground ?—We go sometimes down to the Nash, and sometimes to Cardiff ; we are not pilots for that water, but we cruize down ; we even go to Morte Bay.

12,300. Are there a class of pilots for Bristol ?—Yes.

12,301. Where do they leave ?—Lundy Island is the end of their district.

12,302. Did you hear the evidence given as to the placing of mooring buoys in the usual anchorage at Lundy ?—I did.

12,303. As a sailor of considerable experience, do you think that would be of any advantage ?—Not without some portion of breakwater.

12,304. Not without a breakwater ?—With a breakwater it might be of some little service, but not else. I should think it would not be of much service without a portion of breakwater to defend it from the north-west winds.

12,305. Why ?—Because the western swell heaves in quite heavy ; there is a swell that rolls to that degree, that I have seen vessels roll with their gunwales under water.

12,306. Was that at Lundy Island ?—Yes ; and during that time mooring buoys would be of little service ; they would chafe and tear the ropes to pieces ; they would never be made use of without it was to assist the anchor, but not to ride by.

12,307. Do you think a harbour light on Rat Island would be of much value ?—A good fog light would be of value without any other thing ; without making it a harbour light ; a good fog light like that at the Stack, always down to the water's edge would be useful ; I have found it useful at the South Stack on many occasions running up.

12,308. Have you been often at the Mumbles ?—I have been there many times ; I never frequented it as a place of choice ; I never visited it for choice ; I merely went there to stop a tide ; I have never gone there to slip with a south wind.

12,309. If there were a harbour of refuge there should you have any hesitation in taking a ship there ?—With a large ship I should, because you cannot manage a large ship equally as well as you can a small one. I have not had large ships under my command so much as small ones.

12,310. What tonnage do you call a large ship ?—1,000 tons register. There are plenty of these ships coming in this Channel now. There are plenty of vessels of 1,000 and 1,400 tons, and you want some place for them as well as for the smaller ones.

12,311. With a harbour of refuge at the Mumbles, would you hesitate to run for it with a strong south-west gale ?—I would not attempt it ; no man with a reasonable conscience could attempt it.

12,312. Does that arise from the various shoals ?—It is a nasty dead coast to go down upon, fog and wet always lodge there, you are right down on the top of it before you can make it out, because of the high land in shore ; you cannot risk it to run down upon it.

12,313. Do you think a light on Breaksea Point would be of any value ?—No, I think not ; but if the

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present light were a little improved, it would be of great service.

12,314. What do you mean ?—The lights are shut in, they ought to be more shown to the eastward, to carry you free of danger.

12,315. Do you think a more conspicuous buoy would be of service there ?—Yes, with a bell upon it.

12,316. Is it not the case that the tide sets in much upon that point ?—The flood tide does not set in upon it, the ebb does rather set in upon it.

12,317. Do you know the Skerweather Sands ?—Yes, I have been there, they are in the Mumbles Bay.

12,318. Do you think a light there would be of great value ?—The Mumbles light is a very fair light after the last improvement, and no man will endeavour to approach the land without seeing the Mumbles light.

12,319. You think the Mumbles light is sufficient to keep clear of the shoals ?—Yes, perfectly so, because you can approach them with your lead, and if you cannot fetch the light, you back off or what not.

12,320. (*Capt. Washington.*) You said that a fog light at Lundy Island would be a good thing ?—Yes.

12,321. Are the present lights often obscured by fogs ?—They are so high, I have often been under close-reefed canvass there, and did not see a bit of light until I was right under the land. I never saw a bit of the light until I saw the skare between the land and the light, running up from the Land's End under close-reefed topsails; I never saw the light, and I have not the slightest doubt that several vessels have been lost, because the lights are so high. A fog light about 10 feet above high-water mark would be of great service to the shipping.

12,322. Where would you recommend it to be placed ?—On the south end of the island, that is for approaching vessels both coming up and down.

12,323. Would Rat Island be a good place ?—I think it would.

12,324. Do you know a rock that lies off the south point of Lundy Island, with only nine feet of water over it ?—I have never known a vessel strike upon it, it must be very small. I know a rock at the mouth of the Mumbles Harbour. Vessels have been going over there for centuries, but a few years ago they found it out by a vessel striking upon it, and this rock may be of the same sort. It may be there and it may not ; there is a deal of broken water.

12,325. About a cable and a half from the south point of Lundy Island ?—Oh yes, I know that rock of course, and close round it you can see the sea ; it breaks up against it.

12,326. Notwithstanding that the Lundy Island lights are often obscured, you still think it a good point to run for ?—Yes, it is a bold shore, and when you get there you partly know by the disturbance of the water. There is a great disturbance of the water on the sand.

12,327. Do vessels from Penarth usually pass down tha south or the north channel ?—The south generally speaking, without it is the Irish trade and the Liverpool vessels, they of course go north.

12,328. We have heard that at Swansea there are frequently from 200 to 300 vessels lying in the bay ?—Which bay ?

12,329. Swansea Bay. Can you tell us where they come from ?—There are lots of little places like Port Talbot, out of which there are small vessels bound for Padstow and St. Ives. They merely go to the Mumbles to stop until the wind after the south wind shifts to the north-west, and there they are to windward which is an advantage to them.

12,330. These are the sort of vessels which can take the ground ?—Yes, and bear a bit of thumping.

12,331. And they get a good bit sometimes, don't they ?—I believe you, they do.

12,332. (*Capt. Sulivan.*) Do you know Oxwich Bay ?—I have been there to stop a tide but not to anchor.

12,333. If vessels could be sheltered from all winds which would be the safest to make, Oxwich Bay or the Mumbles, and which of them would vessels most readily run for ?—They would certainly take Oxwich Bay in preference.

12,334. Would it be much further from the sands to leeward ?—Certainly.

12,335. If a vessel missed in thick weather, could she haul off on the starboard tack ?—Yes.

12,336. Could she weather the Skerweather under the same circumstances ?—Not so well.

12,337. Could she weather the Skerweather ?—No.

12,338. Suppose it lay between these two points, do you think the coasting trade would prefer having the harbour in Oxwich Bay, or having it at the Mumbles? —Do you mean the small coasters ?

12,339. Yes; do you think they would consider Oxwich Bay a better place than the Mumbles ?—Yes.

12,340. One of the lights at Lundy Island is much lower than the other, is it not ?—Yes, much lower.

12,341. Still you think it is much too high for fog ? —It is still too high.

12,342. Vessels running from the westward would not see the light on Rat Island until they opened the south point, therefore a light there would not make it safe ?—They generally run for the mid-channel course ; no prudent man would run in unless he could make out the lights.

12,343. Would a small light on Rat Island be useful to vessels coming up between Hartland Point and Lundy ?—Yes.

12,344. Would it be an equally useful aid to vessels trying to pick up a good anchorage in Lundy Roads ?—Yes.

12,345. (*Mr. Coode.*) You say that you got on the Doom Bar, will you tell us under what circumstances that happened ?—The passage is so narrow at Padstow, that the ship not having sufficient way to shoot in, the eddying wind from the land caught the vessel ; she became unmanageable, and she dropped over on the Doom Bar.

12,346. How was the wind ?—West-north-west.

12,347. There are moorings fixed at the harbour to aid vessels in getting in ?—Yes, there are; but for all that, vessels get on the Doom Bar.

12,348. But for the eddying winds, you would have got to a safe anchorage ?—No doubt ; if the point were cut away to allow the wind to come true, it would be a great advantage.

12,349. Did the idea of cutting away the point suggest itself to you, or have you heard it spoken of ? —I have heard it spoken of. I was very glad to get there that time.

12,350. Having heard the suggestion for cutting down Stepper Point, you concur in the desirability of that suggestion being carried out ?—Yes.

12,351. (*Capt. Sulivan.*) Do you know the first capstan-house ?—I do.

12,352. If vessels with a west wind could fetch in as far as the first capstan-house, would that do ?—They would have good assistance then.

12,353. You think that would be sufficiently within the corner of the vessel to get over the difficulties ? —Ketching out on the corner is the principal difficulty, I believe.

Mr. JOHN LEWIS examined.

Mr. J. Lewis.

12,354. (*Chairman.*) In what way are you connected with the port of Newport ?—I am a retired master of a vessel.

12,355. For how many years were you at sea ?—For 42 years.

12,356. And of that period, for how many years were you in command of vessels ?—For 25 years.

12,357. What description of vessels were those which you principally commanded ?—Brigs.

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12,358. What was the size of the vessels which you chiefly commanded ?—About 200 tons.

12,359. In what trade were they employed ?—In the Mediterranean and the coasting trade.

12,360. You are aware of the objects of the inquiry ?—Yes.

12,361. And you have been present during the evidence we have received ?—Yes.

12,362. Do you generally concur in that evidence ?—Yes.

12,363. Is there any additional information which you wish to offer ?—I may pass a few remarks.

12,364. Will you be good enough to do so ?—If I am to give an opinion on a harbour of refuge, I should say Clovelly Bay or Lundy Island.

12,365. Have you any reasons to state, in addition to those you have heard, for your preference for these two places ?—I am aware that every ship from whatever part of the world she may come, always lies herself for Lundy Island if possible, and I am satisfied that in thick weather coming in the Channel the north stream is so powerful that if vessels get no observation often though going to the Bristol Channel they are driven up this channel, and I have known vessels even sailing out of the north channel driven into the Channel, the indraught is so great.

12,366. And, therefore, you are of opinion that Lundy Island is the best site for a harbour of refuge ?—Oh yes.

12,367. (*Mr. Lindsay.*) Do you know that coast well between Hartland Point and the Land's End ?—Yes ; the fact is I served my time out of Swansea. I have been 15 years in the coasting trade.

12,368. What is your opinion as to the necessity for a harbour of refuge, setting aside any harbour at Lundy Island or above Lundy Island ? What is your opinion as to the necessity for a harbour of refuge between Hartland Point and the Land's End ?—No further than that a harbour of refuge would be the means of saving life and property.

12,369. Do you think that for this purpose it is necessary ?—I do.

12,370. Are there many lives which would be saved by a harbour of refuge there ?—I think so.

12,371. What site do you prefer for that line of coast ?—Padstow. The wind which is direct in is the worst wind you can run for ; when you run in under the high land with the wind north-north-west, the wind comes right out, and your vessel goes right upon the Doom Bar.

12,372. Do you think that a harbour at St. Ives would be very valuable for the saving of life and property ?—No ; with the wind north-north-west a ship down there can very easily come up and make Padstow ; if below Hartland Point, with the wind north-north-west, she would fetch Padstow. But as to St. Ives she would never get there.

12,373. Now with the wind you are speaking of from north-north-west, what is the difficulty ?—It is the indraught. If she has her course to, the indraught draws her in.

12,374. When the wind blows from the south-west, does it not generally go round to the north-west and then blows strong from the north-north-west ?—Yes, ranging from the west-north-west to the north-north-west. The wind must be north-north-west for a ship which can carry canvas to come round Hartland Point. I was caught there myself in a gale of wind. We were close in. The people on the cliffs were expecting us to go ashore, but she was a small vessel. We saw the broken water, and if we had gone on Hartland Point, in a minute we should have gone to pieces ; that is the indraught. If there had been any canvas at all on her, she would have weathered Hartland.

12,375. (*Capt. Sulivan.*) Do you know the first capstan-house ?—Many years ago I was there.

12,376. At Padstow ?—Yes.

12,377. If you could give a true wind to vessels as far in as that, would it be a good entrance ?—It would give a good entrance, but you must cut away a great deal of the land.

12,378. If you cut away the land as far as the first capstan-house to give a true wind, would you do away with the danger ?—The only thing is the want of room, and the danger of going on the Doom Bar. Then even if a vessel went on the Doom Bar she might be saved, but there is now no chance of saving her.

12,379. Then do I understand you to say, that the great danger of loosing life would be overcome if a vessel could get as far as the first capstan-house ?—Certainly.

12,380. How many vessels could be sheltered if Padstow were a convenient place ?—Not a great number. I only consider it just a place of safety for vessels.

12,381. Not for a general harbour ?—No, it is too far to leeward ; no ships would go there ; they would sooner go back by half.

12,382. (*Mr. Coode.*) Have you ever known vessels lost on Breaksea Point ?—Yes.

12,383. More than one ?—Several.

12,384. How many ?—Perhaps six or seven.

12,385. Within what period ?—As far as I can recollect, within the last 20 years.

12,386. Do you think there is any special cause for vessels running ashore at that point ?—I think a light ship would do good, but not a lighthouse.

12,387. Why do you prefer a light ship to a lighthouse ?—Because the water is very shallow, and the land is very low, running over from the east shore ; if you do not see the Nash light, the Breaksea Point brings you up.

12,388. Is there any peculiarity in the tide there ?—Not at all.

12,389. Nothing but the shallowness of the water ?—Nothing.

12,390. Have you known many lives lost in the wrecks of which you have spoken ?—I cannot say. I do not think I ever heard of one.

Mr. Peter Williams examined.

Mr. P. Williams.

12,391. (*Chairman.*) How long have you been at sea ?—About 48 years.

12,392. For how many years were you the commander of a vessel ?—For 35 years.

12,393. What description of vessels did you chiefly command ?—They were generally in the coasting trade, from 200 to 210 tons burthen.

12,394. You have been present during the course of this inquiry ?—Yes.

12,395. You are aware of the object of it ?—Yes. It respects harbours of refuge.

12,396. Do you concur generally in the evidence of the previous witnesses ?—Yes.

12,397. Is there any point upon which you are disposed to differ from them ? Do you wish to state anything yourself ?—Nothing particular. In my opinion Lundy Island would be the best place for a harbour of refuge. That is my opinion.

12,398. Do you know the coast between Hartland Point and the Land's End ?—Yes.

12,399. Supposing a harbour were made at Lundy Island and there was another harbour to be made, where would you put the second refuge ?—Padstow is the best place. It can be made a good harbour at a little expense, and it would be central between the Long Ships and Lundy Island.

12,400. And you are decidedly of opinion that Padstow is the place for a second harbour of refuge ?—I think so. But I think there should be a harbour of refuge at Lundy Island.

12,401. (*Mr. Lindsay.*) Do you think that a harbour at St. Ives would tend to the safety of life and property ?—In coasting vessels it might, but not for large vessels. Large vessels generally keep away to the west, and keep clear.

12,402. (*Capt. Washington.*) I think you say

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that you consider Padstow the best side for a harbour of refuge between Hartland Point and the Land's End ?—Yes.

12,403. Can you give us you reasons for that opinion ?—Very often vessels go down the Channel in the winter season, with the wind generally prevailing from south-south-west to north-west. These are generally the heaviest gales we experience upon the coast, and the vessels in going down with the wind to the south, starting from Swansea Roads, give the land as wide a berth as they can. But when there is a sudden shift of wind it sometimes catches them between Long Ships and Lundy Island. They are then down by Padstow, and if Padstow were improved it would be a good place to run into.

12,404. Would you recommend vessels to go for Padstow now ?—Not unless you were well acquainted with it. When the wind is north-west, with the eddy wind, you stand a chance of getting home ashore on the sand.

12,405. Then with these dangers would you recommend vessels to run for Padstow ?—Not unless it is improved.

12,406. How can it be improved ?--By running out an arm from the east side, which would carry the water right clear, because a good deal of backwater may be got, just as there is from Hayle.

12,407. But that would not prevent the eddy wind ?—No ; but it would make the entrance wider.

12,408. Have you known vessels lost there ?—Yes, several vessels have been lost there, and all hands.

12,409. And do you not think that more would be lost, if you were to recommend them to run for it ?—In its present state no vessel would run for it, if she could help it. Those that run for it cannot help themselves ; I recollect several vessels having been lost, with all hands.

12,410. How many vessels would it contain ?—If you mean only inside it would contain only a small number of ships.

12,411. Have you been there lately ?—Not very lately.

12,412. How long ago ?—Ten or 15 years.

12,413. To lie afloat ; how many vessels, if they could round the corner, could lie afloat ?—Very few.

12,414. Then vessels going there would have to take the ground ?—Yes. They would have to run higher up.

12,415. Then you would recommend the improvement of Padstow Harbour, although it would contain so few vessels ?—No one will run for Padstow, except in case of necessity to try to save the ship or life, and ten to one you cannot save ship or life now.

12,416. (*Capt. Sulivan.*) Do you know the first capstan-house at Padstow inside the point ?—Yes.

12,417. If the point were cut away, so as to carry a steady wind over the point, as far as the first capstan-house, would that do away with the greatest part of the danger ?—It would leave a good deal, unless you were to take away the whole of the point. With the wind north-west there is an eddy wind which comes down this little valley, and right out.

12,418. If vessels get above the first capstan-house before they meet that eddy wind, would they then be in safety ?—Oh yes ; in a great measure they would be in safety, because they would have ropes and all assistance.

12,419. You said that a harbour of refuge at St. Ives would be available for the coasting trade ?—Yes, for the coasting trade.

12,420. But not for large ships ?—Not for large ships.

12,421. Do large ships generally go in with the land ?—No, they do not.

12,422. Then the trade which is generally in danger is the coasting trade ?—Yes.

12,423. If Padstow were improved, and a small harbour were made at St. Ives, would it make the coast much better, and save a great deal of life and property ?—It would be very desirable to have harbours at both places, but I do not consider they would be harbours of refuge.

12,424. I am speaking only of the coasting trade round the land ?—Yes, I understand so.

12,425. Is it the men belonging to the coasting trade that perish on that coast ?—Mostly.

12,426. (*Capt. Vetch.*) Have you been at St. Ives lately ?—I have not been ashore, but I have been in the bay.

12,427. Do you recollect how many vessels you have seen lying at Hayle at one time ?—I should say from 15 to 20 sail.

12,428. There are steamboats trading to Hayle ?—Yes, two.

12,429. There are a good many vessels lying at St. Ives Harbour ?—Yes, but they are aground.

12,430. Do you not think that the trade would be benefitted by some protection ?—No doubt, for the same class of vessels.

12,431. When the wind comes round to the north suddenly, is it very dangerous ?—And it comes round very suddenly sometimes.

Mr. JOHN OWEN examined.

Mr. J. Owen.

12,432. (*Chairman.*) In what way are you connected with the port of Cardiff ?—I am agent for Lloyd's, and a shipowner.

12,433. Have you been present during the course of this inquiry ?—Yes.

12,434. And you are aware of its objects ?—Yes.

12,435. Do you concur generally in the evidence given by the preceding witnesses ?—Yes.

12,436. Are there any points in which you are disposed to differ from the witnesses who have preceded you ?—As to a lighthouse on Breaksea Point, I think there ought to be one.

12,437. Will you state your reasons for that opinion —There have been from 18 to 20 vessels wrecked there within the last 20 years.

12,438. Can you furnish the Commissioners, at your convenience, with a list of the vessels which have been wrecked at that point during that period ?—Yes.

12,439. Then be kind enough to do so, and forward it to our secretary. Are you able to give the Commissioners any information as to the proportion of the loss which has occurred among the shipping from negligence, or carelessness, or drunkenness, or not using the lead, or any thing of that kind, which cannot be prevented by a harbour of refuge ?—No, I cannot.

12,440. Have you any opinion as to the proportion of wrecks which occur from these causes ?—No, I have not.

12,441. (*Mr. Lindsay.*) Do you think that a harbour of refuge in the Bristol Channel would be the means of saving life and property to a considerable extent ?—I think it would.

12,442. At what spot would it tend most to do so ?—At Lundy Island.

12,443. Do you recollect any ships which would have been saved if there had been a harbour of refuge at Lundy Island.—No, I cannot say.

12,444. You do not recollect ?—No.

12,445. To return to Breaksea Point. When you are furnishing your return, will you endeavour if possible to show which of those vessels might have been saved by the construction of a harbour of refuge at Lundy Island ?—I will.

12,446. (*Capt. Washington.*) Can you account for Breaksea Point bringing up these vessels ?—For want of a light, for in thick weather you cannot see the Nash light.

12,447. What distance is it from the Nash light ?—Seven or eight miles.

12,448. Would a light vessel or a bell buoy be of much use in thick weather ?—I think a light vessel would be of use.

12,449. Can a light vessel be seen in thick weather ?—It could be seen before you got on Breaksea Point.

12,450. The light vessel might carry a gong perhaps, or you might have besides the light vessel a bell

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buoy ?—A bell buoy might be useful, but a light on the shore would answer the purpose better.

12,451. How far does the ledge project from the point ?—About three-quarters of a mile or a mile.

12,452. Is there a buoy on it now ?—Yes.

12,453. By whom was it placed there ?—By the Trinity Board.

12,454. Is it common for vessels running for Penarth to make land about the Nash ?—They generally keep the English side till they get up as far as Minehead.

12,455. And then strike across for what point ?—Towards Burry.

Mr. JOHN BATCHELOR examined.

Mr. J. Batchelor.

12,456. (*Chairman.*) In what way are you connected with the port of Cardiff ?—I am a merchant and shipowner.

12,457. For what number of years have you been resident here in that capacity ?—For about 15 years.

12,458. You have been present during the course of this inquiry ?—I have.

12,459. Do you generally concur in the evidence which has been given ?—I do.

12,460. Are there any points to which you wish to call the attention of the Commissioners, which have not been brought under their notice ?—Nothing, except to confirm the last witness as to the necessity of having a light to show the position of Breaksea Point.

12,461. The exact position of that light you leave to be decided by others ?—I know the fact which has been stated to be true, that a great number of vessels have been wrecked on Breaksea Point.

12,462. Have you any acquaintance with that part of the coast which lies between Hartland Point and the Land's End ?—None.

12,463. (*Mr. Lindsay.*) All points considered, at what part of the Bristol Channel do you think a harbour of refuge would tend most to save life and property ?—At Lundy Island.

12,464. Is that your decided opinion ?—Decidedly.

12,465. Then you give your decided preference to Lundy Island over Clovelly Bay ?—Most decidedly.

12,466. If a harbour of refuge were constructed at the Mumbles, would there be sufficient depth of water inside for the largest vessels to take it ?—Would you object to the masters of your ships running for that place in a south-west gale ?—Decidedly, in any state of the weather, I should object to any large ships of mine going to Swansea. For ships of 1,000 tons and upwards, I do not think it at all safe to attempt Swansea harbour.

12,467. (*Capt. Sulivan.*) Within your own immediate experience, have you had any vessel belonging to you, or for which you have been concerned, which after going beyond Lundy Island and putting back, has been lost with loss of life?—No, I do not think I could name any instance. I have known vessels which might have brought up under Lundy Island wrecked in Carmarthen Bay and elsewhere, but I am not aware of any lives having been lost.

12,468. (*Mr. Coode.*) You said that you would object to any large ship of yours going to Swansea in any state of weather ; would that objection hold good if a harbour were constructed there ?—Not to the same extent.

12,469. Would you still object ?—I should still object.

12,470. For what reason ?—Owing to the number of shoals in the immediate vicinity of the harbour and the openness of the harbour.

Mr. THOMAS THOMS examined.

Mr. T. Thoms.

12,471. (*Chairman.*) In what way are you connected with the port of Cardiff ?—As a shipbroker and coal shipper.

12,472. How long have you been resident here in these capacities ?—I have been resident in Cardiff for 21 years, and in business for the last 11 years.

12,473. Have you ever been at sea ?—No, not as a sailor.

12,474. Will you proceed now with any statement which you may wish to make ?—I know something of the Cornish coast between Lundy Island and Padstow, and there is one thing which has been overlooked or at least has not been spoken about, and that is with respect to vessels homeward bound. In my younger days I resided at Bude, between Lundy Island and Boscastle, and I have frequently seen vessels drive ashore between Lundy Island and Boscastle, which might have been saved if there had been a harbour of refuge at Lundy Island. I have known many vessels lost there ; I cannot tell their names, but I know that all hands were lost, which I believe would not have been lost if there had been a harbour of refuge at Lundy Island.

12,475. Where is Boscastle ?—Boscastle is about seven or eight miles on this side of Padstow, or about fifteen miles below Lundy Island. Bude is a bay just below Lundy Island.

12,476. I understand that you are well acquainted with the coast between the Land's End and Hartland Point ?—No, between Padstow and Hartland Point.

12,477. Supposing a harbour of refuge were constructed at Lundy Island, in your opinion would further shelter be required for the coasting trade between Padstow and the Land's End ?—For general purposes I should say the harbour ought to be at Lundy Island.

12,478. You mistake my question. I asked you, supposing a harbour to be constructed at Lundy Island, and it was contemplated to provide shelter for the coasting trade between Hartland Point and the Land's End, are you able to offer any opinion as to which would be the best place ?—You speak for the coasting trade?

12,479. The coasting trade, not foreign-going vessels ?—At a place called Manhook. I have heard some talk of making a harbour at Manhook, only some five miles below Bude.

12,480. (*Mr. Lindsay.*) How would a harbour of refuge have saved those vessels which were lost between Boscastle and Bude ?—For this reason, that vessels overtaken by a north-north-west gale find no place to run to up Channel, and cannot turn back. So some attempt to run for Padstow, and others will run for Bude. I saw myself an instance more particularly showing the necessity of a harbour of refuge at Lundy Island. I saw a vessel a long way off which made for Lundy Island, but seeing no place to get to, and not being able to get further up, she tried to make Padstow, and in making Padstow she got a little to the west and went ashore on the Doom Bar. This is not the only case ; nearly every winter you get one or two like it.

12,481. Would a vessel in the position you have described fetch Lundy Island in a north-north-west gale ?—A vessel not deeply embayed would do so, because if itwere not for the broken water they would make for it. From the distance we saw the ship I have mentioned I think she could have made Lundy Island. Another vessel went ashore a little above Bude which no doubt could have got to Lundy Island if there had been a harbour of refuge there.

12,482. What was the course the ship would require to steer for Lundy Island ?—Not being a nautical man I cannot tell you the exact course.

12,483. Where were the vessels ?—They were a long way off when they were first seen. There were hundreds of people on the cliffs looking on ; they were speaking then of Bideford or Clovelly, and saying that if there had been a harbour there it would have saved the ship.

12,484. Would a ship in a north-north-west gale in the position you have named off the coast between

Boscastle and Padstow have been able to weather Hartland Point to get to Clovelly ?—Yes, by the distance she was off. It all depends on the distance she is off the land.

CARDIFF.

Mr. T. Thoms.

1 Oct. 1858.

Mr. ANDREW HARVEY examined.

Mr. A. Harvey.

12,485. (*Chairman.*) Are you a seafaring man ?—Yes.

12,486. For how many years were you at sea ?—Since the year 1810.

12,487. And during that period how long were you in command of vessels ?—34 years to-morrow.

12,488. And what description of vessels have you chiefly commanded ?—From 60 to 562 tons.

12,489. In what trade were those vessels chiefly employed ?—All down the coast of England as many times as I have fingers and toes, all through the Baltic, but the Baltic trade was some time ago.

12,490. You wish to give an opinion as to the best place for a harbour of refuge between Hartland Point and St. Ives ?—Yes. I think you have had enough about Lundy Island.

12,491. Will you be kind enough to remember in giving your evidence, that we do not want you to cut jokes, but to give real information which will be of service to us ?—In the first place, I wish to give you to understand that I am a native of Padstow, and that I served my time out of this place, and that I made five voyages to Quebec. Three times out of five I have gone into Padstow at dead low water without a pilot, and with a ship of 286 tons register, drawing 17 feet of water. As to entering Padstow if you get the wind north-north-west blowing hard, in the present state of Stepper Point, you have two flows out and one in. With a north-west wind you have two flows in and one out. If it can be done when the wind is blowing hard, the flood tide carries us much further in. The moment a vessel is abreast of the outer capstan-house she is all right.

12,492. You speak of these flows as the real difficulties in the entrance of Padstow Harbour. Do you think that the proposal to cut down the hill will remove the inconvenience ?—I have no doubt it will to a certain extent.

12,493. Have you been at Padstow since the small improvements were made ?—I have not been there since last December.

12,494. You are aware that the rock has been cut down a little ?—When I say that I have not been there since December, I mean that I have been in and out in a steamer; I have every reason to believe, from my local knowledge, that if more of the point were cut away, a truer wind would be carried in. But what we want at Padstow is a breakwater from Brae Hill.

12,495. On the east side ?—From the east side to extend in a line with the outer capstans, say two-thirds of a mile, and I then believe the force of the ebb tide would take the sand out of the harbour.

12,496. Are you acquainted with Mr. Martyn ?—Yes.

12,497. Have you ever conferred with him upon this subject ?—I dare say in the course of conversation we have referred to it.

12,498. (*Capt. Sulivan.*) If the point were cut away to the outer capstan-house, so that vessels could shoot inside, would they get to a safe place in heavy weather ?—It is safe in if they can shoot Stepper Point, because the moment you get to the capstan-house you have smooth water.

12,499. Then if a ship had a steady wind as far as the outer capstan-house, she would be in safety ?—Yes.

12,500. (*Capt. Vetch.*) Supposing the affair of a baffling wind were got rid of, how many vessels of 300 tons burden would Padstow hold ?—They would warp as fast as they came in to an anchorage. You might lie there a dozen.

12,501. Do you mean a dozen small vessels ?—Yes.

12,502. Can you easily get out again with the wind blowing in ?—No, there is only 70 fathoms at low-water mark between Stepper Point and and the Doom Bar.

12,503. It would not be very accessible ?—It is frequently used for refuge now.

12,504. (*Mr. Lindsay.*) As you have volunteered your evidence, I want you to tell me, as a shipmaster of great experience, do you think a harbour of refuge would be of much value in saving life and property ?—Yes.

12,505. What site do you think the best ?—Lundy Island I believe, but if you come to the point of expense, I suppose we may say Clovelly.

12,506. You think that Lundy Island is the best side and would do the most good, and next to that Clovelly ?—Yes, in the Bristol Channel.

12,507. And after that would you say the Mumbles ?—No.

12,508. You would not like to run for the Mumbles ?—No, I should not like to run for the Mumbles.

(*Chairman.*) Is there any other person present who wishes to come forward and give any further evidence on the subject of this inquiry ?

No answer.

Sitting at Cardiff closed.

BRISTOL.

Saturday, 2d October 1858.

PRESENT:

Admiral HOPE (Chairman).

Mr. LINDSAY.
Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Mr. WILLIAM BRICE examined.

BRISTOL.

Mr. W. Brice.

2 Oct. 1858.

12,509. (*Chairman.*) You propose to open the proceedings on behalf of the Corporation of Bristol ?—Yes.

12,510. In what way are you connected with the City of Bristol ?—I am solicitor to the Corporation.

12,511. Be kind enough to make to the Commissioners any statement which you may wish on the part of the Corporation ?—I am directed to appear before you to communicate the views which the Corporation of Bristol hold on the subject of this inqury. Those views are embodied in a petition which was presented in the beginning of this year to the House of Commons, and I believe referred to the Select Committee appointed on the subject. One allegation in that petition is,—

"That your petitioners consider the position of such

BRISTOL.

Mr. W. Brice.

2 Oct. 1858.

Chairman.

island, and the facility of access and departure to and from the same, render it a most desirable situation for a harbour of refuge; and that advantages not possessed by other places exist at Lundy Island for the formation of a breakwater or pier, in the abundance of granite of which the island is formed, and in its peculiar adaptation for the employment of convict labour.

"That the island being nearly in mid-channel would, if in the possession of Government, form an unequalled protection in case of war to the whole of the British Channel.

"That Lundy Island being the westward termination of the Bristol Channel pilotage district, and having a first-class lighthouse erected upon it, is the point to which all vessels make upon entering the Bristol Channel in search of a pilot, and is the station selected by the pilots on the look-out for vessels."

These are shortly the views which the Corporation of Bristol, as representing the mercantile interest generally, hold with reference to the selection of a harbour of refuge in the Channel. It appears that the question at present is pretty well limited to Lundy Island and the Mumbles on the north, and Clovelly on the south. It is not the wish of the Corporation to detract from other places, but simply to place before the Commissioners their impression that under all the circumstances of the Bristol Channel, Lundy Island would be the most desirable place of the three for the erection of a harbour of refuge. Captain Drew, the haven master, has been already examined before the Select Committee at some length, and therefore I do not propose to touch upon the evidence further than to say that I will produce Captain Drew to-day to speak to anything which is not properly cleared up by the former evidence which he gave. Captain Drew stated that Lundy Island possessed, in his opinion, advantages over the other places. He considered that Lundy Island, being nearly in mid-channel, would be available in all states of the wind, that it had no lee shore, that vessels might leave to the north or to the south, that it was equally available to the coasting and to the foreign trade, and moreover, possessed on the spot an abundance of material in the shape of excellent granite for the formation of a pier or breakwater. He was questioned with respect to the expense, but upon that point he was not prepared to enter, nor am I prepared to give any estimate or plan. I shall simply endeavour to make out that Lundy Island is the best place, leaving it to you to exercise your discretion as to what is involved under the question of expense. I shall be prepared to support the views of Captain Drew. Captain Denham, when he surveyed the Channel in 1839, laid down the advantages of Lundy Island in these words:

"Lundy Island may be considered as a great natural breakwater, sheltering the mouth of the Bristol Channel from the prevailing winds, and affording a most eligible stopping-place for all vessels struggling to the westward. The great advantages which it offers for that purpose do not seem to have been hitherto duly appreciated, though there is no other anchorage for a loaded ship nearer than King's Road, in bearing up for which she would have to run 80 miles to leeward, and to pass through 25 miles of intricate (and in thick weather, of dangerous) navigation; whereas under the lee of this island she can hold her own, replenish her water, and proceed to sea without further pilotage the moment the wind changes or moderates. Here, also, the homeward-bound vessel is sure of obtaining a pilot for the Bristal Channel, or for any of the adjacent ports."

I think, with the authority of such a man as Captain Denham, acting in a survey of the Channel for the Admiralty, any observations which I could add would be feeble; but I shall produce before you, in support of the propositions which I have asserted, Mr. Poole, a merchant and member of the Town Council; Mr. King, Chairman of the Dock Committee; and two or three pilots. Mr. Poole, I should say, is a member of the well-known firm of Hall, Gilman, and Poole. I believe those gentlemen whom I have named will corroborate all that has been said with reference to the advantages of Lundy Island. I said before it was not the wish of the Corporation of Bristol to detract from the merits of other places; but it is impossible to close one's eyes to the fact, that if Clovelly were selected, that place lies in a bay, and with the wind from north-east to south-east a vessel would be embayed, and would have great difficulty in getting out. That has been stated already by Captain Drew. With regard to Swansea Bay or the Mumbles, it is surrounded by sands, and in thick weather it is difficult to approach. None of these objections apply to Lundy Island. It is an island of about 2,000 acres, and I apprehend there would be no difficulty made in furnishing any amount of ordinary supplies which might be necessary for any vessel that may touch there. There is abundance of fresh water at Lundy Island, and it is a matter of no small consideration that it possesses granite for a pier or a breakwater. I will not go into that, because it is touched upon in the evidence of Captain Drew, and, as I have said, we have not prepared plans and estimates. I think that I am bound, in the observations which I have to offer, to avoid, as far as possible, any repetition of points already alluded to in the evidence taken before the Select Committee. I think that I have trespassed as far as I ought, and I shall therefore content myself by repeating that I appear to-day to endeavour to prove to the Commissioners that Lundy Island is the most desirable point, not only for the interests of this port, but for the interests of the whole Bristol Channel. This view is supported by Gloucester, Newport, Cardiff, and Bridgewater. It is opposed by Swansea, and probably by Clovelly also; but it is for these places to make their case clear. On the part of the five ports I have named, I may state that there is no difference of opinion. We all concur in thinking that the advantages to which I have alluded belong to Lundy Island. We also think, with reference to its situation in mid-channel, that it is a most desirable point, in case of war, for the protection of the Channel generally. That is a question of importance in considering the site of a harbour of refuge, as may appear from the fact that one fifth of the ships, and one tenth of the whole tonnage, of Great Britain passes up and down the Bristol Channel. It is impossible to over estimate the importance of this inquiry, not only to Bristol, but to the trade and commerce of the country. We appear here with no selfish interests of our own. We have no interests to serve in the selection of Lundy Island except the selection of a spot which will be most convenient and most conducive to the public interests; and if the Commissioners should be of opinion that any other place possesses these advantages in a greater degree, we shall feel that we have performed our duty, and shall be perfectly satisfied if the exercise of their sounder discretion should consider any other place, either the Mumbles or Clovelly better than Lundy Island for the purposes of a harbour, of refuge. The first witness whom I shall tender will be Captain Drew.

12,512. Perhaps the Commissioners may wish to ask a question of yourself?—Oh, certainly.

12,513. I think you stated, Mr. Brice, that it was the opinion of the five places which you named, Bridgewater, Cardiff, Newport, Bristol, and Gloucester, that Lundy Island was the proper place? With the opinions of three of those places, Newport, Cardiff, and Bristol, we are personally acquainted. Have you any authority to speak on the part of the public corporations or the public authorities of Bridgewater and Gloucester?—We have received letters from the Town Council of Bridgewater, stating that they desired the selection of Lundy Island also. We have had interviews with parties belonging to Gloucester who entertain the same impression, and other parties we have heard from. We believe, therefore, that the opinion of the five places I have named is unanimous.

(*Mr. William Brown Clegran.*) I appear on the part of Gloucester.

(*Chairman.*) Do you wish to tender evidence on the part of Gloucester ?

(*Mr. Clegran.*) I am not prepared to tender evidence, but to make a statement as to what are the wishes of Gloucester.

(*Chairman.*) We will hear you presently.

Examination of Mr. BRICE continued.

12,514. (*Chairman.*) You stated that you had received letters from the Town Council at Bridgewater ?—Yes.

12,515. Have you any objection to put in copies of these letters as evidence ?—None at all.

12,516. (*Mr. Lindsay.*) You appear here on the part of the Corporation of Bristol ?—I do.

22,517. Did the Corporation of Bristol always hold the same views with regard to Lundy Island ?—I think the matter was first brought before the corporation in its corporate capacity at the beginning of this year, and I believe then there was no difference of opinion. The opinion was unanimous.

12,518. Was the opinion unanimous when the matter was first discussed ?—Yes, when first discussed before them.

12,519. I asked the question because a memorial was presented to the House of Commons in favour of Clovelly ?—I am perfectly aware that the Chamber of Commerce of Bristol petitioned in favour of Clovelly.

12,520. Will any one be here on the part of the Chamber of Commerce ?—I see the chairman and secretary present.

12,521. Then perhaps, if not now, hereafter they will state the views of the Chamber of Commerce as to the best site for a harbour of refuge ?—Yes.

Mr. JOHN DREW examined.

Mr. J. Drew.

12,522. (*Chairman.*) In what way are you connected with the port of Bristol ?—I am the haven master

12,523. Will you now proceed to make to the Commissioners any statement you wish, in addition to the evidence which we have already before us in an official form in the Report of the Select Committee of the House of Commons relative to the object of this inquiry ?—I have nothing additional to add to the evidence which I have already given before the Committee of the House of Commons, but I have witnesses to corroborate and strengthen that evidence.

12,524. There are no remarks you would wish to make to the Commissioners, in addition to that evidence ?—Nothing.

12,525. You are a seafaring man ?—Yes.

12,526. Are you personally acquainted with the Bristol Channel ?—I have been acquainted with the Bristol Channel ever since 1812.

12,527. Do outward-bound vessels in working down the Bristol Channel keep to either shore by preference ?—Are you speaking of vessels from ports in the Channel or from Bristol ?

12,528. From ports in the Channel and from Bristol,—from all the ports up the Channel ?—From Newport and Cardiff, if the wind is to the north, they keep the north shore ; on the contrary, if the wind is south, they keep on the south shore. The Bristol ships invariably take the south shore, unless the wind is too far north.

12,529. Where do they take their departure from ?—Lundy Island.

12,530. And with west winds—with the winds from west-south-west and west-north-west changing to the westward—they always attempt to work down the south shore towards the Land's End ?—If the wind is moderate they do. I have spent many days about the Channel and about Lundy Island, and I should have been very glad of refuge at Lundy Island. I have been obliged to bear up, and if the wind is west or west-north-west it is right up the Channel, and gives you no chance.

12,531. Between the Holmes and King's Road what is the nature of the anchorage ?—The anchorage under the Holmes is not very good. The vessels trading to Newport anchor there when the docks are full or the ships are outward bound ; but it is anything but a safe anchorage.

12,532. Supposing a ship running in a heavy wind from the west-south-west passing Lundy Island, and passing the Holmes, can she ride between the Holmes and King's Road in safety, with good ground tackle in bad weather ?—Vessels may ride there. There is good holding ground, but the tides are very strong.

12,533. Therefore ships ride there very uneasily ?—Yes, unless they know the Holmes and the shelter.

12,534. Did you ever know of accidents to ships there, such as parting from their anchors ?—I have known instances where anchors have parted, and where a ship has gone to King's Road, and run on the mud or gone to Newport.

12,535. Are these instances frequent ?—They are not.

12,536. Are you acquainted with Milford Haven ?—I have been there.

12,537. What kind of place is Milford Haven to make in dirty weather from south-west, when ships have run in from sea, and have had no observations for three or four days ?—Very bad. You would get into difficulties. If close in, there would be difficulty in weathering the swells.

12,538. I take advantage of having your opinion upon this point, because it has an important bearing upon our inquiry ?—I have found Milford, when running for it, an exceedingly blind place in heavy thick weather.

12,539. What is the objection to running for Swansea ?—I am there surrounded by sands—the Nixons, the Skerweather, the Outer Green Grounds, the two-fathomed bank called Hugo, and a variety of others.

12,540. As to Lundy Island, what is the character of the place for a ship making the land in thick weather ?—The generality of the trade will make Lundy Island ; if they pass to the north of it, they come up channel.

12,541. I wish to know your opinion of the land about Swansea ?—Do you mean from Oxwich Head to the Mumbles Head ?

12,542. Yes ; what kind of land is it to run for in thick weather ?—It is very awkward to run for.

12,543. Will you please to state your reasons ?—The difficulty is, that if you get in on a lee shore you will not easily get away from it.

12,544. Then there is no reason as respects fog or haze about that land more than any other ?—It would not be thicker there than at any other part of the Channel ; and I do not see why it should be so.

12,545. Precisely ; that is what I want to know ?—That is my opinion.

12,546. (*Mr. Lindsay.*) Then, from what you have stated of the Mumbles and the dangers which surround it, you think it is out of the question as a harbour of refuge ?—Certainly, when I can get such a place as Lundy Island.

12,547. Putting the Mumbles aside, after the opinion you have expressed, I wish to ask one question, whether you think a harbour constructed at Clovelly or at Lundy Island would tend most to save life and property. We will say nothing about convenience to commerce ; but at which of these points do you think the construction of a harbour of refuge would do most to save life and property ?—Do you mean losing sight of Lundy Island ?

12,548. No ; which do you say, Clovelly or Lundy Island ? Assuredly Lundy Island would be the best.

12,549. Then in your opinion a harbour of refuge at Lundy Island would do more to save life and property than if it were constructed at Clovelly ?—Certainly.

BRISTOL.

Mr. J. Drew.

2 Oct. 1858.

Mr. Lindsay.

12,550. Now, from your knowledge of the Bristol Channel, and your great experience, can you tell me of any lives or property which might have been saved if there had been a harbour of refuge at Lundy Island; take property first?—Two years ago, an American ship lost half her crew in Barnstaple Bay; she was a total wreck.

12,551. Do you recollect how the wind was?—She had been knocking about Lundy Island for some days, and had mistaken the lights.

12,552. Then it might have happened if there had been a harbour there?—No; she would have been in.

12,553. Had she been at anchor under Lundy Island?—No; under weigh.

12,554. Do you remember how the wind was?—No, I do not. I merely saw the case in the papers. The wind was west-north-west, and she could not weather the point.

12,555. Would anything which could be done at Lundy Island in the shape of building a harbour of refuge make the anchorage there better with the wind from the west than what it is now?—No.

12,556. The island shelters you from all west winds?—Yes.

12,557. Then the expenditure of money would not improve Lundy Island as a shelter during west winds?—We want a breakwater to the eastward.

12,558. How would the American ship have been saved by a breakwater to the eastward?—If there had been a breakwater there she would have gone in to anchor.

12,559. But I understood you to say that any expenditure of money would not improve the anchorage in westerly gales?—If a breakwater had been there she would have got to shelter. The fear and danger of Lundy Island is this,—in the winter you may be caught with an east wind if you anchor there.

12,560. Speaking to you as a nautical gentleman of considerable experience, what would be the effect of the construction of a breakwater at Lundy Island when the wind chopped round to the east, which is a fair wind to go down channel? Would ships be able to get away with as great facility as now?—Assuredly; they would be sheltered; they would be able to get their anchors. There would be two entrances, I suppose, a north and a south entrance, and ships would be able to haul out either one way or the other. I am not an engineer, but that is my opinion.

12,561. Have you turned over in your mind how it would be best to construct a breakwater? Of course you know nothing of engineering. Neither do I; but speaking to you as a nautical man, have you turned over in your mind how a breakwater can best be constructed to shelter ships at Lundy Island in an east wind?—No, I have not.

12,562. Have you turned over in your mind the question of expense?—It has never entered my mind.

12,563. Do you think the question of expense at all involved?—I consider it in a national sense, that it would be beneficial to the world.

12,564. But as we are so heavily taxed already, the question of expense should be a consideration to us all. Have you no idea of the expense of a break-water at Lundy Island within half a million?—I think I have heard 650,000*l.* stated for a breakwater at the south, and I suppose a 1,000,000*l.* would do the other.

12,565. What extent of anchorage would that give you?—A mile of anchorage. If you were to run a breakwater from that island and another at three quarters of a mile or a mile from the shore, I consider that would give shelter to a large fleet.

12,566. Then I understand you to say that you would have entrances north and south?—You would be embayed if there was only one entrance, and that one to the north.

12,567. Is it the case that many lives have been lost in Barnstaple Bay? Can you speak as to that of your own knowledge?—No; I do not know, of my own knowledge.

12,568. You know of no other but the case you have mentioned?—No; I do not recollect any o t h at the present moment.

12,569. I wish your opinion upon another point; do you know the coast between Hartland Point and the Land's End?—I have frequently passed that part.

12,570. Putting aside a harbour above Lundy Island, do you think a harbour of refuge somewhere between Hartland Point and the Land's End would tend to save life and property?—I should imagine that it would.

12,571. Is the prevailing wind south-west?—Not so much south as west-south-west.

12,572. At what point of the coast would you think it most desirable to construct such a harbour?—Shall I take a view of the Bristol Channel trade?

12,573. Take the trade generally, because if the public funds are to be spent in the construction of a harbour, we should always take into consideration the shipping of England?—As far as the Bristol Channel trade is concerned, I should say Padstow.

12,574. As far as the shipping of the world is concerned, what do you say?—St. Ives.

12,575. Padstow, in your opinion, would save life and property, and would be good for vessels frequenting the Bristol Channel, but St. Ives would be the better place for the trade generally?—Yes.

12,576. Do you know Oxwich Bay?—Yes.

12,577. What do you think of that?—You have the Helwick Sands outside, only four or five miles between.

12,578. Supposing it lay between Oxwich Bay, Clovelly, and the Mumbles, which site would you prefer?—Clovelly.

12,579. Supposing it lay between Oxwich Bay and the Mumbles, what then would you say?—I can hardly give an opinion; there are difficulties existing in both.

12,580. Would the dangers be so great and so many in running for Oxwich Bay during a gale of wind as in running for the Mumbles?—No, certainly not.

12,581. (*Capt. Washington.*) Have you heard any complaints of the difficulty of seeing the lights on Lundy Island?—Some time ago, nearly 12 months ago, they were making some alterations in the upper lights. We then had complaints from the pilots, but since the alterations have been made we have not had any.

12,582. Any complaints with reference to the fog?—No. We know that the high land of Lundy Island is capped frequently, and perhaps the lights are not easily seen.

12,583. Are the lights frequently obscured?—I was several years in command of a vessel, and I never experienced any difficulty in making them out.

12,584. I think you said that the trade of Bristol went to the north of Lundy Island?—The trade with a south wind bound round the western ocean would come to Lundy Island, and the trade to Ireland and the south would pass to the north.

12,585. And to America?—It would depend upon the wind. If the wind is north-east they would go to the north, if south-east they would go to the south, of Lundy Island.

12,586. (*Capt. Sulivan.*) During your knowledge of the trade of the Bristol Channel, do you know of any amount of loss of life above Lundy Island, which you would think would warrant a large expenditure of money to save it by a harbour at Lundy Island?—I know of but few lives lost; but a great saving to the trade would be this, they would have a fair starting place to the north, instead of running back up a dangerous channel of 80 miles.

12,587. Would the great value of Lundy Island to the upper part of the Bristol Channel be, its being a good weatherly stopping-place to prevent putting back, and ready to start with a slant of wind?—I think it would be a great advantage to shipping if there were a place of that kind.

12,588. Would it be a great advantage of Lundy Island that it would be a weather port to stop at and to start from?—That would be a great object.

12,589. In advocating Lundy Island have you that

object in view more than the saving of life and property ?—More property than life. Property may be lost when lives are not.

12,590. Do you know whether vessels find it difficult, or, from the dark appearance of the land, are afraid, to haul as close round that island, as is necessary to fetch a good anchorage ?—Men acquainted with Lundy Island find no difficulty.

12,591. Do you think a small harbour light on that island, to enable vessels to haul close round, and in thick weather a fog light, would be an advantage ?—I think so ; but it should be that description of light which will not interfere either with the revolving light or the standing light.

12,592. You spoke of the difficulty and danger of vessels at Lundy Island when the wind was round east ?—If the wind is east there is no chance of weathering it out.

12,593. Does the wind go round to the east from the north-west ?—Sudden changes of wind will take place in the winter months.

12,594. Does it not go round to the north-west and north before going to the east ?—It veers sometimes west-north-west, north-west, and north-east.

12,595. As it is at present can a vessel round the south side of the island and go on her voyage ?—Yes, she can go round the south end.

12,596. If a sudden change of wind to the east takes place, when ships are anchored at Lundy Island, does it come strong, or is it moderate at first?—I do not know whether I have the honour of addressing a nautical gentleman, but nautical gentlemen will tell you it is quite uncertain with sudden changes of wind.

12,597. But I am asking, within your own knowledge of the Bristol Channel, whether, when the wind veers from west to east, it comes on suddenly strong, or whether an east wind springs up gradually ?—It is calm when the wind is east, but the wind flies out from the south-west to the north-west first.

12,598. I am quite aware of that. Is the anchorage rather deep ?—Yes.

12,599. With the wind veering to the east, do vessels find a difficulty in getting up their anchors and making sail. The holding ground is good, and if the anchor has been lying some time there is a difficulty in purchasing it.

12,600. There is a difficulty in getting it up ?—Which way will you have the wind ?

12,601. Easterly ?—With anything east to east-north-east it is easy enough, but to the south of east you find some difficulty.

12,602. Do you think it would assist vessels anchoring there if a few buoys were put down near the position of the anchorage, not to take into as moorings, but to hold on to while they got up their anchors, and to make sail from the buoys instead of from their anchors ? Do you think that would be an advantage? —Certainly it would.

12,603. You spoke of Oxwich Bay as having sands near it. The Helwick sands run to the west, do they not ?—They run about west by north.

12,604. Do you know whether Oxwich Bay has a safe approach and deep water up to it ?—There are the Helwick sands coming west.

12,605. Coming in from sea is the ground clear up to Oxwich Bay ?—Yes ; up to the east of you.

12,606. If ships were running for a harbour constructed there, but in thick weather missed it and got to leeward, would they have much more chance of hauling off on the starboard tack than they would if the same thing occurred at the Mumbles ?—If they went so far in at the Mumbles it would be very difficult to haul out with the Skerweather and the Nash sands under their lee.

12,607. But would they have more chance of hauling off from Oxwich Bay on the starboard tack than if you made a harbour at the Mumbles ?—They would have a better chance at Oxwich. It is farther to the westward.

12,608. With respect to Clovelly, do you consider it an objection to any harbour of refuge there that when ships enter it during the prevailing gales which are foul for them, and when the wind shifts to a quarter which would be a fair wind to go to sea, they find themselves in the depth of a bay, and cannot get out ? —There is a difficulty in getting out of the bight of a bay.

12,609. Do you think that would be a disadvantage in selecting a position for a harbour of refuge ?—Certainly.

12,610. Do you know personally Padstow and that neighbourhood ?—No; I do not.

12,611. (*Capt. Vetch.*) I think you recommended Padstow as a proper place for a harbour of refuge ?—I think it would be a better place for the Bristol Channel trade than St. Ives, as vessels when they have not reached so far west will have a chance of going into Padstow.

12,612. Are you aware of how many vessels can be accommodated at Padstow;—No ; I know nothing of Padstow.

12,613. We have it in evidence that six vessels can be accommodated there ?—Nothing beyond that. I was only looking to the distance. A vessel may be able to reach Padstow when she cannot reach St. Ives. If we were down as far as St. Ives we might keep the sea.

12,614. I think you prefer Clovelly as a site for a harbour of refuge to the Mumbles ?—Yes ; I do.

12,615. Are you aware that any number of vessels collect at Clovelly to go down channel ?—They are only five miles from Hartland Point. They would never anchor there, but many vessels would be glad sometimes of shelter.

12,616. Are you aware that 200 or 300 vessels are often collected at the Mumbles waiting for a wind ?—Yes; and if a gale comes on from the south-south-east they drive on shore.

12,617. Being in such a defenceless situation, do you not think some shelter desirable ?—As far as the trade of Swansea is concerned, no doubt, but for the general trade of the Bristol Channel, I say Lundy Island is the place for anything of the kind.

12,618. (*Mr. Coode.*) Separating the two questions of life and property, I will ask you which you think the best site for a harbour of refuge in the Bristol Channel, having regard to life alone ?—I still think that Lundy Island is the spot above all others. I cannot have any other opinion as a nautical man who has known the Bristol Channel for many years. Lundy Island is the spot above all others.

12,619. That is your opinion, considering the saving of life alone ?—If there were a breakwater there ships would run for smooth water, and if in a gale of wind they could lay there till the weather moderated, and then make sail easily.

12,620. Have you ever anchored at Lundy Island ? —No.

12,621. You spoke of the holding ground ?—Yes. I am in daily communication with 75 of the pilots of the Bristol Channel.

12,622. Is there any difference among the pilots on that subject ?—I think not.

12,623. Do you know anything of the character of the granite at Lundy Island?—No, I do not.

12,624. With regard to the fresh water, shall we have evidence on that subject ?—There is evidence on that point.

12,625. Have you ever been in Padstow harbour ? —No.

12,626. Do you know it from the chart ?—Merely passing it coasting.

12,627. (*Capt. Sulivan.*) Do you think that if a light-ship were placed at the western end of the Skerweather Sands, it would be useful not only to the trade of Swansea, but add to the safety of the Bristol Channel ?—We have the Mumbles and the Nash lights. I think the more numerous the lights the greater the confusion. You cannot lose sight of the Nash light before you see the Mumbles light in fair weather.

12,628. It shows so far off the land ?—Yes.

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12,629. In thick foggy weather, do you think there is great danger of passing both lights without seeing them, and so possibly get on the sands?—Yes, certainly.

12,630. Do you know any sands so far off there without a light on them?—No, not in the Bristol Channel.

Mr. JAMES POOLE examined.

Capt. Sulivan.

Mr. J. Poole.

12,631. (*Chairman.*) In what way are you connected with the port of Bristol?—I am a merchant, a member of the Bristol Corporation, and a member of the Dock Committee, Deputy Chairman of the Taff Vale Railway, and a Director of the Cardiff and Abergavenny and the Cardiff and Plymouth Railways. I had intended to give evidence at Cardiff, but I was not at home when I received a communication on Thursday night, advising me of the Commissioners' meeting. If you will allow me I will, presently, impart a little matter connected with Cardiff.

12,632. I dare say you may have noticed, from our examination of previous witnesses, that we have not confined them simply to what may be the interests of Bristol only, but have sought to procure unbiassed evidence with reference to other places. You are aware of the objects of this inquiry?—Quite so.

12,633. Will you now proceed to make to the Commissioners any statement, as far as may be relative to the advantages or the necessity of a harbour of refuge in the Bristol Channel, for the passing trade?—I shall speak more as to the necessity for a harbour. With regard to Cardiff, we find great inconvenience arising from the fact of the overcrowded state of the roadstead at Penarth. When the wind is from the west, vessels come there from Gloucester, Chepstow, Newport, and Cardiff, and I have known a time when there have been from 400 to 500 vessels in the roadstead, and the docks being crowded with shipping at the same time, light vessels unable to get in, and laden vessels with no place to go to. We have been obliged to send and stop orders to the clerks; everything has been at a stand-still, and the trade has been put to great inconvenience. It has been represented that when the wind is scant, or when there is not a prospect of getting to sea, a number of vessels refuse to quit their anchorage, fearing that should they not make their voyage and have to come back they would find other vessels in their places, and no place to anchor. However, they will not go unless it is an east wind, which enables them with certainty to clear the land. We are told that if a harbour of refuge were made where they would have an opportunity of going away they would go there, and then instead of running back they would take advantage of that harbour, and we should not suffer inconvenience from the circumstances which I have stated.

12,634. Is there any further statement which you wish to make in addition?—I shall only say that from the evidence I have heard respecting the island of Lundy, I am satisfied that every person acquainted with the shipping trade will concur in recommending that place; but if you ask me questions, such as have been put to nautical gentlemen, I shall not be competent to answer them, because I am not a nautical man.

12,635. Are you directly connected with the shipping of this port?—Not the foreign shipping.

12,636. (*Capt. Vetch.*) You spoke of the crowded state of Penarth Roads and the danger and accidents which occur from that crowded state. Will you point out any mode in which it can be relieved?—I think we have been always given to understand that if a harbour of refuge was made somewhere by that place the roadstead by Penarth would be relieved, because masters now refuse to go to sea unless the wind is so fixed and determined that there is a certainty of their clearing the land.

12,637. Supposing Lundy Island were made a harbour of refuge, how many vessels would take shelter there?—I can only give a general answer to that question. I have heard, from the evidence, that there would be a mile of roadstead, and if there were a mile of shelter I should think that would shelter a large number of vessels; but if you ask me how many, I cannot answer the question.

12,638. I believe the number which do take shelter there now is very small?—At Lundy Island, at present, I should imagine they must be.

12,639. (*Chairman.*) Is any port used as a port of call for orders by the Bristol Channel trade?—I understand Falmouth and Cork.

12,640. Falmouth and Cork?—So I have understood.

Mr. DREW re-examined.

Mr. Drew.

12,641. (*Chairman.*) What I wish to ask you is this, whether tugs are made great use of to take large ships down channel as far as Lundy Island?—Not as far down as Lundy Island. They tow them as far as the Holmes, but occasionally below that. But with a current of wind and the flood tide they cannot tow.

12,642. Is the practice of using tugs with the larger and more valuable ships on the increase?—The trade from Bristol is generally towed to King's Road, to Newport, to Cardiff, and occasionally to the Holmes; but if the wind is fair they use their sails.

12,643. Would you anticipate that if a harbour of refuge were established at Lundy Island, it would become the practice always, in moderate weather or no wind, to tow vessels as far as Lundy Island, and leave them to take their departure thence?—Certainly, it would be an advantage if vessels were towed so far as they could take their chance of the first north wind which should blow.

(*Mr. Brice.*) Will you excuse me for suggesting the name of Mr. King, Chairman of the Dock Committee? I thought that as a member of the Town Council and of that body you might take his evidence as to both.

(*Chairman.*) Certainly.

Mr. RICHARD POOLE KING examined.

Mr. R. P. King.

12,644. (*Chairman.*) In what way are you connected with the port of Bristol?—I am Chairman of the Bristol Dock Committee, and have been a shipowner for the last 30 years.

12,645. Are you aware of the objects of this inquiry?—No, I am not quite aware whether, with a view to the convenience or advantage of shipping, or solely for the saving of life.

12,646. The primary object of the establishment of a harbour of refuge is, no doubt, first the saving of life. That is the first thing to be considered. After that comes the saving of property; and then, no doubt a very important consideration—the subsidiary purpose of their convenience to trade generally, as ports of call, or ports to which the shipping can proceed, and where, when they have made a certain portion of their passage, and are driven back by foul weather, they may put in, and therefore save the inconvenience and expense of running some 50 or 60 miles. I hope I have explained my meaning clearly?—Perfectly. I speak more of the convenience of the Bristol shipping, and being a Bristol shipowner, and from my experience, being a nautical man, I should say that Lundy Island is the most convenient place for the trade of Bristol as a port of refuge. There is scarcely a winter passes but vessels going as far as and even past Lundy Island, when the wind sets in strong from the north, are obliged to return to King's Road. If there were good anchorage at Lundy Island they would avoid coming back, and save running 80

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miles. I think that would not only prevent great inconvenience, but would avoid great risk in going up and down the Channel. The Mumbles have been alluded to as a port to which vessels go, but from the experience which I have had I would rather return to King's Road than proceed to the Mumbles. It is so far to the north that if the wind hangs to the south you remain in there a much longer time than you do at King's Road.

12,647. Do you consider that the risk of which you speak of vessels running back through the Channel has any appreciable bearing on the rates of insurance ?—Well, we have had vessels that have gone up and down the Bristol Channel three or four times from not having a place at which to anchor at Lundy Island. We do consider the risk.

12,648. Altogether are you disposed to say that a harbour of refuge at Lundy Island would diminish the rates of insurance at this port ?—I think it would. I do not think the shipping generally would find Clovelly of the slightest use unless they had the misfortune to get into Barnstaple Bay. They would never avail themselves of Clovelly ; nor do I think they would ever avail themselves of a harbour of refuge in Swansea Bay.

12,649. Do you leave the captains of the larger and more valuable ships entirely at their own discretion with respect to taking refuge in bad weather, or do you give them instructions on the subject ?—I leave it entirely to their own discretion, but I think they would in a great measure be guided by the pilot unless they were past Lundy Island. I do not think either St. Ives or Padstow would be much valued by ships for shelter, for this reason, if they were so far to the west, they would proceed to sea ; they would not put back.

12,650. As a general rule, can you tell us what is the opinion of the captains of large ships as to keeping the sea, and trying to make their passage, and not taking shelter, or whether they would view it as a duty to their owners to take refuge in order perhaps to save the wear and tear to the ship, and probably damage to the cargo ?—I leave every captain to his own discretion. Some proceed to sea in any weather; others bear up, thinking it a more prudent course to get into harbour as soon as possible.

12,651. As you have probably considered the question of harbours of refuge generally, not merely as to the Bristol Channel, but with reference also to the east coast of England and to Scotland, do you consider that these harbours are more wanted for the coasting trade and the smaller description of vessels than for the larger and better found ships ?—I am hardly prepared to give an opinion, but I should think they were more required for coasting vessels than for large ships.

12,652. Perhaps you have not given attention to the subject ?—I have not been mixed up with coasting vessels. One point occurs to me ; life will be endangered often in running for these harbours of refuge.

12,653. Therefore, is the facility in running past Lundy Island, should vessels miss it, a great advantage in your estimation ?—So I consider.

12,654. Can you acquaint me whether the Chamber of Commerce was formerly in favour of Clovelly, and whether they changed their views in favour of Lundy Island ?—I was rather surprised when I heard that a petition had gone from Bristol from the Chamber of Commerce. I suppose it arose from one vessel in distress in Barnstaple Bay, in which case I can fancy a harbour of refuge at Clovelly would have been extremely desirable.

Mr. William Terrell examined.

Mr. W. Terrell

12,655. (*Chairman.*) Are you Chairman of the Chamber of Commerce ?—I am.

12,656. May I ask you is the Chamber of Commerce still in favour of Clovelly, or, if they have changed their view in favour of Lundy Island, will you state the reason ?—I can state briefly that the circumstance which induced the Chamber of Commerce to memorialize in favour of Clovelly was from hearing evidence from practical persons connected with the coasting trade and the trade of this port. In consequence of that they came to the conclusion that Clovelly would be an excellent harbour of refuge. That evidence struck them as being of such value that they tendered it to the Committee of the House of Commons, and one of the gentlemen was heard, Mr. Sanson, and other witnesses who are here present prepared to support the views which the Chamber of Commerce took, and to give much more practical reasons than I could give as to why they prefer Clovelly to any other place in the Bristol Channel. The claims of Lundy Island were not overlooked. We considered that if a given depth at Lundy Island could be inclosed, it would be one of the best possible protections of the Channel in time of war. Nevertheless, we think that the anchorage ground and other circumstances, which will be better stated by the witnesses present, are sufficient to justify Clovelly as a harbour of refuge. I was not chairman at the time this evidence was given, but I feel satisfied that whatever port was chosen by the Chamber of Commerce, was chosen upon good grounds, and that any place further down than Clovelly, whether at St. Ives or elsewhere, would be of little service at all to vessels coming up the Bristol Channel. If you will allow me I will now read the memorial :—

" To the Honourable the Commons of the United Kingdom of Great Britain and Ireland in Parliament assembled.

" The humble petition of the Bristol Chamber of Commerce,

" Showeth,

" That for many years past the expediency of constructing a harbour of refuge on the south coast of the Bristol Channel, for the purpose of saving life and property in ships navigating the Bristol and St. George's Channels, has been recognised, and every year, from the great increase of trade, particularly in vessels of large tonnage, the necessity for such protection as a harbour of refuge would afford has become more and more evident.

" That your petitioners are informed that the general question of harbours of refuge for the United Kingdom is now under the consideration of your honourable House.

" That, amongst other suggestions which were brought under the notice of the Committee appointed by your honourable House in the last Session of Parliament, was one for the construction of a harbour of refuge at Saint Ives, near the Land's End, in Cornwall.

" That your petitioners, as representing the trading, commercial, and shipping interests of the city and port of Bristol, are of opinion that St. Ives is by no means the best locality for the proposed harbour, but that the neighbourhood of Clovelly is beyond all comparison the most suitable in every respect for the trade of the Bristol Channel.

" That St. Ives is near to the Land's End, and much exposed, whilst Clovelly is about midway between Land's End and Kingroad, and sheltered by high lands.

" That Clovelly is opposite to Lundy Island, which is the point vessels make for on arrival, and at which pilots leave them when outward bound ; and it frequently happens that ships when to the westward of that island are overtaken by gales from the south-west to west-north-west, and having no harbour at hand are driven back to Penarth, or King's road, at great risk and peril, which might be avoided by such a place of refuge as that proposed.

" That Lundy Island and Hartland Point are landmarks for Clovelly, making it easy to run for, and the nature of the ground for anchorage (blue clay), and the water deepening to ten fathoms, would render it a perfectly safe harbour of refuge at a moderate

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outlay, the materials for the purpose being close at hand in any quantity.

"Your petitioners therefore pray that they may be allowed to present witnesses before a Committee of your honourable House to substantiate the statements of this petition, and to prove the necessity of establishing a harbour of refuge at Clovelly.

"And your petitioners, as in duty bound, will ever pray, &c.

"Signed, on behalf of the Bristol Chamber of Commerce,

"MARK WHITWILL, Chairman."

12,657. Then I understood you to say that the Chamber of Commerce still adhere to that opinion?—We still hold to the opinion expressed in this memorial, and shall be prepared to bring forward evidence to support it. The witnesses tendered to the House of Commons are here. One witness was examined, and the other, Mr. Edwards, is connected with the shipping trade of the city, and also practically acquainted with the navigation of the Channel for many years.

Mr. JAMES HALL examined.

Mr. J. Hall.

12,658. (*Chairman.*) What is your occupation?—A Bristol Channel pilot.

12,659. How long have you been a pilot in the Bristol Channel?—Six years.

12,660. And previously, what was your occupation?—On board a steam packet in the Irish trade from Bristol to Dublin.

12,661. For how many years did you command that vessel?—I did not command her. I was a man before the mast, in the Dublin trade.

12,662. You are aware of the object of this inquiry?—Yes.

12,663. Will you state to the Commissioners any opinion which you may entertain as to the advantage or necessity of a harbour of refuge in the Bristol Channel for the passing trade?—A harbour of refuge at Lundy Island would be a great advantage to all vessels passing up and down the Bristol Channel. For instance, they cannot leave King's Road or Penarth with foul weather, because there is no place to anchor. They are afraid of returning again, and finding their places taken up. If there were a harbour of refuge at Lundy Island, they would go and stop there until there was a fair wind to go upon their voyage.

12,664. State your reasons for preferring Lundy Island to the Mumbles?—The reason is, that all advantages of wind can be taken at Lundy Island. At the Mumbles you cannot do so. I can leave Lundy Island with any wind and in any weather. I can leave with the wind north or south. At the Mumbles, I cannot leave with the wind at south; the wind is dead on shore.

12,665. Have you any other reasons?—Do you mean any other reasons for preferring Lundy Island?

12,666. Yes; for preferring Lundy Island to the Mumbles?—If westward of Lundy Island, when running for the Land's End, I can run boldly on for the island, and if I miss it, I am still in safety; there is nothing under my lee to pitch me up; nothing more than the open Channel to me, and I can boldly run for Lundy Island. Whereas, in running for the Mumbles, if it is thick, I cannot see the light; the Mumbles light is not seen far in thick weather.

12,667. Do you prefer Lundy Island to Clovelly?—Oh yes, by far.

12,668. For what reasons?—If you run for Clovelly with the wind at north-west, and miss the harbour, you are immediately in danger, especially if the tide is low, so that you cannot make for the bar; and if it is blowing north-west round to north-east, you cannot get out of the bay, so for that reason I would not run for that place at all.

12,669. Have you often anchored ships between the Holmes and King's Road?—Yes; I have anchored ships there.

12,670. In heavy weather from the west?—Yes; in heavy weather from the west. The holding ground from the Holmes to King's Road is middling good, but not over good. You drag your anchor unless you have a great scope of cable. Sometimes you drag two or three miles with the tide, until the tide turns again.

12,671. Do you recollect any occasion in which a vessel has dragged in the way you describe?—I was to anchor there last winter on board an American ship, and I dragged close upon a mile.

12,672. What sized ship was it?—800 tons.

12,673. What anchors had she down?—35 cwt.

12,674. One anchor?—Yes; we had one.

12,675. And what scope of cable?—60 fathoms.

12,676. What water did you anchor in?—We had 11 fathoms.

12,677. What yards aloft?—Mainroyal yard.

12,678. Was it blowing very heavy?—Very heavy from the west-north-west.

12,679. And when the neap tide set you dragged?—When the flood tide came up.

12,680. Is the land about Swansea easy to make in thick weather?—It is very hard to make.

12,681. Why?—Because the land is rather low. The land away at the back is high, the fore part of the land is low.

12,682. And the land about Hartland Point, is it easy to make?—Yes; but in hazy weather all lands are difficult to make.

12,683. I suppose we all know that. Is there any difficulty between the land about Swansea and Hartland Point in thick weather? which site should you prefer?—I can run boldly on to make the land about Hartland Point, but I cannot about Swansea. There are the Helwick Sands to the westward, and the Skerweather Sands to the east in running for Swansea.

12,684. Are you acquainted with Milford Haven?—Yes.

12,685. What kind of place is that to run for from the sea if a ship has had no observations for two or three days?—A very difficult one.

12,686. Why?—Because it is surrounded by danger?—There are the Smalls and the Burrow to the north and west. Up to the east there is Freshwater Bay, and the Crow Rock there. If you get in and it blows south-west you cannot get out.

12,687. Which is your heaviest gale in the Bristol Channel?—From west-south-west to west-north-west.

12,688. And as a general rule, how do the south-west gales begin?—Generally from the south-south-east.

12,689. And back round?—Yes; back round to north-west.

12,690. And when they fall down to north-west do they fly out to the east?—Yes, generally; but in winter time they back round again.

12,691. And continue to blow?—No; they go away calm and rise again.

12,692. Have you ever been at anchor at Lundy Island?—Many times.

12,693. Have you run in there for shelter in heavy westerly weather?—Yes; that is our rendezvous.

12,694. You are obliged to anchor pretty close, are you not?—We generally do in our pilot boats.

12,695. But I am talking of ships?—Ships generally anchor three-quarters of a mile or half a mile off the shore.

12,696. If the wind comes to the eastward, is there any difficulty in getting away?—It has often happened that ships have had to slip their anchors, and put the springs on the cable. It is not the easiest thing to tack out at the south side of the island in east winds.

12,697. Does that arise from the rapidity of the tide?—If you do not get your anchor you go right on the island. For that reason you are bound to slip your anchor, but if the wind should fade away light you have a chance of getting out.

12,698. (*Capt. Sulivan.*) Can you give me any reason why ships use Lundy Island so little as they do?—They are afraid of the wind shifting round to the east upon them.

12,699. From what you say, the only thing, as far as I can see, is losing the anchor and cable. They get away by sacrificing anchor and cable; a vessel then is in no danger?—She would still be in danger getting out if she did not slip her anchor and chain in time.

12,700. But by sacrificing the anchor and chain she can get away?—She will get away clear if she lets go her chain in time.

12,701. Do you find the holding ground good?—Very good.

12,702. Do you find any difficulty in hauling round the island when it is dark? Do you think it would assist you to have a small light on Rat Island?—It would a stranger, but it would not assist us much.

12,703. Not you, because you know the coast well?—Yes.

12,704. Do you think that buoys placed there, from which you could slip, would be an advantage?—It would be a little advantage, because you could hold on by the buoy until the wind falls away light, and then you would be ready to start.

12,705. Do you think there would be more advantage in having buoys to slip from than disadvantage in having them in the way of ships anchoring?—No.

12,706. What I wish to ask is, would you rather have buoys than leave it as it is?—I would rather have buoys than leave it as it is.

12,707. Do you find the lower light hid in thick weather?—The lights are hid.

12,708. Both of them, or do you see the lower one much longer?—When one is obscured the other is.

12,709. Did you ever see the lower one and not the upper one?—I never saw it in my life.

12,710. Do you think a low light on Rat Island would be useful to vessels running between Hartland Point and Lundy Island?—It should be put so as not to be taken for the low light of Lundy Island. It might be a little assistance, but it would be no assistance to us.

12,711. Have you ever anchored at Clovelly?—Never.

12,712. Do you think it an objection to a harbour of refuge that it should be placed in a bight where, with the prevailing shift of wind, a ship is brought upon a lee shore?—When you are in a bight, with the wind as it is, you are bound to be on a lee shore.

12,713. I ask you whether it is desirable to have a harbour of refuge where, with the prevailing shifts of wind, ships would find it difficult to get out of the bay, and go on their voyage?—That would be a great objection.

12,714. If you had to choose a site for a harbour of refuge, and the prevailing winds go round to north-west, making it a fair wind to go from a north shore, which should you prefer, the north or the south shore?—I would prefer the north shore to have a fair wind out.

12,715. Do you consider the great advantage of Lundy Island to be that vessels can go either way?—Yes, either way, and in any wind.

12,716. Have you known any instances in which ships have gone to the westward of Lundy Island, and then were lost in running back?—Last summer a Plymouth schooner was lost on the Culver Sands, in Bridgewater Bay.

12,717. After she had passed Lundy Island?—I do not know whether she had passed Lundy Island or not. It was in coming back.

12,718. You do not know whether she had passed Lundy?—No.

12,719. Were any lives lost?—Yes, all hands.

12,720. Do you know anything of the coast between Hartland Point and the Land's End?—Yes.

12,721. Is there a large coasting trade round the land passing that coast?—Yes, there is a deal of trade in the Bristol Channel.

12,722. Putting aside a harbour for the Bristol Channel, do you think that a harbour between Hartland Point and the Land's End for the coasting trade bound round the land, which they could run for in north-west gales, would be valuable to that portion of the trade?—No large vessels in a gale of wind will run upon a lee shore when they can weather away, but for vessels caught upon a lee shore, harbours would be very serviceable.

12,723. I am asking as to the coasting trade, excluding the foreign trade. Is it the coasting vessels which keep close in?—They do.

12,724. If the wind shifts to north-west, and they are caught close in shore, is it not difficult to weather it?—They are caught close in shore.

12,725. Then for that portion of the trade, would it be desirable to have some port of refuge to get into?—It would be desirable, but if there were a harbour at Lundy Island, they would make for it.

12,726. Do you think that vessels caught so close in shore are at all likely to weather Hartland Paint?—No.

12,727. Do you know, or have you heard in your own experience, of many lives being lost in coasting vessels between the Land's End and Hartland Point?—No, I have never heard of any.

12,728. You spoke of a vessel that drove under the Holmes?—Yes.

12,729. You said she was a ship of 800 tons, and you said she had out a 25 cwt. anchor?—A 35 cwt. anchor, I said.

12,730. Then it is my mistake. I thought you said it was a 25 cwt. anchor?—No, a 35 cwt.

12,731. (*Mr. Coode.*) You have spoken of vessels north and south of Lundy Island in certain winds. Will you tell us what is the fact as to the proportionate number of vessels going north and those going south?—They keep to windward. If the wind is north, they go north; if south, they go south.

12,732. Which are the prevailing winds?—South.

12,733. Then it comes to this, that most of the vessels go to the south?—Most of them.

12,734. Do you know the proportion?—There may be an equal number going to the south as going to the north, on account of the great number of vessels trading to Ireland.

12,735. Am I to understand you to say that vessels from Newport, Cardiff, and Bristol go to the south?—Vessels bound out to sea generally go out mid-channel course; they take their departure from Lundy Island.

12,736. Have you been at Lundy Island with a vessel, and taken in fresh water?—I have, with our own boat.

12,737. Is it your practice to take water at Lundy Island?—Yes.

12,738. Is it good?—Yes, very good.

12,739. And the quantity?—There is a well at the top of the rocks, and a stream runs down by the roadstead.

12,740. Is it near the present Trinity landing place?—It is about one third of a mile from the landing place.

12,741. Towards Rat Island?—To the north.

12,742. Is there any quantity of fresh water there?—The quantity sometimes varies.

12,743. Have you ever had occasion to take water towards the end of a dry summer?—No, I never had occasion to do that.

12,744. (*Chairman.*) You say that the holding ground at Lundy Island is good?—It is very good.

12,745. Has it ever occurred that a vessel has been caught in an east wind and rode it out?—Yes.

12,746. Do I understand you to say that you are acquainted with the coast between Hartland Point and the Land's End?—I am very well acquainted with that coast.

12,747. Supposing you had a harbour at Lundy Island, and it was decided, in order to save the lives of seamen employed in the coasting trade, to put

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additional shelter between Hartland Point and the Land's End, what site should you select ?—Padstow.

12,748. Will you state your reason for saying Padstow ?—Padstow is a place planned very nearly out for the purpose, and, moreover, it is half-way from Hartland Point. Vessels bound along the coast reach half way, and then get in ; but when there is a harbour at Lundy Island they would rather return. They would be running on a lee shore with the wind at north-west.

12,749. Then you are decidedly of opinion, that if anything is to be done there, Padstow is preferable to St. Ives ?—A great deal more.

12,750. Would you be disposed to say, that when a vessel gets as far down as St. Ives, she generally gets round the land ?—She generally gets round the Land's End or keeps the sea, unless it blows a terrible gale of wind.

12,751. (*Capt. Vetch.*) Have you ever been at Padstow Harbour ?—Yes.

12,752. Often ?—I have been there perhaps a dozen times in my life.

12,753. How many vessels can find shelter there ?—It may be a dozen sail, but they would fetch the ground in the harbour.

12,754. What wind do you get in with ?—The wind at north-east.

12,755. Do you think a place that can only contain a small number of ships a fit place to make a harbour of refuge ?—That harbour is full of sand.

12,756. Do you expect that you could get rid of that sand ?—I should imagine if you were to make a harbour of refuge there you would make it outside the sand.

12,757. (*Capt. Sulivan.*) What is the difficulty of entering now with a gale from the north-west or the north-north-west ?—It is difficult to enter.

12,758. At high water ?—At all times. The Doom Bar is close, and with a wind you get placed so that you have to go very close to the mainland to get clear of the sand, and to get to deep water. If you go a cable and a half from the Point you are on the land. You have not more room than that.

12,759. Then the difficulty is the baffling wind off the Point ?—The baffling wind off the land.

12,760. Are you aware that they have cut down a small portion of the Point ?—No, I am not aware of it.

12,761. Do you know the first capstan-house ?—Yes.

12,762. If they cut away the Point, and the true wind were carried in as far as that, would that do away with the greater part of the danger encountered by vessels entering ?—The greater part, I should think.

12,763. Do you think that vessels would then take it in a gale of wind which are now afraid of the baffling wind ?—Small vessels would.

12,764. (*Chairman.*) Do the Bristol Channel pilots come for inward-bound ships ?—Yes.

12,765. Where is their cruising ground ?—Ten miles radius off Lundy Island.

Mr. JOHN GILMOUR examined.

Mr. J. Gilmour.

12,766. (*Chairman.*) What is your occupation ?—Bristol Channel pilot.

12,767. How long have you been a pilot ?—14 years.

12,768. Previous to being a pilot, did you follow the sea ?—No, I have always been a pilot.

12,769. Always piloting ?—Yes ; my father was a pilot, and I was always along with him.

12,770. You are aware of the objects of this inquiry ?—Yes.

12,771. State any opinion which you may have as to the advantage or necessity of a harbour of refuge in the Bristol Channel for the passing trade ?—I say there is no place like Lundy Island.

12,772. Will you state first, is a harbour of refuge necessary, in your opinion ?—Yes, I should think it was.

12,773. Will you state why ?—Because there is no harbour here going up channel.

12,774. You state that you consider Lundy Island the best site. Will you tell me why you think it better than the Mumbles ?—There is a way to get out and a way to get in there. You would not like to run upon a lee shore like the Mumbles. I would sooner go up channel or go out than run for the Mumbles.

12,775. Have you ever run for the Mumbles in bad weather ?—Yes ; I have run for the Mumbles and anchored my vessel.

12,776. Which do you prefer, Clovelly or Lundy Island ?—There is a way to go out and a way to go up if you run.

12,777. I am talking now of Clovelly ?—As to Clovelly, you would be running on a lee shore, and you could not get out with the wind to north ; if you were in Clovelly you would have to remain there. You would not get out with the wind at north to go up or down. If it were fair weather it would do very well.

12,778. Are you acquainted with the coast between Hartland Point and the Land's End ?—Yes.

12,779. Supposing a harbour of refuge to be made at Lundy Island, and that it were also considered desirable to spend money with the view of giving shelter to the coasting trade on that part of the coast, where is the best site to spend the money ?—Where do you mean ?

12,780. Between Hartland Point and the Land's End ?—I should say Padstow.

12,781. Will you tell me the reason why you would prefer Padstow to St. Ives ?—I was in St. Ives last summer, and likely to lose the boat. It came on to blow a gale. That is my experience of St. Ives, and to St. Ives I will never go. All the ropes we had on board could not hold her.

12,782. I think you hardly comprehend my question, because if there were a good breakwater at St. Ives accidents of the kind to which you refer would not take place ?—It is a very heavy sea in there.

12,783. Supposing a breakwater were made at St. Ives, which would give good shelter, do you think it would be equally valuable as Padstow, or would you still prefer Padstow ?—I should prefer Padstow myself.

12,784. (*Capt. Vetch.*) How often have you been to St. Ives Bay ?—I have never been there but twice.

12,785. Are you aware that there are very large vessels trading from St. Ives Bay above Hayle ?—Not very large vessels, I believe.

12,786. Vessels of 500 tons ?—No ; I was not aware they had any so large.

12,787. Did you ever go up to Hayle ?—No ; I never did.

12,788. Can you get a large vessel of 500 tons into Padstow ?—Oh yes, with a high tide.

12,789. How many vessels can you get into Padstow of that size ?—Not many of that size.

12,790. It would not accommodate a great number of vessels ?—If you make more water it will accommodate a great deal more.

12,791. You say there is a great sea running into St. Ives Bay. Would it be a great protection to that bay if the heavy sea were prevented ?—I should not like to run for it in a gale of wind.

12,792. Not behind a breakwater ?—I would sooner take Lundy Island or keep to sea.

12,793. You would not run for St. Ives with a breakwater ?—I would rather keep to sea where I had good room, and down that far you would have good room.

12,794. (*Mr. Coode.*) Have you ever been to Padstow ?—Many times.

12,795. Have you ever run for Padstow in a gale of wind ?—No ; I would rather keep out of it then.

12,796. Supposing a really good harbour were constructed at St. Ives and also at Padstow, or in its neighbourhood, which should you prefer to run for ?—Do you mean from Hartland Point to the Land's End ?

12,797. Take what position you like ; select the best situation ?—Padstow.

12,798. Supposing an equally good harbour could be constructed at St. Ives as at Padstow, which would you prefer to run for ?—I would run for Padstow before I would run for St. Ives.

12,799. Why would you do so ?—I should not have to go so far to the westward.

12,800. Do you think vessels would run for one or other which are embayed at Cape Cornwall ?—No vessel has reason to run unless she is embayed, not if she can keep the sea.

12,801. She would prefer to keep the sea ?—I would never run for a harbour in a gale of wind ; I would sooner keep my ship out to sea.

12,802. Then am I to gather from your answer that you consider a harbour down there only necessary for vessels which get embayed between Hartland Point and Cape Cornwall ?—Yes.

12,803. (*Chairman.*) What is the nature of the anchorage ground between the Holmes and King's Road ?—Pretty good.

12,804. Have you often anchored there in heavy weather ?—Yes.

12,805. Have you rode out a gale there ?—I have been there when it has been blowing very hard.

12,806. With what sized ships ?—Different sizes ; 400 and 500 tons.

12,807. What scope of cable ?—50 to 60 fathoms.

12,808. How many anchors down ?—Sometimes two, sometimes three.

12,809. Have you known vessels drive ?—I have, myself, often. It never happened to me but once.

12,810. Are you disposed to say that it happens frequently ?—No, not frequently, if your anchor is fair.

12,811. Upon the occasion on which you drove, do you recollect what yards you had crossed ?—Our gallant yards were crossed. We got them down when we could.

12,812. Within your own knowledge, do you know of many accidents which have happened to vessels anchoring between the Holmes and King's Road ?—No, I never heard of any.

12,813. Have you ever heard of vessels which have parted and gone on the sand, or run up into the road to prevent doing so ?—One Dutch ship parted with both her anchors, and had to run up in the wind.

12,814. Was there any damage to life and property ?—No, none but the loss of the anchors.

12,815. Therefore you are disposed to say that a stranger running in from sea would find safe anchorage above the Holmes ?—Yes.

Mr. WILLIAM THOMAS examined.

12,816. (*Chairman.*) What is your occupation ?—A pilot.

12,817. How long have you been a pilot ?—About eight years.

12,818. Were you a seafaring man previously ?—I have been a pilot from 14 years of age up to the present time, with the exception of four years at sea.

12,819. Are you well acquainted with the Bristol Channel ?—Yes.

12,820. You are aware of the object of this inquiry ?—Yes.

12,821. Have you heard the evidence of the previous witnesses ?—Yes.

12,822. Do you agree with that evidence ?—As regards a harbour of refuge, I believe Lundy Island is better than any other place.

12,823. Have you any reason for that opinion to offer in addition to those which have been already offered by other witnesses ?—In regard to going to Clovelly, vessels which come up the Channel do not like to run there. At Lundy, if you miss the island, you are still in safety.

12,824. Did you ever know a ship get into trouble running for Lundy Island in thick weather ?—Do you mean get on the island ?

12,825. Yes ?—No.

12,826. During all your experience you have known no ships running for Lundy Island get into trouble ?—No.

12,827. Running for the Mumbles, what do you say for that under the same circumstances ?—In thick weather ?

12,828. Yes ?—It is not easy to run for the Mumbles.

12,829. Why ?—You have got the Nixons, the Skerweather and other sands. A vessel was lost in the Nixons since my recollection.

12,830. Therefore do all these dangers make pilots and masters hesitate in running for the Mumbles ?—Yes.

12,831. They do not like to make free with it ?—No.

12,832. But you can make free with Lundy Island ?—You can.

12,833. Running for Hartland Point, what do you say ?—It is a bold place and little danger.

12,834. Is Hartland Point as easy to make as Lundy Island ?—It is a bold shore, but you cannot run with north or north-west winds, as you can at Lundy Island.

12,835. Do you mean that because in those winds if you miss Lundy Island you can run past it ?—Yes.

12,836. Tell us what is your opinion as to Clovelly ?—The evil which I see in Clovelly is the danger of getting embayed in north-west or north-north-west gales. Running for the harbour, if you get out a little bit you are on a lee shore directly.

12,837. If you miss the harbour you go on the shore ?—Yes, you go on the shore.

12,838. You have heard the evidence of the previous witnesses as to the anchorage above the Holmes. Do you concur in that evidence ?—Yes ; I have anchored there a good many times.

12,839. Is that a place where a strange vessel can run in, drop her anchor, and lay in safety ?—Yes, provided you get the ship well up, because flood tide brings up a very heavy sea.

12,840. Then a vessel anchoring there might find herself in difficulty ?—Yes, with the tide running strong and blowing a heavy gale of wind.

12,841. Do you know what sort of a place Milford Haven is for a ship to run into from the sea, not knowing her position ?—It is a blind place. They have to encounter the Crow Rock, Freshwater Bay, and of course a person cannot be accountable to hit the entrance of the harbour coming in from sea.

12,842. Are you acquainted with the coast between Hartland Point and the Land's End ?—Yes.

12,843. Supposing all the wants of the Bristol Channel were provided for by a harbour of refuge at Lundy Island, and it were determined to spend some money to give protection to the coasting trade, where would you expend the money ?—At Lundy Island.

12,844. But I am putting to you the question upon the supposition that that harbour is made entirely to your satisfaction, and that it was intended to spend more money upon some other place ?—Well, then, Padstow.

12,845. Is Padstow the place which you would prefer ?—Yes.

12,846. Will you state your reasons ?—It is near

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about mid-way between the Land's End and Hartland Point.

12,847. And therefore you think it more useful being mid-way. Are you disposed to say that when a vessel gets as far down as St. Ives she generally gets round the Land's End?—If the wind is any way north of the westward they go off a little way and get round.

12,848. They can either get round to Land's End or stand to sea with a north wind?—Yes, if they are any distance off.

12,849. And if it is not a north wind they get off the shore?—Yes, they can get off the shore on the other tack.

12,850. (*Capt. Sulivan.*) Supposing a harbour of refuge were made at the Mumbles, and you had your choice of putting back from Lundy Island in thick weather, and a south-west gale, running for the Mumbles, or running back to the Holmes, which should you do?—I should run back to the Holmes.

12,851. Have you ever known any vessel within your own knowledge which, after having passed Lundy Island, has had to put back and been wrecked?—I do know of a schooner, but I do not know whether she had reached Lundy Island.

12,852. You do not know how far down she had got?—No.

12,853. You do not know whether a harbour would have saved her or not?—Vessels often do come back to Cardiff Roads, and receive damage from the roadstead being so crowded.

12,854. Have you been into Padstow?—Yes.

12,855. Often?—Several times.

12,856. We have heard of the baffling winds making the difficulty of entering Padstow, is it so?—Yes.

12,857. Do you agree in that statement?—Yes, I know it to be true.

12,858. Do you think if the Point were cut away that would obviate the difficulty?—You would not have the baffling winds so much off the Point if the Point were cut away.

12,859. When a vessel has got in as far as the first capstan house is she in comparative safety?—Yes, after she had passed the baffling winds at north-north-east she would be free again.

12,860. (*Mr. Coode.*) When you went to Padstow where you taking a vessel in?—No, I have been in our own boat.

12,861. Were you obliged to run for it in a gale of wind?—I was never forced to run for it. I have been in there with an easterly wind, when it was very hard to beat up.

12,862. Have you ever had occasion to take vessels there?—No.

(*Mr. Brice.*) Perhaps, before you call the next witness, you will allow me to state that I have received a letter from Bridgewater, in which they inform me that it is their intention to send a deputation to meet you on Monday next; so that probably if you sit until Monday you will have an opportunity of hearing from them what their opinions on this subject are.

(*Chairman.*) Be good enough to hand that communication in.

Mr. Thomas Lee examined.

Mr. T. Lee.

12,863. (*Chairman.*) Have you followed the sea?—Yes.

12,864. For how many years were you at sea?—I was brought up as long as I can recollect at sea. I was bred in a fishing boat out of Clovelly, and have followed the sea ever since, with the exception of the last two years, when I have been residing at Lundy Island, in consequence of deafness. I then gave up the sea, but my home was always at Lundy Island.

12,865. How many years were you in command of vessels?—About 10 years.

12,866. What description of vessels did you command, steam or sail?—From a smack to a schooner.

12,867. In what trade were the vessels employed which you commanded?—Coasting, the Mediterranean and South of Spain, and to Cadiz; in the fruit trade.

12,868. Will you proceed to make any statement you may wish relative to the subject of this inquiry?—Being acquainted with the Bristol Channel all my life, I recommend Lundy Island as the site for a harbour of refuge. It must appear to all practical men, the Royal Commissioners included, in passing Lundy Island, that the place was fixed there on purpose. You must have been impressed with that, coming up the Channel. The advantages are the access and departure. Now I will suppose you and your ship knocking about the Bristol Channel in a disabled state, in which many vessels are in the winter time. Coasters generally put into harbour when the wind comes on, but the larger outward-bound ships, many of which trade to this Channel now, hang on as long as possible. If you are caught to the westward in strong westerly gales, you must make Lundy Island. You cannot make the coast without sighting Lundy Island. The Bristol Channel is much exposed to ground sea, and no place is more free from ground sea than the east side of Lundy Island. It is the place in the Channel which vessels try to sight.

12,869. How long have you been a resident on the island of Lundy?—For 15 years it has been my home. I have myself surveyed the place, and have found the depth of water to be exaggerated. I would recommend the outer place with the pen mark, which you will find on the plan produced. The depth of water averages from 9 to 10 fathoms at low water, and if you are expected to go farther out, you can make a harbour there in 9 fathoms. I would propose the larger place, taking into consideration how it would ease the upper ports, I mean Penarth Roads. Wrecks and damage frequently occur, and collisions also, because these roads are so crowded, and many ships are detained waiting for a chance to load, which enhances the freight.

12,870. How long do you say you have been a resident on Lundy Island?—For 15 years it has been my home, and I have been residing generally there for the last six years.

12,871. Do you possess any property there?—No.

12,872. Who is the proprietor?—My father rents the property, but his term expires in three years.

12,873. To whom does it belong?—To Mr. Heaven; the name is spelt in the same way as the place to which we all wish to go.

12,874. (*Capt. Vetch.*) You have resided 15 years on the island?—For 15 years it has been my home; but I have been to sea since that.

12,875. What is the largest number of vessels which you ever saw taking refuge there at a time?—I have seen upwards of 100 there. I may tell you that last July 84 vessels left the road with a south-east wind to proceed to the westward. I am a native of Clovelly. A vessel was lost on the pier there. At the same time there was a smack. The wind veered north-west, and she was caught in Bude Bay. The 84 vessels which left Lundy Island had 9 miles offing from the Cornish coast, and were safe. Having an offing, they could have proceeded back up the Channel. Supposing they had all left Clovelly, where one was lost there might have been 20.

12,876. Did 100 vessels take refuge at Lundy Island in a south-west wind?—Vessels take shelter in Lundy Roads until the wind is favourable to go to the west.

12,877. (*Mr. Coode.*) Do you know whether the greatest number of vessels pass to the north or to the south of Lundy Island?—It depends upon the wind. The fact is, Lundy Island is just in the track of your whole shipping, and many prefer the south side, on account of the shoals about the Welsh coast; but as to the question of going north or south, with a north or north-east wind, they would take the south coast.

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12,878. Taking the average of the whole, what course do you say most of the vessels would take?—The south side.

12,879. (*Chairman.*) You said you wished to make a statement with reference to the chart. Before you commence that statement, will you let me know whether it is in reference to that plan as a breakwater?—Yes.

12,880. Are you a professional engineer?—No.

12,881. Have you taken the advice of any professional engineer on the subject?—No.

12,882. Then, although I am unwilling in any way to check any statement you may wish to make, before you begin, you must understand that this harbour engineering is a question upon which the first men in the profession differ very much; and therefore I hope you will not take up our time at any length, unless you have had the advice of a proper professional engineer?—All I can say is, that I recommend a pier carried out to the outer part. There is an average depth of 9 to 10 fathoms only at low water, and you might have anchorage for the whole trade of the Channel, if necessary. If you take Lundy Island as the site, as I think you ought, taking into consideration that it is the Gibraltar of the Bristol Channel, you might keep a few large ships of war there, to defend the trade of the Channel.

12,883. Our inquiry has nothing to do with the defence of the Bristol Channel; it is purely as to the shelter of the mercantile marine. Therefore, we cannot allow you to go on about the Gibraltar of the Bristol Channel.—All I can say is, that you might make the place smaller if you are so disposed; you might take a pier three quarters of a mile in length, and another a mile and a half in length.

Mr. Joseph Sawyer examined.

Mr. Joseph Sawyer.

12,884. (*Chairman.*) You were examined before the Committee of the House of Commons, with reference to Clovelly as a site for a harbour of refuge, were you not?—Yes.

12,885. Have you any statement to make in addition to what you then said?—Nothing more, but that I still retain the same opinion.

12,886. Are you acquainted with the coast between Hartland Point and the Land's End?—No, only by passing at a distance.

12,887. Therefore you have no opinion relative to the comparative merits of Padstow and St. Ives?—No.

12,888. (*Capt. Sulivan.*) If you were running for a harbour in the prevailing foul gales of wind, would you not consider it an advantage if it were so situated that when the wind came fair with the ordinary shift of wind, you should be able to go out easily, without working out of a deep bay?—You allude to Clovelly.

12,889. I am putting the question irrespective of Clovelly or Lundy Island. As a general question, would you prefer, for a harbour of refuge, a place that you could run out of on either side, with the wind fair in the prevailing shifts of wind, or would you prefer a place where the wind shifting fair, you would be in a bight and on a lee shore?—I believe you have overlooked the entrance. With a fair wind out of the Channel, you would be able to get out of Clovelly with two or three tacks.

12,890. I was not speaking with reference to Clovelly, I was speaking generally; whether a port where you would have to work out against a strong wind would be preferable to a place that you could run from with a fair wind when you wanted to go to sea?—I do not see the question in the way you put it.

12,891. I will take Clovelly. With a north-north-west gale, if the gale shifted from south-west round to west and north-north-west, a ship anywhere in the Bristol Channel which could weather Hartland Point or Lundy Island would go down channel, would she not?—Yes.

12,892. In Clovelly, with the gale having shifted round, but still blowing strong, would a vessel be able to get away without working out of the bay—would she be able to weather Hartland Point?—No, she would not.

12,893. If she were at Lundy Island, would she be able to round the south end of the island with a fair wind, and go to sea without any difficulty?—She would.

12,894. If a harbour of refuge were made at the Mumbles, and you were at Lundy Island, and had to put back in a heavy south-west gale, which should you prefer running for, the harbour in Swansea Bay or the Holmes?—I should prefer the Holmes by all means.

Mr. John Edwards examined.

Mr. John Edwards.

12,895. (*Chairman.*) Are you connected with the sea in any way?—I am a shipowner. I have been a seafaring man for 30 or 40 years.

12,896. And during that period, how long in command in vessels?—About 26 years.

12,897. What size of vessels have you chiefly commanded?—Small vessels.

12,898. In what trade have you been chiefly employed?—For the last 19 years trading to France for brandies.

12,899. Are you aware of the object of this inquiry?—I am.

12,900. Will you now proceed to make any statement which you may wish relative to the advantage or necessity of a harbour of refuge in the Bristol Channel for the passing trade?—As a member of the Chamber of Commerce my evidence was given in favour of Clovelly. In the early part of my life I was trading over Barnstaple Bar, and I know well how many lives would have been saved if there had been a harbour at Clovelly. Many vessels have been wrecked on the Barrows and many lives lost. For my own part, I have passed many a night in Barnstaple Bay when I would have given all that I possessed if there had been a place where I could have taken shelter, there not being water to go over Barnstaple Bar.

12,901. How was the wind under the circumstances you have named?—West-north-west.

12,902. Was it right into the bay?—North-west was right into the bay.

12,903. I understand you to say, if there had been a harbour of refuge at Clovelly you would have anchored there?—Yes; instead of keeping my vessel in a heavy sea going to and fro.

12,904. I think I understood you to say a considerable loss of life had taken place in Barnstaple Bay in bad weather from the circumstance of the difficulty of entering the harbour—is that so?—Yes, that is the case.

12,905. Would a harbour of refuge at Lundy Island meet the difficulty?—I do not think it would.

12,906. State the reason why?—Lundy Island is often capped. I have known cases where vessels have run in near the island, and not seen the lights, when, if there had been a light placed on the north-east extremity they would have seen it. I wish to make a remark on the suggestion of a light on Rat Island. I think it would have a very good effect, because the fog often caps Lundy Island down to the water's edge, and therefore a light which was not very high would be seen a sufficient distance before a ship got ashore.

12,907. Do you think that the principal disadvantage of making a harbour of refuge at Lundy Island is the difficulty of making out the lights as they are at present?—More than that. When you get in you

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have to go very close to get an anchorage, and you are met with baffling winds.

12,908. As respects Lundy lights, do you not think that is a difficulty which could easily be removed by having fog lights ?—Very possibly.

12,909. As respects the baffling winds, are they such as to prevent a ship getting into the anchorage ?—You can have greater facilities for getting to the anchorage in Barnstaple Bay ; no man can gainsay that.

12,910. Though the difficulties are greater, is it not the case that a great many ships take shelter under the island in westerly gales ?—When a pilot is not to be found ships go round the island and bring up.

12,911. Therefore the baffling winds do not prevent their anchoring ?—No ; only sometimes they have to go and leave their anchors, and seek refuge elsewhere. The anchors of a Russian frigate are there now ; they were lost a number of years ago, when the ship had to come up to King's Road.

12,912. Does that often happen ?—I suppose so, for I very often hear of vessels picking up anchors which other ships must have left behind.

12,913. Do you not think they are the anchors of vessels which have had to slip for fear of easterly winds ?—It may be so.

12,914. Do you not think it is not only possible but likely ? Is it not more likely that the anchors picked up are anchors which vessels left behind when they slipped them, than that they are the anchors of vessels which had parted from them in westerly gales ?—Most likely they are the anchors of ships which have slipped and got away.

12,915. (*Capt. Sulivan.*) If there were a good harbour at Lundy Island and another at Clovelly, and you were to the westward of Lundy Island, and wanted to take shelter in a place convenient to go from when the wind was north-north-west, to which place should you go ?—Well, I should go into Barnstaple Bay.

12,916. Do you think you would get out of Clovelly with a north-north-west wind to go down channel as easily as you could out of Lundy Island, if you had a good harbour in that place ?—I am not prepared to answer that question. It depends upon how the breakwater is constructed. I think Clovelly quite as good as Lundy Island, and for naval reasons—for the protection of ships in time of war—I should say Clovelly decidedly.

12,917. I only ask you as a sailor whether, if you had to choose leaving Clovelly after a south-west gale, when the wind went round to the northward, or leaving Lundy Island, which would be the safest to leave ?—I should not leave either with a north-north-west wind, because I think Padstow would pick me up.

12,918. Well, a north wind ?—North is bare enough in any case, and particularly for coasters bound round the land.

12,919. Which would be the easiest for them, to get out of Lundy Island or out of Clovelly ?—Perhaps it is easier at Lundy Island to get to sea, but if the weather is fit to go to sea, I should prefer to be at Clovelly then.

12,920. Which would be the best place for vessels only going to Barnstaple and Bideford if they wanted shelter because they could not take the bar ?—Clovelly would be the best place then.

12,921. In reference to Clovelly, have you considered more particularly vessels entering Barnstaple or Bideford rather than the general trade of the Channel ?—I have no interest in either place.

12,922. I do not ask you if you have any interest in either place, but whether you have considered the danger they are exposed to more than the general trade of the Channel ?—No ; the general trade of the Bristol Channel. There was a vessel bound for the West Indies lost on the Moor Stone and a part of her crew drowned. If there had been a harbour in Barnstaple Bay that vessel would not have been lost.

12,923. If there had been a harbour of refuge at Lundy Island, could she have taken refuge there ?—Very possibly she might.

12,924. Do you think that she was south of her reckoning, and was not aware that she was running on a lee shore ?—Yes ; vessels are south of their reckoning sometimes.

12,925. Please to answer the question. Do you believe that she was running back, and being south of her reckoning, ran on the east coast ?—Yes.

12,926. Then even if there had been a harbour at Clovelly, could she possibly have found out her mistake any sooner, and would she not probably have gone ashore all the same ?—No, she would not, because they saw Baggy Point before.

12,927. Is Baggy Point the second point ?—It is the north head of Barnstaple Bay.

12,928. Can a vessel, being inside of Barnstaple Bay in a westerly wind, haul up and fetch Clovelly ?—With a west-north-west wind she would go down to Clovelly.

12,929. With a westerly wind she could not ?—No ; with a westerly wind she could not get back.

12,930. Putting Clovelly out of the question, if there were a harbour at the Mumbles, and you were at Lundy Island, and had to put back in a strong gale, which should you prefer running for, the Mumbles or the Holmes ; which should you consider the safest in a south-west wind and thick weather ?—If bound for Swansea ?

12,931. No, not bound to Swansea, merely putting back for refuge ; I wanted to know which you thought the safest place ; if you want to run for a safe place, and have no alternative than to run for the Mumbles or the Holmes, which should you run for ?—I should go to King's Road, most undoubtedly.

12,932. I think you said you traded with France ?—Yes.

12,933. In that case you can tell me how you generally round the Cornish coast ?—Between the Land's End and the Scilly Islands ?

12,934. And going round in south-west weather, would the usual course be along the land ?—We always give the land a pretty wide berth, for fear of the wind coming to the north or the west.

12,935. Do you consider a harbour somewhere between Cape Cornwall and Hartland Point would be valuable for vessels caught in north gales on that coast ?—Undoubtedly.

12,936. Do you know St. Ives ?—Yes.

12,937. Do you know Padstow ?—Yes. I went there to seek a harbour, to see if I could find a place where a steamer could lay afloat.

12,938. If such a harbour of refuge for the coasting trade were to be put either at St. Ives or Padstow, which should you prefer ?—I think a harbour is half made by the stones which lie at St. Ives now.

12,939. If a pier were carried out so as to protect St. Ives from north-west or north winds, do you think it would be a valuable place of refuge for the trade round the land ?—There is no doubt as to that for a moment.

12,940. (*Chairman.*) Supposing it were determined to spend money at some place between Hartland Point and the Land's End, to give shelter to the coasting vessels, which place do you think the best ?—I think both places equally eligible. Cutting the Point at Padstow away would make it accessible for small vessels. A breakwater at the stones would make St. Ives Bay a very efficient place. When I was at sea, a vessel came into contact with another off the Land's End ; she made a considerable quantity of water. They were afraid to go back to Milford, they went into St. Ives and got over Hayle Bar, and both were repaired there. As a place of refuge St. Ives is all very well.

12,941. But which would be the more useful, St. Ives or Padstow ?—Why Padstow is about half way, and if Padstow could be made equally eligible, I should say Padstow, myself.

12,942. Therefore, if Padstow can be made accessible and improved, you would say Padstow ?—If Padstow can be made equally eligible with St. Ives.

12,943. (*Capt. Vetch.*) Do you think Padstow can

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be made equally eligible with St. Ives ?—I do not, myself. I do not think it can be made equally eligible.

12,944. (*Mr. Coode.*) Supposing an eligible site could be found in the immediate vicinity of Padstow, which then should you say, that site or St. Ives ?—If made equally eligible I should prefer the place near Padstow, because it would be mid-distance between Hartland Point and the Land's End.

12,945. You spoke of making a pier at "The Stones"; should you prefer that position to St. Ives Point ?—I should, because the "Stones" almost form a low breakwater now.

12,946. What winds are most required to be protected from at St. Ives ?—North-west and north-north-west winds, when you can neither get up nor down.

12,947. Do you know enough of the bay to say whether shelter would be given against north-west winds by a breakwater on the Stones ?—If it were carried off the head as well it would make it safe.

12,948. You would propose two piers ?—That's it.

12,949. What opening would you propose between the two ?—About a mile.

12,950. Do you know the length such piers would be ?—No.

12,951. Are you intimately acquainted with St. Ives Bay ?—I traded to Hayle in early life.

(*Mr. Brice.*) I am instructed by the Merchant Adventurers to say that they do not think it necessary to offer any further evidence, as they are satisfied with the evidence which has been already produced on behalf of the Corporation, whom they simply represent in this matter.

Mr. William Brown Clegrer examined.

Mr. W. B. Clegrer.

12,952. (*Chairman.*) In what way are you connected with the port of Gloucester ?—I am a solicitor of Gloucester, solicitor to the Gloucester and Hartland Canal Company, and a member of the Committee of the Chamber of Commerce, and represent both parties here.

12,953. Will you proceed to state anything which you may wish to offer to the Commissioners concerning this inquiry ?—I will not detain the Commissioners long. I am not prepared with any witnesses, and I am not aware that any evidence which I could give would be different from that which you have had on this occasion. I wish shortly to state, that the matter was considered by the Chamber of Commerce and the Gloucester and Hartland Canal Company, and they are decidedly of opinion that Lundy Island is the best site for a harbour of refuge in the Bristol Channel. Without wishing to deny the advantages of a sheltered roadstead at Clovelly and the Mumbles, still if there is to be only one harbour, they think Lundy Island more advantageous than Clovelly or the Mumbles. Further than that, I have no statement to offer. There is no difference of opinion at Gloucester among the mercantile community as to Lundy Island being the best site under all circumstances.

(*Chairman.*) Are there any other parties present who wish to tender evidence to the Commissioners on the subject of this inquiry ?

No answer.

Sitting at Bristol closed.

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Wednesday, 13th October 1858.

PRESENT :

Admiral Hope, Chairman.

Sir Frederic Smith.
Mr. Lindsay.
Captain Washington.
Captain Sulivan.
Captain Vetch.
Mr. Coode.
Mr. Evans, Secretary.

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(*Mr. James Mather.*) I have a memorial to hand in from the seamen of South Shields, agreed to unanimously at a public meeting in September last, praying, not that this Commission will thoroughly inquire, because of that they have no doubt, but that as the Tyne is one of the principal harbours of refuge on the north-east coast in time of danger, it will receive their particular attention. They pray also most earnestly, that they may be heard before the Commissioners. They can prove to the Commissioners that the destruction of life and property on their coast is caused principally in south-east and south-south-east gales, and those gales which prevail from the south, in which a harbour of refuge to the northward is the only security. They can show, by facts innumerable, that such is the case ; but, like generous men of their profession, they do not confine themselves to their own interests and their own locality. They pray that the three great ports, the Tyne, the Wear, and the Tees, may, by the recommendation of the Commissioners, receive assistance from Parliament and the country ; and they say, that without some assistance of that kind, a solitary harbour of refuge on the coast, if made, would not provide for one half, I may say, one quarter of the wrecks which occur on the coast, and that therefore these great harbours which are used so much, and where we have about a fortieth of the sailing of the kingdom, in and out, and which are the great centres of destruction, may be made sufficient for the purpose not only of their destination to facilitate trade, but be made equally available to the saving of life. Perhaps you will permit me to say, at the same time, that at a meeting of the Maritime Societies of Shields, Stockton, Newcastle, and North Shields, exactly the same sentiments were expressed which I have the honour to lay before you to-day.

Mr. Cowan examined.

Mr. Cowan.

12,954. (*Chairman.*) You are the Chairman of the Tyne Improvement Commissioners ?—I am.

12,955. Will you now proceed to make any statement which you have to offer relative to the advantage or necessity of a national harbour of refuge on this particular part of the coast ?—On behalf of the Tyne Improvement Commissioners, I may now state that it was our intention on this day to have submitted to the Royal

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Commissioners plans for the extension of the piers, taking them into 6 fathoms of water, and to have supported that plan by the evidence of the engineer who is in charge of the present piers, Mr. Walker. We regret, however, to state that we are deprived of the assistance of Mr. Walker to-day, in consequence of the death of one of his relatives, whose funeral he attended yesterday or the day before. We are given to understand that it is next to impossible that he can appear here, and we felt that it would be almost an act of cruelty, under such a bereavement, to have requested him to be here. I have, therefore, to ask you, to be kind enough to hear the whole of our engineering evidence in London.

12,956. There can be no possible objection to your proposal to take the whole of your engineering evidence in London.—Very well; then we will produce the plan in London, and the report of Mr. Walker, and Mr. Walker himself, together with any other such engineering evidence as may be considered necessary. We thought it would be more convenient to give the engineering evidence at one time rather than to divide it, if you made no objection.

12,957. None whatever.—Then, on behalf of the Tyne Improvement Commissioners, all I have to say is, that having already given my evidence before the Select Committee of the House of Commons of 1857, which is in the Blue Book of 1857, I am not aware that I have anything to add to that myself, but I shall be happy to answer any questions which any of the Commissioners may wish to put to me, if they think that any part of that evidence requires explanation, and also to give any further information which may be considered necessary relative to the construction of the works now going on in the Tyne. But it does not strike me that I can do more than I have done in that evidence. No doubt it will be borne out by witnesses who will be examined here to-day, which will be much more satisfactory to the Commissioners than having a repetition of my evidence from myself. It has been suggested that I should put in certain statistical tables to the end of 1857; I did give in before the Committee of the House of Commons a table to the end of 1856, and there does not appear to be anything in the statistics of the year following to affect my evidence in any way. After these few remarks, if it is the pleasure of any of the Commissioners to ask me any questions, I shall be very glad to answer them. It is understood, I suppose, that the evidence taken in London will be considered as evidence taken here.

12,958. When we return to London we shall call any evidence up there which we may consider necessary, and of course, that evidence will be as much part of the evidence if taken in London as if taken here?—That is not what I mean. I mean with reference to the evidence already published, which was taken before the Select Committee of the House of Commons.

12,959. We have been in the habit generally of requesting gentlemen, who have already been examined, and who have tendered their evidence before us, to avoid a repetition of that which is already before us in the reports of the Committees of the House of Commons of 1856 and 1857?—That is exactly my case; my evidence is already before you, and it would be merely a repetition and a waste of the time of the Commissioners to go through it again.

12,960. (*Sir F. Smith.*) I was fortunately present when you gave your evidence, Mr. Cowan, before the Select Committee of the House of Commons; and I understand you to say, that you have nothing now to add to that evidence?—No; there is nothing that strikes me at present.

12,961. Have you any reason to believe, on further consideration, that these works, which are now in progress under the direction of Mr. Walker, are calculated to produce the effect imagined?—Yes; they are.

12,962. And the estimate is sufficient for the work to be carried out?—Yes; I think so. The estimate then given in for the piers, as laid down by the plan, was 400,000*l.*, and its correctness has been borne out by further experience since that time.

12,963. Looking at the whole question in a liberal spirit, do you think that if the public funds were applied to the saving of life and property upon this coast, it would be desirable that these funds should be applied to one particular locality, or divided among more than one?—I think it would be right to divide them among more than one. That is decidedly the spirit of the evidence which I gave in London. It would be decidedly the best, the most advantageous, and the most proper to divide it among the existing harbours.

12,964. And those harbours would be those which you enumerated?—Yes; the Tyne, the Wear, and the Tees.

12,965. What amount of money do you imagine would be sufficient to effect the necessary improvements at these three points?—Well; I am not prepared to answer that question. You mean the whole of the three?

12,966. Yes; the whole of the three?—I am not prepared to answer that question. I am only prepared to state so far as my own position goes. The position which we have taken is this,—We are already assisting ourselves by spending money, and we stated to the Government long ago, that we thought it fair, that for each pound laid out by us, the Government should lay out another pound; and that, if we bore half the expense, it was not unfair to ask the Government to bear the other half. I still entertain that same view of the matter.

12,967. Then, in point of fact, your opinion is, that it is quite equitable for the country at large to pay a considerable portion, say one half (the locality paying the other half) for these improvements, on the ground that while the locality will derive advantage from the half which they contribute, the country and the world will also obtain an equivalent advantage for the half contributed by the public?—That is just my opinion.

12,968. And you think that principle likely to apply to the other ports which you named?—I think it is only reasonable that it should apply. I think that each port ought to set an example by doing something for themselves.

12,969. I am aware that in your evidence before the Select Committee of the House of Commons almost everything which we desired to know from you to-day is to be found; but it is dispersed over a considerable number of pages, and it is no doubt highly desirable to concentrate as much as possible the evidence taken before us under the Royal Commission. I am desirous therefore of asking some things of you which you have already stated before the Select Committee of the House of Commons; but I wish to get them more clearly and more completely before us. I will ask you whether you think that a harbour of refuge on this coast is very important?—I think a harbour of refuge on this coast would be important, but at the same time I think that any one single harbour of refuge on this coast would be a total failure as regards meeting the requirements of the coast.

12,970. Then will you be good enough to state why upon this particular coast one harbour of refuge is insufficient when it is considered that in other parts of the coast one would be sufficient?—For this reason, that there is a larger amount of shipping passing and repassing this coast than any other part of the kingdom of the same extent. Not only a larger part, but a considerably larger part, I think we have passing out of these three ports. I believe it amounts to one-fifth of the entire shipping of the country, and I believe one-half of that passes out of the River Tyne.

12,971. One half of the fifth?—Yes. With respect to one particular, I don't know to what extent you could go in forming one harbour of refuge to take in all the ships which in stress of weather find it necessary to go into all these ports.

12,972. Then may I conclude from what you have stated, that if the public funds were applied to an unlimited extent in forming a harbour of refuge on the Tyne, that would not be sufficient for the saving of life and property ?—No, I am not prepared to say that, if you apply the public money to an unlimited extent ; but still I am prepared to say that you would have to go on, that it would be unlimited, and that it would embrace far beyond anything we have ever contemplated ; and my decided opinion is that any one harbour of refuge constructed for anything like 1,000,000*l.*, or 800,000*l.* which has been talked of, would be quite insufficient for the requirements of the locality.

12,973. I don't think my question is quite understood. My object is to ascertain from you whether, if the public funds, or all necessary funds, for that reasonable extension of the harbour which might be expected, the harbour being in one locality would not meet the whole requirements of the trade and commerce of the country ?—I am decidedly of opinion that it would not.

12,974. Even if Mr. Walker had the power of applying money to make one harbour in this locality, it would not satisfy you, you would want other places ?—It would not satisfy us.

12,975. That being the case, suppose we do make such a harbour, what do you think will be the effect on the trade of this locality ?—Do you mean one large harbour ?

12,976. If one large harbour were formed at Tynemouth, would that harbour increase the facilities of trade in this particular position at Shields and Newcastle ?—No doubt it would facilitate trade and diminish the loss of life and property.

12,977. Are the losses sustained by vessels endeavouring to get in, meeting with collisions, or being wrecked in crossing the bar ?—By both, frequently by collisions, and frequently by crossing the bar, or attempting to make the harbour.

12,978. Do you imagine that the works in contemplation will remove that bar ?—Yes, we do.

12,979. You have no doubt about it ?—I have no doubt of it. We shall submit to you a plan for taking the piers out to six fathoms of water, and I have no reason to doubt that we shall maintain, if not that depth of water, something approximate to it.

12,980. And the bar will be removed by the operation of the water or by dredging ?—The bar is nothing but sand, and by the contraction of the mouth of the river, or by the scour of the ebb tides, we have no doubt that the bar will be removed ; in fact, done away with altogether.

12,981. Scoured out into deep water ?—It will be scoured out into deep water.

12,982. Do you think you will have an accumulation of water to produce that effect, because I presume that if you contract the piers you will have less water entering the river ?—That question is more of an engineering character than one for me to answer, but my opinion is the contrary, that we shall have not an equal but a greater quantity of water, that the bed of the river will be deepened consequently, that the water will have more easy access, and rather than less, that we shall have more water.

12,983. Are you able, by statistical returns in your possession, to say whether the losses arising to vessels with cargo are more numerous than those arising to vessels without cargo ?—We will put in an analysis of the wreck chart, which will fully supply that information.

12,984. Do you imagine that a harbour of refuge at Filey Bay would not answer the purposes of the Tynemouth trade ?—I think it would be quite insufficient, that it would not answer at all.

12,985. Do you imagine that a harbour of refuge at Tees Bay would not answer the purposes of the Tynemouth trade ?—It would not ; and besides, there is no doubt, from information in our possession, that the Tees Bay will silt up, there is no back at all to keep it open.

12,986. You have no reason to suppose that your harbour will silt up ?—I have nothing to lead to that supposition.

12,987. In point of fact, your answer is "No" to my question ?—It is "No."

12,988. Do you imagine that if the state were willing to contribute a large sum, the locality would contribute an equal sum for still further improvements ?—I have no doubt at all but that they would do it most willingly.

12,989. (*Mr. Lindsay.*) As Mr. Walker will not be here to-day, do you intend to bring forward any engineering evidence ?—None ; for we thought it best not to divide that evidence.

12,990. Will you have any other witnesses who will be able to speak to the present state of the works, or who will be more competent to speak than yourself ?—No, I think not.

12,991. Will Mr. Taylor be here ?—Yes, Mr. Taylor will be here to-day.

12,992. Will he be able to speak to the present state of the works ?—Mr. Taylor will have something to say to you to-day, and he will be able, perhaps, to give better evidence as to the works than I can, but I thought your question referred to money expended.

12,993. It bears to a certain extent on that point ; and I should like to ask you a question or two upon it. I understand that the original estimate for the construction of the piers to the full extent was 400,000*l.* ?—Yes, it was for that amount.

12,994. And that the works under contract amount to 160,000*l.* ?—To 166,000*l.*

12,995. Now what is it then that prevents you from going on to take contracts for the full amount of the works ?—We cannot get the consent of the Admiralty, consequently we cannot contract for anything more.

12,996. Why have the Admiralty put a veto on your contracting further ?—That is a question which I cannot answer. By the Act of Parliament for the construction of the piers we were obliged to submit our plans to the Admiralty, and the Admiralty had the power of sanctioning the plan and fixing the extent to which we should go. We did submit the plans to the Admiralty, and we got their sanction as far as the contracts have been let.

12,997. That is to say, to so far as the extent of 166,000*l.* ?—Just so.

12,998. Have the Admiralty given any reasons why they will not allow any further contracts to be let ?—The reason was evident, that they wished to see the effect which would be produced by the work done.

12,999. Has any effect at all been produced upon the bar, have the piers tended to deepen the water as far as they have gone ?—The pilots who are to be examined will answer that question ; but I have no doubt, from the statement before me, that the water has deepened two feet upon it.

13,000. The water has deepened two feet ?—We have got a better bar by two feet.

13,001. From what time ?—From the commencement of the piers.

13,002. You have two feet more water than when you began to construct these piers ?—Just so.

13,003. I think, Mr. Cowan, you expressed an opinion to Sir F. Smith that, looking to the enormous trade along this coast, the construction of three smaller harbours of refuge, or the making of the present tidal harbours suitable to receive at all times of the tide the ordinary class of vessels which trade along the coast, would do more to save life and property than the construction of any one harbour of refuge at any particular site along the coast ?—I am decidedly of opinion that that would be the case.

13,004. And you said that the principle by which you proposed money shall be found for the improvements of the Tyne was this,—that for every pound of public money expended you, the people of the Tyne, were willing to spend another pound. I understood from you that Mr. Walker was about to submit to us in London a plan for supplying a further extension of

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these piers, and that he proposed to carry these piers into six fathoms at low water ?—Yes, that is so.

13,005. Have you any idea about what the cost would be ; can you give me an estimate very roughly ? —That plan would take the piers up to the point where the present works would leave them, so that the present work would have been advantageously done, and form part of the whole ; and I should suppose, from a rough guess, that the cost of the additional work might be about 400,000*l.*

13,006. Then the whole cost would be 800,000*l.*, or would it be 400,000*l.* added to 166,000*l.* ; is that what you mean ?—No ; it would cost 800,000*l.* for the whole. To complete the pier according to the present plan would cost 400,000*l.*, and it would take 400,000*l.* more to take the piers out into six fathoms of water.

13,007. Then, in fact, the bargain you are willing to make is this : you would spend your 400,000*l.*, or the remainder of your 400,000*l.*, towards the construction of this large plan ?—Yes.

13,008. Therefore, by the country subscribing 400,000*l.*, which would be added to your own 400,000*l.*, you would have a harbour of refuge which ships of any size could take in a gale at low water of spring tides ?—That would be so.

13,009. The next point to consider is, what accommodation you would have for those ships which came for shelter. Tell me what the means are to clear your river of the number of ships which come here for trade. What dock accommodation have you ?—Northumberland Dock is already completed.

13,010. How many ships will it hold ?—350 sail.

13,011. Will the Jarrow Dock contain an equal number ?—The two docks will take in at least 700 sail. They will take that quantity of vessels out of the river. We have already had, on more than one occasion, 1,250 ships in the river, consequently we should have berths for 2,000 ships.

13,012. But in your two docks you will only have accommodation for 700 ships ?—But, if before we could accommodate 1,250 ships, then with our additional accommodation for 700 more ships we shall have accommodation for 2,000 ships.

13,013. Are there any other works to be executed at Coble Dean ?—That dock will not be so large as the Northumberland, but will contain 300 ships.

13,014. And consequently you will shortly have dock accommodation for 1,000 ships ?—Yes.

13,015. I need hardly ask you the question, but I wish it down in evidence, for it is always a question the answer to which has great weight with me. Can you give any idea of the number of lives which would have been saved during the last ten years, and the amount of property, if there had been a harbour of refuge constructed at the mouth of the Tyne ? Have you any return which will show that ?—I think I can supply you with the return probably to-morrow. I have spoken to that point before, when I gave evidence in London. I spoke to the fact, and I think all that is before you ; but if not, Mr. Mather can speak to it much more than I can.

13,016. You have a table, I think, which you intend to put in to-morrow, which will analyse the wrecks which have taken place along this coast. May I ask whether the proportion of laden ships is greater than that of light ones ?—That is a question which I would rather you get from nautical men, who are better acquainted with the subject than I am. You will have the exact numbers from other witnesses who are going to be examined.

13,017. Now, one question further ; if such a harbour as that which you propose to be constructed at the Tyne were made, which would give a very large area of water inside (especially when your dock accommodation is complete) would that, in itself, suffice for the wants of this north-east coast ?—It would not.

13,018. You think it would not ?—I think it would not.

13,019. Then you think there ought to be another harbour somewhere near the north of Tees Bay or Sunderland ?—I think there should.

13,020. Then do you think, supposing the harbour at Shields were made as you have recommended, and that there was an extension of the present harbour, either at Sunderland or at Hartlepool, so as to make a harbour of refuge to some extent for vessels which frequent this coast there, do you think the two would suffice, or would it be necessary to have a harbour further south ?—I think that if these three places were all improved on somewhat like the scale which has been laid down, that it would be totally unnecessary to do anything further for the requirements of the trade. That is my opinion.

13,021. I will ask your opinion, as a gentleman of great experience, more especially as you have, much to your credit, given particular attention to this subject, do you think or do you not think that a harbour somewhere about the neighbourhood of Flamborough Head, say at Filey Bay, would be of value to the shipping frequenting the north of England, having a view to the saving of life and property ?—I have no doubt it would be of value, but I have great doubt whether it would be of value in any respect commensurate to the amount of cost. No man can shut his eyes to the fact that a harbour would occasionally be beneficial, wherever you put it, but a harbour at Filey Bay would be quite insufficient to meet the requirements of the trade along the coast.

13,022. Then even if it were decided that there should be a refuge harbour at Filey Bay, with a view of saving life, which is the all-important point for us to consider, you still think something ought to be done for the tidal harbours in this bay ?—I do ; most decidedly I do.

13,023. (*Capt. Washington.*) Will you be good enough to state what amount of funds are available for the extension of the pier ?—The sum which we have by the present Act of Parliament power to borrow is 200,000*l.*

13,024. Yes ; but what amount of dues are levied for the piers ?—The amount of dues for the piers was about 12,000*l.*

13,025. Separate from the river dues ?—Distinctly, it is separate altogether ; it was 12,399*l.* 12*s.* 6*d.*, being an increase of nine per cent. on the collection of 1856.

13,026. It has increased, and is still continuing to increase ?—Quite so.

13,027. There is no objection to that due ?—None whatever.

13,028. It is paid willingly?—Paid willingly. It is a small tax.

13,029. Do you levy the full amount you are empowered to levy ?—Not in all cases. I think they are modified in some cases.

13,030. How much a ton is it ?—1*d.* for coasting and 2*d.* for foreign vessels; and I believe after vessels have gone seven voyages then they are exempt for the rest of the year.

13,031. And can you state the amount of river dues separately, somewhere thereabouts, in round numbers ?—In what way do you wish to have them ?

13,032. The dues available for the improvement of the river separate from the piers.—The net sum available for river purposes?

13,033. Yes.—I can put in a statement. This year it will be about 13,000*l.* net, after paying the interest of the debt, salaries, and everything else.

13,034. There are 13,000*l.* available for the improvement of the river, and 12,000*l.* for the extension of the piers ?—Yes, and I think we may state that we spent 14,000*l.* last year in dredging.

13,035. I hope it has been attended with benefit ? —It has been attended with benefit, for the nine-foot bar has disappeared.

13,036. I am very glad to hear you state so ?—The sea reach is four feet deeper, I am told. We have gone on materially increasing in our dredging. I can give the amount we have dredged each year.

13,037. Can you state what depth there is over the nine-foot bar now? Is it the same as outside?—I think the harbour master will tell you that better than I can: he has been paying more attention to it.

13,038. I think you said that the nine-foot bar had disappeared, or nearly so?—We have taken 7,626 tons from it.

13,039. You found no difficulty, no rock?—We found some difficulty. We found no rock, but large boulder stones.

13,040. I believe that prior to its removal it was a very great cause of obstruction to the trade of the Tyne?—It was; its removal will be of great benefit to the Tyne.

13,041. Has any improvement taken place in the in-sand?—I am hardly able to answer that question. I would rather you would ask the harbour-master; it would be merely my own opinion.

13,042. (*Capt. Sulivan.*) You said, Mr. Cowan, that ships of all sizes would enter if these improvements were carried out?—I did.

13,043. That is, you consider that a fleet of large line-of-battle ships would be able to take refuge in this port?—I reasonably calculate from 20 to 25 feet at low water.

13,044. Do you mean between the pier heads?—Yes.

13,045. Where do you propose that they shall find accommodation inside?—We shall find accommodation for them.

13,046. Do you know the narrow channel called the Narrows?—We contemplate that the Narrows will disappear.

13,047. Would the channel above Shields be available for anchorage ground?—It would, keeping a proper passage at all times in the centre of the river.

13,048. With reference to the trade with the colliery ports and London, have you heard generally that the great want of the trade is some port on the coast that they can put into during their voyage. Has that been the general complaint of the masters of colliers?—I hardly understand your question.

13,049. Has the general complaint of the trade been, that the east coast of England affords no refuge between the coal ports and London?—No, I do not think that is the general complaint; I think it is, that the ports of destination that they go from and have to come to have not sufficient accommodation in getting in and out. It is not so much the want of a harbour into which they can go during their passage.

13,050. When a fleet of laden colliers leave the Tyne, do they ever go out in east-north-east or south-east gales, which make it dangerous outside?—That is a question I would much rather you would put to nautical men. Some nautical men will be examined before you, and I am only commercially connected with the port.

13,051. But as a matter of fact, not relating to the voyage, I want to know whether it is the custom of colliers to go out in all weather, or whether they wait for a slant of wind, or whether they choose fine weather?—I would rather you get an answer from some other person.

13,052. Supposing a fleet of colliers to leave the Tyne under ordinary circumstances, do you think or do you not think, that a refuge harbour between their port and the next point at which they could get shelter would be of great value in east or north-east gales?—I think a harbour would be of value to them, but if the idea is carried out as suggested of two harbours to the south, if the harbour at the Wear were improved, which is the port of the principal trade, and also at the Tees, then there would be two harbours of which they could avail themselves.

13,053. I think you stated that you expect to get 15 feet of water, with the present improvement?—Just so.

13,054. Will that 15 feet at low water enable you to take a large portion of your colliery vessels at all times?—Yes, it will.

13,055. Then if you improve your harbour until you get 15 feet of water, so that it takes nearly all your vessels at all times of the tide, and in addition, you have a harbour to the southward, would that be better for this port than if the outlay were made here to make a harbour for large ships without any port to the southward?—I hardly comprehend your question.

13,056. Would a harbour with 15 feet of water here, which you say would take nearly all your colliery clsss of vessels —— ?—Take the light vessels.

13,057. I asked you whether it would take the ordinary class of vessels. I understood you that it would take them at all times of the tide?—Yes, I think it would.

13,058. With such a harbour here and such a harbour further south, which they could take at all times of tide, make vessels safer than they would be if there was only one harbour here, with 20 feet of water?—If both were to be done—ours taken out to 15 feet, and some other to the south also improved, probably the benefit would be considerable; but whether it would be equivalent to taking ours to 20 feet, I hardly think it would, because when you have 15 feet it will take a large portion of the trade; but the tendency of ships is to increase in size so considerably that I apprehend by the time we had got out to 15 feet, then we should find it necessary to go out to 25 feet; therefore I think it is desirable to go out to 25 feet.

13,059. Is it the case that the sand on the south side is filling up and rising rapidly against the pier?—Not inside but outside.

13,060. But the pier is getting partially buried in sand?—It is so.

13,061. How long has that pier been made?—It has been going on about four years. I think it was commenced in 1854.

13,062. (*Capt. Vetch.*) To what extent has the north pier been carried from the Castle Rock?—I cannot answer that question in an off-hand manner, but I shall be able to tell you to-morrow, or Mr. Taylor will be able to point out exactly.

13,063. I understand you to say that in consequence of the works carried out you have already two feet more water over the bar?—Yes.

13,064. With respect to the south pier, has that had the effect of cutting off the swashway called the Wheal?—It has, so far as it has gone, had that effect.

13,065. And with respect to the nine-feet bar, do I understand that you have cut it away to the same depth as on either side of it?—I am not prepared to say that it is entirely done. We have taken the dredger away now because of the advanced state of the season, with the view to send it back again next year to complete the work. I am not prepared to say it has entirely gone, but a portion of it has.

13,066. Do you not think that if it were entirely removed it would have the effect of increasing the current, both ebb and flow?—No doubt of it.

13,067. (*Mr. Coode.*) You said that the bar had been deepened two feet; has any shoaling taken place?—None whatever.

13,068. Are you sufficiently intimate with the subject to speak with confidence on that point?—I think if there had been such a shoaling, I must have heard of it, because we gave these things before the Commissioners at all our meetings. If anything of the kind happens, I cannot walk in Shields or Newcastle without being taken hold of, to be told of it, so that if there had been any shoaling, some one I am sure would have pulled at my coat long before now, and told me.

13,069. You propose to improve the Tyne, the Wear, and the Tees. Can you tell me the distance between the Tyne and Tees?—About 23 miles.

13,070. And can you tell me the distance from the Tees to Flamborough Head?—No.

13,071. Should you be prepared to find that it was somewhere about 50 miles. I think it may be.

13,072. And would you spend the whole of the

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money upon the 23 miles, and leave the 50 wholly unprovided for; because that would be the effect of your proposal?—I would; at Filey Bay you have already got some shelter, and for the best of all reasons, that the bulk of the trade is here.

13,073. Then do I understand you to say that vessels require a harbour of refuge at their ports, and not where they are overtaken by storms in their voyage?—They do.

13,074. You lay that down as a principle?—I do. You find that vessels require more protection where they belong. All the practical information which I have been able to collect, and all the information most distinctly shows that old sailors will make at a considerable risk for the port they belong to, and if those ports have all the facilities which they can have, then it is that life and property will be safe.

13,075. You are not a nautical man?—No, I am not.

13,076. Are you aware of the proportion of laden to the proportion of light vessels which are lost?—No.

13,077. Have you seen the returns of the Board of Trade?—I have, and they will be put in to-morrow.

13,078. (*Capt. Sulivan.*) You say that it is important that the harbour should be improved, because vessels running for the ports they are bound to will persist in doing so. Then, with regard to all these three ports which you mention, that reason would apply to light colliers, and not to laden colliers?—There are a great many merchant vessels bound to the ports, as well as the colliers.

13,079. But as to colliers only, your reason would apply to light and not to the laden colliers?—Yes, it would; the laden vessel, in case of contrary wind, will come back. We have it continually happening that vessels from the Wear come back to the Tyne. You will hear of a vessel which a few nights ago went out and came back again.

(*Mr. T. Glover.*) I have the honour to appear here with Mr. Williamson and Mr. Salmon as a deputation from South Shields. I have only to say that we take the same view as our friends in Newcastle with respect to a harbour of refuge for this important port, and we are very glad that Her Majesty's Government has sent a Commission, and I am sure the evidence which you will hear from the shipowners will be such as to convince you of its necessity.

Mr. Joseph Straker examined.

Mr. Joseph Straker.

13,080. (*Chairman.*) Are you resident in South Shields?—No; I reside now a little further up the Tyne. I was for a great many years resident at North Shields, but I have lately removed from that place.

13,081. In what way are you connected with the port?—I am a shipowner to a small extent. I have been a very considerable shipowner, but I have sold out of it, as not being a very profitable speculation in the present times, with the competition which we have under free trade. I have got into something which pays me better; the coal trade. I may state that I was bred to the sea, and have commanded ships. Afterwards I had something to do with the graving and repairing docks in the river, and I have been a shipowner all my life; for the last 50 or 60 years.

13,082. You are aware of the object of this inquiry?—Perfectly.

13,083. Will you state to the Commissioners any opinion which you may entertain as to the advantage or necessity of a harbour of refuge—a great national harbour—on this part of the coast?—I have given that matter a great deal of consideration; for living, as I did for many years, at the mouth of the Tyne, I have witnessed all the wrecks which have taken place, and I have come to the conclusion that refuge is necessary, but that no harbour of refuge in any one locality will be sufficient for the necessities of the trade. I have quite come to the conclusion that the improvement of the different harbours along the coast will be much more effectual for the preservation of life and property than one single harbour in any particular locality, let it be to what extent it may. And, if you will allow me, I will give you my reasons for that opinion. It has been already stated to you that a very great number of vessels, a very large proportion of the shipping of the country, trade here to this very port and its neighbour the Wear. Now, the nature of the trade is such that people are all employed by the voyage, and not by the month, masters as well as seamen. A great many of these people live in this immediate locality. Their wives and families are here, and if you had a harbour of refuge at any one particular part of the coast, my opinion is that it would not be frequented by anything like the extent anticipated by those who advocate a single harbour of refuge, but that ships would pass it and persevere in going to their port of destination, and that the loss of ships and life will be diminished in a very trifling degree to what it would be if you were to improve the existing harbours. This is the conclusion to which I have come after a great deal of consideration of the matter. The difference between the trade upon this north-east coast and that in the Channel, for instance, where a harbour of refuge may be much more effectual, is this, that a great many foreign ships coming to British ports and passing up the Channel have to call for orders at some port or place; therefore it is necessary they should have some place to go to; there should be some place for them to go to, and a single harbour of refuge would be much more useful to them than on this coast, where it is hardly ever known that a ship calls for orders—ships come direct to the port and discharge, and proceed to their own port. If an opportunity occurs they go in; if not, they keep to sea. In the Channel, I say, it is different. Ships call for orders, and it would answer remarkably to go into a harbour of refuge while they were corresponding with their London and Liverpool friends, to get further provisions and to get their men renovated, for after a day or two's rest a crew come out new men. But here it is quite different. Ships, I believe, almost in 99 cases out of every 100, would pass such a harbour of refuge and come on to the port they are bound to. That is my firm conviction.

13,084. When you were at sea, in what trade were the vessels chiefly employed which you commanded?—The vessels I commanded for some years were engaged in the Baltic, the North American, and the Mediterranean trades, and in the winter season we got into the beautiful coasting trade—the coal trade.

13,085. How many voyages have you made to the Baltic?—Do you mean altogether?

13,086. Yes, altogether?—I really can hardly tell, until I have given the subject some consideration. I think I was for five or six years in the Baltic trade, and sometimes made two, and sometimes three voyages a year, but then we sometimes turned into the coal trade.

13,087. Have you returned from the Baltic late in the year?—Yes, I have.

13,088. Will you give me your opinion as to the advantage or necessity of a harbour of refuge on the east coast of Scotland for the Baltic trade? Would it have been any use to you?—Certainly not to me, for I was always bound to this port and came here.

13,089. But in the event of unfavourable weather; in the event of the prevalence of winds from the south-west, so that you were not able to make a straight course?—I may tell you I always bore up for my port, with a foul wind I kept to sea; but if I should have had to do so, if you will tell me which way the wind, I will tell you what port I should have borne up for. In a south-east gale I would have gone to Leith Roads, unless the weather allowed me to get into the Farn Islands.

13,090. Has it ever occurred to you not to make the land until as far north as Buchan Ness ?—No ; I always made for Tynemouth Castle.

13,091. Therefore you never made the coast of Scotland bound home from the Baltic as far north as Buchan Ness ?—Never, when bound home from the Baltic. I may give as another reason why ships will not enter a harbour of refuge in any particular locality, the very low rate of their freights and the absolute necessity of persevering and making their voyages as quickly as possible. With the competition of railways, freights are reduced so low now that it is with the greatest difficulty ships can pay their way.

13,092. I understand you to say that it is of very great importance that captains who command your ships should keep the sea in all weather, and make their voyages if they can ?—Certainly.

13,093. Has it ever occurred to you, in the course of your experience afloat, that if you had put into a harbour of refuge you would have saved wear and tear of your ship and damage to the cargo ?—Such a thing might happen, unquestionably, but the practice is not to give it the chance.

13,094. (*Sir F. Smith.*) I think you mentioned that you commanded a vessel trading to America ?—Yes.

13,095. Were you in the habit of going north about ?—Generally north about from here.

13,096. Did you go through the Pentland Firth ?—Yes, through the Pentland Firth.

13,097. Have you ever been through the Pentland Firth in a gale of wind ?—Yes, I have.

13,098. And meeting an adverse tide ?—Yes ; and a very ugly navigation it is.

13,099. Which is the usual course to America ?—Going outwards we make Duncansby Head, and make for the Firth, and wait for the proper time to go through.

13,100. You dodge about ?—Yes, dodge about.

13,101. And wait till the tide turns to run through? —Yes.

13,102. Have you ever had occasion to run into Cromarty ?—I never did run into Cromarty.

13,103. Do you know Long Hope ?—Yes, but I never was in it.

13,104. Is it good anchorage ?—It is considered good anchorage.

13,105. And usually taken ?—Yes ; but I never took it.

13,106. Do you know anything of Wick ?—No, nothing but what is on the chart.

13,107. You have passed Peterhead ?—Oh yes, often.

13,108. What do you think of Peterhead and Wick for vessels going north about, either homeward or outward bound ?—I do not know them sufficiently to give an answer to that. The only port to the north of the Firth that ever I was myself in was Aberdeen, and certainly it was not a very good harbour at that time, but I understand it has been improved very much since.

13,109. What size of vessel did you command at that time ?—A brig of about 240 tons.

13,110. Can you go in at low water, or are you obliged to wait for the tide ?—I know you are obliged to wait for the tide.

13,111. I suppose vessels of any size can come in here at high water, can they not ?—When you know the draught of water you can judge. We had one in a gale of wind on Saturday drawing 16 feet of water.

13,112. What time of tide was it ?—She would take the best of the tide, no doubt. I was not here to witness it myself, but I have a memorandum from the harbour-master stating that a ship drawing 16 feet of water came in.

13,113. You are aware of the improvements of the Tyne ?—Perfectly. I have been on the River Commission until now, when, having removed beyond the limits, I can no longer act.

13,114. As a gentleman of considerable observation, have you reflected on the effect of the works ?—Yes, I have given the matter great consideration. There was not one meeting which I did not attend when I was on the Commission. Moreover, I quite agree with what the Chairman has stated, that the depth of water is improved.

13,115. Already ?—Already, and is gradually improving.

13,116. You have no doubt that if the piers are carried out at an expense of 800,000*l.* the result will be highly satisfactory ?—That is my opinion.

13,117. And vessels of the largest draught of water will be able to come in at any time ?—That is more an engineering than a nautical question ; but if the effect which the engineers anticipate is realized then they will.

13,118. And you have no reason to doubt that the effect anticipated will be realized ?—I have no reason to doubt it.

13,119. Then the result of your observations rather leads you to believe that Mr. Walker is right ?—That is so.

13,120. Do you imagine that there is any feeling amongst master mariners and shipowners of the district to make for their own port, so that if a harbour of refuge were made at the Tees it would be a reflection on the sailors of the Tyne to go there ?—Decidedly there is such a feeling ; and, again, they are all so well acquainted with this locality that they would not risk their ships in a strange place if it were possible to reach this one. They know every inch of the ground, and the set of the tide ; therefore, if their own interests do not lead them elsewhere, they will not go.

13,121. Do you think any proportion of the casualties has happened from the circumstance of the master mariners attempting to get to a port not the port of their destination ?—Yes, I know an instance of that very lately, and I believe you will have a captain of a ship before you who will state that instance. I forgot to mention of ships which put back with a south-east or east gale to the Tyne. It happened that they saw a vessel deeper in the water running for Hartlepool. Seeing this ship go in, although they admit they were not well acquainted with the place, they ran for old Hartlepool and stuck fast. Another ship did the same, and each took the ground at the entrance.

13,122. Are there any instances of ships running back from Flamborough Head to take refuge in the Tyne ?—I think that is a thing which does not often occur, because ships rounding the Head can generally reach the Humber.

13,123. But ships being to the northward, awaiting adverse winds, when bound for London, would they not run for this port ?—They would, if they were obliged to take a port.

13,124. Are there instances of casualties in running for the Tyne ?—We have had many instances of laden ships running here and striking the bar.

13,125. We have had evidence before the Select Committee of the House of Commons that ships run back as far as the Firth of Forth ?—That is also the case. Different commanders of ships take different views. Where the great bulk run for the Tyne, more than a fourth run for the Firth of Forth.

13,126. I presume that if there were a harbour at Filey they would be saved that long voyage ?—If they were to the south of it.

13,127. Do you know Bridlington ?—Yes; very well.

13,128. Do you think that bay possesses capabilities for forming a harbour of refuge ?—Yes, very great capability. I think myself Bridlington Bay a much better place to form a harbour than in the bight of the bay down here, and for this reason, that any quantity of materials to form a breakwater may be found at a spot under Flamborough Head, close to Flamborough Head, but a sufficient distance from it to form an excellent place of refuge. There is also a shoal called the Smithic. Now, I think something in the shape of a crescent formed on the Smithic Shoal, leaving an opening between the north end

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and Flamborough Head, and leaving an opening also to the south, would make a decidedly better refuge than any place down in the bight; and there would be this advantage, that a ship would be always to windward, and at an advanced point. Supposing ships took refuge in that harbour from the east-south-east to south-east, they can come round the north end, between it and Flamborough Head, and make their voyage down to their ports. If the gale should be north-east they can go round the south end; laden ships will go to Yarmouth, and light ships will come to the place of their destination.

13,129. Then your opinion is, that Bridlington Bay is well worthy the consideration of the Commissioners?—I think it is; and there is another point. By taking it at the proper time of the tide, you get under weigh at high water. The strong outset of the tide between the Smithic Shoals is such that a laden vessel would drive out.

13,130. Do you know Hartlepool Bay?—Yes; I know Hartlepool Bay.

13,131. In the event of any works being instituted there, do you imagine it would be better to have a detached breakwater with access at both ends, or to connect it with the shore?—You wish me to take an engineering view of it.

13,132. To a certain extent a sailor's view also?—But one great matter would be the expense.

13,133. Consider only the saving of life?—But I mean, to make the place equally effectual. You know that where a breakwater is connected with the land it affords an opportunity for conveying materials at all times of the year on to it. If you could make it equally effective I should prefer its joining the land. If it cannot, then of course the saving of life and property is the first consideration, and you must have it detached from the land. But one of the great objections to that bay is this, that it is very shoal towards the land; it is very shoal a considerable way from the land; that is, it shoals gradually out, and from all that I can ever learn I believe it is shoaling and will continue to shoal. At Old Hartlepool the practice of sluicing into the entrance makes an accumulation on the bar, which has grown out continually. Then the Tees, on the other hand, is surrounded by sands, and every freshet brings a quantity out. The result is a gradual shoaling up of the bay. Supposing, for argument's sake, that a breakwater were formed in either way, either connected with the land or detached from it, and let us suppose also a large fleet of ships caught in that immediate locality, we know by experience that the smaller ships always take the first of the tide, and run in first. It has been proposed that vessels drawing little water should go into the shoal water, and that according to depth vessels should take their stations farther out; but I should be glad to know whether any gentleman here, if he were in a small vessel running in, would not choose the best berth the harbour could afford. The consequence would be that before the larger ships could take their places, the ground would be occupied by the smaller ones. Again, to what extent can that harbour be made available?—At Yarmouth Roads we have a place 12 miles long, and we do know the facilities it has afforded as a natural harbour of refuge. Yet I have known ships obliged to run through Yarmouth Roads because they could not find anchoring ground, and go to Harwich. The same number might be caught down here, and how are they to be accommodated?

13,134. You consider that a great argument in favour of dividing the harbour?—Yes, of dividing.

13,135. You say that no one harbour, however considerable, can meet all the wants of the trade?—I think not. If you give the government money to make only one harbour of refuge, I should say it will not be sufficient.

13,136. Do you consider, as a general principle, taking any coast, that it is better to take the indentations of a bay than a promontory which forms one of the horns of the bay, to make a harbour?—I should prefer the promontory, because a ship with any wind could get out and make her voyage. If she were at the bottom of Tees Bay with a south-east wind she could not get out.

13,137. But supposing a vessel had not to go to a port of discharge but to a port of call, which would afford most facility to trade, a port in the bight of a bay or on a promontory?—I would decidedly prefer improving the ports where ships have to go to, and I would have the greatest improvements, and the largest sums of money laid out upon that port which had the largest amount of trade to accommodate. I think our Chairman, Mr. Cowan, neglected one thing when he spoke of the readiness of the people of the Tyne to lay down pound for pound; he might have gone farther and said that we will admit all ships for refuge without the payment of a farthing.

13,138. What do you think of the Humber as a place of refuge?—It is a good place; it is the only place resorted to in that neighbourhood.

13,139. Can vessels of great draught of water get in?—Yes; they can.

13,140. Looking at the wreck chart, I find an immense amount of collisions and damage off the Humber?—Off the Humber.

13,141. Yes, off the Humber. How do you account for that great loss by collisions?—From collisions I think you said?

13,142. Chiefly from collisions; there are few wrecks?—I can only account for it by the great number of ships running for the same place at one time. There is a very dangerous shoal at the mouth of the Humber called the Stoneybinks. I have known a ship catch their banks, and with a flood tide, though a new first-class vessel, roll over and drown every man on board.

13,143. Then you think it is very probable these collisions happen from the circumstance of vessels running together to get shelter at one time?—Yes.

13,144. And that is an argument for lessening the risk by increasing the number of harbours?—Yes.

13,145. (*Mr. Lindsay.*) How long did you reside at Shields?—Some 60 years, I think; perhaps 70.

13,146. During your long residence at Shields, have you seen any great loss of life?—Yes; I have, I am sorry to say.

13,147. And a large loss of property?—Yes; a large loss of property.

13,148. Out of what description of vessels were the lives chiefly lost?—Coasting vessels chiefly.

13,149. Have you known many strange ships lost in this immediate neighbourhood?—I have known strange ships lost, but nothing in comparison with vessels belonging to the neighbourhood.

13,150. Now, is it your opinion, for you have evidently given great attention to this subject, that if a harbour had been constructed, such as Mr. Cowan has shadowed forth, a large proportion of these lives which have been lost would have been saved?—I have no doubt of it whatever.

13,151. During what gales of wind has the greatest loss of lives and property occurred?—In a wind generally south-east to east-south-east.

13,152. Well, then, a wind from east-south-east will blow right into the Tyne?—It does, right in.

13,153. Supposing these piers carried out in the manner proposed to five or six fathoms of water, would a heavy sea tumble into the bay then during east-south-east gales?—I think not; not in comparison to the present sea which we have.

13,154. Not in comparison?—Not as compared with the present heavy sea, which we have.

13,155. Why do you think that the extension of the pier will lessen the sea tumbling into the harbour?—Because as you get into deep water, the sea does not break it rises and rolls, but it is very different from broken water. A wave will strike a ship, and in one instant turn her head to wind, and many instances have we known of vessels, when struck by the sea, becoming quite unmanageable and driving ashore.

13,156. Is it on account of the heavy ground-swell, which raises a dangerous sea, that a ship becomes un-

manageable, and, consequently, is driven on the rocks to the north or the beach to the south ?—Yes.

13,157. Is there a large amount of property lost ?—Yes.

13,158. And life ?—Yes.

13,159. Were the piers carried out, you would remove that heavy sea, because they would be beyond the limits of the ground swell ?—You would ; even by the piers, as at present projected, I think we shall, in a great measure, obviate that danger, because if a ship is once inside the piers, and is driven on the sand, on one side of the rocks or the other, she will be partially sheltered by the piers.

13,160. Then, in fact, if the piers were constructed there would, if not of property, be a saving of life ?—There would a saving of life and of property too.

13,161. And of property too ?—Yes.

13,162. Have you seen, in your time, many laden vessels get away a good distance from the harbour, and then obliged to put back ; I speak more of vessels bound south, the colliers ?—Ships bound south, if once they can reach and round Flamborough Head, generally get to the Humber ; but if short of Flamborough Head, and a heavy gale comes on, and more especially if the ship has become leaky, which many of these heavy ships do when plunging overhead, they are obliged to put back, and run either for the Tyne or Leith Roads.

13,163. Then your opinion is, that if ships weather Flamborough Head, they usually reach the Humber ?—They usually do.

13,164. Then if that is the case, why do you recommend a harbour of refuge at Bridlington Bay ?—I did not recommend one ; I was asked as to the capabilities of Bridlington Bay.

13,165. You only alluded to the capabilities of Bridlington Bay, not to the site ?—No; I am decidedly of opinion that no one harbour will answer the purpose.

13,166. But I understood you to say, that you considered Bridlington Bay a better site than Filey Bay or Hartlepool. Is that your opinion ? Do you consider it a better site ?—Yes ; than any other place near to it, such as Filey Bay.

13,167. But if it is the case, that ships which weather Flamborough Head, usually reach the Humber, and if it is the case, that ships are usually caught to the northward of Flamborough Head, and, consequently, cannot weather Flamborough Head, and are obliged to run back to the bight of this bay, why do you consider Bridlington Bay, which is to the southward, a better site than a place to the northward of Flamborough Head ?—I think it has this advantage—that supposing a ship were in Bridlington Bay, with such a place we have been describing, if the wind came away to the south-east, she could get under weigh and come north to her port. If she were down in any of the bights, she could not get out with the same facility. But I do not advocate or recommend any of them.

13,168. You do not recommend any of them ?—None of them.

13,169. Supposing the Tyne were converted into a refuge harbour, such as you recommend, and a harbour were made south also, in the bight of the bay, either at Sunderland or Hartlepool, would you then, looking to the expenditure of the public money, think it necessary to have another harbour farther south, somewhere about the site of Filey Bay, or somewhere about the site of Flamborough Head ?—I can only answer that question generally, that the more harbours there are the better.

13,170. I wish you to look at it as a question of the expenditure of the public money to the greatest advantage ?—A harbour of refuge about here would certainly be of use to a certain extent, but still I hold to the principle of improving the present harbours. I am of opinion that that would be far more effectual than any one harbour of refuge. If the government were prepared to give a harbour of refuge in addition to improving the existing harbours, it would be better still.

13,171. From your experience, do you think a harbour south much wanted ?—I do not think so.

13,172. You do not think so ?—I think the result would be, that it would not be used.

13,173. You think it would not be used ?—If these ports were improved in the way contemplated, I think ships would rather run there.

13,174. That is to say, you do not think that a harbour at Filey Bay would tend much to save life and property ?—I think not.

13,175. Ships put out from the Tyne, the Wear, and Hartlepool, with the wind fair and weather fine, thinking they will get to London, but when to the southward, near Flamborough, are caught with a heavy south-east gale or east-south-east gale, which I understand are the most dangerous gales on this coast, and are obliged to run for shelter and come down helter-skelter, and congregate in vast numbers at the mouth of the Tyne, the Tees, or the Wear, as the case may be ; would it or would it not, in your opinion, be a great facility to commerce if there were a harbour somewhere about the site of Filey Bay, where these ships could run in and find shelter until there was a change of wind ?—Taking it in comparison with the other places which have been spoken of—Bridlington Bay, for example—I should prefer Bridlington Bay. The reason is——

13,176. I spoke of vessels caught to the northward of Flamborough Head, which could not get into Bridlington Bay ?—Then, if they could not get to Bridlington Bay, I think it would be of advantage to them ; but there would be this disadvantage, that if the wind came north-east or east-north-east, blowing hard, if they were in an offing they could make their passage, but they could not make their passage out of such a harbour, and it is not the practice of ships to hug the shore to the eastward, they generally take an offing and try to make their passage.

13,177. Going out of the Tyne, if there is any east in the wind, do they go right out to sea till they get a good offing ?—Not right out, but they take a good offing, with the view that if the wind continues east they will be able to weather Flamborough Head and get to the Humber, or make their passage.

13,178. But if there were a harbour somewhere about the site of Flamborough Head or Filey Bay, either south or north of the Head, would it not tend to lessen, to a very considerable extent, the number of vessels which crowd outside the three harbours which I have named, and thus lessen to a considerable extent the loss of life and the damage to propertywhich take place, and which arise from vessels all running to these harbours when there is often not sufficient water to enter?—It would have that effect if ships would take the place, but my opinion still is that they would not take the place, that they would persevere for their ports.

13,179. With a south-east wind, caught to the northward of Flamborough Head, it would be a comparatively easy wind back again to the Tyne, would it not ?—It would.

13,180. Would it not be a considerable saving of time and expense if there were a harbour near the Head, into which vessels could run instead of running back to their own ports ?—Much depends upon the description of harbour which it would be. If it were a place which they could get out of easily again, then they might take it, but if there were any risk of that, then they would not go near it.

13,181. Have you many vessels which run to the Tyne for refuge ?—Well, in comparison to the number of ships which go out and come in, I cannot call the number great. There is a number, but when you look to the immense number of vessels coming and going, I cannot call it great.

13,182. What number of ships have you leaving the Tyne annually ?—About 45,000.

13,183. Do you know about what number of ships take refuge in the Tyne annually ?—I am not prepared to say. There are other gentlemen who will perhaps give you an exact account when under examination.

13,184. Are there many ships which take refuge at Hartlepool now ?—I think not many.

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Mr. Lindsay.

13,185. Are there as many which take refuge there as take refuge in the Tyne ?—I should say not.

13,186. Are there half as many ?—I should say not half as many, but I do not know the number.

13,187. Supposing a harbour of refuge constructed at Hartlepool, and every facility for vessels using that harbour of refuge, would it be of much advantage to the shipping of this immediate neighbourhood ?—Generally it would not, for reasons which I have already stated. Ships leaving here take an offing. They do not look to Hartlepool, but if caught near it with the wind dead on the land, they would take it.

13,188. It would be of some use ?—Yes, it would be of some use.

13,189. But you think it would not be of considerable advantage, because vessels bound south take an offing ?—Just so. There are many reasons why vessels prefer the Tyne. The high land at Tynemouth Castle, with the lighthouse and castle, forms a prominent object that men on the coast would know again if they saw it under any circumstances, even through a snow storm. In the neighbourhood of Hartlepool the land is low ; there is no conspicuous object to mark the coast. I think that men at sea, obliged to run for a port, especially in snow showers, would like to run for a place above it, there could be no mistake. With Tynemouth Castle to lay hold of, and the piers to guide a ship into the harbour, I think they would decidedly give it the preference to running down to the bottom of a bay. Besides, the moment a ship enters within the piers she has every facility afforded her, for there are some 200 tugs belonging to the Tyne, so that if 200 sail were to enter at one time, there would be a steam tug for each to carry them away to their berths. Again, it is nearly a mile to run from the bar into Hartlepool Harbour—the Narrows, as it is called—and to a ship under storm sails that is a consideration. At the Tyne they have no occasion to let go their anchors ; a steam tug lays hold of them and takes them to their berths. Again, I have it from experienced pilots, that a port more easy to make than the Tyne is not to be found anywhere, not only on this coast, but on any other coast. Again, if a ship gets damaged—I know it from my own knowledge—there are some 50 or 60 docks, and about 24 shipways and gridirons for the repair of vessels. There is everything to be got here which a ship requires. Now, when we are considering a proposal for a harbour of refuge, it must be remembered that you cannot keep up a staff of that kind purposely for the assistance of ships occasionally frequenting such a harbour. I do not know where the funds are to come from to pay for it. It would not be practicable ; but here you have all these facilities. We have steam men-of-war and other steamers coming in here. We have the best steam coal in the country. We have some of our docks which will take very large vessels. The *Carlo Alberto* frigate was in North Shields, and another in South Shields. The *Bulldog* was also in the harbour. All these are advantages which it is impossible to have in a place simply for refuge.

13,190. Are your most dangerous winds accompanied by thick weather ?—Very often by heavy showers of rain, and in the winter by heavy showers of snow.

13,191. As it is only in gales of wind that harbours of refuge are wanted, it is consequently all-important, if that is the case, that whenever a site of a harbour of refuge is fixed upon, there should be a conspicuous headland to guide vessels in ?—I think that one of the most essential requisites.

13,192. Is the land easier made in the neighbourhood of the Tyne than in the neighbourhood of Hartlepool ?—Yes.

13,193. Is it easier made in thick weather ?—Decidedly.

13,194. Is it easier made than the land at Sunderland ?—I think it is, but there is not much difference there.

13,195. Do I understand you to say that there is a decided difference in that respect between this and Hartlepool ?—Decidedly. There is a much more distinct mark here.

13,196. Is Tynemouth Castle better known to ships trading along the coast than any other point ?—I think so.

13,197. Then, in fact, Mr. Straker, I understand the sum and substance of your evidence is this, that, looking to the objects which the Commissioners have in view, which are, first of all, the saving of life ; secondly, the saving of property ; and, thirdly, facilities of commerce,—taking into consideration all these points, you think that the public money, if it is to be expended at all, should be expended in improving the existing harbours, so as to make them accessible at all times of the tide rather than in the construction of any one harbour of refuge, wherever the site might be ?—That is my decided opinion. I may add that I would not confine it to the three places named by Mr. Cowan, but I would also wish the Government to extend aid to some of the fishing stations to the north. There is never a summer but what some of the fishermen are sacrificed. They go out in the herring fishery, and if they have a good haul they have it at the risk of being swamped coming in. I have observed that during the herring season the gale often comes on north-north-east. There is no place to make for, and almost invariably some of these poor fellows are lost. Therefore, I think that a very small sum comparatively, if laid out on some of these places, would be of great service in the saving of life.

13,198. Do you allude to any particular place ?—I take the whole range of the Scotch coast.

13,199. From Wick southward ?—Yes. As you gentlemen have visited those places you will be better acquainted with them than I can possibly be.

13,200. I do not clearly gather what your opinion is as to the necessity of a harbour on the east coast of Scotland. Have you considered the subject sufficiently to say whether a harbour there is necessary ?—I have not thought so seriously of it as of this place, which has been under my daily observation for half a century. Though I have gone along the Scotch coast, as I have said before, I never put into a harbour in my life, and consequently I have never visited the Scotch ports.

13,201. Then the opinion which you have formed as to the best mode for expending the public money on this coast is not a new one, but one to which you have given your attention for nearly half a century ?—I have, and I have thought of it ever since I thought of anything.

13,202. Then your great experience gives you the opinion that sailors will run, if there is any chance of reaching it, to that port to which they belong in preference to all others ?—That is my opinion.

13,203. Consequently, you have arrived at the conclusion, that if money is spent for the saving of life, which is the all-important consideration, it should be spent at such places as those which men run for when caught in violent gales of wind, and obliged to seek shelter ?—That is my opinion.

13,204. (*Capt. Washington.*) With reference to the last opinion which you have expressed, that sailors will not go into a port of refuge, even if constructed, but rather run for their own ports. I think you have said so ?—Yes.

13,205. And you spoke of the Tyne, of the Wear, and the Tees, do you speak of them in their present state, or as proposed to be improved ?—I spoke always of them in their present state, and what I said will apply much more favourably, of course, if they were improved.

13,206. You have spoken of laden vessels which bear up and run ?—Yes.

13,207. Those laden vessels only go out just at the best of the tide, do they ?—Just so.

13,208. If caught in a gale of wind and obliged to run, they might be 11 hours off one of those ports ?—They might be.

13,209. Is that a safe state of things, and would you recommend that state of things to continue ?—I do not consider it safe.

13,210. To keep a vessel for 11 hours off the port in a gale of wind would expose the lives of the crew to almost certain destruction, would it not ?—No ; because many come in safe, and all expect to do so, and with that expectation they take those ports.

13,211. Might not the contingency arise, that they might be driven back and caught in a gale of wind and obliged to wait 11 hours ?—Yes.

13,212. What must they do under those circumstances ?—Keep in the offing until the tide serves.

13,213. Are vessels which sail from the coal ports of the Tyne, the Wear, and the Tees so found, so fitted, and so manned that they can keep the sea in an on-shore gale ?—Laden ships can.

13,214. Laden ships can ?—Light ships can, but necessity obliges them to throw their ballast at sea.

13,215. What necessity is there obliging them to throw their ballast at sea ?—Many of them, if they brought their ballast into the port, would make a loss instead of a profit.

13,216. Then do I understand that vessels risk the destruction of their crews to save the small sum for ballast dues ?—They certainly do it, there is no denying it.

13,217. Are the ballast dues heavy at the Tyne ?—Rather so.

13,218. Then is not what you have stated an argument that the ballast dues should be decreased ?—There is the loss of time as well, while throwing the ballast. When they come in empty they can take their cargo directly.

13,219. How long does it take to get rid of ballast ?—That depends upon their turn ; they must wait their turn.

13,220. How long does it take them to get rid of ballast ?—When they are at the berth three or four hours.

13,221. How long are vessels waiting to get to their berth ?—That is quite an uncertainty ; it must depend on the number of ships.

13,222. Can you not give an answer?—I do not think I can. I have known ships have to wait two or three days, and I have known at other times when there has been no delay at all, and they could get their ballast out immediately.

13,223. Are those cases of throwing ballast at sea within the power of the Tyne Commissioners to remedy?—Well, I do not know that it is ; the principal part of the dues is derived from ballast.

13,224. Would they not rather sacrifice the dues ?—But it is incurring a risk in another way: if the income is so reduced that they cannot dredge, ships will risk loss at the harbour's mouth. It is a choice of evils.

13,225. Speaking of ballast, we have gone away from the first question which I asked: what vessels would have to do, if they arrived off the bar, and had to wait for 11 hours to come in? — Some of them would keep the sea until tide time; others, if the wind served, would go further north, to Leith Roads.

13,226. And you, as a sailor, do not recommend a harbour of refuge to save those vessels which would rather run the risk you would expose them to ?—I look at the question as it is. I have given my reasons why I would not do it. I do not say that I do not wish vessels to avail themselves of a harbour of refuge, but I say that the practice would be, that they would not do so, for the reasons which I have given. They know the locality, and to their own minds they think there is no greater risk in running for their own ports than in running for a harbour of refuge. They know that there are the appliances which I have mentioned, steam tugs and pilots ; and that if their ship got a little damage, it could be repaired there. If a ship was damaged, and got to a harbour of refuge, she would temporarily repair, and come afterwards to the port she was bound to, to complete her repairs.

13,227. Hartlepool Bay has been mentioned as a harbour of refuge, has it not ?—It has been mentioned incidentally.

13,228. Would there not be the same facilities for the repair of ships at Hartlepool as at the Tyne ?—Certainly not.

13,229. But there would be sufficient means to repair them ?—But still they would have to go into a harbour to do it, because the harbour of refuge is to be outside, in the bay, as I understand.

13,230. But at tide time there would be no difficulty, would there, in that ?—They prefer repairing at their own homes, and they prefer coming to their own ports, rather than go into another port.

13,231. But if it is a case of danger, is there time to think of connections ; are not the lives of the crew entrusted to the commander of a vessel, and is it not his duty to run for a place of safety, rather than risk loss for the sake of his relations ?—But, as I understand, this is when they are in safety, if they were in harbour in Hartlepool ; I say they would not avail themselves of the port nearest to them.

13,232. Do you think it desirable that this state of things should exist, and remain so ?—No, decidedly not ; and I think the best way to effect the improvement is to improve the different ports along the coast, in preference to any one harbour of refuge in any one locality.

13,233. I understand you to advocate the improvement of the three harbours at the mouths of the Tyne, the Wear, and the Tees ?—No, I do not confine myself to these harbours ; I think it should be extended to many other places, even to fishing stations.

13,234. I am very glad to hear you say so ; but for the moment, we are speaking of the north of England. You propose that those three ports should be improved ?—No ; I do not state any place particularly. I leave that to engineers.

13,235. Are there any other harbours near ?—Yes ; there is Blyth Harbour, and Warkworth Harbour to the north, again.

13,236. Do you know Warkworth ?—No.

13,237. Do you know that a sum has been laid out upon it ?—Yes,

13,238. And piers carried out ?—Yes.

13,239. Under one of our most eminent engineers ?—I do not know the name.

13,240. Nor do I ; but I believe he is one of our most eminent engineers. Do you know what money has been laid out there ?—I know that a great deal of money has been laid out at Warkworth, and that it has not answered the purpose.

13,241. Do you think that as much as 150,000*l.* have been laid out at Warkworth ?—I should think so.

12,242. Do you think that more has been laid out ?—I do not know.

13,243. Do you know the depth of water now into Warkworth ?—No ; I am not able to speak to that.

13,244. Perhaps some of the pilots will be able to tell us ?—I dare say they will.

13,245. My belief is, that it is a dry bar ?—Very likely.

13,246. And before any money was expended, there were three feet of water into the harbour ?—I think that is very little.

13,247. Remember, that is one instance of improving by piers a river harbour, and the result is a dry bar at low water. Now can you, in the face of that, recommend that the Tyne, the Wear, and the Tees should be similarly treated ?—I find that the portion of the piers already constructed has had a beneficial effect ; and therefore, I think it is not unfair to conclude, that when completed, they will have a much better effect ;

13,248. I will not confine you to Warkworth, but go round the whole coast of England, and tell me if you know any river harbour which has been improved by piers ?—Will you allow me to increase the limit and go to Ireland ? I will then give you Kingstown.

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Mr. Joseph Straker.

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Capt. Washington.

13,249. Perhaps I shall save you trouble if I tell you that that is not a river harbour ?—I beg your pardon, yes, but I think Aberdeen.

13,250. Which cannot be touched or gone near at low water ?—Perhaps not ; but there is more water into it.

13,251. I will give you a better, Yarmouth ; but it cannot be touched at low water. As I understand, you propose to make refuge harbours of the Tyne, the Wear, and the Tees. Now, I ask you, can you adduce a single instance of a river harbour in the United Kingdom which has been improved, so as to be accessible at low water ?—I do not know that I can.

13,252. Still you wish to lay out money upon these rivers ?—I think if you improve them, even though the improvement should fall short of what is anticipated, and you should not be able to take those bars at low water, a great point will be gained, because ships take them not at low water, but at high water. That is the practice, and if you deepen the water so that they can come in at high water, a great object is gained.

13,253. Although an individual Commissioner, not connected with the Tyne, you will give me credit for caring as much for the enormous traffic going in and out as many residents do, and the desire to improve the river, if possible ?—There is no question about that.

13,254. But would the Commissioners be justified in recommending a large expenditure upon a river harbour without any proofs that that river can be improved ? —I hope that when the Commissioners sit in London, we shall be able to give proofs, with which we are not provided, for the reason which our Chairman has stated.

13,255. You mentioned Kingstown ; do you know that that is a good refuge harbour ?—It is.

13,256. And has not shoaled up since it was made ? —I believe not.

13,257. You are aware that a refuge harbour was made in the bay, that it exists, and is very useful ?— I do.

13,258. Is not that an encouragement to go only to the places in a similar position along the coast of England ?—I do not think that it is conclusive on that point exactly.

13,259. I think you said that you never had occasian to run for a place of shelter, which is an unusual circumstance ; how did it happen ?—Because I thought there was greater safety in deep water than running into shoal water.

13,260. Were you in a vessel well manned, and well found ?—So well manned, that we had come from North America with half a crew, and the pumps going all the way.

13,261. Is it a fact that the ships from the coal ports are well found ?—Well found, decidedly, well provisioned, and as to manning, it is difficult to draw the line there. When one man, in some cases, is worth three, you cannot decide that matter by the number of men.

13,262. Are they sufficiently manned ?—Sufficiently manned generally ; and I may say, that although they are not in the same order in their upper works, they are the strongest ships in their bottoms which go to sea.

13,263. And you do not believe that the chief cause of the wrecks on the east coast of England is due to the unseaworthiness of the vessels ?—I think not ; and when we consider it is not in deep water these ships go down. The great bulk of the loss is in taking the harbours. Upon that principle, as long as a ship will swim under me at sea, I will never run for a harbour.

13,264. You will keep the sea if you can ?—I will.

13,265. Do you think that facilities for repair are indispensable for a refuge harbour ?—Not to say indispensable, but incidentally an advantage.

13,266. You have heard Filey Bay mentioned ?—Yes.

13,267. Are there such facilities in that bay ?—I should say not.

13,268. Do you know it ?—I have never been in. I know it, having passed it.

13,269. Is it an open beach ?—It is an open beach, in part, a reef of rocks.

13,270. Do you believe that if a harbour of refuge is made anywhere, that all the appliances of docks and gridirons for the repair of ships will follow ?—I think they will not follow a refuge harbour. You cannot keep up a staff for an occasional demand. It would be impossible to maintain them.

13,271. Will ships sail in a tolerable wind—a north-east wind ?—Yes.

13,272. When they see a possibility to make a passage ?—Yes.

13,273. What is the course from Tynemouth to London ?—South-east-east. With the wind moderate from the east, they will make their passage.

13,274. They will sail with a north-east wind ?— With an east-north-east wind. They have this advantage, because they are more to windward. From Hartlepool the course is south-east and east clear.

13,275. There some winds then when vessels can sail from the Tyne, and not from the other ports ?— Yes.

13,276. If the wind heads them at Flamborough Head, what do they do ?—They generally fall to windward.

13,277. If the wind is southward, do you know no shelter on the south side of Flamborough Head, not in Bridlington Bay ?—Certainly not to the southward.

13,278. Do you think that if there were one, vessels would strive to round Flamborough Head, and go into the harbour ?—I think they would, because they could go out at all winds, north or south, when they could not out of a harbour in a bight.

13,279. (*Capt. Sulivan.*) Have you ever read a return of the number of laden and light ships which have been lost belonging to the colliery ports ?—Yes, I have.

13,280. I have a return in my hand. In 1856 there were 382 laden colliers lost, and 62 light colliers only were lost. Do you think, from what you know, that that is likely to be something like the proportion ?—I would rather refer that to another witness who has made more particularly a study of it— Mr. Mather.

13,281. Will it be the case that where a laden collier is lost, there will be greater loss of life generally than when a light collier is driven on shore ?— Decidedly.

13,282. Then if the Board of Trade Returns show five or six times as many laden lost as light colliers lost, and the loss of life is double in laden vessels to what it is in light, that would give ten times as great a number of lives lost in laden vessels to what are lost in light vessels, would you have every reason to think that estimate wrong, from your own knowledge ?—How wrong ?

13,283. The proportion in the numbers. If the returns show that double the number of men are lost in laden colliers, and that five times as many laden colliers are lost as light colliers, does that not give ten times as many lives lost in laden colliers to what are lost in light colliers ? would that be in accordance with your general idea of the subject of loss of life in colliers ?—I understand you are speaking of the fact.

13,284. Yes ; we have these returns before us. I ask you, whether you would have any reason to doubt that fact ?—Not at all.

13,285. The fact being, that two lives are lost in laden colliers to one in light colliers ?—I should not doubt that a laden vessel grounds in much deeper water, and there is more danger of loss of life. Light ships ground where the men can walk out dry shod as it were.

13,286. Is there much greater chance of light colliers getting off, and not being wrecked ?—Yes.

13,287. Might that account for the large proportion of laden colliers lost ?—Certainly it would.

13,288. Are not the laden colliers lost by leakage, and sinking at sea?—That would be a very small number.

13,289. Would not that increase the proportion of laden over light?—It would.

13,290. Supposing the returns to be correct, and that there are five times the number of vessels lost with cargoes in comparison with those in ballast, and a much larger number of lives, would you not think it right to consider the placing a harbour where the laden colliers would derive far greater benefit than the light?—Certainly; yes.

13,291. You say that the laden colliers often put back to their own ports, and are lost in taking their harbour?—That is so.

13,292. Do you know whether a large proportion of the loss in laden colliers occurs in that way?—That I am not prepared to speak to, and I would rather not speak to it, inasmuch as there is another witness who has all those particulars, and has taken the trouble to take them out of official returns.

13,293. But you gave as a reason, that they like to run for their own port?—Yes.

13,294. But is it not a fact, that except their own ports, there is no place to run for at the north of Flamborough Head?—Oh yes; they have the chance of all the ports which they pass.

13,295. To a Tynemouth vessel, is there any place between Flamborough Head and the Tyne, with a south-east or easterly gale, where there is such depth of water likely to save her as the Tyne?—I think not.

13,296. Might it not be the case, that these vessels run back to the Tyne as the best mode of saving their lives, more than because it is their own port?—They are best acquainted with it. There are many reasons—one is, that it is the best port they can find; another, that they are better acquainted with it; another, that there are greater facilities by steam tugs, which they cannot have in any other place.

13,297. But is it not the case, that at present there is no port to be compared to it south of it to Flamborough Head?—That is so.

13,298. But supposing a harbour of refuge to be constructed, accessible at all times of tide, either at Filey or Hartlepool, and vessels caught south of the harbour in south-east or easterly gales—do you believe that they would pass that harbour and run back to the Tyne?—I think a great many of them would. A proportion might not, but the greater proportion would, especially if they were subject to any tax for taking it.

13,299. Leave out the question of tax, and consider it purely as to the advantage of a harbour?—Then, I take it, I may suppose there is no more charge at one place than another.

13,300. Exactly so. Leave out all question of charges, and confine yourself to the laden colliers, and take all my questions as bearing upon laden colliers exclusively?—Then my opinion is, that still a large proportion of them would run for the Tyne.

13,301. That they would run for the Tyne in south-east and easterly gales generally?—Yes, generally.

13,302. What do vessels do, if, having left with a north-east breeze, it freshens to an east-north-east or northerly gale, and off Whitby they are in an offing?—They proceed to the southward, and make their passage, and there would be an end to the matter.

13,303. If the wind were dead on shore?—Then they make the best they can on either tack to get off.

13,304. In such a case, would a harbour between Flamborough Head and the Tyne be of any service?—If they could not get off, and there were a harbour under their lee, they would take that; if that were the last alternative they would avail themselves of it.

13,305. You spoke of one disadvantage in a harbour of refuge at Hartlepool—that it would not be sufficient for the number of vessels—that more vessels would enter than there was accommodation for inside?—No; I put it this way—that if a large fleet were caught in the immediate neighbourhood and obliged to run in, what would be the effect of it.

13,306. You said that the small vessels would run in, and the large vessels would have to wait for the tide. Do you think that a harbour of refuge at Hartlepool would still be a tidal harbour?—I do not know.

13,307. Would not a harbour, to be available to save life and property on the coast, if made especially with that object, particularly require to be accessible at all times of tide?—I should think it ought.

13,308. Then that objection to the size of vessels would not apply?—If there were depth of water at all times these ships could then go indiscriminately.

13,309. You said, that if there were a number caught off the port they would all want to enter at once the one harbour, and you instanced sometimes the number of ships in Yarmouth Roads. How do you reconcile that with your opinion that a harbour of refuge would not be used by vessels, if constructed—that it would not be used by vessels in large numbers?—I think I have accounted for it by stating the inducement which the captain and crew have to proceed to their own port.

13,310. From whatever motive, if there is a large number of vessels which will not run for a harbour, how can you fear any crowding in that harbour?—I am supposing a case where they have no chance, when they cannot get off the land on either tack, and are obliged to run to a harbour. If they have to run to Yarmouth Roads it happens that they run in until the roads are filled; and I have known vessels obliged to proceed right through, and go away to Harwich.

13,311. Then I understand you to say, that if there were a harbour of refuge, large numbers would go there?—If the place were in the track, and they cannot get off the land on either tack, then there is no alternative, they must go in.

13,312. Supposing that a harbour of refuge were constructed south of this, near Flamborough Head, would it save those which bear up off Flamborough Head leaking, in a south-east gale?—If a harbour were made where do you say?

13,313. To the southward of this, between this and Flamborough Head. Would it reduce the risk of vessels bearing up leaky?—It would, to the extent of whatever ships happen to be in a leaky state.

13,314. You gave an answer with reference to collisions off the Humber. Is it the case that there is a large passing trade north and south?—Yes.

13,315. Is it the case that there are a large number of steamers leaving it for all parts of the world?—There are a great many.

13,316. A great many steamers go out from there to the north of Europe?—Yes.

13,317. Might not that account for the large number of collisions, the fact of steamers passing the track of a great passing trade?—Yes; I think many collisions attributable to steamers.

13,318. And at Flamborough Head, do most vessels round rather close, and steamers also rather close?—That is so.

13,319. All those collisions do not bear upon a harbour of refuge?—No.

13,320. They often occur at night time in moderate weather, do they not?—Yes.

13,321. You spoke of the difficulty of vessels getting out again. Suppose that Filey Bay were made into a harbour, do you see any greater difficulty in getting out of Filey Bay than in getting out of the Tyne?—Yes; it only needs a glance at the chart to see that with the wind east-north-east they will get out of the Tyne and make their passage, but with the same wind blowing into Filey Bay I do not see how they are to get out at all.

13,322. How do vessels get out of the Tyne with the wind north-east?—By towing down to the north pierhead and sailing from there.

13,323. If vessels tow out of the Tyne, if they wish to proceed to sea with the wind on shore, cannot they be taken out of Filey Bay in the same way?—Not with the wind blowing right on shore. If it blow hard I

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do not think a steamer can take them out, and then we have already a staff of steamers here to the extent of 200.

13,324. If a harbour of refuge were found to take a large number of ships, and so cause the demand for steam towage in that harbour, do you believe that steamers would go to supply that demand?—You cannot expect it, because it will be only a casual circumstance, but here they are employed every tide. Here 200 fleet of tugs are towing ships in each direction, and they are always ready in any emergency.

13,325. You spoke of Bridlington Bay as a place that vessels could get out of either way with the wind?—Yes.

13,326. Are you aware that Bridlington Bay is as deep as the bay to the north?—I do not intend a harbour down in the bay; I mean one out at the Head.

13,327. Are you aware that with an easterly wind she would have to work to windward through the passage, or be towed out?—Yes, and to enable a vessel to do that, she has a very strong tide under her lee, between the shoal and Flamborough Head.

13,328. You said you considered that Hartlepool had been silting up; have you any knowledge of that subject, from having anchored in the bay?—I never anchored in it in my life; I never went near it; and I believe you will find there are many captains of ships here who have been in the trade all their lives, and have never been in that bay. They always give Hartlepool a wide berth, and keep the sea. I never was in there, but I know something of it from shipping a large quantity of my coals there, and being down at the place occasionally.

13,329. Supposing that you were going in a vessel now, and your own life, and the vessel with the crew under your orders, were at stake, if you had your choice of the Tyne deepened to 15 feet (supposing that were effected), and a good harbour at Filey or Hartlepool besides, accessible at all times of tide; would you prefer that, or your own harbour at Tynemouth made deeper?—If you will tell me the point to go to, I will tell you. If you go to six fathoms, I would prefer the Tyne, but 15 feet is rather little.

13,330. But I am supposing 15 feet at the Tyne, and a harbour to the south with deeper water, to take all classes of vessels; would you prefer the Tyne alone, and no harbour to the south?—I should prefer the Tyne alone, in that case.

13,331. For the Tyne trade?—No, the trade generally; because I think the great bulk of the ships belonging to the other ports would take the Tyne as a refuge. In fact, they do so at present.

13,332. Do laden ships put back?—Yes, but on the sand there is only 16 feet.

13,333. Then laden vessels do not press on their voyage to the south in all weathers?—It happens occasionally they do not; but as long as a ship keeps all right and tight, she will keep the sea and persevere.

13,334. Supposing the Tyne were all that you wished, and it was decided to make a deep-water harbour in addition to the Tyne, between the Tyne and Flamborough Head, and you had to decide for the benefit of the lives and property connected with the colliery trade, would you prefer it at Hartlepool or Filey?—If I were obliged to choose—I am hardly prepared to say which I should choose—I think I should say Filey, as further to windward, and having deeper water in towards the shore. Yes, I would prefer Filey.

13,335. Do you think that for all the trade north of Hartlepool, for Sunderland, Shields, and the Tyne ports, Filey would be better than Hartlepool for the saving of life and property in the deep laden colliers?—Supposing them both to have equal advantages.

13,336. I am supposing they can enter either at all times of tide, that a harbour was made for that purpose, and the site depended on the value set by colliery masters of the north colliery ports?—I should prefer Filey, because it is a bolder shore, and you can see it better, and there is a better chance to see it in snow. If by chance you should not hit the place, you would have a better chance of getting off the land than if you got down into a deep bay; because, with the cross tides which ships encounter here in dirty weather, in winter, they cannot always make an exact point. They go groping and blind, and in that case I prefer Filey, because you can haul off on the other tack, whereas, if you go to the depth of the bay, there is no safety for you.

13,337. Supposing vessels to start with a slant or favourable wind from the Tyne, are they sufficiently far to windward, if it comes on to blow from the east or east-north-east, to fetch Hartlepool or Filey?—With the wind north-east, they would make their passage.

13,338. I speak of east-north-east dead on the shore?—They would weather the Head.

13,339. Supposing they could carry canvas, and hold on?—Yes.

13,340. Which is the safest place to make or run for in a heavy east or north-east gale, Hartlepool or Filey?—Do you mean supposing a harbour were made?

13,341. Which is easiest made?—I should say Filey, for the same reasons. It is a bold shore; you can see it before you are up to it, and you have deep water up to it.

13,342. (*Mr. Lindsay.*) One of the Commissioners asked you if you knew of any harbour constructed at the entrance of a river by means of piers which ships could take at low water. I think you said, in reply, that you did not know of any such a harbour?—I have not any in my recollection.

13,343. But do you know of any harbours where the bar has been deepened, or the entrance of the bar deepened, situated at the mouths of rivers, by means of an extension of piers?—Yes.

13,344. Then is it the case, or is it not the case, that if you carried the piers far enough out, you would be able to make a harbour at the entrance of the river, which ships could take at low water?—I should think so.

13,345. In fact, it is a question of expense?—It is a question of expense as to the extension of the piers.

13,346. As a sailor, having given great attention to it, is it the case that a bar usually follows the piers,—that if you carry out the pier, the bar goes further out to sea?—I think it is very probably rather an engineering question; but as far as my observation has gone, it is very likely that shoal water, though perhaps not the bar itself, will continue out; but if you carry the pier out into deeper water, there is not much fear of the bar forming across the mouth as it does at a shallow part of it before the piers are carried out.

13,347. Why have you arrived at that opinion?—Because I think it would be such a deep deposit at the mouth of the piers, when extended, that it must be a work of very long time, supposing accumulation to be going on, and by the very act of carrying the piers clear of the shore, anything washed out of the river would be carried north or south by the water passing to and fro at the end.

13,348. Then your opinion is, that if the piers were carried out sufficiently far, so as to get to the point where the ocean tide is ebbing and flowing, that tide would get hold of the sediment, and it would be washed away?—That is my opinion to a great extent, but a portion of it might settle there.

(*Mr. Clayton.*) I wish to ask a question.

(*Chairman.*) We have not admitted of any examination of witnesses by parties interested, but we generally give intimation that if any of the parties interested notice points which seem to have escaped the attention of the Commissioners, they are at liberty to put in the shape of queries any questions which they would like to have asked. On the other hand, the Commissioners reserve to themselves the right of judging as to the relevancy or expediency of putting the question or not.

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Examination of Mr. STRAKER continued.

13,349. (*Chairman.*) You have been a long time under examination, Mr. Straker, but there are one or two questions which I should like to ask you. From what point of the compass does the wind blow which gives the worst weather in the North Sea?—We have the heaviest sea rolling in with gales from the northward; but the most destructive gales which we have on this coast are from the east round to south-east.

13,350. With what weather do these gales from the south-east commence?—They generally commence with fine weather, and increase to a gale.

13,351. And does the south-east wind generally veer round to north-east, or back the other way?—More frequently round to north-east. Sometimes it ceases altogether, and it springs up from the north-west. That is not unfrequent, but generally the wind backs round to north or north-east.

13,352. Are your south-east gales generally accompanied with thick weather?—Yes.

13,353. And, therefore, it is very difficult for vessels to make out exactly where they are on the coast?—Yes, that is the difficulty; hence the necessity of some conspicuous point to make for, such as Tynemouth Castle.

13,354. And are the north-east gales usually accompanied with clear weather?—Rarely of late; we have here more rain from the north-east than any other quarter. We used to think that our rain came from the east.

13,355. Is the wind on shore from east-north-east to east-south-east generally accompanied with thick weather?—More south-east than north-east. The north-east wind is generally clearer weather.

13,356. There are two questions which Mr. Clayton wishes to be proposed to you. Do you know any case in which there is such a scouring power as in the River Tyne?—I think my reply to that should be, that the scouring power is very great in the Tyne; but I am hardly prepared to say that I do know or that I do not know of any other place where it is greater.

13,357. Does the effect already produced by the works of the pier at the mouth of the Tyne assist your judgment in giving an opinion as to the ultimate result?—Yes, it does. The effect so far has been decidedly favourable, in my opinion.

Mr. MATTHEW POPPELWELL examined.

Mr. Matthew Poppelwell.

13,358. (*Chairman.*) You are connected with the port of Tynemouth?—I am.

13,359. In what capacity?—Lloyd's surveyor for the river Tyne. I served my time at sea, and I am connected with the coal trade.

13,360. Are you a shipowner?—I am not.

13,361. Have you been a shipowner?—I have.

13,362. For how many years?—For 40 years.

13,363. How many years were you at sea?—For 20 years.

13,364. And for how long in command of vessels?—From 10 to 22 years.

13,365. In what trade were the vessels which you commanded chiefly employed?—In the coal, the Baltic, American, and Mediterranean trades.

13,366. How many voyages have you made to the Baltic?—I should not think above 14. I was seven years in the Baltic trade; and I reckon two voyages a-year.

13,367. In making your passage home from the Baltic in the fall of the year, with the wind hanging to the south-west, how do you make your passage, by stretching across to the coast of Scotland, or working to windward?—I have gone in by Lowestoft. I have also come into Flamborough Head and made the Tyne. I was never driven down to the north as many ships are sometimes.

13,368. Is it a fact, that ships are frequently driven to the northward?—They are sometimes.

13,369. And taking that into view, will you give me your opinion as to the advantage or necessity of a harbour of refuge for the Baltic trade about Buchan Ness?—That is, to go through the Firth.

13,370. The advantage or necessity of a harbour near Peterhead?—No doubt, a vessel driven down would go into a harbour of refuge; if the wind were southerly it would be a benefit.

13,371. But are you disposed to say, that the mass of the trade, or that a great quantity of shipping, are driven down, sufficiently to warrant the formation of a harbour of refuge with that especial view?—Not entirely for the Baltic trade.

13,372. Have you made the passage north-about through the Pentland Firth?—I have, to America.

13,373. Give me your opinion as to the difficulties of getting through the Pentland Firth?—The tidal way there makes it very difficult, and the best harbour I know, were a ship bound for Liverpool, is Widewall Bay, in the Orkneys, because you can go there in easterly winds.

13,374. Has it ever occurred to you to run with a heavy gale from the south-east or south-south-east through the Pentland Firth?—It never has.

13,375. Are you acquainted with the harbour or bay of Wick?—I know it by the chart.

13,376. What is your opinion as to the advantage or necessity of a harbour of refuge at Wick for the trade north about to Scotland?—My objection to it is, that in an easterly wind you are land-locked; you cannot get out.

13,377. But as respects the locality, putting that disadvantage on one side?—I think it an excellent harbour.

13,378. You think it an excellent site for a harbour of refuge?—I think it an excellent harbour.

13,379. You are aware of the objects of this inquiry with respect to the north-east coast of England?—Yes.

13,380. Give us your opinion as to a site near Flamborough Head, and another down at Hartlepool?—I go upon the principle, that if the present harbours are not to be improved, Filey would make a good harbour of refuge, but that provided Hartlepool could be made good, like the Tyne, it would be an advantage.

13,381. For the present I am putting the question of expense out of view. Would you be disposed to say, that the most perfect system, with a view to the saving of life first,—and secondly, of property,—would be one harbour of refuge at Filey, backed by the improvement of the harbours along the coast?—Decidedly; it would not be used so generally, but the feeling is, that the coast requires it, because there is none from Whitby to the Tyne.

13,382. (*Sir F. Smith.*) You are well acquainted with the east coast, are you not?—I have been in the trade some time.

13,383. As a master mariner?—As a master mariner.

13,384. What part of the coast do you consider the most dangerous between the Tyne and London?—The sands at Yarmouth is the most dangerous part of the coast.

13,385. Where do the greatest number of wrecks occur on that line of coast?—I have seen the wreck chart, but I have not taken the numbers. There is a large number of wrecks round Yarmouth, as well as on the north coast.

13,386. And a great number at the Tyne?—Yes, a great number at the Tyne.

13,387. Do you know the cause of those wrecks?—My opinion of the cause of the loss of ships near the Tyne is the immense trade which comes to the Tyne. Wherever ships locate, no matter whether it is deep or shallow water, losses will take place, particularly when they run in in distress.

13,388. Is not the trade upon the increase here?—It is gradually increasing.

13,389. And you have found the wrecks increase as the trade has increased?—I cannot speak as to

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that. I think the returns a better guide than anything I can say as to that.

13,390. It should, according to your theory, be so; because, if a great amount of trade causes the loss, the greater the trade the greater the loss?—Not so, exactly; vessels may be better equipped and better navigated.

13,391. Then you think probably that they were not well equipped or navigated before?—I think not.

13,392. Do you think they are better found, better equipped, and better manned?—They are much better manned than during the last war.

13,393. And much better commanded?—Yes.

13,394. Do you suppose that the size of the ships increase?—They have of late years, but I do not think they will go further than they have done.

13,395. Do you imagine that steamers will be used more than they now are in the coal trade?—If the country is rich enough, all coals will be carried by steam.

13,396. Then the chance of accident will be less?—Steamers create many accidents.

13,397. Are not steamers more likely to keep off a lee shore?—No; a little steamer is a dangerous vessel.

13,398. (*Mr. Lindsay.*) Are steam colliers on the increase?—Rather decreasing than increasing. I cannot speak as to the fact, but I suppose so generally.

13,399. But the trade between this port and London is materially on the increase?—It is.

13,400. And consequently the steam colliers are not paying; or does it arise from the fact that they do not pay as well as sailing vessels?—I have seen 20 steam colliers building in the Tyne, and now we have but one or two; that is what makes me say they are not increasing.

13,401. Are not the sailing colliers materially on the increase?—The sailing colliers are materially increased.

13,402. Do you know the east coast of Scotland pretty well?—I never passed above six times through the firth in my life.

13,403. Supposing then it rested between Peterhead and Wick for a harbour of refuge on that coast, which do you think would be of most advantage to the ships belonging to this district employed in the Baltic trade, a harbour of refuge at Wick or at Peterhead?—I should say that for all ships going to America—all ships going north about—it would be of more advantage on the weather point.

13,404. Then do I understand you to say that you think it would be of more advantage to have it at Peterhead?—Yes; or entering the firth at Widemouth Bay.

13,405. Then, giving the preference to Peterhead, does it apply to sailing vessels bound from the Tyne to America, as well as those to the Baltic and Archangel?—It would.

13,406. You heard the evidence of Mr. Straker and Mr. Cowan with regard to the necessity for a harbour of refuge on this coast?—I did.

13,407. Do you agree generally with what was stated by those gentlemen?—Substantially I agree with them.

13,408. Are there any points which those gentlemen did not call the attention of the Commissioners to which you would like to add?—I think not. I am not aware of any points. I think that I agree with them substantially.

13,409. From your knowledge of shipping, and your great connection with it as Lloyd's agent here, and from your intercourse with masters of ships, are you clearly of opinion that, with the object of saving life as the primary object, and property next, the improvement of the existing harbours would tend more to save life and property than one great harbour of refuge further south?—Knowing, as I do, that 93,000 passengers go from the present harbours existing, I am of opinion that the improvement of these harbours would save more life and property than any one single harbour of refuge, place it where you will.

13,410. We will turn to another subject. Are you one of the Commissioners of the Tyne?—I am.

13,411. Do you know anything of a sum of money levied by Newcastle amounting to 10,000*l.* a year on the shipping frequenting the Tyne?—You mean the river dues.

13,412. You have spoken upon the subject?—I know that application was made to purchase from Newcastle the river dues which amount annually to 10,000*l.*

13,413. What is done with it?—There is a debt borrowed on it.

13,414. When were those debts contracted?—I cannot answer.

13,415. You do not know?—No.

13,416. I wish to ask you a question, having in view that which was proposed by Mr. Cowan and recommended by Mr. Straker, namely, the extension of the present piers, which will cost 400,000*l.* more than the sum now intended to lay out. I wish to know if the fund which is now collected from shipping cannot be in some way applied towards assisting in the construction of this very large harbour of refuge which they propose?—If we stop at our present contract, and the Admiralty allows us to go no further at present, and we apply a third of the amount of the pier dues to a larger extension, of course our present funds will be spent in the large extension works.

13,417. Then do I understand that it is the intention of the Commissioners of the Tyne, that if they go on to spend more than 166,000*l.*, for which they are now liable, this tax, which they now levy on shipping, is in some way to be appropriated to aid in the construction of the piers?—It would; and there would thus be 200,000*l.* really in hand to expend upon the piers.

13,418. There would be 200,000*l.*?—Yes; out of the first sum which was named.

13,419. Then the shipping frequenting the Tyne would not be taxed to the extent necessary to pay the capital of 400,000*l.* Do I understand you to say that?—They would be taxed for 400,000*l.*

13,420. Do you intend to raise it by a fresh tax on shipping frequenting the Tyne?—The intention is to raise it upon the present Act, with some improvements.

13,421. By means of a fresh tax?—Yes; the present Act is to be so amended that we should lay no more tax on the coal trade than there is levied in it now.

13,422. Then you intend to relieve the coal trade? It would not be relieved—it would pay the same as now; but the Mercantile Shipping Act took away from us the power of levying the dues on the foreign trade and coal trade outwards, and if we amend the Act to include the foreign trade outwards, and the coal trade outwards, we shall gain 5,000*l.* or 6,000*l.* a year, and the coal trade will be the same.

13,423. Supposing that the Commissioners should decide that it was not advisable to have a harbour of refuge at the Tyne, and that only one site was to be chosen for that harbour of refuge, and that it rested between Hartlepool and Filey Bay, whether do you think a harbour of refuge at Filey Bay or Hartlepool would tend most to save life and property in the ships frequenting this coast?—If life and property were the only question at stake—but in trade it is impossible it can be so—but if life and property only were at stake, then I would leave it to an engineer to choose any place between Hartlepool and Filey Bay.

13,424. Would you say Filey Bay or Hartlepool?—No place that I know of is equal to our own port. Vessels will come down for their harbour south of Sunderland, and as far as a small harbour will hold them, it might be an advantage, but it never would hold them.

13,425. I do not think that I clearly understand your answer; would you give a preference to Filey Bay over Hartlepool?—I would not take the high land

on the bay north of the Heugh. Then it would answer the trade also between Seaham and the Heugh.

13,426. Then you would prefer a harbour somewhere between Hartlepool and Seaham to a harbour in the Tees Bay ?—I would.

13,427. But supposing that you cannot obtain a suitable site for the construction of that harbour, and supposing that the engineers on this Commission had arrived at the conclusion, that the only sites for the construction of a harbour of refuge between Flamborough Head and the Farn Islands (for that is the most dangerous part of the coast), that the only two sites were Hartlepool Bay or Filey Bay, to which would you give the preference ?—I cannot get out of the old thing. Where the trade is, there you should come to save life and property, because people will come were the trade is, and Hartlepool is near.

13,428. You think that Hartlepool would be the better place, provided there were no engineering difficulties ?—It would tend most to save life and property. It would likewise tend to increase trade. Upon the same principle I should like all the ports to be improved.

13,429. But nevertheless I understand your opinion is that if the public money is to be expended for the saving of life and property, it ought not to be spent on one particular spot, but to improve the existing harbours for vessels ?—There is no difficulty in my mind about it. The more harbours you make the better. A ship cannot meet one place, but she may meet one of the two or three.

13,430. (*Capt. Washington.*) If a vessel should be caught in distresss, where would you have the harbour, on a salient point or in the bight of the bay ?—The captain would have to consider two points. He must go to a place where he can have his repairs done. I should like to hand in this paper, showing the capabilities of the Tyne for repairing vessels. There are 52 dry docks, with 24 gridirons ; vessels would always come here for repairs.

13,431. How many dry docks do you say there are ?—52 ; and some of them hold two and some three ships. We have had some of the largest ships in here. There was the *Carlo Alberto*, a 15-gun frigate, and the *Bulldog*, with all her men and guns, and 240 tons of coal in her.

13,432. In fact there is every facility for the repairing of ships ?—Yes.

13,433. There are a large number of steamers always sailing about the Tyne ?—There are about 200 afloat at this time.

13,434. You spoke of 93,000 vessels going out of the Tyne ?—No ; 93,000 passengers.

13,435. Are those the arrivals and sailings at the three ports ?—No ; at six ports.

13,436. Are they the Tyne, the Wear, the Tees and Whitby ?—No ; from Hartlepool, the Tyne, Sunderland, Seaham, Blyth, and Warkworth. From the Tyne 45,000 passengers, from Sunderland 18,794, from Hartlepool 19,066, from Seaham 4,118, from Blyth 2,370, and from Warkworth 4,464 ; making a total of 93,712 passengers.

13,437. In a district of about what length ?—In about 40 miles. I find that the Tyne takes Sunderland, Hartlepool, and Blyth to make them equal to the Tyne.

13,438. I do not quite understand that ?—Sunderland, Blyth, Hartlepool, and Warkworth get 600 sailings and arrivals more than the Tyne ; the Tyne has nearly half the whole.

13,439. And the whole is 93,000 ?—The whole is 93,712.

13,440. Do you know of such a traffic on so short a coast anywhere else ?—I am not come to the knowledge of it.

13,441. Therefore you think it essential that there should be be a refuge provided for those vessels somewhere or another ?—Yes.

13,442. And you have stated your opinion that improving the existing harbours, if it can be done, will be the best mode of providing that refuge ?—I state that on the basis of these passengers. There is no single harbour of refuge can answer the purpose, except a place like Yarmouth Roads. There is no single harbour of refuge, without limitation, which can provide sufficient refuge the same as that within the ports.

13,443. It is not probable that all the vessels would be about the same spot at once, is it ?—Captains do not go in, unless in case of real distress.

13,444. Captains do not go in, except in cases of real distress, and in cases of real distress what situation of harbour would catch them ?—If these ports were made good, they would catch them directly. If laden ships putting back could take the Tyne, being the most northerly point, they would take it in an east-north-east wind in preference to Hartlepool, because if they were down at Hartlepool, they could not get out of the bight.

13,445. You stated in your evidence that the piers were being carried out as far as the Admiralty permitted them to go ?—Yes.

13,446. Do I understand you that you anticipate that the Admiralty will prevent the piers being carried further ? The Act of Parliament allows 2,100 yards on the north, and 4,200 yards on the south pier, and the Admiralty made a mark at two-thirds of each of these points, and allowed the Commissioners to make contracts for that distance.

13,447. But I do not understand you to say that there has been any prohibition by the Admiralty against going further ?—Not at all. They will allow us to go out the whole distance.

13,448. It has been always understood that the present contract is an instalment ?—Quite so, to see the effect of it.

13,449. (*Capt. Sulivan.*) With reference to what you said as to constructing a harbour of refuge at Peterhead, were you thinking of vessels stopping for foul winds, or of a shore where vessels cannot get off on either tack ?—I was thinking of vessels which cannot get off on either tack, and wanted refuge, and were bound either south or round the land.

13,450. Will you tell me what wind would make anywhere near Peterhead a lee shore, and prevent a vessel going off on either tack ?—I cannot speak as to that ; I do not know the distance ; it is out of my course rather.

13,451. Just look at that chart and see if any vessel not bound into the port, making her passage up, can in any wind not go off on the port tack to the Firth of Forth, or on the starboard tack to Cromarty Firth?—She can go on either side of it.

13,452. Then you do think a harbour of refuge on a salient point where the coast runs back almost at right angles, and there is a port under her lee on both tacks, would warrant an expenditure of money ?—Excuse me, I am putting the trade there.

13,453. I put the trade there too ?—If you want to save life only, then the bottom of the bay is the best.

13,454. Recollect that a harbour of refuge is only required where ships are in danger of being driven on shore when they cannot keep the sea, and not as a stopping place to save ships from losing ground. Keep that in view, and tell me whether anything would justify a large outlay of money in such a place as Peterhead ?—I think that a harbour of refuge should always be at the bottom of a bay to catch those vessels which are embayed ; but for life or death; then I would say you are not likely to be so humane as to lay out so much money on a point like Peterhead.

13,455. Are there great dangers in running through the Pentland Firth ?—There are.

13,456. With a south-east gale, and an easterly tide do you think any small vessel dare run into it ?—I think if a vessel is caught there with a south-east gale, she can go in a short distance ; but if she found there was danger of swamping in the strong tide she would not be likely to attempt it at all, and Wick would be very convenient to her.

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13,457. If a vessel were running that way would she have any means of escape if she could not keep the sea?—Do you put an extreme case of a vessel under bare poles?

13,458. Or storm sails?—If under storm sails she can never keep to windward.

13,459. Then what would happen if she could not make the Pentland Firth on account of the strong tide?—She would lay her head to the south, and go ashore.

13,460. And to all such vessels would Wick make a valuable harbour of refuge?—It would save life.

13,461. If you were told that immediately on the west side of Wick 1,060 vessels had taken refuge in a year, do you think that would be a strong reason for a harbour of refuge also on the east side?—It would.

13,462. With reference to those vessels bound from the Baltic, is it usual for them to be driven so far north when bound for this port that they cannot get into the Firth of Forth?—It will happen now and then.

13,463. But usually?—Not generally.

13,464. What wind would drive them above the Firth of Forth?—With a south-west wind they generally fetch on the starboard tack.

13,465. There is no risk of loss in a south-west wind?—There is no risk of loss.

13,466. And if caught by a north wind, if out too far north of the Farn Islands to go in there, would Pentland Firth serve?—If the tide was in favour.

13,467. I mean the Firth of Forth?—I beg your pardon. The Firth of Forth is now a harbour of refuge.

13,468. Then, for the Baltic trade, coming to the east coast of England, you consider no further harbour of refuge necessary than the Firth of Forth north of that?—That is just according to the degree of humanity. If you think you can save every person, you cannot have too many harbours of refuge.

13,469. But for the general interests of trade, upon the whole, would it be necessary?—I should not think it would.

13,470. You said that vessels go back to the Tyne in preference to Hartlepool in south-east gales; would they do so even if there were a harbour of refuge?—I think they would. I speak now of the Tyne improved.

13,471. Supposing the Tyne had 15 feet of water, would they run back to the Tyne rather than to Hartlepool?—I think many vessels are lost between Hartlepool and the Tyne. And upon no other principle than that the Tyne is the place where they can get repaired.

13,472. Are there not many vessels which are damaged and yet cannot keep the sea?—All the better class of ships keep the sea.

13,473. But caught in a gale of wind with a good harbour under their lee, do you think they would come to the Tyne or enter that harbour to save risk in keeping the sea?—All large ships, such as those which go to India, would keep the sea.

13,474. I am speaking entirely of the colliery trade, heavily laden colliers?—The small colliers and the weakest of the vessels would all take a harbour of refuge.

13,475. Supposing you had 15 feet of water at the Tyne, but a harbour of refuge at Filey Bay, and the vessel were south of Filey Bay so that she could fetch it, would she go back to the Tyne?—If she were well equipped she would remain at Filey Bay, but if she wanted repair she would come to the Tyne.

13,476. But merely wanting refuge?—I think such vessels would keep Filey Bay. I assume you speak of ships bound south.

13,477. Upon the same principle, if there was a harbour of refuge at Hartlepool, and a ship were caught south of Hartlepool, would she not run for Hartlepool in preference to the Tyne?—Am I to speak of the Tyne improved?

13,478. Yes?—No, she would not go to Hartlepool, because it is in the bight.

13,479. If a vessel were to windward of the two ports, and could make either Filey or Hartlepool, and she had no alternative but to run for one or the other, which do you think the master would rather run for?—I would like to know where the vessel is placed.

13,480. I say a vessel to windward, with an offing sufficient to fetch either, if she had the choice of running for either, and could find shelter at either, which would she make for?—It would take some time before a man would run for one. If they were in the practice of going into Hartlepool, they would go there.

13,481. I ask you to put the Tyne out of the question, and give me your opinion as to Filey and Hartlepool; which would masters of colliers prefer to run for in a gale of wind?—They would go to Filey.

13,482. In preference to Hartlepool?—Yes, they would be further south on their voyage, and a better outlet.

13,483. Supposing your view upon that point to be correct, and you had the laying out of a large sum of money purely for a refuge harbour, and it must be laid out either at Hartlepool or Filey Bay, upon which would you lay it out to benefit the trade of Tynemouth and Sunderland?—I cannot give an opinion. I should take the Tees and Hartlepool point.

13,484. I am speaking of the whole trade?—It is then dividing the opinion.

13,485. You said just now a person would rather run for Filey Bay?—But if a vessel were in the position to fetch either Filey Bay or Hartlepool, I should prefer giving to Hartlepool the trade in preference.

13,486. In answering the question, please to shut out of view all benefit to an individual port, and take a larger view.—Taking the whole of the colliery trade as a whole, without reference to the fact of any particular port, and looking to the case simply as refuge, which would be the best place for a harbour of refuge: Hartlepool or Filey Bay, if it must be in one of those places?—I should say Filey Bay, decidedly.

13,487. Give me your reasons?—The whole of the six ports are to the north of it, and the Scotch trade often meet off the Head, and it often happens that when a north wind gets away to the south-west, a large fleet of vessels leave the roads and meet under the Head. The wind comes east-south-east dead on the land, and they must all come north.

13,488. A gale will drive laden colliers to run for safety, will it not?—Yes.

13,489. Then, in that case, what space will you require to hold them; that is the first consideration?—I should gather full a 1,000 or 1,500 sail. Yarmouth Roads are 12 miles long and $1\frac{1}{4}$ wide; and I have seen a thousand vessels at anchor there, and many obliged to leave, and go to Lowestoft or Harwich. There was no place to put a vessel there, and unless you make a place like Yarmouth Roads, how can you get one big enough?

13,490. Would not that apply equally to Filey Bay or Hartlepool?—But if the ships were divided among the ports?

13,491. That is quite foreign to my question. My wish is to confine you to all the ports, putting aside the probability of Hartlepool being selected. But supposing the advantages of construction perfectly equal, and everything equal, which is the best place for a laden collier to seek refuge?—I would go along the coast, and take the best point an engineer would point out, as far north as I could from the bight, so as to get out of it again.

13,492. That is, going up to your north ports again; we have your opinion of that; put that aside. Suppose it were impossible to lay out money where only 15 feet of water could be obtained, which you propose to get at the Tyne, then where would you have the refuge; at Filey Bay or at Hartlepool? You said just now Filey Bay, and I asked you your reasons?—We came after that to 1,500 sail, and Filey could not hold a twentieth of them.

13,493. Put that out of the question. Supposing that there were equal facilities to make a harbour of refuge at Hartlepool as at Filey Bay; consider all things equal, and tell me which port would the colliery trade consider most safe and most beneficial, and which would they prefer to run for in heavy weather?—They would come for the bold land as far north as possible.

13,494. I have asked you to give up all that.—I should like to give a correct answer. I should like to comprehend the thing ———

(*Chairman.*) I think the question which Captain Sulivan asks has reference to the whole coast between Hartlepool and Filey Bay.

(*Witness.*) I did not hear that.

13,495. (*Capt. Sulivan.*) I have said all along, supposing that it was decided that the outlay should be made in one or other of these places, which would you prefer for the benefit of the colliery trade, and particularly for the safety of running to and being in a place available to save most lives and property?—The laden ship no doubt would get into Filey very well.

13,496. Laden ships only?—Laden ships. It is a good bold place to go in. Every master would go in there in preference.

13,497. Would they not go to Hartlepool?—No; Hartlepool is in a bight, and captains generally lose their ships through false judgment. When they leave the high land from Newcastle the inland of the coast is all high; we do not see the coast at all. From that point of the coast across to Redcar the land is low, and most of the seafaring captains to this day have an impression (for I have spoken to many on the subject) that it is much deeper than it is. It is fallacious. The moment they come to Redcar they imagine it is a very deep bay, indeed. This idea grows with the growth of the great bulk of them, but when you lay your rule on the chart you will find out it is not the deepest bay. It is a deception, and they go in there and are lost.

13,498. Is the approach to Filey Bay better marked with high land than the approach to Hartlepool?—With the inland land which we generally see at sea with an offing.

13,499. Is Filey Bay better marked with high land than Hartlepool?—Filey is better marked. It is a bold high land altogether.

13,500. (*Capt. Vetch.*) I think you alleged that the Admiralty had placed some limits to your works, as to how far the north and south piers might be carried out?—I understood their idea was to wait and see the effect of the contract entered into.

13,501. I suppose there is some kind of arrangement as to when the works have arrived at these points?—They have not had any communication to that effect.

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13,502. There is a supposed understanding that when the works are arrived at these points there will be no difficulty to proceeding further?—The Tyne Commissioners always supposed that when the works were carried to the extent of the contract, the Admiralty would allow them to be carried to the extent of the Act of Parliament.

13,503. You are not arrived yet at the terminal point?—Not yet.

13,504. (*Mr. Coode.*) You said that you had repeatedly made Lowestoft, Tynemouth and the Head coming from the Baltic; what head do you allude to?—Flamborough Head.

13,505. You said that you knew formerly 20 steamers in the Tyne building, and that now there are only two or three?—There are only two or three at this time, and we have known 20. I wish to make one remark to show that ships will come to the ports where they belong to get repaired. A screw steamer—a very large one—broke down in the deeps, and was towed into the Humber. After she was there, and the weather moderated, a steamer went down from here and towed her here to repair her. I mention that to show that vessels will come to the port where there are facilities to have repairs.

13,506. (*Sir F. Smith.*) To whom did the steamer belong?—To Messrs. Palmer and Co.

13,507. Are they concerned in the building trade?—Yes.

13,508. (*Capt. Sulivan.*) Where is their building port?—In the Tyne.

13,509. Then they brought their own ship to their own port?—Yes; she is laden. They will come where the facilities are the greatest.

13,510. If the owner had lived at the Humber do you think he would have found facilities to repair his vessel at Hull?—If there are the same works at Hull no doubt he could repair her there.

13,511. Do you mean that the vessel has come to the Tyne because there are not facilities at Hull, or because the owner prefers to have the repairs done under his own eye?—When I named the case I mentioned it to show that things are done cheaper and better in the Tyne than anywhere else. I do not except London, Liverpool, or any other place.

Thursday, 14th October 1858.

PRESENT:

Admiral HOPE, (Chairman).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

(*Mr. Poppelwell.*) I wish to correct the evidence which I gave yesterday, as to the owners of the steamers to which I made reference; on the register the names are Hugh Taylor, of the Coal Exchange, London, and Charles Palmer, of Newcastle.

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Mr. CONRAD GREENHOW examined.

13,512. (*Chairman.*) You are resident at North Shields?—I am.

13,513. How long have you been connected with the port, and in what capacity?—I served my apprenticeship to the sea in the Baltic trade. I have resided here ever since. I commanded a ship for 12 years in the coal and Baltic and Archangel trade.

13,514. You are aware of the objects of this inquiry?—Perfectly.

13,515. Were you present yesterday?—I was.

Mr. Conrad Greenhow.

13,516. Will you now offer any statement you may wish to make relative to the advantage or necessity of having one large national harbour of refuge on the coast?—I perfectly agree with the suggestions of former gentlemen, that it would be much better to improve the present harbours and make them all harbours of refuge. For the reason that with only one harbour, and these harbours un-

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improved, many more vessels will work to that one harbour than will find accommodation. That will lead to great loss and destruction, to collisions and to accidents of a fearful character. I have no objection to making a harbour of refuge, but at the same time I think you ought also to improve these harbours.

Chairman.

13,517. Then you are of opinion that the system best calculated for the saving of life and property on this coast would not be completed by one harbour in any particular spot, but that there must also be subsidiary ones upon the coast?—Decidedly so.

13,518. With reference to the number of vessels which you say would require accommodation, can you give any idea of the largest number of vessels which have run into the Tyne on any particular day in bad weather?—I should say that certainly between 250 and 300 have run in. I have left Yarmouth Roads with upwards of 500 or 600 sail. If we had been cut short in a north-east gale and had all crowded for one place, we can easily anticipate what would have been the result, and we know that it would require a place of greater extent than can be found to make a harbour for all these vessels at a single spot.

13,519. How many voyages have you made to the Baltic?—Five years' apprenticeship, I should say 30 voyages at least.

13,520. Leaving the Baltic with the wind hanging to the southward at the fall of the year, where do you take your departure generally?—If you come down the Scaw with a south wind you get down to the Naze. If the wind is south-south-west you make west, so that you get hold of the south coast if possible. About three years running I have made Buchan Ness light.

13,521. Are you able to say as a general rule whether vessels, with the wind hanging to the southward, make their passage by stretching across for the Scotch coast?—The general rule is to go into Norwegian harbours of refuge, but those vessels which do get round the Naze must persevere and make west if possible.

13,522. But you mean that when a vessel has taken her departure from the Naze in moderate weather, she makes westing and gets hold of the land wherever she can?—Yes.

13,523. In the fall of the year what winds generally prevail—south-west and generally very heavy weather?—Yes, especially in the Sleeve and on the coast of Norway.

13,524. And are you able to give any notion of the part of the coast where the trade leaving the Baltic in the fall of the year generally make the land?—It depends on the wind. If they are bound to London, they make Lowestoft. Most ships, after the winter is set in, make Flamborough Head.

13,525. You say it depends on the wind, but is the wind generally to the south-west?—Generally.

13,526. These being the prevailing winds, what part of the coast do you say the Baltic trade, homeward bound, make? — Between Flamborough Head and Buchan Ness.

13,527. But looking to the distance across from the coast of Norway to the coast of England, that is rather a wide range. It depends entirely on the state of the wind if you can keep to the south; but a wise man will not be very exact as long as he makes westing, and very often they make the land north of the Bell Rock.

13,528. Are you disposed to say that in many cases the land is made between the Bell Rock and Buchan Ness?—Last year many vessels got into Cromarty.

13,529. You are aware that we have to investigate as to the necessity of a harbour of refuge on the north coast, and where the Baltic ships make the land in the fall of the year is a most important element in its consideration, will you give us your opinion as to the best point between the Firth of Forth and Pentland Firth to form a harbour of refuge for the Baltic trade?—I should say south of Peterhead; Peterhead itself is a very good harbour, and I should say that between Peterhead and Buchan Ness would make a capital site; the Baltic trade does not go generally to Cromarty, because with the wind north-east they are in a bight, and there is no loosing with the wind north-east, because the land trends to the south-west into the Forth.

13,530. Then do I understand you to say that you would name Peterhead as the most eligible site for the purpose?—Yes, on account of leaving with an east-north-east wind.

13,531. Have you had occasion to run up the Firth of Forth in heavy weather?—Yes, in the coal trade but not in the Baltic trade.

13,532. And in thick weather?—Yes.

13,533. Where did you run for?—Leith Roads.

13,534. Did you never run higher up?—No, I never did.

13,535. Is the Firth of Forth a place that many vessels run for?—A man can run there with his chart.

13,536. And a man with his chart can run to Long Hope Roads?—Yes, it is quite as good.

13,537. So that the Firth of Forth is a capital harbour of refuge as it is?—It is.

13,538. Have you ever made a passage north-about through the Pentland Firth?—Yes, going and coming.

13,539. What are the difficulties of the navigation of the Pentland Firth?—Much the same as was said yesterday, the strength of the tide is all the difficulty.

13,540. Would you consider that a difficulty in a well found ship, seeing that you need not run into the Firth in very heavy weather?—If the weather is bad from the eastward I would go into the Orkneys, because I could loose without going through the Firth from Long Hope.

13,541. Have the ships which you have commanded been generally well found ships?—Yes, thoroughly well found. The ship belonged to myself, and I took care to have it well found.

13,542. In a heavily-laden ship have you ever been under the necessity of running because you could not heave to?—No, I never have.

13,543. You could always heave your ship to?—Yes, I could always heave to.

13,544. With perfect safety?—Yes.

13,545. And you have commanded deeply-laden vessels?—By the way, I was once obliged to run coming from Archangel. I carried away my bowsprit.

13,546. On that occasion were you obliged to run?—Yes, for fear I should lose my foremast.

13,547. Then you do not say that you could not have lain to if you had not feared to lose your mast?—No.

13,548. You have a pretty good knowledge of the vessels in the coasting trade?—Yes.

13,549. Would you be disposed to say that a majority of them are as well found as the vessels you commanded?—Yes, I think the vessels from the port are well found and well manned, that is with skilful seamen, and the ships are perfectly safe under their handling.

13,550. Let us go back to the difficulty of the navigation of the Pentland Firth, which to my mind is simply this, that if a deeply-laden ship with a heavy gale from the south-south-east find herself near the Pentland Firth, if she can heave to for a lee tide the danger ceases, but if she cannot heave to then she must run in with the weather tide, and the danger becomes very considerable?—She would not steer.

13,551. Good; now tell me, does that apply to the coasting trade, can they as a general rule heave to in heavy weather, or would many of them be obliged to run?—Do you mean off the Pentland Firth?

13,552. Yes?—A prudent man would not go down with the tide running through against him, he would keep to windward, at any rate he would keep Cromarty Roads open.

13,553. But a prudent man might not be able to heave to and might be obliged to run; that is the pith of my question?—A heavy weatherly tide would help him into the Orkneys.

13,554. Therefore you think he could haul his wind

without danger in getting to the Orkneys ?—I think so.

13,555. And avoid the danger of the Pentland Firth ?—He could not with a heavy gale and a strong tide against him run through the Pentland Firth.

13,556. From your knowledge of the coasting trade can you say that vessels are found near to the Pentland Firth which cannot heave to with safety ?—That is an exceptional case, but it may very well happen.

13,557. Would you think it an exceptional case or a common one ?—I think it a very exceptional case.

13,558. That is your opinion ?—Yes, decidedly.

13,559. That is what I wanted to know as to your opinion. Do you know Scrabster Roads ?—Yes.

13,560. Have you seen vessels lying there in any number ?—The only time I was there there were not a dozen.

13,561. We know that vessels do resort to Scrabster Roads in considerable numbers, therefore a port at the entrance of the Pentland Firth is found a convenience. Will you give me your opinion whether a harbour at Wick would be very convenient to the coasting trade ?—I am afraid in Wick, if the wind is north-north-east or north-east and by north a ship cannot get round to get through the Firth ; it is only when the wind is south of east that she can get through.

13,562. Then your objection to Wick is the difficulty of getting out of the harbour there ?—Yes, in certain winds it would be difficult to get round the point. I think you will find the point extends further to the eastward.

13,563. Waiving that difficulty, and supposing that by means of steam tugs, vessels could be taken out into an offing ?—If there is much wind a tug cannot take a vessel into an offing. The sea is very heavy from the north-east there, it would not be safe, considering the bad navigation, and that she has been seeking refuge in bad weather.

13,564. I am considering that the vessel seeks refuge in bad weather, and that when the weather moderates she comes out to make her voyage. Would you then consider that the difficulty of the tug would apply ?—No ; certainly not so much then. We find in Leith Roads that ships merely go on to wait for a tide. They cannot do that at Wick with the wind north of east.

13,565. Therefore you think that Wick would not be used as a convenient harbour by vessels waiting for a tide ?—I think not.

13,566. Supposing it were determined to make a harbour on this coast, and it lay between Hartlepool and Filey Bay, which would you prefer ?—I should prefer Hartlepool, for this reason, vessels leave the Tyne with very bad prospects, and meet with south-east gales before they can avail themselves of Filey. It is in leaving the ports that they want shelter. After they have rounded Flamborough Head the Humber is open, and therefore I think the harbour ought to be more this way than Filey.

13,567. In fact you think it would be more convenient if it were to the north of Filey ?—Decidedly.

13,568. We have had it in evidence that the Tyne is a more advantageous place for ships to loose from than Hartlepool ?—It is a more weatherly port, with a fair wind.

13,569. But after it has been blowing hard from the south-east, does the wind generally go round to the south-west, and break at north west ?—Mostly.

13,570. Then after heavy weather, the advantage of weatherly position is not great in the Tyne ?—But the wind very generally goes rapidly round and settles at north-east, and before the sea goes down again, for it is often four or five days before the sea falls so that vessels can get out, or it is neap tide and large vessels will not get out. After a south-east gale they generally go when the wind settles to north-east.

13,571. How soon after ?—As soon as the weather settles down to north-east.

13,572. As to the facility of making land, is Hartlepool easy to make in thick weather with the wind blowing on shore ?—I should be very chary of running into Hartlepool with thick showers. It must be a very extreme case to compel a man to do that.

13,573. (*Sir F. Smith.*) You stated that Peterhead is very useful to the Baltic trade ?—I have found it so myself. A vessel would be very glad if there were a place there to get there for supplies.

13,574. Would it be a harbour of refuge or a place of call ?—Both. Ships thrown so far to the north have generally been a long time on their passage and are short of everything.

13,575. What circumstances would induce you to seek Peterhead ?—I would not seek it. If I left the Naze of Norway with the wind south and south-west blowing hard, I could not carry much canvas, and the probability is that I should make land between Aberdeen and Buchan Ness. If short of provisions and my ship had been very much thrashed, it would be very convenient to have a harbour to go into without difficulty or danger.

13,576. Do you know Fraserburgh ?—No. I know the coast well. I know Dundee, because I used to deliver there from the Baltic.

13,577. Dundee or Aberdeen do not present facilities for a harbour ?—No.

13,578. Have you ever been at Aberdeen ?—Never.

13,579. You were employed on the coast ?—Yes.

13,580. Are you aware that the casualties in the last five years have been very considerable, and do you imagine that a harbour of refuge would have prevented those casualties ?—If there had been good access to the Tyne and the Wear and the other parts, no doubt that would have prevented nine-tenths of them.

13,581. You think, in fact, that the formation of a harbour of refuge at the three points you have named would prevent nine-tenths of the casualties which ordinarily occur ?—You will find most of the losses off those harbours, and that better than one half of them, occurred in taking the harbours. I was once standing on Tynemouth cliffs and saw 11 vessels come ashore.

13,582. When was that ?—In February 1853 or 1854.

13,583. Then I apprehend that these were casualties to light vessels ?—No ; laden ships, all of them.

13,584. Were they coming back for shelter ?—No ; only one, from Peru, with a cargo of silver, which was lost, was bound here. The others principally were bound to other ports.

13,585. Were they lost for want of knowledge on the part of the masters ?—No ; from the sea striking them. The sea will turn a ship round in broken water.

13,586. Are you aware of the scheme of Mr. Walker for the improvement of the Tyne ?—I have seen it.

13,587. Do you imagine that that scheme will suffice to give deep water at the bar ?—They are going to carry a pier out to six fathoms. They cannot expect to maintain six fathoms, but no doubt they will have from 23 to 25 feet.

13,588. Why cannot they maintain six fathoms ?—Because of the débris washing out from the harbour, which will deposit when it meets the ocean current.

13,589. Are there no means of counteracting that ?—No ; I do not think so, unless you go further out, to throw it further into the sea.

13,590. And you cannot manage that ?—No ; unless you have a great deal of back water to wash it away.

13,591. Do you imagine that when the piers have narrowed the entrance you will get as much sea water as at present ?—Quite as much. Water will find its level.

13,592. If you give it time it will ?—As to time, I do not suppose that the difference between the bar and Newcastle is more than an hour or an hour and a half.

13,593. Supposing there were to be only one harbour, what capacity would you have it, or what length

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of anchorage ?—I do not think you could make any one harbour sufficient.

13,594. You think that impossible ?—Yes ; I have seen Yarmouth Roads so full of vessels that you could not bring up another vessel in them.

13,595. Your opinion is that one harbour would not, that two might, and that three would be sufficient ?—Yes ; three would.

13,596. And if the country is to spend money for the purpose of saving life and property, you think it should be done in three places, and not in one, whatever place that might be ?—One would not do at all.

13,597. No, not even the Tyne ?—No, not even the Tyne.

13,598. You seem to think Hartlepool better than Filey ?—As far as the place goes Filey is the best land to make, but Hartlepool is the best situation.

13,599. Are you of opinion that harbours are better in the bights of bays than on promontories ?—No ; but I think vessels are much more likely to be caught short of Hartlepool ; I should rather have a harbour farther away than Hartlepool, between the two a little.

13,600. Is there any spot you can indicate ?—I am not an engineer, but there is the old place they were talking about some years ago, Redcar.

13,601. Do you know Redcar ?—I have been there, but have only been there by railway.

13,602. Are you aware that Hartlepool is silting up ?—I am not aware of that.

13,603. Are there any indications of silting up in the Tyne ?—None.

13,604. Any accumulation of sand near the newly constructed works ?—No.

13,605. You are not aware that that is the case ?—No.

13,606. (*Mr. Lindsay.*) After the very excellent evidence which you have given and the large amount of information you have rendered the Commissioners, I have very few questions to ask you, Mr. Greenhow ; still I would wish to know from you, if a harbour of refuge were constructed on the Tyne, would it be the means of saving a great number of lives and a large amount of property ?—Decidedly it would.

13,607. Taking the last five or ten years, can you tell me, of your own knowledge, any cases where life and property would have been saved if there had been a harbour there ?—Yes, certainly.

13,608. Do you recollect any ?—In many cases I have seen ships wrecked and their crews drowned.

13,609. I do not wish to go into the matter in a formal manner, but ask you the question off-hand ?—I have seen many ships lost and their crews drowned. I was standing on the cliffs in January 1854, and I saw 11 vessels come ashore, and I saw the crew of one drowned, men lashed to the rigging were rolled over under water ; one poor fellow held on for some time, his hands became benumbed, and then he dangled about by his legs, and was drowned ; I could see the expression of his features, and it was a most distressing thing. There were upwards of 30 vessels came ashore that day ; 11 laden vessels came to the rocks ; if there had been a good entrance they would all have got in ; they were all lost in taking the harbour.

13,610. How was the wind ?—East or east-south-east.

13,611. Did these ships come from the south ?—They came from the south, except the little Peruvian.

13,612. If these ships came from the south, would a harbour to the south have saved them ?—No.

13,613. Then they could not have got it ?—They shaped their course for this river. Filey certainly they could not have touched.

13,614. If they were to the south why would not Filey have done ?—They would have gone to the Humber. I saw from where they were then, that they could not get into Filey, and if they could they would have gone to the Humber.

13,615. As this is a subject which you seem to understand so thoroughly, I wish to put a question to you as a sailor, and I will ask you this question founded on the Report of the Select Committee of the House of Commons. Now is it or is not the case that a large number of laden vessels which leave this port fetch nearly as far south as Flamborough Head, or rather that a large number of vessels which leave these ports bound for London and the ports to the westward of these are usually caught in heavy gales of wind somewhere in the neighbourhood of Flamborough Head, and are obliged to run back from that point ?—Yes ; on the Yorkshire coast.

13,616. Are all the colliers which start from Shields supplied with barometers ?—I should say not.

13,617. Then many of them leave the port in very fine weather, when if they had a barometer on board it would warn them that a gale was approaching ?—Probably ships go out here with very shy prospects, because it is a tidal harbour ; if the piers were carried out they would not go out with a bad prospect, but now they are towed out and risk the weather, and gales are very sudden on this coast.

13,618. On account of being kept in the harbour a lengthened period and the difficulty of getting out, vessels often go to sea now expecting a heavy gale will rise, which they would not otherwise do ?—Decidedly.

13,619. And that is another reason why so many losses take place ?—Very probably. If the harbour were improved they would get to sea even with a swell on.

13,620. That would be a convenience to trade, but would it be the means of saving life as well ?—Decidedly, it would be the means of saving life as well. Men are always sanguine, they will go out if there is any chance at all.

13,621. You said just now, in reply to one of the Commissioners, that a great number of the vessels lost were laden vessels ?—On that particular occasion I should say the proportion was more laden than light vessels ; I am speaking from memory.

13,622. Do many vessels founder and get lost at sea when they are obliged to run back to Hartlepool and the Tyne ?—Sometimes, but they are only exceptional cases.

13,623. Then the losses in fact are principally in taking the harbour ?—In taking the harbour.

13,624. Does this arise from a heavy ground-swell making the ships unmanageable ?—From the badness of the entrance, with a swell, they will not steer through the sea.

13,625. Have you in your experience known any ships belonging to this place get as far south as Flamborough Head and be driven as far north as the Firth of Forth ?—Yes, I have.

13,626. Was that because there was no harbour here which they could attempt to take ?—Yes, on account of the high sea.

13,627. Then ships will not attempt to run for Shields ?—They will not run in on account of the sea. They are afraid of the harbour.

13,628. Does that often happen ?—They go to Leith Roads in preference to taking Shields when the sea is high, and especially at neap tides.

13,629. You seem familiar with the east coast of Scotland, and your evidence was very clear on that point ?—The ship I was apprenticed in traded there.

13,630. From your experience, do you think that a harbour of refuge is necessary on that part of the coast ?—It would be decidedly very useful ; I do not know sufficient of the coast to know whether it is absolutely necessary.

13,631. Do you think it would be the means of saving life ?—Yes.

13,632. And property also ?—Yes.

13,633. Do you think it would afford great facilities to trade ?—Yes.

13,634. Supposing it rested between three places : do you know the sites of Wick, of Fraserburgh, and of Peterhead ?—Yes.

13,635. Taking into consideration the saving of

life and property and the facilities for commerce, to which site would you give the preference if it were left in your own hands?—I would make the harbour at Peterhead.

13,636. All things considered?—All things considered. The probability is if you cannot get Peterhead, you get the Firth on one side, or Cromarty on the other.

13,637. Do you know St. George's or the North Channel?—I have been there sometimes. I do not know much about it.

13,638. Do you know enough about it to state whether a harbour of refuge at the Isle of Man would be of considerable value?—That is more a Liverpool question. I have once put in at Douglas.

13,639. You cannot give an opinion?—I went into Douglas because we had picked up a ship's crew, and our rudder was started; we got in there and put the crew ashore, and got our rudder put right.

13,640. Do you know how the wind was?—South-south-west. It is a dry harbour, but we got in very well.

13,641. Looking to the passing trade, do you think a harbour necessary at the Isle of Man?—I scarcely think it would. It might be very useful.

13,642. But I ask you the question, whether it is necessary?—Not absolutely necessary. At the same time it would be very useful.

13,643. Do you know the harbours in the North Channel from Belfast Lough to Lough Foyle?—No. I know very little about it.

13,644. Not sufficient to offer any opinion?—No.

13,645. (*Capt. Sulivan.*) Will you be kind enough to tell me what danger there is for ships off Buchan Ness that require a harbour of refuge?—I thought more of a harbour for supplies than for refuge.

13,646. Supposing the object of a harbour of refuge to be chiefly the saving of life and property, and that nothing will warrant the outlay of Government money unless these great advantages are gained, will you tell me how ships caught off Buchan Ness are ever in that position that they cannot get to Cromarty, or to the Firth, or keep the sea?—When very close in. But it is an act of humanity to give sailors supplies after they have been knocking about at sea for weeks.

13,647. Set aside the supplies, and look merely to the risk of life and property?—A ship cannot well be anchored at Buchan Ness.

13,648. Is there good anchorage in Peterhead, one side or other, where a ship can get supplies?—Between Peterhead and Buchan Ness, but the coast trends south-west.

13,649. Or, north of Peterhead, could she not get into the Moray Firth?—Vessels would not go there much. They would go south of Peterhead.

13,650. Then if the wind drove a vessel to the south, she would get a supply?—But it is a very bad roadstead with the wind south-east.

13,651. I was speaking of the wind south-west. With the wind south-east cannot a vessel run round for Fraserburgh?—Of course, she is under the lee of the land; when round the point, she can go to Cromarty, or where she likes.

13,652. Do you think that the captain of a vessel, under any circumstances, off Buchan Ness, would have any anxiety as to the saving of the life of her crew?—No, I do not think he would.

13,653. Take the case of Wick, and the Pentland Firth. What would place a ship in the greatest danger? What would be the worst gale for vessels proceeding through the Pentland Firth?—A vessel would not go into the danger at Wick. If a captain were wise, he would fall off on the starboard tack.

13,654. You described the case of some ships which cannot keep to windward, that must run. Place a ship in these two positions, one with any wind off Peterhead, and the other with the worst gale for entering the Pentland Firth, which ship is in the most danger?—At Wick, because the land does not fall away so rapidly at Cromarty as from Peterhead to Leith.

13,655. Then, if the saving of life and property from destruction were merely the object, do you think the trade through the Pentland Firth would find more safety from wreck at Wick than at any other place?—I think it a very exceptional case if a ship is caught at Wick.

13,656. But would you think it a more exceptional case if ships were so caught at Peterhead that lives would be in danger?—Both are almost equally exceptional. But at Peterhead, for all that coast of Scotland generally, a harbour would be very useful. I have found it so myself.

13,657. Do you mean a stopping harbour or a harbour to save vessels?—To save wear and tear, and to renovate the crew.

13,658. To save wear and tear, and not for refuge?—For refuge in fact, because if a crew from the Baltic has been out for a long time on the passage in bad weather they are pretty well exhausted, and a day or two's rest is of great advantage to them and the ship.

13,659. When we have to consider the question of a harbour on the east coast of England, is it not the feeling that it is required to prevent the loss of life and property?—Yes.

13,660. And that gave rise to the idea of making a harbour of refuge?—Yes; but the number of ships off here and off Peterhead are very different.

13,661. Do you consider there is any such chance of loss by wreck in the neighbourhood of Peterhead as to warrant the expense of making a harbour there?—No, I do not.

13,662. Knowing, as you do, the comparative advantages of the two places, will you add to your consideration what one gentleman has very properly alluded to, namely, the great loss of life among the fishermen, and then take the position of Peterhead and Wick, and say which is the proper place for a harbour of refuge. You may know that there is a large extent of fishing and great destruction of life at Wick, which would turn the balance there, because a harbour would be more valuable for the saving of the fishermen's lives?—For the fishermen, Wick, but not for the shipping, I should prefer keeping to windward to get to the Orkneys.

13,663. Do you think any ship, except a very large one, would run down from Duncansby Head, meeting the east tide, across that tide to the Orkneys?—She must be well to the windward before she crosses it. It does not extend very far.

13,664. Have you ever got into a ten-knot tide?—I have crossed the place in a very heavy gale to go to the Orkneys, and my ship was laden with salt too.

13,665. Do you think there is any point on the whole coast at all approaching the danger of the Pentland Firth under the circumstances we have been describing?—I do not know; many would go down with a good gale unless they were caught, and that very seldom happens. A gale does not come on without notice.

13,666. You think that a majority of the ships keep the sea, and keep off a lee shore?—Yes.

13,667. Why does not that apply to the other coast?—Because, going north, when a ship leaves Peterhead she has a good offing to run down on Wick. Here she goes to sea from the coast and has to make her passage by the coast, which makes all the difference.

13,668. When north of Wick, and between Wick and the Orkneys, supposing the Pentland Firth closed, is it not a straight coast?—Yes; but a prudent man would not go down with a bad prospect.

13,669. Do you think, generally, that the coasting vessels wait for the tide?—Every vessel will heave to if the tide is against her and the wind strong.

13,670. Do I understand you to say that of the two places there is more chance of wreck east of Wick than near Peterhead?—Not with a ship; with a fisherman there is. I have not seen the wreck chart so as to know whether there have been wrecks there,

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but I do not think there have been any (*the chart was handed to the witness*). I see that more are lost off Peterhead than off Wick.

13,671. You spoke of the great disadvantage of getting out of Wick when once in?—No, not always. If a ship bound to the westward went in, when the wind moderated she could not get round the point.

13,672. Would not that apply to any harbour at Hartlepool or Filey?—Of course. But the weatherly harbour is the best, if a man has the choice of a harbour.

13,673. You said you would prefer Hartlepool to Filey, on the ground that you wished a place somewhere midway between the Humber and Shields, and you thought Hartlepool would come the nearest?—I said that ships which leave here were more likely to get to Hartlepool than to Filey.

13,674. You said that the great want was somewhere midway between the Humber and Shields?—Not the want; I said if there was only one harbour to be made.

13,675. I find that Filey is 40 miles from the Humber and 60 miles from Shields, while Hartlepool is little more than 20 miles from Shields and 70 from the Humber. Taking that into consideration, how would you apply your remark about wishing for a place midway and yet preferring Hartlepool?—I said that ships leaving the Tyne and the Wear would be more likely to be caught on this side of Filey. If they were much on the other side that would be a very little distance, and one tack would take them to the Humber.

13,676. Would gales from east-south-east and south-east drive them back?—Yes.

13,677. Would they run for the Humber in these gales?—If a vessel were well to windward she would fetch it.

13,678. But must not the wind be north of east to insure her fetching it in a gale of wind?—It would require the wind to be east or north to fetch the Humber to be safe.

13,679. Then in an east-south-east gale a ship is more likely to run back?—Decidedly, because on the starboard tack the land falls away there.

13,680. In speaking of the advantage of improving the ports, do you set aside the idea that this port is already improving?—No, I do not.

13,681. Supposing this port to be deepened to 15 feet of water, would it obviate, so far as the light vessels are concerned, a great deal of the danger?—It would obviate the danger entirely so far as the light vessels are concerned, but not the laden ones.

13,682. You spoke of a large fleet of ships?—I said that 500 or 600 left Yarmouth Roads together.

13,683. Were they all light?—The larger portion of them were.

13,684. If five laden ships are lost to one light one, would you consider the light ones in selecting a harbour, or the laden ones?—I would consider the laden ones, because if they can get in, the light ones can also.

13,685. Then when this port is deepened to 15 feet, do you consider that even if there were a harbour of refuge at Hartlepool or anywhere south, light vessels would still run for the Tyne?—Of course; they do not want refuge.

13,686. Would not that relieve the harbour of refuge of a crowd of light vessels?—With that wind, but not with the wind from the east-north-east if it veered round and took them short.

13,687. Do you think the statement correct, looking at the return, that for 62 light vessels lost in one year there were 380 laden ones?—I think most are lost in taking the Bar, light vessels the same as laden ones.

13,688. How do you account for the small proportion of light vessels which are lost when you consider the risk of their being caught in large clusters with east-north-east gales?—If there is a harbour a light vessel will go in, because a ship in ballast is not very pleasant off the coast in a gale of wind on a dark night.

13,689. Is it not the case that a tidal harbour will save most light vessels?—Yes.

13,690. And would not that reduce the number of light vessels that would run for a harbour of refuge if made?—After these harbours are improved.

13,691. Would that be another reason why laden vessels principally are those which would require the harbour of refuge?—Yes.

13,692. From what you know of the usual trade of these ports, do you consider that if a harbour were made where no means of supply at present exist, and a demand arose for anchors, cables, spars, ropes, and all the ordinary supplies for ships, I am not alluding to their requiring docks but to the ordinary supplies for ships, do you think the trade would follow the demand and that people with capital would go and supply that demand?—If the demand were sufficient they would, but the demand would be only occasional, and larger profits would be required to keep such a place, and vessels would prefer coming where they could obtain a cheaper supply.

13,693. (*Capt. Vetch.*) Looking at the state of the coast here from Blyth to Whitby, you prefer that the existing harbours should be converted into good shelter, rather than that one large harbour should be constructed for the benefit of the whole?—Yes, I should prefer that decidedly.

13,694. Which of the existing harbours would you propose should be benefitted by such works?—The large harbours, the Tyne, the Wear, and Hartlepool.

13,695. Supposing the Government entertained a different opinion, and preferred one single harbour, what site would you propose in that case?—That is a very difficult question. I would take the site where I could get the largest harbour.

13,696. You have no predilection for any place in particular, under these circumstances?—I would prefer Redcar or Hartlepool, on account of the high land about it.

13,697. Speaking of the improvements going on in the River Tyne, supposing that the piers are carried to the proposed depth of 15 feet, will not that be the means of saving all the vessels that are now wrecked inside these pier heads?—Decidedly it will.

13,698. It will save all the lives?—Yes, and save the ships too, because the sea will not break in six fathoms, as it now does, when there is nothing to prevent it.

13,699. Do you know the amount of the tidal current which runs across the mouth of the proposed harbour?—In spring tide it is only about a knot and a half.

13,700. Does that run right across?—Directly at right angles.

13,701. Would not that tend to keep away the formation of any bank?—It would prevent any bank of sand forming immediately in front, but I think it would make a bank to the north.

13,702. (*Mr. Coode.*) Can you tell me what land, ships from the Baltic, make when bound to Hull or Shields?—They generally make Flamborough Head. Bound south for London they make Lowestoft.

13,703. Is it not the practice to endeavour to make Flamborough Head so as to get holdof the land?—Not if they go to the southward.

13,704. Have you not said that the wind prevails from the south?—It does.

13,705. But as a matter of fact do not vessels make Flamborough Head generally?—I should say, from my own experience, that five-sevenths of them make it north of Flamborough Head.

13,706. (*Chairman.*) Can you tell me if the Archangel trade and the trade to the Baltic is very considerable or otherwise?—It is a very considerable—a very large trade.

13,707. Are the ships engaged in it generally of a large size?—No; about 300 tons is the outside, except vessels going to St. Petersburg. The other ports will not take them larger than 300 tons. Archangel Bar is only 14 feet.

13,708. In the fall of the year, coming from the Baltic, is the weather very coarse ?—Yes, it is very nasty. There is a strong current down the Sleeve, and it makes a nasty sea.

13,709. What do you call a good passage in the fall of the year ?—After November we consider three weeks a good passage from Elsinore.

13,710. And from Archangel, what is a fair passage ?—Why, I made three passages, each in 17 days from Archangel, very curiously, by keeping well to the north. A ship going in a high northern latitude is sure to make her passage.

13,711. Was that a good passage ?—Above the average, I should say the average from Archangel was 30 days.

13,712. And what do you call a bad passage from the Baltic in the fall of the year ?—Some vessels have been four months from the Sound before they got to London.

13,713. And of that time were they a great deal at sea ?—They got into Cromarty and lied there some time.

13,714. What is a bad passage from Archangel ?—I have known ships six months on the passage. In 1828 several were six months. But about two months.

13,715. Is two months a bad passage ?—Anything above 30 days.

13,716. But passages above 30 days—are they unfrequent or not ?—Frequent, I should say.

13,717. And in making the passage, is the work hard ?—The weather is severe after the month of October.

13,718. And the work is hard to the people ?—Of course, and the people are exhausted and worn out when they make the Scotch land.

13,719. Therefore, although as respects the mere question of saving life or even saving property a harbour at Peterhead might not be required, still it would be a decided advantage for the weather-worn crews ?—It would be a great boon to the Baltic and Archangel trade.

13,720. Although not absolutely required for the saving of life and property ?—Yes.

13,721. Do you think you can procure for me any tracks home from the Baltic or Archangel in the fall of the year ?—I will try, if I can, to get a log.

13,722. If you will not object to the trouble ?—It will take up some time. I shall have to get hold of a log-book, and prick the mark off on the chart.

13,723. But if you will undertake to superintend the preparation of these tracks the Commissioners will meet the expense of employing proper persons ?—I will do it myself. It will be less trouble than superintending others.

13,724. What I wish is that these tracks should be selected not with the view of maintaining any particular opinion of mine, if you suppose I have one. They will be the more valuable the more indiscriminately they are taken.—You mean a fair average of the passage ?

13,725. Yes, from Archangel and the Baltic in the fall of the year.—Will you have the track all the way from Archangel, or after latitude 60 ?

13,726. I should say the latitude of the Orkneys and the Shetland Islands, and also taking the departure from the Sound and the Naze, as the case may be, the object being to show where the ships make land under these circumstances ?—Yes, I will do that.

13,727. (*Sir F. Smith.*) Do you imagine that the coal trade will be carried in steam vessels ?—No ; I do not think it will.

13,728. Do you think that the size of the vessels will increase ?—No, not beyond what they are now.

13,729. So that the depth of water required now will be sufficient ?—For the coal trade. But for long voyages, in my opinion, the size of the vessels will increase, and the trade from the Tyne is very extensive to the East Indies, and the West Indies, and all parts of the world.

13,730. And is that trade increasing ?—It is increasing rapidly.

13,731. You do not happen to know the number of vessels trading for a year from the Tyne ?—I do not.

13,732. But they are very much upon the increase ?—They are very much on the increase, and are increasing in the size of the vessels.

13,733. (*Mr. Lindsay.*) Look at this parliamentary paper. The question I am about to ask bears reference to an answer which you gave, where you stated that if one harbour were to be made on any particular part of the coast, you would choose that where there would be most room ?—Yes.

13,734. Do you know Hartlepool Bay ?—Yes.

13,735. Have you seen any plan for a harbour proposed to be made there ?—I have.

13,736. You see before you a plan of Filey Bay ?—Yes.

13,737. Looking with the eye of a sailor, and at the scale to measure the size and depth, would you have more space for ships in a harbour in that bay or in Hartlepool Bay ?—In Hartlepool Bay, I think, if a breakwater were made as I have seen it laid down, making a curve from the Heugh.

13,738. Was there any estimate attached to that plan ?—No.

13,739. But looking to the plan of Hartlepool Bay and the plan of Filey Bay, you would consider there is more space in Hartlepool Bay ?—If the wind got south-east, very few ships in Filey Bay would be really sheltered.

13,740. Do you know the plan which has been proposed to extend the piers at the Tyne so as to give five or six fathoms at the entrance ? Which would then be the most spacious for refuge, the harbour in the Tyne or Hartlepool Bay ?—There would be much more room in the Tyne. In Hartlepool Bay vessels would have to ride at single anchor, but in the Tyne the tugs would take hold of them ; they would be moored safely, and there would be no risk of further injury from collision or driving.

13,741. When you say more ships, you mean more stowage of ships ?—Yes.

13,742. You are taking into consideration that most of the ships would be moored as they came into the Tyne ?—They would be moored as they came in, without confusion and without difficulty.

13,743. Now, in your opinion, would any harbour, such as that before you in Filey Bay,—would any harbour of that extent be sufficient on all occasions for the number of vessels which may require to run for it in a heavy easterly gale ?—I do not think it would. The number of light ships in Bridlington Bay would sometimes fill that harbour to crowding.

13,744. With the practised eye of a sailor, can you tell us what number of ships that harbour at Filey would hold riding at anchor in a gale of wind ?—I do not think it would stow above 250 ships.

13,745. About 250 ships ?—A ship with 50 fathoms of chain, would take eight acres to swing in.

13,746. By a return it appears, that five laden vessels are lost to every light vessel, consequently a harbour of refuge, in the strict sense of the word, ought to be such a harbour as will admit laden vessels at all times of the tide ?—Decidedly so.

13,747. Will that be the case with the Tyne when the piers now going on are completed ?—Not with the present plan. It will not.

13,748. Then to make the Tyne a harbour in the strict sense of the word, it is necessary to carry the piers further to sea ?—Decidedly.

13,749. So as to give a greater depth than 15 feet at low water at spring tides ?—Decidedly, to prevent it breaking between the piers in ordinary gales.

13,750. And although these piers when carried out, so as to give 15 feet will lessen the danger, they would lessen it a great deal more if carried out to a greater depth ?—If we could have six fathoms a ship might come in at low water, and at low water the sea would not break. It will not break unless there are undulations, and the piers would prevent it from breaking.

13,751. Then it is necessary to carry the piers

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Mr. Conrad Greenhow.

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so far out that the sea will not break upon the bar. That is your opinion ?—Yes, decidedly so.

13,752. (*Capt. Washington.*) Do you say that you had seen from 400 to 500 light vessels in Bridlington Bay ?—In Yarmouth Roads, I said.

13,753. Will you state what number of laden vessels you have ever seen making their way together which a south-east gale would oblige to bear up ?—I have seen 200 go out of the Tyne, and as many out of Sunderland, and off the Yorkshire coast 400 or 500. As the tide serves they always go out together.

13,754. Is that a very unusual circumstance ?—Not at all in the winter time. At the same time a south-east breeze gives very little notice.

13,755. Then you consider that if the work is to be confined to one harbour, provision must be made for 500 vessels at least ?—Yes, it will require provision for 500 vessels.

13,756. If the three harbours were improved, would these 500 vessels be distributed ?—If the Tyne were improved they could stow away 500 sail. They would be taken by tugs to their berths without confusion.

13,757. (*Capt. Sulivan.*) You say six fathoms of water, I presume you mean between the pier heads ?—I am telling you what the engineers report.

13,758. Tell me how you could get a ship ride ?—In my opinion the present bar would disappear. I do not expect to keep six fathoms, but I do not think the growing up would diminish it to less than 25 feet.

13,759. You said before that the silt was carried out to sea ?—It must follow the piers out of course.

13,760. Then I presume that, with the present piers and the depth which they will give, it will only be a question of time when this silt accumulated outside ?—If the piers are carried far enough, there will be no fear.

13,761. But at present, or when you have the 15 feet ?—I think the present piers are beyond the range of the beach, and it will take a long time for sand to accumulate outside.

13,762. You said it must accumulate ?—There is sure to be a deposit.

13,763. Then you consider it is merely a difference of time as to when the silt will form ?—In six fathoms I don't think it will ever form so as to be detrimental.

13,764. Do you think that the whole passage over the Narrows and the nine-feet bar will be swept sufficiently clear for large vessels to enter, even supposing that the six fathoms are kept at the pier head ?—There will be earth works to concentrate the current and make it take the true direction.

13,765. You mean that down from the Narrows there will be other works to confine the current to the channel ?—To give a true direction to the current decidedly, to prevent its spreading.

13,766. Supposing that were done, when large vessels come in for refuge, a line-of-battle ship say, where would she bring up ?—In ordinary circumstances she would bring up generally where the present bar is ; but she would merely temporarily bring up ; she would not ride.

13,767. At present is there one depth in the Narrows ?—No, there is Peggy's Hole.

13,768. Can a ship drawing 26 or 27 feet of water anchor there ?—No.

13,769. You are aware that all men-of-war draw from 26 to 27 feet ?—I am aware of it.

13,770. Do you think that the Narrows, a place with a strong tide, a proper place for a line-of-battle ship to bring up in ?—Not a very large number might bring up. A few might. We expect the harbour to be improved inside. We can easily remove what is in it if we can keep it out.

13,771. Must not the channel be very narrow to keep it deep ?—No. There would be a great body of water in the channel if it were not allowed to disperse, and it would maintain a good stream.

13,772. At present the steam is confined until it passes the Narrows ?—It then disperses.

13,773. Then you require a channel as narrow as the Narrows ?—No, I do not think that. The Narrows are much narrower than they were 30 years ago. They will widen when the works are done.

13,774. If the volume of water only sweeps out a channel of 15 feet in depth, would it not require you to narrow that channel to sweep out 26 feet ?—No, I do not think it would, not if it were directed in its energy. If allowed to disperse about and lose its energy it will deposit.

13,775. What is the strength of the tide in the Narrows ?—In spring tides I should say at once, four knots quite.

13,776. Supposing a harbour were made at Hartlepool, if large ships are running in, where would you rather bring up, in a bay like that with no tides in it, or in a four-knot stream ?—The four-knot stream ; in the Narrows down there is not two knots.

13,777. Where it is two knots there must be a wide expanse to carry the tide ?—Yes.

13,778. And you must confine the channel to get a depth ?—I would not confine it as narrow as the Narrows.

13,779. In any case, would you rather bring up a large ship in a tidal channel or in deep water ?—Under certain circumstances I would rather bring up in smooth water, but with a weatherly tide I would as soon bring up in a tidal channel.

13,780. You say there are 500 or 600 vessels off the coast in gales at one time, can you tell us, upon the average how many persevere, being generally well found, and endeavour to keep to sea, and what number try to get shelter ?—Every ship, if she is well ballasted, will keep to sea.

13,781. I spoke of laden ships ?—If laden, every ship will persevere so long as there is no absolute danger of doing so, and then she will go back to her own port if she does go back.

13,782. Out of the 400 or 500 vessels which you have known to leave the northern ports in one day, and congregate off the coast at Flamborough Head, what number would you think it necessary to provide refuge for, allowing for the proportion of those who endeavour to keep to sea ?—That is a very difficult question to answer, because I cannot tell how many would require shelter. Cases occur where ships cannot keep to sea, and must run. Deeply laden colliers in certain gales must run. In my opinion there is not 10 per cent. that would not keep to sea.

13,783. (*Mr. Coode.*) You have spoken of a plan for a harbour in Hartlepool Bay ?—No, I did not. I merely saw a plan roughly drawn to show a harbour there. I think it was Mr. Calver's.

13,784. Can you tell us the exact number of acres sheltered by that plan? —No, I cannot.

13,785. Speaking of the plan before you, of Filey, and the plan of Hartlepool, can you state generally which has the most space ?—I can see with my eye that there would be more room at Hartlepool, because at Filey laden ships would not take advantage of it as it is exposed to the south-east.

13,786. Please to refer to the plan of Filey, and tell me how many acres there are in that breakwater for laden ships sheltered from the winds ?—I cannot tell, unless I know what depth they would require.

13,787. I believe $2\frac{1}{2}$ fathoms will suffice for a laden collier ?—I have known some of them drawing 16 feet ground.

13,788. What proportion of the colliers out of the Tyne draw 16 feet ?—Fully one half of them. These ships would not be safe in three fathoms anchorage, even if it were smooth.

13,789. Do you know the anchorage in Hartlepool Bay ?—No, I do not. I merely saw a plan, and I think it is more extensive than Filey Bay.

13,790. (*Capt. Vetch.*) Looking to the present plans for the improvement of the Tyne there would be an opening of 1,100 feet left between the piers ?—I believe so.

13,791. When these piers are completed, will not

all the water which flows in at flood tide be confined to a much narrower space ?—Of course, where you want more energy you must narrow the stream.

13,792. Will not that produce a much greater current between the pier heads ?—Decidedly.

13,793. And will not that increased current tend to scour out the channel of the river ?—It will, and by the works on the north side to prevent its flowing over the Flats it will divert the whole force upon the channel.

13,794. Independently of any further extension, will not that be a great benefit ?—It will.

Mr. COWAN re-examined.

Mr. Cowan.

13,795. (*Chairman.*) In the revenue account of the Tyne Improvement Commissioners, I find for the year from the 1st of January to the 31st of December, 1857, the amount arising from the duty of 2*d.* per chaldron of 53 cwt. on coal, coke, culm, and limestone is 19,138*l.* odd shillings and pence ; the Corporation of Newcastle receive the whole in their name and pay over to the River Improvement Commissioners three-eighths of that amount, 7,177*l.* odd, leaving a balance of 11,961*l.*, and that balance of 11,961*l.* is applied to other purposes than the improvement of the river ?—It is applied by the Corporation of Newcastle to such purposes as they think proper. By the Tyne Improvement Act of 1850, there was an arrangement made with the Corporation, that they were to retain five-eighths of the amount, and of course the Corporation can do what they think proper with that five-eighths. Previous to the passing of that act the Corporation of Newcastle were entitled to the whole receipts, and to lay out such portions as they thought proper on the maintenance of the river.

13,796. And in fact the revenue derived by the Corporation of Newcastle from dues is probably chartered right of very ancient date ?—It is.

13,797. And by custom, whatever was the original intention, it has been appropriated as a part of the town income ?—Just so.

13,798. Then when this arrangement of which you have just told me was made, am I to understand that the three-eighths which is now devoted to the improvement of the navigation of the river was considered a fair compensation, under the circumstances, that the Corporation of Newcastle should give three-eighths for that purpose, and keep five-eighths, as being entitled to it under this old vested interest or right ?—There were two parties contending at that time, and the two bills which were then before Parliament, in consequence of an arrangement, were run into one. I was a party myself to the arrangement. Each party thought they had done the best they could, and had made the best bargain they could under the circumstances. It was a compromise between the parties under the circumstances, bearing this in mind that the River Tyne Commissioners were to get a much larger sum for the improvement of the river than the Corporation of Newcastle were in the habit of doing.

13,799. And as far as respects the parties concerned in this compromise, how would any disturbance of the compromise be viewed, as fair and right or the reverse ?—We have in the last session of Parliament attempted to disturb it ; but were prevented from doiug so by the present Government. The Corporation of Newcastle and the Tyne Commissioners agreed, the Commissioners to purchase and the Corporation to sell them the remainder of those dues, and they agreed upon the principle on which the value should be determined by arbitration. In consequence of the present Government inserting a clause with reference to certain dues, which they thought unreasonable, the arrangement went off, but I have no doubt that arrangement would have been of benefit to the Commissioners.

13,800. Then if I understand you rightly that arrangement indicated that it would not have been considered honourable on the part of the parties concerned in that compromise to have disturbed it except by mutual agreement ?—Certainly not. There is no greater proof of this than the circumstance that the Improvement Commissioners were the parties who brought in the bill for the purpose of effecting the arrangement, they did not think it honourable to take anything away from the Corporation without compensation.

13,801. (*Mr. Lindsay.*) You said that this 11,961*l.* which the Corporation receive annually from the coal duties was used for corporation purposes ; do you mean that the whole of it is so expended ?—It goes into the general funds of the Corporation. I am not aware what they do with it, but I presume they pay the interest of some debt incurred, or appropriate it to the general purposes of the Corporation.

13,802. But if you levy dues upon the coal trade, what do you do for the coal trade in return ?—We maintain the river, as far as the improvements are concerned, and we lay out our funds for the benefit of the general trade.

13,803. But is any portion of the 11,961*l.* laid out for the benefit of the river ?—Not at all, we do not draw it.

13,804. Do I understand you to say that no part of this 11,961*l.* which is levied upon the coal trade is expended for the improvement of the river ?—None at all.

13,805. You said yesterday that 400,000*l.* was the sum that you contemplated laying out in the construction of the present pier ?—Yes.

13,806. And that you would require 400,000*l.* more to turn the Tyne into a harbour of refuge so as to give six fathoms at low water ?—Just so.

13,807. How much would 11,961*l.* per annum, if capitalized, give at the present rate of interest ?—I have not gone into the question. It is a matter of calculation as to what it would give, but I have not made it.

13,808. It would give close upon 300,000*l.* at four per cent. ?—Probably it would.

13,809. Would the extension of the piers to the extent you have named be of great value to the trade of this immediate district ?—No doubt of it.

13,810. Would Newcastle derive very great benefit from it ?—No doubt it would.

13,811. Do you not think it would be for the interest of Newcastle to capitalize this 11,961*l.* a year, or at least, if not the whole, a large slice of it, towards the 400,000*l.* required for the construction of the piers ?—It was the intention of the Corporation that some such idea should be acted upon in the bill which we had before Parliament in the last session. It was to be a compromise, even that, because it was arranged that the value should be ascertained by arbitration, and that the parties would take all the circumstances of the case into consideration, as to the value which they would put. My own notion is that the Corporation did not expect to receive such a sum as would be given for the bonâ fide purchase of property of a different description, therefore they are prepared to compromise to a certain extent, and to act upon the principle to which I am alluding. At any rate, that is my impression.

13,812. Then do you think that if the Government were disposed to assist, the Corporation of Newcastle would do that which I suggest ?—In the same bill it was proposed to lessen the ballast dues, and thereby give compensation to the shipping interest at once.

13,813. Supposing the Government were disposed to assist in the construction of this great harbour, do you think the Corporation of Newcastle would be disposed to meet the Government readily in regard to this sum of 11,961*l.* annually, which they now draw ?—I cannot answer for the Corporation. I can only state what has already passed. As I have stated, my own impression is that the bulk of the Corporation, the majority of the Corporation, expected in the sale and purchase of the dues which would be effected by the bill, that they would not get the full value. It was upon this principle that the arrangement was made.

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Mr. Lindsay.

13,814. Would the difference in value have gone to the extension of the piers, or to the general improvement of the river? Had the Corporation power to apply the money either to the piers or to the river?—I have no doubt in my own mind that that was their intention. The Corporation did not expect to receive so large a value by far as they would have done from a purchase of real property.

13,815. You are now speaking your own individual opinion?—Certainly, I am not prepared to give any answer on the part of the Corporation.

13,816. Do you think it would be policy on the part of the Corporation of Newcastle to consent to such an arrangement?—Yes, I do.

13,817. If the Government come forward and offered a sum of money to aid in the construction of the piers, do you think it would be a wise policy on the part of the Corporation to place a portion of the 11,961*l.* at their disposal?—I think it would be wise for them to do it. I have always said so.

13,818. (*Capt. Sulivan.*) Be kind enough to explain the exact nature of this due of 2*d.* a ton?—2*d.* a chaldron.

13,819. Is it a coal tax to that amount, or 2*d.* a chaldron for what ships carry?—It is for what ships carry.

13,820. Then it is not a shipping tax, but a coal tax?—Yes.

13,821. More like what the Corporation of London receive?—Yes, it is paid usually by the purchaser of the coals. The vendor is obliged to pay sometimes.

13,822. But it does not fall upon the shipping? It falls more upon the colliery?—There is a difference of opinion on the subject. I have always maintained that it falls on the purchaser of the coal. Some say that it falls actually on the owner of the coal mine. If I am the owner of a coal mine, and open a coal mine, and for every chaldron of coals am subject to a tax of 2*d.*, I presume, as the owner of that royalty or that mine, if I were letting it to any gentleman here I should let it for 2*d.* a chaldron more. Therefore I say that the 2*d.* actually comes out of the pocket of the purchaser of the coals. That is my view of the case, and always has been.

13,823. Then if we could suppose that the Corporation of London were to give three-eighths of their coal tax for the improvement of the Thames, it would be a very similar case?—It would.

Mr. JAMES MATHER examined.

Mr. James Mather.

13,824. (*Chairman.*) You are one of the River Tyne Commissioners?—I am.

13,825. I think you stated yesterday that you wished to supply a list of witnesses, of seafaring men who wished to be examined?—In a few minutes, after I have done myself, I will get these names, and hand them to you.

13,826. You are aware of the objects of this inquiry?—I am.

13,827. Will you make any statement which you wish to offer on the subject. I will ask you, before entering on your statement, to avoid anything we have before us in an official shape in the Report of the Committees of the House of Commons in 1857–8?—I will give, if you have no objection, a portion arranged from official documents, combined with facts which have been ascertained on the spot generally, which strikingly illustrate the question in all its bearings upon the subject of a harbour of refuge. I will not trouble the Commissioners with every detail. In showing the importance of the Tyne and the ports along the coast, I will not go over all the facts given in the parliamentary and official first returns, but I will state, if you will permit me, the great increase which has taken place in the last five years at these several ports, as bearing on your important inquiry. I find that the Tyne has had an increase on shipping of 967,731 tons within the last five years. Sunderland has had an increase of 617,349 tons within the last five years. Hartlepool has had an increase of 17,604 tons during the same time. Last year the Tyne had an increase of 394,000 tons; Sunderland had an increase of 328,000 tons; Hartlepool had a decrease of 69,525 tons. This statement will illustrate, I fancy, the condition of these harbours, the character they bear in the minds of commercial and nautical men. The Tyne, with its enormous increase of nearly 1,000,000 tons in five years, and increasing in a greater ratio now than before, is a proof of the great improvement which has taken place here, to which the previous witnesses have spoken. At Sunderland, owing to the very creditable efforts making there, there is also a very large increase; while, with all the efforts which Hartlepool can make it is perfectly plain that if she is to be saved, she must be saved immediately. With regard to the great staple commodities of the places, coal and coke, in the last five years the Tyne had increased 711,653 tons, the Wear 736,189 tons, while Hartlepool has decreased by 61,050 tons.

13,828. In what time?—In five years, but it has been chiefly in the last year that Hartlepool has decreased. She has had an increase at other times, but this year's decrease balances and turns the scale the other way. It is an important feature to state the quantity of coals carried coastwise. We are now losing that trade to a certain extent; in the five years there being a decrease on the coasting trade of 153,858 tons. Sunderland has increased 234,620 tons, whilst Hartlepool has decreased 124,865 tons. Sunderland has balanced nearly the two decreases in the Tyne and Hartlepool trade. We have lost the trade in consequence of the cheap rate coals are carried by railway to London. In the year 1852, 3,330,428 tons were carried by sea, and by inland carriage only 414,917 tons, making altogether 3,745,345 tons. In the year 1857, six years afterwards, the decrease in ship-carried coal was 196,969 tons, while the increase of the inland coal trade by railway to London was 820,332 tons, London taking during the last year 4,368,708 tons. The increase to London has been 623,363 tons, while the trade of carrying coals by ships has decreased 196,900 tons. Showing that we are losing the coasting trade, owing to the competition of railways. The steamers, no doubt, are doing harm, but I have not a shadow of doubt that they are on their last legs, and will disappear entirely from the waters of the Tyne, and be employed elsewhere. We have, however, compensation for the decrease in the quantity of coal carried coastwise. We have an export of coal and coke to foreign ports, and that trade has increased in five years, from 1853 to 1857, 61 per cent. in the Tyne. The Tyne has an increase of 836,697 tons; Sunderland has an increase of 494,995 tons; and Hartlepool an increase of 77,292 tons; being an increase in the export trade equal to 61 per cent., as I have said, for the Tyne, 91 per cent. for the Wear, and 17 per cent. for Hartlepool. Stockton had an increase of 117,390 tons, making a total of 3,865,703 tons exported last year from the north-east ports, and showing the enormous increase of 1,500,000 tons of export trade. The total coal exported by the United Kingdom is 6,737,718 tons, and we sent from the northern ports considerably upwards of one half. This shows that the loss we have sustained by railways is more than made up by the gain where no railways come; and I think I may congratulate the shipping on having this sheet anchor in their difficulties. Perhaps you will permit me hereafter to give these tables in.

13,829. Perhaps it would be desirable that you should supply a statement in order to check the figures?—Another element in the increase of the foreign vessels which come to the Tyne is, that these vessels cannot discover along the coast any sufficient harbour. They seek the Tyne harbour in all difficulties. When therefore the Tyne has more foreign vessels engaged in trade than London itself, it is a matter of consideration whether suitable provision should not be made for those vessels. We last year had for this river upwards of 7,000 foreign ships,

giving a trade in foreign ships to the Tyne upwards of one half of those to all the north-east ports. There has been some statement made of the number of vessels along the coast, which I think may be taken merely as a little guess-work. The total number of vessels, in and out, laden and light, was 93,802 for all these ports, the Tyne itself having upwards of 41,600 tons.

13,830. Ships you mean?—I meant ships, of course; 41,688 ships for the Tyne. This will partly apply to the wrecks which are perpetually occurring on these shores. It will account partly for the great number of laden ships which are wrecked, although not to so great an amount as you have already heard in the statement made to you. I cannot clearly comprehend that statement, but I will submit other figures from the Admiralty returns, showing that the laden vessels are not five to one to the light vessels wrecked. I believe the proportion is rather against them. The Board of Trade do not favour the public with particulars, and since the Admiralty have given up making the wreck returns, we have to take for granted all that the Board of Trade states, and that is a general summary. I conceive that when the Admiralty favour the public with the details ship by ship, where bound to, what weather and wind, whether light or laden, the public are advantaged by these papers. I wish the Board of Trade would take a leaf out of the Admiralty book. I may add that with regard to the foreign trade, bearing on that subject is the number of different ports with which these ports deal. The Tyne, in the month of July, dealt with 166 foreign ports. We sent and had shipping from those 166 foreign ports. The Wear dealt with 93 foreign ports; Hartlepool with 90 foreign ports; Middlesborough with 30 foreign ports. We had nearly double the whole trade of the kingdoms of Scotland or Ireland; and I trust the Commissioners will remember that in dealing with us they are dealing, not with a port, but with a great maritime people.

13,831. I did not catch that expression.—I take the liberty of saying this, that this important river has more maritime property afloat, and as many vessels as the kingdoms of Scotland or Ireland, and therefore when you are adopting measures for their advantage and protection, you will, I hope, consider that you are dealing with interests equal to those of a kingdom, and not with a river of that kingdom. We now come to a very disputed point in the tables, about the winds.

13,832. Before you proceed further, Mr. Mather, may I ask if you have furnished the statistical part of your statement?—I have, I have got to the wrecks and the winds.

13,833. Then I would suggest that to make your inquiries of value, you should attach to the margin of these returns the authorities from which they are drawn. You will see the object is to give them greater weight and authority than they would otherwise possess.—They are chiefly from official tables; and I will, with your permission, forward tabulated statements, with the authorities whence derived, to the Commission. Some of them have been already published.

13,834. Any authority, not of a public nature, you will please to authenticate as best you can.—In coming to these tables I am happy to say that I have had results, corroborated by a gentleman whose authority will be recognised everywhere, Mr. Tom John Taylor, who, with great industry and application, has devoted himself to the development of this subject. I had not known that Mr. Taylor had applied himself at all to it, but the results which I arrive at, although not his precise results, are sufficient to show their general accuracy, considering also the independent sources from which we both derived our information. I will give you first my own statement as to the direction of the winds on the coast, and then Mr. Taylor's. I think it was observed in the north that you had not evidence as to the winds, such as you would like—that you could not exactly ascertain the prevailing winds—and a desire was expressed by the Court to have a return showing their direction and prevalence. The first return which I shall give is from the *Shipping Gazette*. I went over the whole of it for four months, and these are the results:—On fifty-three days in these four months, the wind in the district prevailed from the south, on thirty-three days from south and east, and on thirty-three days from the north. We will get more precise information than that. I will give now the direction of the wind for every day in the year for 1857, at the mouth of the river Tyne. My authority is the pilot master at South Shields. He keeps a register, which I hope will be laid before you, because there are some very good remarks in it on the state of the weather, the barometer, the way the wind is blowing, the state of the sea, and many things in which nautical men are interested. From that register I find that for 1857 there were 184 days on which the wind blew from the south, 148 when it blew from the north, 18 when it blew from the west, and 15 when it blew from the east. Looking at the matter in a harbour of refuge point of view, there were 75 days when the wind blew from the south and east, and 68 days on which it blew from the north and east. The west being rarely dangerous winds, are of course not noticed. For the six months of the present year, up to July, there were 82 days on which the wind blew from the south, 82 days from the north, 6 from the west, and 11 from the east. There were 41 days when it blew south and east, and 31 when it blew from the north and east. These are then the prevailing winds for the last eighteen months, which I have the pleasure of stating to you. If you will permit me, I will now give you the number of wrecks at the mouth of the Tyne, and the prevailing winds, from the Admiralty Wreck Charts. The wrecks which occurred in five years at the mouths of the three rivers were 126 with the wind from the south and east, east-south-east, and so on; 105 with the wind from the north and east, east-north-east, and so on; 17 with the wind from east by north. There were 107 vessels wrecked when laden, according to the Admiralty reports, and 95 of these lost vessels were in ballast. There were also 44 laden vessels in which there was no direction of the wind ascertained, making 151 laden vessels altogether.

13,835. (*Capt. Washington.*) For how long a period are these returns?—I think I have stated that the return is for five years, from 1850 to 1854 inclusive. There were 22 vessels also in ballast, in which no direction of the wind was ascertained, making 117 light vessels altogether; and 66 vessels, laden and light together, in which no direction of the wind was ascertained. This is from an important state document, on which one can safely rely. If we take the total wrecks on the seaboard of the north-east coast, without deducting the wrecks at Blyth, Warkworth, Filey, and Redcar, with the wind from south by east and south-east, there were 142 wrecks; with the wind from the north-east, north-north-east, and north by east, there were 119 wrecks; 62, however, of the 119 occurred in and round the Tyne; so that a harbour of refuge to the south would not have protected these 62 ships, which were wrecked in the north-east gales. This shows that if a harbour were made, as suggested, to the southward, it would only meet the wants of a portion of the wrecks; and here is a proof that there are 62 vessels seeking for proper shelter in the Tyne in gales from the north-east. If south-east gales are to be provided for—and they must be provided for—and if you provide for the wrecks to the northward, you must add 142 east-south-east wrecked ships to the 62 wrecked in north-east gales, which make upwards of 202 vessels which would be provided for by a harbour of refuge here to the north, leaving just 57 vessels to provide for by a harbour of refuge to the south, or little more than one quarter. If the claims of humanity are to be the great consideration, which I understand from the members

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of the Court it is intended to be, here is an opportunity to respect them. It is all very well speculating upon one part of the coast, and placing a ship here and a ship there, with a certain wind. Here are facts, with the hand of Providence pointing where harbours of refuge should be made. I really regret occupying the time of the Commissioners so long, but there are more important facts. I have taken up a considerable time, but I now come to the figures of Mr. Taylor, which are of great value, and which I shall have the pleasure of offering to you. I know that he has given the closest attention to the subject, and that his figures are results chiefly drawn from the Admiralty returns. Mine are for five years, his are for three years. The number of vessels stranded, according to Mr. Taylor, was 140 in ballast, and 133 in cargo, making together 273.

13,836–7. (*Capt. Sulivan.*) Where was that ?—On the north-east coast, including Warkworth, Blyth, the Tyne, Sunderland, Seaham, Hartlepool, and the Tees, but excluding Whitby, as outside the local limits. Mr. Taylor states that along that coast in three years there foundered at sea three ships in ballast and 22 ships with cargo, making a total of 25. There were stranded after collisione one vssel in ballast and two with cargo ; total three. There foundered after collision two in ballast and 10 with cargo ; total 12. Here are the winds and wrecks in the three years. They give a total of 102 wrecks with the wind from north to east ; 135 wrecks with the wind from south to east; giving a preponderance, as I have shown before, to the south-east gales. There were 21 wrecks with the wind from north to west, and 15 wrecks with the wind from south to west, making a total, as above, of 273 wrecks. There foundered six vessels with the wind north to east, two with the wind south to east, six with the wind north to west, 11 with the wind south to west, making a total of 25. He has separated the vessels which foundered after collision from those which have stranded after collision; and he gives, as stranded after collision, one with the wind north to east, one with the wind south-east, one with the wind north-west, none with the wind south to west ; total three. Foundered after collision, one with the wind north to east, two with the wind south-east, none with the wind north-west, nine with the wind south-west ; total 12. The average I need not give, I suppose. Here is a fact showing that strangers are as likely to want shelter as vessels belonging to these ports. The vessels trading to and belonging to the ports, which were wrecked in 1852, were 88 ; in 1853, 55; in 1854, 159 ; total 302, making an average of 100 $\frac{2}{3}$ ships a year. The vessels wrecked not belonging to these ports were three in 1852, five in 1853, three in 1854 ; total 11. The vessels from the Tyne wrecked and stranded were 13 with cargo, with the wind north to east ; 16 with cargo, with the wind south to east ; eight with cargo, with the wind north to west ; four with cargo with the wind south to west. These were vessels from the Tyne. The vessels to the Tyne were 19 with the wind from north to east in ballast, and seven with cargo, total 26 ; with the wind south to east in ballast 18, with cargo nine, total 27 ; with the wind north to west, in ballast two, with cargo three, total five ; with the wind south to west in ballast one, with cargo three, total four. This is the last table, summing up the whole of his results. I need not trouble you with it, and will merely refer to a portion.

13,838. (*Chairman.*) It rests with yourself. We are here to listen to what you have to say. It rests entirely with yourself.—The number of light vessels stranded is nearly equal to the whole of the wrecked and stranded vessels shown in table No. 1. Table No. 2 shows the number of vessels foundered at sea, and the laden exceed the light vessels. The casualties from collisions in the light vessels are about five per cent. of the whole. That is in the third table. The fourth table shows a greater number of wrecked and stranded vessels with the wind south to east than with the wind north to east. The proportion is 135 with the wind south to east, and 102 with the wind north to east. 57 light vessels were wrecked with the wind north to east, and 72 with the wind south to east ; 45 laden vessels with the wind north to east, and 63 with the wind south to east. The fifth result shows the great number of vessels which have foundered in the same direction westward. The sixth result shows that the casualties are almost all confined to vessels trading to ports in the bay, the passing vessels being only three per cent. on the whole, while, as regards the Tyne in particular, only one not belonging to the port was wrecked at the harbour; she was a timber ship bound from Stettin to Dundee. There was also a vessel going from Hartlepool to a foreign port which was wrecked here, and which is not stated in the Admiralty report. The seventh result shows that the number of vessels wrecked at the mouth of the harbour, or to the north, was 34 out of 43, equal to 79 per cent. as compared with the vessels wrecked to the southward of the Tyne. This paper is signed Tom John Taylor.

13,839. Is your statement finished ?—It is quite finished.

13,840. Do I understand you to say that you draw the conclusion that a harbour of refuge to the south would be comparatively of no service, because the greatest number of wrecks occurred in north-east winds ?— I have misstated it then. I intended to state that, comparatively speaking, it would be of little service, because vessels in east-south-east and south-east winds must be provided for by a harbour here, northward ; and out of the north-east wrecks, as the greater number had been wrecked at the harbour, it is clear that even in east-north-east and north-east winds they will find their way here. Had there been a harbour here, there would have been only 67 vessels to be provided for to the southward, and altogether, had we had a harbour here, there might have been saved upwards of 200 vessels out of those which were wrecked here during the five years specified.

13,841. Have you at any period of your life been at sea ? Have you any nautical experience ? — None whatever.

13,842. Have you been in communication with seafaring men upon this subject to any considerable extent ?—To a considerable extent, because the Shipowners' Society have done me the honour to send me as one of their representatives. I have also presented to the Commissioners a petition from the seafaring men.

13,843. Were these seafaring people masters and mates of vessels employed in trade ?—A portion, a small portion, the chief being seamen.

13,844. Was there any wish on the part of the seamen in question to tender evidence personally to the Commissioners ?—There are two or three parties present who are deputed by the mates and captains, and they are prepared to give you evidence of their opinion.

13,845. Then I understand you to say that the body of seafaring men who presented that memorial through you will be entirely satisfied if we hear these two or three witnesses ?—I believe so, entirely.

13,846. Will you supply a list of these witnesses ? —I will do so.

13,847. (*Mr. Lindsay.*) Summing up all that you have said in these returns, which are interesting and valuable—looking at these returns, at what point of the coast between Flamborough Head and the Farn Islands would the construction of a harbour of refuge tend most to save life and property ? Having regard to these wrecks and these returns, at what point of the coast, if any one harbour is to be made, would it be best to construct it ?—Looking at these returns, and answering as well as I can your question, which has rather an engineering question mixed up with it——

13,848. I am not speaking of it as an engineering question. I don't want you to consider whether the site which you give will be suitable in an engineering point of view for a harbour, but I want you to say at what point of the coast between these two headlands would a harbour tend most to save life and property ?

—Looking at the returns I should say either here or at the Wear. Heaven forbid that a solitary one should be constructed ; but a harbour here would have done more to have preserved all those ships and lives which have been lost than in any other place.

13,849. You stated that a considerable decrease of trade has taken place at Hartlepool during the last twelve months ?—There has.

13,850. Is that coasting or foreign trade ?—It is the general trade inwards and outwards to the extent of 69,500 tons.

13,851. Are you or are you not competent to say what is the cause of it ?—Does it arise from the fact that the coals shipped at Hartlepool are not considered equal to those which are shipped in the Tyne ; or does it arise from the fact that ships come more regularly to the Tyne than to Hartlepool ?—I think the chief cause is that vessels find greater conveniences for trade here in the Tyne and the Wear than they do to the southward ; and, if I may go so far as to anticipate the future, I should say that the preparation of the magnificent docks now going on at the Tyne, which will hold 500 or 600 vessels, will empty the harbours to the southward as soon as those docks are laid open to the trade. We shall be able to load an enormous number of vessels—I believe 200 vessels a tide—in those docks ; and they will, on leaving the docks, be always ready for sea. This line of railway, terminating at the docks, gives complete communication with the coal fields of Durham, Lady Londonderry's mines, Earl Durham's, and other large properties, where the finest coal is to be obtained. Therefore I think the statement which I have given is merely a foreshadowing of that which is to come.

13,852. You have told us of a great fact—that the trade of Hartlepool has decreased during the last year. Is it because there is better dock accommodation or more conveniences for shipping, or greater facilities for shipping, by entering the Tyne or the Wear ?—It is so. That is the chief reason.

13,853. You said something about the Board of Trade. Did I understand you to say that you have no faith in the accuracy of the Board of Trade return ?—No ; I said it was not a complete return.

13,854. Do I understand you to say then, that this return, which shows that there are 382 laden vessels lost for every 62 of colliers lost in ballast, is not correct ?—I did not deny the accuracy, but I merely meant to say that the circumstances of those cases are not stated.

13,855. But to state all the circumstances of all those wrecks would make a very voluminous document, would it not ?—The agents of the Admiralty did it for five years very efficiently.

13,856. You do not doubt the accuracy of the statement in these returns that the proportion of laden to light vessels lost is as five to one ?—I neither doubt the accuracy nor the contrary. I should like to see the data on which the Board of Trade has given this return. It is so contrary to what I have seen as the facts for five years previously that I cannot accept any such statement without its being demonstrated.

13,857. Can you tell us, of your own knowledge, whether it is right or wrong ?—I do not know, of my own knowledge, that it is right.

13,858. But do you know that it is wrong ?—It is so contrary to the facts which have gone before that I doubt it.

13,859. Can you tell me whether the proportion of laden vessels lost in the five years previous was far fewer than the proportion of light vessels ?—Much fewer in proportion.

13,860. You say they were much fewer in proportion ?—Yes ; the proportion was 151 laden to 117 light. It was not five to one.

13,861. During what years ? — During the five years preceding the time when the Board of Trade took up the returns.

13,862. Therefore you arrive at the natural conclusion that there is something you cannot understand, when you see the proportion of laden and light vessels which are lost instead of being about the same, is, since the time the Board of Trade took up these returns, five to one ?—The difference is so great that I cannot comprehend their data for arriving at such a conclusion.

13,863. But are you aware of the fact that when the Admiralty kept these returns, and gave the proportion of these losses, they were absolutely correct ? —They did not give the proportion. I gave it. I did not make them responsible for my return ; I make them responsible only for the data of my return. In the Admiralty returns each ship is stated, and I gave you returns drawn from their report.

13,864. What strikes you as very remarkable is that the proportion of laden to light ships lost should be five to one, when they were in about equal proportions before ?—That is so.

13,865. You cannot account for it ?—No.

13,866. You are not a sailor, but for many years you have taken great interest, much to your credit, in the cause of the poor sailors. Speaking as you have done, no doubt, to the sailors belonging both to the Wear, the Tees, and the Tyne, can you tell us whether it is the general opinion or not of these men that if a harbour of refuge could be constructed at the Tyne it would do more to save their lives than at any point of the coast between Flamborough Head and the Farn Islands ?—If you refer to the memorial it will give you the best possible proof of what their opinions are.

13,867. I do not look for a formal answer, but from the conversations which you have had with them have you gathered it to be the general feeling among these men that there ought to be a harbour here for the saving of their lives ?—The question has only been before them a very little. I have had means of communicating with them, and from what I have heard from ships' captains and others, North Sea pilots, and men capable of forming a sound judgment—the men, in fact, for whom a harbour would be made—I think they are all of opinion that the three ports should be improved. Much as I value the interests of the Tyne, and much as I think it ought to be improved, I think the same thing should be done for the more southerly ports like the Tees and the Wear, so as to render all these harbours perfectly accessible, or as accessible as possible, at all times of tide.

13,868. Is that their opinion also ?—To make them, as far as possible, accessible at all times of tide, is their view.

13,869. (*Capt. Washington.*) We may presume that the very valuable statistics which you have laid before the Commissioners are correct ; but you are aware probably that the Board of Trade have much more perfect machinery for ascertaining the causes of wreck that the Admiralty had ?—From the results I am not aware of that.

13,870. Such is the fact. When the returns were collected by the Admiralty eight years ago, they had no power, or they did not choose to exercise the power, over the receivers of droits upon the coast; they had no perfect machinery to ascertain the numbers and causes of wrecks. The best that could be done was done, but when they handed it over to the Board of Trade, the Board of Trade had much better means of obtaining accurate information. Therefore there is great reason to suppose that the latter return will be more accurate than the previous one. Probably that is one of the causes of the discrepancies to which you allude. I think you make a comparison between the trade of the Tyne and the trade of Hartlepool. May I ask you whether you included the Tees in the trade of Hartlepool, or whether you confined the returns simply to the shipping of Hartlepool?—In the one place I included the Tees; in the other place it was excluded.

13,871. When you mentioned the falling off of trade, did you include all the nine shipping places of the Tyne and compare them with the two of Hartlepool? —I did.

13,872. Do you think it was just to exclude the

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whole trade of the Tees in the comparison?—In one other place you will find it stated. In giving the comparison in another place as to the coals, culm, and timber, which form the staple trade, I included the Tees there.

13,873. Besides Newcastle and North and South Shields, there are some six or seven other important shipping places in the Tyne?—There is Blyth.

13,874. I mean within the Tyne?—The most important shipping place is South Shields.

13,875. Is the Tyne Main coal shipped at South Shields?—Yes.

13,876. But in the Northumberland dock, that is not shipped at North or South Shields?—But I should think it is nearly on an equality with South Shields.

13,877. I wish to understand the comparison which you have made. Is it between the nine shipping places of the Tyne and the two of Hartlepool, or the whole of the Tees?—I gave the whole of the river Tees, which is recorded passing through the customs there.

13,878. You included Stockton and Middlesborough?—Yes; I included Stockton and Middlesborough for the Tees.

13,879. And as to the falling off of which you spoke at Hartlepool, was the Tees included?—No; that was entirely Hartlepool. As Hartlepool has been made a perminent feature in this question—I hope I do not err in saying that—I dealt with Hartlepool independently, in order to show its condition.

13,880. If by that observation as to Hartlepool being a prominent feature you allude to the Commissioners, I may tell you that I am not aware that Hartlepool has been treated in any way except accidentally as one of the sites for a harbour of refuge on this coast. You spoke of a decrease of shipping amounting to 69,000 tons?—That is confined to Hartlepool, and has nothing to do with the Tees. In 1853 it had 87,000 tons; and in 1857 it had 748,000 tons.

13,881. I only wish to have it quite clear. As you have handed in Mr. Taylor's figures, perhaps you will express to him the feeling of the Commissioners, that they set great value on his labours.—Providing they are correct, they are very important indeed.

13,882. (*Capt. Sulivan.*) I think your complaint is, that the details of each wreck are not published by the Board of Trade?—I incidentally named that the returns of the Board of Trade were not as full as those of the Admiralty.

13,883. Be kind enough, without going into any statement, to tell me whether you did not complain that there were not ample details of each wreck now published?—I implied it, but I did not complain.

13,884. You are aware probably of these three or four pages of abstract of all the wrecks, particularly of every class, whether steam or sail, whether laden or in ballast, and the cargoes of all. Now, for the general public, irrespective of any special inquiry and any special purpose, anxious as we are to get the details of each wreck, do not you consider an abstract sufficient?—I think not.

13,885. You are aware that it would make a very large publication to give the whole details of 1,140 wrecks?—I have no doubt of it.

13,886. And that great expenditure would attend such a publication?—The expense would be justifiably incurred.

13,887. You are aware that the expense comes out of the Mercantile Marine Fund?—I know it does to a large degree.

13,888. Do you know that the particulars can be obtained for any special purpose, and, knowing that, do you think it would warrant the outlay to publish all the details in addition to the abstract, merely upon the chance that one might now and then be wanted, when they could be obtained by those who wanted them?—I do not know what use they can be in their present form, except for a Commission of this kind. They do not meet the case of nautical men, who, if approaching a difficult coast, will examine the wreck register to see the dangers ahead, the effects of prevalent winds, and all that he must seek to shun. I presume it would be of great assistance to nautical men to know wherever the most serious danger arises.

13,889. Then, do you think that, if published, vessels in general, and colliers particularly, would have a wreck register on board?—No one had the Board of Trade report the other day. I had to hunt it out.

13,890. Then, if they will not have a short report, do you believe they would have a long one?—Yes; if it were useful. They will not have a small one if it is useless.

13,891. When the returns were published more in detail, do you think that the vessels were supplied with them for assistance and guidance?—I know I saw them more frequently.

13,892. You are aware that the table refers to the whole wrecks of the kingdom?—So I understand.

13,893. And that the proportion of colliers, laden and light, which are lost refers to the whole wrecks of the kingdom?—Yes.

13,894. Have you seen the return of the last two years prior to this?—Yes.

13,895. Did you notice that two years ago only one fourth of the vessels lost were light, and that during the last year they have increased to five to one and six to one. Now, if two years ago they were only four to one and are now five to one, is it not probable that if you go still further back you will find a still smaller proportion?—We do go further back. The only returns we have analysed are those of the Admiralty.

13,896. If you found that during the last three years the proportion of laden and light colliers which have been lost has increased from four to one to five to one and six to one, would you not infer that previous to that period there was a still smaller proportion, and therefore might not those returns coincide more nearly than you at first imagined?—Allow me to state that four to one is an enormous disproportion in comparison to the previous documents. I must take them upon your authority, but I cannot comprehend them.

13,897. Have you remarked upon the proportion of vessels not colliers? Take the general vessels; there are 623 laden ships of all kinds, and only 138 in ballast, lost, exclusive of colliers, giving a proportion of six to one. Would not that confirm the idea that there was an equal proportion of losses among the colliers?—I am obliged to take this as a government return, but I should prefer infinitely the detail being given of the circumstances of each loss instead of a mere dry statement of the losses. It is still my conviction that in this form they are of no benefit at all.

13,898. Did you feel it was important to have these returns for the purpose of this special inquiry? Would you have found them very valuable?—Perhaps you will allow me to state——

13,899. Be kind enough to answer the question.—No, distinctly then, not for this purpose.

13,900. Then, if the previous returns by the Admiralty enable you to give such valuable information, would not an analysis of the returns of the Board of Trade have been equally valuable?—Infinitely more valuable; but we could not wish them especially for this inquiry.

13,901. But as they would have been more valuable, did you think of asking the Board of Trade to give you the return specially for this purpose?—I certainly found, and I stated so, that after the Admiralty returns terminated, I could not proceed. I wrote to the Admiralty, asking for the details of the later returns, and I was answered that they did not now publish these returns and that I must apply elsewhere.

13,902. Did you apply elsewhere? Did you apply to the Board of Trade?—I would if I had thought they would have given me the returns in detail.

13,903. Then perhaps you will be glad to know that the details have been prepared by the Board of

Trade for the inquiry on this part of this coast?—I am glad to hear it.

13,904. You gave a large number of vessels wrecked at the mouth of the Tyne. Does not the Tyne give the deepest water, and is there not more chance of safety at the Tyne than at the other colliery ports?—It is so.

13,905. If there were a good harbour accessible at all times at Hartlepool, do you believe that they would run for the Tyne, especially in north-east winds, with the risk of entering the bar at the time? Would not those vessels have made for Hartlepool?—I do not think they would. I think nothing would induce them.

13,906. (*Capt. Vetch.*) Captain Washington has anticipated me in one point. You gave a comparative statement of the trade between the Wear and Hartlepool; did you include the trade of the Tees?—In one place I included it.

13,907. Do you not think it would make your statement more complete if you included it in every case?—I should be very glad to include it, but it is but a small item—some 200,000 tons.

13,908. Are these ports, such as Seaham, included?—Seaham is included with Sunderland, and Blyth with the Tyne.

13,909. (*Mr. Coode.*) You have given a return of some wrecks in the southern district; was the river Tees excluded because of its being beyond the local limits?—In another place I gave Redcar, I went further southward as far as Filey.

13,910. Did you not set aside the Tees?—No, Mr. Taylor stated that his return ceased at Whitby.

13,911. And your return ended there?—My return included Filey, and within a certain range of the Tees.

13,912. Did you go as far as Flamborough Head?—No.

13,913. Have you read the report of the Select Committee of the House of Commons?—I attended the Committee.

13,914. Are you aware that the Committee considered that between Flamborough Head and the Tyne, the greater number of wrecks occurred?—This return does not go so far south, nor is it very material it should.

13,915. Have you a copy of the wreck chart for the five years ending in 1857, which was published by the Select Committee?—I have not. (*A copy of the chart was placed in the hands of the witness.*)

13,916. Will you be kind enough to look at the number of wrecks between Flamborough Head and Redcar, and tell me whether they do or do not exceed a dozen?—With the collisions and others they do considerably; I am sure I included Filey at one time.

13,917. Did you say that you stopped at Redcar?—No, I think I did not say that.

13,918. Tell me where your returns do terminate? Is Filey included?—Some portion of the returns were restricted partly to the locality of the rivers.

13,919. Will you be kind enough to state the limits embraced by your returns?—I shall have pleasure in doing so.

13,920. (*Sir F. Smith.*) In the results which you have been so kind as to give us there is a sort of analysis of the return. Under the head of No. 2, I find "Foundered at Sea," and of that number the laden vessels exceed greatly the light vessels. What do you mean by "Foundered at Sea"? Do you mean considerably beyond the limits of the coast?—Considerably beyond the limits of the coast, I cannot specify the distance. It may be from a few miles to 20 miles off.

13,921. Would a harbour of refuge influence that return very much?—I cannot say that those ships which foundered from westerly gales would fetch a harbour. In such a case the wind would be dead off the land, and they could scarcely come in under any circumstances.

13,922. You do state that these ships foundered in westerly winds, and therefore such vessels could not have taken a harbour of refuge here?—That is so.

13,923. (*Capt. Sulivan.*) Will you explain why vessels founder more with the wind off shore than with the wind from the south-east?—They get off into the full effects of the sea. I am not a sailor, but I know that.

13,924. As you have included the neighbouring ports as interested in a harbour of refuge at the Tyne, do you not think it would have been fair to have included all the Tees ports as equally interested in the harbour of refuge at Hartlepool?—I do not understand your question.

13,925. As you have included the neighbouring ports to show the increase of the trade of the Tyne, and as you have given the decrease of the trade of Hartlepool, do you not think it would have been equally fair to have included the Tees in making a comparison with Hartlepool?—I have already accepted a hint to include that.

13,926. You say that you will include it, but do you not think it would have been fair to have done so at first?—It has nothing to do with fairness at all. I take the ports as they stand. I give the ports of the Tyne, the Wear, and Hartlepool, and it was not for me to break down the official arrangements, and prevent my being able to certify them by including the Tees, and putting it with Hartlepool. I can give them separately. It is something less than 4,000 or 5,000 tons. It will not bear upon the question at all.

13,927. You gave a small increase in one of your returns for Hartlepool; did you give there the increase or decrease of the Tees trade?—I shall be glad to do so. There was a great decrease of a million and a half at one time. It has increased lately. I believe it was stated here yesterday that the Admiralty would give their authority to the River Tyne Commissioners to carry the piers out further, and as one of the River Tyne Commissioners I am extremely glad to hear it.

13,928. (*Chairman.*) That is not at all relevant to the present inquiry. You must recollect that this is a Royal Commission, and that we are perfectly independent of every department of Government. We have nothing to do with the Admiralty, the Treasury, or the Home Office; therefore you must apply to the Admiralty in a proper way?—I was anxious to know whether the piers would go on or not.

Mr. Philip John Messent examined.

13,929. (*Chairman.*) In the absence of Mr. Walker, the chief engineer, I must ask you just to make a short statement as to what has been done in the river Tyne in the way of harbour improvements, for the information of myself and others?—What I have to state will have more reference to the piers at the mouth of the Tyne than to what has been done in the Tyne up the river. These are the only works with which I am acquainted.

13,930. Precisely, and not the others?—The works were commenced in 1854, and I think you have seen a plan of them. A contract was made with Mr. Laughton, the amount of which, as you are already aware, was 166,000*l.*, and of that contract about half of the works contained in it—rather under than over half—have been completed. The north pier will be 1,400 feet, the south pier 2,500 feet. On the north side about 700 feet have been completed, and on the south side 1,700 feet, and the total value of the whole amounts to nearly half the contract or more, taking into consideration that the contractor has been obliged to expend a large sum before he could get on with the works. The value of the work done is quite half of the contract. The time for the completion of the contract is May 1861, and with fair weather or average weather, such as we have had up to the present time, there is every reasonable chance of the contract being completed by the period specified.

13,931. Will you tell me the object with which the work has been undertaken, and what has been the

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result ?—To extend the entrance of the harbour into deep water, and to deepen the present bar ; but that is all explained in the original report to Mr. Walker, which probably you have before you.

13,932. And so far as the works have been conducted are you able to form any opinion whether the result desired is likely to be attained ?—As far as they have gone the result has been satisfactory, but at present they are not nearly far enough advanced to form a very certain opinion upon the improvement. The improvement on the bar at present is no doubt partially the result of the works.

13,933. (*Mr. Lindsay.*) One question only ; the question which I want to ask is one in which as a sailor I am interested. Have you sounded the bar, and did you sound it to know the depth of water before you commenced to carry out the piers ?—I did.

13,934. And have you sounded it recently ?—Not very recently. I have confined my attention to the works of the piers. The improvement of the river navigation is in charge of other engineers. The harbour master takes periodical soundings, and I do not interfere with his duty.

13,935. From what you have seen has the effect been to deepen the water on the bar or otherwise ?—From what I have seen and heard the bar at present is deeper than is shown by the figures on the plan before you.

13,936. (*Capt. Washington.*) You do not mention when the works were begun ?—They were begun in 1854 ; perhaps a little before.

13,937. Can they, if you are so disposed, be pushed forward much more rapidly ?—A little more rapidly.

13,938. A little more rapidly. But in case it was desired by the River Tyne Commissioners to push them forward much more rapidly, could not that be done ?—By extraordinary exertions it could.

13,939. Is the south pier under your direction ?—It is.

13,940. Is there a staging on the outer pier ?—It is not a staging ; it is a large travelling crane, the object being to set the facing stones. The south pier is a core.

13,941. Rubble work ?—Faced with a heavy kind of pitching.

13,942. My only object is to know if the works could be forwarded in case of need ?—Yes.

13,943. (*Capt. Vetch.*) When did you say the works were commenced ?—In 1854.

13,944. Do you remember when the Act was passed ?—It was the end of the year 1855, when the works were commenced.

13,945. To what amount is the present contract ?—166,000*l.*

13,946. And how much of that has been expended ?—Between 70,000*l.* and 80,000*l.*

13,947. What is about the monthly cost of the work ?—It varies ; in the summer it is of course much higher than at other times.

13,948. Taking the present month, what is it ?—Some months are very small ; the highest monthly expenditure has been 6,000*l.*

13,949. And the works, as far as they have gone, have stood the weather very well ?—Exceedingly well.

13,950. You are quite confident that the sandstone employed in the structure of the north pier will stand ?—Quite confident, it is freestone. The lower portion of the north pier is made of limestone magnesian ; it is only the lower portion which is exposed to friction.

13,951. Where do you get the magnesian limestone?—From Hartlepool.

13,952. From the Heugh rock ?—Yes.

13,953. Is there an abundant supply ?—At present we have an abundant supply.

13,954. When do you think the works will be completed to the extremity now shown in the plan ?—Do you mean the contract ?

13,955. The piers altogether. Within what period, if funds are amply provided, can these piers be finished ?—If it is decided at once to proceed with the full scheme I think the whole might be completed two years after the completion of the present contract.

13,956. And when will that contract be completed ?—In May 1861, by the contractor's agreement.

13,957. Then the whole would not be completed until 1863 ?—That is the whole scheme, but if the present contract were hurried it might be done sooner. I say two years from the completion of the present contract.

13,958. But if it were pushed on to the greatest possible extent, within what period would the whole work be completed ?—A year earlier than that.

13,959. Within what period would it be completed from the present date ?—Do you mean the whole scheme ?

13,960. Yes.—I do not think you could calculate on shortening it more than I have already stated—by a year.

13,961. Does that mean that the works would be finished in 1861 ?—No, in 1862 instead of 1863, and that would require extraordinary exertions to do it.

Mr. George Shotten examined.

Mr. G. Shotten.

13,962. (*Chairman.*) Are you resident in Shields ?—I am.

13,963. How long were you at sea ?—Nearly 40 years.

13,964. And during that period for how many years were you in command of vessels ?—About 30 years.

13,965. And in what trade were the vessels which you commanded chiefly employed ?—They have been very generally employed in short voyages—not exactly in the coal trade, as a collier, except during my apprenticeship. The rest of the time I have been going to the Baltic, the Mediterranean and America, and I was for a considerable time a regular trader to Bordeaux from London, and elsewhere.

13,966. What was the size of the vessels which you generally commanded ?—Mostly small vessels ; in fact, all sizes, from 500 tons.

13,967. Have you often come home from the Baltic in the fall of the year ?—I was not much in the Baltic trade.

13,968. How did your mostly make you passage after leaving the Naze of Norway or the Scaw ?—It would depend partly where I was bound to.

13,969. I am supposing that you were bound to Tynemouth ?—I suppose we should keep reaching on the larboard tack so as to fetch the land as far as we could to the southward—as near the port as possible.

13,970. And how far north have you ever made the land ?—Once, as far as Dundee.

13,971. Generally how far north ?—It is an exception if you go farther north than that, but some do get as far as Moray Firth.

13,972. Have you made the passage north-about through the Pentland Firth ?—Yes.

13,973. You have heard the evidence given this morning ?—I have.

13,974. And as to the advantage and necessity of a harbour of refuge at Wick, give me your opinion ?—I am not well acquainted with the Moray Firth.

13,975. The Pentland Firth I am talking of ?—I know the Pentland Firth very well ; I thought you meant the Moray Firth.

13,976. You heard the evidence given this morning about the advantage and necessity of a harbour of refuge at Wick for ships passing north about. Will you give me your opinion on that subject ?—As I said before, I am not acquainted with the Moray Firth ; Wick I do not know at all.

13,977. But did you ever see or know of any difficulty in going through the Pentland Firth? Has it never occurred to you to run through with heavy weather to the southward?—I have.

13,978. And do you recollect under what circumstances you did it, with the weather or a lee tide?—Excepting once, I have gone with a lee tide, because I should heave to if the tide were going to windward until the tide changed. There is no difficulty in keeping to windward until the tide has slackened. With all her yards to the mast a ship will keep to windward if she does not get into the tide.

13,979. Is your knowlege of vessels employed in the coasting trade so great as to enable you to assert that under a closed-reef main-topsail you could bring a ship to the wind with safety and watch for the tide to run through the Pentland Firth?—It is generally understood, when you can no longer scud, that you should do what you can for the safety of the ship. But a ship is safer lying to than scudding.

13,980. Will that apply to a deeply-laden ship?—Under any circumstances, no matter what. A ship scudding has got to be afraid of being pooped, and rather than run the risk she will take the sea to the bow and heave to.

13,981. Am I to understand that a deeply-laden ship under those circumstances will bow the sea well when hove to?—Generally it is so.

13,982. Is it generally so?—The coasting vessels are shorter built than the foreign-going trade, and the shorter the vessel the better she lies to.

13,983. And therefore any man well acquainted with the difficulty of running through the Pentland Firth—the strong weather tide of eight or nine knots—can, generally speaking, heave to and wait for the tide?—Nine times out of ten you can shorten sail without the necessity of heaving to; but if it comes to the worst you can heave to.

13,984. Now give me you opinion as to the advantage or necessity of Peterhead as a harbour of refuge for the trade from the north, from Archangel and the Baltic?—As Mr. Greenhow has said, I think I agree with him. Peterhead is a nice place to call at or put in at wind-bound, but I do not think there is any necessity for a harbour there for saving life.

13,985. Well, then as there is no necessity as respects the saving of life, I will call your attention to the question or series of questions which I put to him with reference to the length of the passage sometimes made by the ships from the Baltic in the worst season of the year. Are you disposed to concur with him on that point, that it would be a great boon to the Baltic and Archangel trade to have a harbour there?—I quite agree with him in that. Ships are very often much thrashed. Their sails are split, their provisions run short, their people exhausted, and if there is a place they can get conveniently into it is a very great benefit to them.

13,986. Now, view the question as respects damage to the cargo which ships experience in knocking about in bad weather?—Naturally if a ship has been knocking about, if the cargo is grain, it is a great chance that part of it may get wet.

13,987. Would Peterhead be a convenient place of call for the Archangel trade?—The most convenient place that I know of.

13,988. Have you run for the Firth of Forth in bad weather?—I have.

13,989. Have you run to Long Hope?—Not to Long Hope, but to Grangemouth.

13,990. Do you consider the facility of access such as to render it a harbour of refuge in gales from the eastward?—I think it is, and it has been much improved by the lighthouse at St. Abb's Head and at the Bass Rock. It is a most extraordinary thing that there was no light there before. Two fine ships were lost there in Dunbar Bay. They did not see the May light; they saw the light on the shore, and they ran in one alongside the other. That was about 45 years ago.

13,991. I am to understand that you consider the Firth of Forth perfectly easy of access at night in bad weather?—If you make those lights.

13,992. And ships in bad weather can run up as high as Long Hope?—I cannot say so high as Long Hope in the night-time; but I consider Leith Roads a perfectly good roadstead for ships with good anchors and cables.

13,993. (*Sir F. Smith.*) Have you much experience of the east coast?—I have.

13,994. You have navigated it often?—Yes.

13,995. In colliers?—Not directly in colliers, though I served my apprenticeship to one. I was very much in the habit of going to the Baltic and to Bordeaux, and of leading out with the colliers.

13,996. The trade has much extended since your apprenticeship, I suppose?—It has, indeed. I went to sea in 1801; you will be able therefore to judge by that.

13,997. Do you think that any one harbour of refuge placed anywhere would be sufficient for the trade of this coast?—I do not think so.

13,998. You think the trade so extensive and the demand for accommodation so great, that to construct one harbour in any one place would be insufficient?—I think so.

13,999. Do you think two would be sufficient?—I think they might, but three would be better.

14,000. Supposing that the national funds could not afford to construct three harbours, which two spots would you select for the two harbours?—I think I would rather that the three harbours which we have—the three harbours so frequently named, the Tyne, the Wear, and the Tees—were improved. If those three places were assisted it would answer better than making any one harbour of refuge, no matter where it might be.

14,001. Is it a feeling among shipmasters and the seafaring class generally, that it is discreditable to run to a port to which they do not belong if they can get to their own port any how? Do the ships belonging to the Tyne and the Wear go to the Tyne and the Wear and risk a good deal in doing so?—Decidedly. The men are paid for the voyage, and as soon as they get the voyage over they are done. This makes them anxious to get it over as soon as possible, and they often run great risk in order to terminate the voyage, many times when a prudent man would have run in.

14,002. Would not that feeling induce them to keep to sea rather than go into port?—But I was speaking of a ship going into her own port.

14,003. Supposing a ship were beaten back, would she not make great efforts to keep at sea?—But in a heavy gale you are sure to lose more ground when you cannot carry sail.

14,004. Is not that a reason why there should be more than one harbour of refuge?—It is not only that, but if it was at their own port they would make efforts to get to it. They frequently put in here even when laden; they come back laden and run the risk of striking the bar, which they do very often.

14,005. Let us suppose that the Tyne was improved and that there was a harbour of refuge at Hartlepool, and that vessels as far to the southward as Flamborough Head are caught and driven back, do you think they would pass a good harbour at Hartlepool and come on to the Tyne?—I think they would.

14,006. They would give the preference to their own port, and run by a port of safety in order to come to their own port?—It might turn out that 30 miles further might be an advantage, because if a wind goes round to north-east instead of south-east, which it frequently does, they cannot come out of Hartlepool, as they can out of the Tyne, because the Tyne is much more to windward.

14,007. Supposing we divided the bay into two portions, without reference to the Tyne or any particular locality, would you, for the purpose of safety, place a harbour of refuge to the north or the south of that divisional line?—I would certainly place it to the north, in consequence of the greater number of

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ships which sail in and out. Wherever there is the greater number of ships, I would place the harbour as near as possible.

14,008. Taking the prevailing winds, should the harbour be to windward or leeward ?—As far as this bay goes it does not make much difference. There is not much difference with the coast down from Redcar.

14,009. You know Redcar ?—I do.

14,010. Do you think Redcar offers facilities for a harbour of refuge ?—I think it does.

14,011. Do you think ships would go there ?—It would be an advantage, but there is one thing, that if there were a harbour there it would not be frequented so much as here, where the ships load their cargoes.

14,012. Then, all things considered, you prefer to put the harbours where the trade is ?—Yes.

14,013. For many reasons ?—For almost every reason.

14,014. Do you think it desirable to place harbours in the bights of bays, or upon salient or prominent points ?—That depends upon circumstances, upon the centre point and the lands. As an old sailor I will say that no sailor likes to run down upon a lee shore to be embayed, particularly if the land happens to be low, because in a gale of wind it is never easy to make sure of your distance by two miles or so, and if you happen to miss it you are upon the shore before you can do anything with your ship ; whereas if you run for bold land, such as Tynemouth Castle, it is better to make out than anything on the coast.

14,015. Is the high land distant from the shore at Hartlepool ?—Yes.

14,016. And that is a disadvantage ?—Yes.

14,017. Therefore, for mariners making the coast the land is better at Flamborough Head than Hartlepool Bay ?—I think it would be better.

14,018. You know Bridlington and Filey?—Yes.

14,019. Which of those two would you select for a harbour of refuge ?—Filey.

14,020. Why?—Because in Bridlington Bay there is a very large extensive place, and a first-rate roadstead at present, while Filey Bay is good for nothing, because it is not safe. But if Filey were made safe we should have the advantage of Filey, and not lose that of Bridlington.

14,021. So, whichever way the wind blew, you would have the advantage of both places ?—Besides that, when a fleet of colliers or ships from the Baltic are caught about Flamborough Head, it would be very convenient to have such a place as Filey instead of running all the way back to the Tyne or the Tees.

14,022. Would a vessel come out easily from Filey? —If a ship were bound to the south she would sail out perfectly free. It is perfectly free to go out.

14,023. You are not aware of any disadvantage in the Harbour of Filey?—I am not aware of any.

14,024. What is the amount of acreage which each vessel would require ?—It depends on the description of the harbour. If there is no tide in the harbour, very much less scope is required. At such a place as Filey, ships would always lie head to wind, and they would require less space than lying at Yarmouth or Hartlepool, where the tide naturally goes through, and ships swing with the tide ; whereas in a place like Filey there is no tide and not half the scope is required.

14,025. Would four acres to a ship be enough ?—In Filey four acres would be enough ; whereas in the other places eight would scarcely suffice.

14,026. If a breakwater were to be constructed in Hartlepool Bay, would you construct it from the shore or with an opening at each end ?—There would not be space unless it was extended a long way out. A place like that is very shallow from the shore, and a ship drawing 16 feet of water requires about four fathoms to ride in, and that would be a good bit from the shore at Hartlepool.

14,027. Do you know anything of the Sunderland trade ?—At present Sunderland has got a most excellent dock, and that is almost as much as can be said for it.

14,028. Do you know what draught of water is going over the bar at Sunderland at spring tides ?—Do you mean the docks or the harbour ?

14,029. Through the harbour ?—There must be very little at low water indeed.

14,030. Are there 10 feet ?—I should not think there would be half of that, or not more than half.

14,031. Do you know the Bristol Channel ?—A little.

14,032. Can you favour the Commissioners with any opinion as to the advantage of a harbour on the coast of Cornwall ?—I am not so well acquainted with the coast as to be able to give an opinion. I would rather decline.

14,033. (*Mr. Lindsay.*) Supposing that the Government should consider it necessary to have a harbour of refuge on the east coast of Scotland, and taking into consideration the trade from the ports in this neighbourhood and the trade from London to the Baltic ports, and also to Archangel, and also taking into consideration the trade which goes north about, at what point do you think that a harbour would tend most to save life and property, and offer the greatest facilities to commerce ?—Do you mean as a place to take shelter in ?

14,034. I want you to consider it for a moment as a place for the saving of life, the saving of property, and the convenience of commerce. Take your time, and taking all those circumstances into consideration, tell me at what point you think the harbour should be. Do you think the harbour would be better at Wick, at Fraserburgh, or at Peterhead ?—Well, really I do not know. I will give the preference, I think still, as I said before, to Peterhead.

14,035. All points considered ?—Yes, all points considered, taking the bad with the good.

14,036. Just carry your mind back to the time when you were at sea, and suppose you were in command of a ship going north about to Quebec, and supposing that you were caught with a strong south-east gale between Kinnaird's Head and Duncansby Head—do you know these points ?—Yes, well.

14,037. And supposing that a harbour of refuge were made at Wick, and the gale was such that you found it necessary to seek shelter, whether would you take the harbour, at Wick—I am speaking of a harbour so constructed that you could take it with safety—whether would you take that harbour at Wick or run through the Pentland Firth, and seek anchorage in Long Hope ?—Bound to the westward, do you mean ?

14,038. Supposing you were bound to America ?—Why, I would not take either of them.

14,039. But I am supposing it was necessary for you to take shelter ?—Then I would go to Long Hope.

14,040. Even if there were a harbour at Wick which you could take with every facility ?—Yes.

14,041. Supposing you were driven down on the coast from Archangel somewhere about the points I have named, and it was necessary to take a harbour of refuge, whether would you take Wick or Long Hope ? —If I could fetch it I would take Long Hope. It is a place to get out of at all times of the tide, when you cannot get out from the other.

14,042. How long have you retired from the sea ? —I can scarcely say that I am retired from the sea now. I am engaged in under-writing; I am a shipping master, and have been among ships all my life.

14,043. How long have you resided on shore ?—I think 18 or 19 years.

14,044. Supposing that the Government resolved to make the Tyne a harbour of refuge, can you tell me, of your own knowledge, whether it would be the means of saving life and property to any very large extent ?—I believe it would.

14,045. Do you recollect any instance within the last ten years where, if there had been such a harbour as that which has been pointed out by Mr. Cowan, life and property would have been saved to a considerable extent ?—Yes, I think I do.

14,046. Just state the case ?—I was not aware that

I should have such a question put to me until to-day, but I thought I would not trust my memory, so I have just put down on paper a few cases. There was the *Percy*. She went under the lighthouse. We fired rockets and got part of the crew on shore, but the rope failed, and the captain was drowned. Afterwards, when the ship was breaking up, the lifeboat by great exertions got the rest of the men out, but the captain was lost. There was a brig, belonging to South Shields. She was in a sinking state and breaking up at Cully Ports, wind east, and she had a signal of distress flying. We could not launch the boat, but it did so happen that, contrary to every one's expectation, the crew landed all right in their own boat. The vessel went down ten minutes after they left her. She would have been saved and the people would not have been put to that peril if there had been a harbour of refuge here. There was also the schooner, the *William Wallace*, belonging to Scotland. She went on shore on the Herd sands, and all hands were lost. There was a brig belonging to this place, the pilot and 12 hands were lost in her, when going out last year. There was a schooner came ashore close to the haven where the people were all drowned. Mr. Greenhow mentioned that case where the people were all lashed to the rigging, and everybody saw them, but could render them no assistance whatever. There was another schooner anchored off Souter Point. She let go both her anchors ; the crew took to the boat, and they were all drowned, but the vessel rode the gale out. These are cases which I can recollect without referring to papers.

14,047. What is the greatest number of vessels which you have seen ashore at any one time within the immediate neighbourhood of the Tyne ?—I should think 20.

14,048. At one time ?—I think there have been 20 at one time.

14,049. During an easterly gale ?—Yes.

14,050. And if there had been a harbour here would these ships have been able to come in ?—Yes, decidedly. One of the great causes why ships are wrecked while coming in is, that one approaches too near another and takes the wind out of her sails. A wave strikes her, which makes her lose steerage, and go ashore. If there were a harbour of refuge here, they would come in as they come down, but now they are obliged to wait for high water, which then they would not have to do. All are brought in in a body, and at the same time there are others going to sea. All are obliged to stop until there is high water, whereas if there were a harbour of refuge they would go out and come in at any time.

14,051. I want to ask you a question referring to this coast, of the same nature as I asked you with reference to the east coast of Scotland. Supposing that the Government should decide upon constructing only one harbour of refuge between Flamborough Head and the Farn Islands, at what point in your opinion ought that harbour to be constructed, bearing always in view, first, the saving of life, and secondly, the saving of property ?—I have no hesitation in saying that that would be the Tyne.

14,052. You have no hesitation in saying the Tyne? —Not at all. It would only require more accommodation for ships. If there were a dock at the low heights large vessels could lie there afloat.

14,053. That is to say, you think that if the Tyne were made into a harbour of refuge, and the piers extended, there ought to be a dock much closer to the entrance than any which now exists, so that ships might get into dock and get out of the way more readily?—I think, in fact, that is absolutely necessary. In the present day trade is increasing in such a way that we don't know what dock accommodation we shall require.

14,054. Can ships come out of the docks which now exist, and go to sea with the same tide ?—It is rarely done, but sometimes it is done.

14,055. Then, in your opinion, the site of a dock at the entrance would be of advantage, if we look only to the clearing of the river, because it would be in such a situation that ships could leave dock and proceed to sea in the same tide ?—I do think so, especially for large ships. I speak of ships drawing 17 and 18 feet of water. These ships could lie close to the bar if there were a dock, and could get out quite readily.

14,056. Supposing that it rested between Hartlepool and Filey Bay, bearing always in view that only one harbour was to be constructed, and looking only to the saving of life and property, and supposing that it rested with yourself to decide at which of those points you would spend the money, at which would you spend it ?—Bearing in mind also the improved state of the Tyne ?

14,057. No ; putting the Tyne altogether out of the question in the meantime, I want you to tell me which of these two places you would prefer. You have stated, and I hope it will be considered, especially what you have told me, that, in your opinion, a harbour of refuge at the Tyne, if any one harbour is to be constructed, would do more to save life and property than anywhere else. But supposing that the Government should arrive at a different conclusion, and it rested between Hartlepool and Filey Bay, tell me candidly as a sailor at which of those two points you think the construction of a harbour would do most to save life and property ?—If you will allow me to say just what I was about to say at the time, I should prefer Filey Bay. Bearing in mind that the Tyne is always improving and has improved, Filey Bay would be the place.

14,058. That is to say, in addition to the harbour constructed at the Tyne ?—I did not mean constructed by Government. I did not mean the harbour of the Tyne being made by Government.

14,059. No ; but suppose that you are constructing at the Tyne works which will admit ships of a much larger size than vessels which can now enter at low water, and supposing that harbour were constructed, then, taking that into consideration, you would give the preference to Filey Bay over Hartlepool ?—I would.

14,060. Supposing it should turn out that the expenditure of this 400,000*l.* does not increase the depth of water on the bar, and consequently does not afford greater facilities for ships entering the Tyne than now exist, or, in other words, supposing that the Tyne bar remains in its present state, will you tell me whether you consider the construction of a harbour, either at Filey Bay or at Hartlepool, would do most to save life and property ?—I would still say Filey.

14,061. Will you state your reasons for arriving at that conclusion ?—Because, if you make Hartlepool Bay a harbour of refuge it is so likely to fill up. It is a very sandy bay to begin with ; and to make a harbour, you must carry the breakwater outside the Heugh, and the sand which travels to the south would fall into the wide space and would soon fill up.

14,062. You and I are sailors, and it is no use our talking about engineering ?—I consider myself a sort of engineer.

14,063. It is a serious question we are considering. —And I think seriously about it, I assure you.

14,064. Excuse me for a moment. Supposing that as great facilities can be obtained at Hartlepool—for that is a question to be inquired into by engineers—supposing as much water can be obtained and kept at Hartlepool, and as large an acreage of deep water can be kept there, will you tell me then, under these circumstances which I have named, whether you would think a harbour at Hartlepool or at Filey Bay would do most to save life and property ?—It is a very difficult matter to judge, because there are so many contingencies. Things which are anticipated may not be realised ; and it is contrary to common sense to expect it to be so. But I think it is only a trial which can ascertain which will be the best.

14,065. You are not prepared, under such circumstances as these, to offer any decided opinion ?—I think, after all, I may answer the question upon the same

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principle as that on which I gave an answer just now. I spoke just now as to Filey in preference to Bridlington, because Bridlington was already a good roadstead, and Filey is a bad harbour. We have already Hartlepool as a middling harbour, which the smaller class of ships, at any rate, can go into to wait until the weather moderates. Therefore we can have Hartlepool but not Filey; but if Filey were made, then Hartlepool would still be of use in the state in which it is at present.

14,066. Now one question more. Supposing that the Government, taking into consideration the great loss of life and property which takes place on this coast, and being desirous to alleviate the sufferings and the losses which take place, were to place in your hands a million of money to be expended, so as to alleviate these sufferings, and save those losses which now take place, as far as money can do it, where would you expend that million of money?—As I said in the beginning, I would spend it at three places—the Tyne, the Wear, and the Tees, or Hartlepool, as the case may be.

14,067. Would you or would you not use any portion of that million of money upon points farther south?—I do not know that we could go farther south, because Filey is a place which would require so very large a sum that the whole million would be swamped there or pretty nearly so, and there would be nothing left for the other places.

14,068. Well, then, supposing that sum were increased, would you, under such circumstances as those, consider it necessary for the safety of life and property to spend a portion southward of the Tees?—I would.

14,069. You would?—Yes, at Filey.

14,070. Would you spend it at Filey in preference to Redcar?—Redcar is a very nice point; it might be divided between them. Redcar is very close to Hartlepool, it is true, and it might not be necessary to have two so close together; but I think dividing the cost would be better than having only one at Filey. If a harbour were made at Redcar, then there would be no need to make one at Hartlepool.

14,071. Then the substance of your evidence is this—that if the sum were limited to a million, you would spend that million at the three points you have named?—Yes.

14,072. But if it extended beyond a million, and you had sufficient money, you would expend a portion of it to the south of the Tees Bay, and that point would be Filey Bay?—Yes.

14,073. You say that is your opinion?—That is my opinion.

14,074. (*Capt. Washington.*) From the last answer you gave, do you keep in consideration the saving of life?—Yes.

14,075. And you understand that that is the great object of a refuge harbour?—Yes.

14,076. Do you know Robin Hood's Bay?—I do.

14,077. And North Sunderland, close to the Farn Islands?—I do.

14,078. Supposing a line were drawn from one to the other, it would include the whole of the coal ports, would it not?—It would.

14,079. From those ports within such a line there are a great many vessels sailing and returning?—Yes, a great many.

14,080. What is the worst wind which blows on this part of the coast, which makes it most difficult to get off shore?—From east to east-south-east.

14,081. And not to the northward of east?—No; not to the northward of east—it is worse weather; but we have not so much difficulty in getting off shore as when the wind is east or southward of east.

14,081 *a*. Supposing the wind east-south-east, could vessels sailing within that line weather the north of Robin Hood's Bay?—They seldom go to sea with the wind that way unless it is fine weather.

14,082. They would sail with a north-east wind?—Yes, or an east-north-east wind.

14,083. Not an east-north-east wind?—A north-east wind.

14,084. But the wind east by north is the most embaying wind, is it not?—Then they would not go to sea; it blows right into the harbour.

14,085. But with an east-north-east wind they would?—If it were blowing hard they could not get out.

14,086. I thought you said they would sail with an east-north-east wind?—If it did not blow hard.

14,087. Suppose it were moderate weather?—Then they would go to sea any way.

14,088. Supposing a ship should sail, and the wind should come to east-south-east, could she weather the north of Robin Hood's Bay?—No.

14,089. What would she do?—Put back to a harbour of refuge. If there was not water to go into the Tyne, she would go into the Forth.

14,090. Do a large number of vessels go out and get caught in that way?—It is not a great many; it is not every one that will venture out with the wind scant.

14,091. Could any of these vessels reach Filey Bay?—Do you mean with the wind east by north?

14,092. With the wind east-south-east or east by north?—No, they could not.

14,093. Then would a harbour here be of any use to them?—No, it would not; but very often a large fleet is caught about Flamborough Head. They want shelter, and they would be very glad to have such a place as Filey Bay.

14,094. It would be a great convenience to them, they would not have to run back?—Yes.

14,095. What would vessels do caught with the wind east by north?—There would be nothing for them but to run ashore, or to get Scarborough Pier, and there is very little choice between the two. There would be very little chance, because there is very little sand; all the rest is rock.

14,096. Would Filey Bay be a good stopping place?—It would indeed.

14,097. But would they come into a harbour of refuge there?—In such a case, when they cannot fetch round on the larboard tack with a gale of wind, they have nothing but to put their heads to the north and go ashore at Scarborough.

14,098. Why could they not run to the north?—A deeply-laden ship, under close-reef maintopsails, with the sea washing over her, will make very little way, I assure you.

14,099. Do all vessels come close to Flamborough Head?—All steer for Flamborough Head, because it is a very fine bold line.

14,100. What is the distance to Flamborough Head?—70 miles.

14,101. And Filey would be 10 miles to the north?—Somewhere thereabout.

14,102. Then there would be 60 miles of coast unprovided for?—Not by the Government, except by the harbours at present.

14,103. Do you think we must either improve or create?—Yes, or make a harbour in the bight.

14,104. You think we should improve the harbour at the bottom of the bay?—Yes.

14,105. And your reason is because in the bay is where vessels are caught?—It is so, but I have a great objection to running for a low coast; I like high land.

14,106. Is not the entrance to the Tyne some way in a bay?—No, it does not deserve the name.

14,107. As compared with Flamborough Head and North Sunderland?—It is a very wide reach.

14,108. You spoke so strongly of Filey Bay, I wish you to assign a reason?—If there is any other explanation I shall be most happy to give it. As I have already said, we have other harbours, such as they are; and if further money is to be expended on them it will only improve them; whereas Filey Bay, as at present, is useless.

14,109. Do you think that the Tyne is being improved by the piers being carried out?—Yes.

14,110. And that some depth of water is gained?—I have reason to believe that there are two feet more

water over the bar. I have seen a vessel coming in and out with large boulder stones of two or three tons weight, which they have taken up during this summer, and I saw a wreck taken up close upon the bar. It was the bottom of a ship, and with all that taken away the sea sand has been scoured out.

14,111. And that is the great object of the Tyne Improvement Commissioners?—It is.

14,112. And the Admiralty have sanctioned that principle?—As far as I know they have. I have no doubt, that if they only go on next year as they have during the last year, double the amount of gain will be made.

14,113. Do you think the works could go on a little faster?—I would like to see them go much faster.

14,114. You mentioned the case of lives being saved by the life-boats; is there a good supply of life-boats?—Yes, I am glad you have named it, because I think we are better supplied with life-boats and life-boat men that any other port in the kingdom, or in the world. We have four very fine life-boats, and the best men in the world to man them.

14,115. Do you mean the Tyne pilots?—Yes, they are never wanted. It is more difficult keeping them out of the boats than getting them in, whereas very often men have been drowned in ships which have been wrecked very close to us in the south.

14,116. That is not the case in the Tyne?—That is one reason why so few men are lost in the neighbourhood of the Tyne, by having such good boats for getting the crews out.

14,117. I am very glad to hear of such a state of things?—And another reason is, that the ships lost are generally light ships, which do not become total wrecks. They hold out some little time, while a laden ship goes to pieces directly.

14,118. (*Capt. Sulivan.*) You have said you would recommend Peterhead as a harbour of refuge, combined with the advantage of a place for ships calling?—Yes.

14,119. Tell me under what circumstances a vessel could be off Peterhead or Buchan Ness, so as to go on shore, if she had not a harbour to run for?—It is the best place.

14,120. Tell me under what circumstances a ship can be so caught off Buchan Ness, with what wind can she be caught, that she cannot now save herself from going on shore? Just look at the chart?—It is not necessary, because I know the coast so well. As I said before, when I answered, I think it was a question of Mr. Lindsay's, I do not say much for it for saving of life, but as a place of refuge for ships to go in which have been out a long time, and are short of provisions—have sails split and their crews exhausted—it would be a capital thing for that perhaps; but as to saving of life, I do not think there is any necessity for it.

14,121. In laying out a large sum of money, do you think that the whole should be laid out where life and property are in danger, or that a portion should be laid out there and a portion laid out for the convenience of vessels stopping?—I think there is a great deal of reason for laying out money on places for stopping, because for want of such a place, ships are often in danger of being wrecked. For instance, supposing a ship coming from Archangel, she passes 10 or 20 miles off a harbour, but if she had been coming to the land she might have anchored close to the land. She might drive, it is true, but that is not a thing to be anticipated.

14,122. Have you ever known such instances?—I have known them.

14,123. Then you think an outlay would be justifiable by the possibility of such a thing occurring?—No, I will not say that.

14,124. You spoke of wrecks at the mouth of the harbour; had the works been completed to the present plan, and 15 feet obtained, do you think that many wrecks would have been saved?—I should think nine out of ten would have been saved.

14,125. Do you consider it very important that those who recommend the outlay of the public money and have the responsibility for its application to harbours of refuge, should be particular in advising that it should be laid out where there is no human probability of the money being wasted by the harbour silting up?—I think it very necessary to be very careful upon that point.

14,126. Can you yourself feel at all certain that the harbours you have mentioned would, after a large outlay, give that depth of water necessary for ships to enter at all times of tide?—I cannot so well answer for Sunderland. I do not know how far they are prepared to make a harbour of refuge there, but certainly, their harbour might be improved, and I dare say the Tees Bay or Redcar could be improved very much, particularly Hartlepool, without laying out a great deal of money there.

14,127. Do you mean by constructing an outer harbour at Hartlepool, or by making the channel deeper up to the present harbour?—I am not sufficiently acquainted with Hartlepool to give an engineering opinion.

14,128. You said just now, that from the depth of water, you know that a breakwater to enclose ships of some size must be carried a long way out?—Certainly.

14,129. Do you know whether there has been a decrease of water there for the last few years?—I cannot answer that question.

14,130. You said that men were glad to run for their own ports, because, being hired by the voyage, they wanted to complete the voyage as soon as possible, that remark would apply to light vessels?—It would.

14,131. Would not laden vessels make an endeavour to get shelter on the voyage, rather than put back, for the same reason?—I think they would, if it was a safe anchorage, and it would also depend on the distance they might have to come back.

14,132. You said that vessels caught in certain winds between Redcar and Flamborough Head would have to beach at Scarborough?—Yes, and also north of Whitby too.

14,133. Is that an ordinary thing in a bad wind from east-north-east?—There is scarcely a winter that the like does not occur.

14,134. And those are vessels which would not be able to fetch back to Hartlepool, or fetch round Flamborough Head?—When their canvass is blown away, or they are leaky.

14,135. Do you confine that remark to laden vessels?—Yes.

14,136. Do light vessels run on the beach to save life?—They do.

14,137. Would a harbour at Filey save all those ships?—I do not say all.

14,138. But a large proportion of them?—Yes.

14,139. The large mass of vessels which have left the Tyne and are proceeding south, if caught in the same way in east-south-east or east gales, would they not also, if there were a harbour at Hartlepool, prefer bearing up for that, notwithstanding the low land, rather than risk going on the starboard tack, and reaching back to the Tyne?—If they have a fair chance of reaching the Tyne they would do it; because, as I said, the wind from the east generally backs to north-east, and they can fetch round Flamborough Head when they cannot get out of other ports.

14,140. (*Capt. Vetch.*) I think you said you knew the coast from Cromarty up the Pentland Firth?—I have been along it; I have not been in any of the ports.

14,141. Are you aware of any natural port besides Wick?—There are two or three small ports.

14,142. How small are they?—I cannot speak as to that.

14,143. You would not take your vessel in there?—I understand there are places where a great many fishing boats go in during the herring season.

14,144. Do you know Wick?—Only sailing past to Duncansby.

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14,145. It is an open creek; there are between 200 and 300 vessels sometimes in it, and there are 1,500 boats fishing off it. Supposing a north-east gale to come on, what must become of them?—I know it is an iron-bound coast, but it is a nice bold coast.

14,146. Knowing the coast to the extent which you do, and knowing that there is no refuge at hand, do you not think that they require a harbour there, where the fishing boats and vessels are congregated? —For that trade I think it would be a great advantage, that the natural harbour should be improved, but as to the question which I was asked before, as to vessels going to the Baltic or the Pentland Firth, it is a place I should not think about.

14,147. I am referring only to the local necessities for saving these boats and the lives of the fishermen? —I think it would be a great benefit for that.

14,148. (*Capt. Sulivan.*) In addition to what Captain Vetch has said, if you knew that the trade of Wick was exposed by having to anchor in that open creek exposed to easterly gales, and that that trade was double the amount of tonnage, besides three times the number of fishing boats than there is at any other Scotch port, would you then say whether you think the outlay of public money to save life and property should be at Wick or Peterhead?—Wick, decidedly. I said, as to saving of life, I did not name Peterhead; Peterhead is a place to put into, but Wick for the saving of life, decidedly.

14,149. (*Mr. Lindsay.*) Taking into consideration the saving of life and the number of lives exposed in those fishing boats, you say Wick?—Yes.

14,150. Leaving them out of consideration, and taking into consideration the passing trade and the saving of life and property, which would you say, Wick, Fraserburgh, or Peterhead?—Peterhead. When you talk of the fishermen it is another question.

Mr. William Wake examined.

Mr. William Wake.

14,151. (*Chairman.*) You are harbour-master at the Tyne?—Yes, harbour master of the Tyne.

14,152. How long have you been connected with the port in that capacity?—I have been harbour-master of the Tyne for 12 years.

14,153. And previous to that, were you at sea?— Yes; I served my apprenticeship to the sea, and commanded a ship for 22 years.

14,154. In what trade were the ships employed which you commanded generally?—The general trade, not much in the coasting trade.

14,155. And to what parts of the world did they trade?—To various parts; a great deal to the Mediterranean, North America, the Baltic and West Indies.

14,156. You have been present during the course of this inquiry?—I have.

14,157. Give me your opinion as to the advantage or necessity of Wick as a harbour of refuge for ships going north about?—I never was in Wick; I have been off Peterhead; as far as regards the saving of life, I think Wick a very desirable place to make a harbour of refuge. I have seen an immense number of fishermen who, in heavy gales, are placed in a very perilous situation.

14,158. Viewing the question merely as respects the passing trade, give me your opinion as to the advantage of Wick, not for the fishermen, but for vessels going through the Pentland Firth?—I think, if they were bound north about, they would endeavour to get to the Orkneys and Longhope, if possible.

14,159. From the evidence you have heard given, and the questions you have heard asked relative to the Pentland Firth, I dare say you will be aware of the difficulties of navigating it which exist, or are supposed to exist, from the strong tide running through it, and vessels being forced in against this tide. Knowing they have to meet this weather tide, will you tell me, from your knowledge of the coasting trade, are they vessels which generally can heave to in time?—They generally heave to, and haul to the eastward, and endeavour to get to Longhope.

14,160. You heard from the last witness that he was employed in the coasting trade, and that the vessels in that trade run as long as they can, and then heave to as a safer thing to do; is that your opinion? —It is.

14,161. Therefore, I am to understand that a man running for the Pentland Firth has no difficulty in rounding to in time, and waiting for the lee tide?— Quite so.

14,162. There is no difficulty?—None at all. I have done it frequently.

14,163. You have heard the evidence as to Peterhead, what is your opinion as to the advantage or necessity of Peterhead as a harbour of refuge for the Baltic or Archangel trade?—I do not see the great necessity for it, because the distance is short and you can either get to one firth or the other, northwards or southwards.

14,164. Therefore, you are disposed to say the coast is provided sufficiently with natural harbours of refuge? —I never was in Peterhead.

14,165. With reference to your answer that the firths are both open, do you think there are sufficient harbours of refuge for the wants of that coast?—I do, as far as the saving of life, they can take the one firth or the other.

14,166. Have you run up the Firth of Forth in heavy weather?—Not since my apprenticeship; never since I was master of a ship.

14,167. Coming further south, respecting a harbour of refuge, what is your opinion?—With respect to what harbour?

14,168. I mean from Berwick to the Humber?—I think to improve the harbours in existence is better than to have only one harbour.

14,169. And do you concur in the opinion that no one harbour can be constructed for any practicable sum which would be sufficiently large for the wants of the trade?—I am afraid not. I think it could not be.

14,170. Do you consider Hartlepool difficult to make in thick weather blowing from the eastward?— I have been very little at Hartlepool.

14,171. What is the heaviest weather on this part of the coast?—Generally east-south-east and south-east.

14,172. How do your gales commence, with what kind of weather?—They begin foggy, with the wind south, and often to the east.

14,173. Does the wind go to the southward, and back round to east-south-east?—Yes.

14,174. With rain and thick weather?—Yes, and back round again.

14,175. Do your south-west winds go to the north-west and north, and break?—Very often.

14,176. Would you say, that that was generally the case?—Yes.

14,177. Does the south-east back round to north-east, and blow very hard, does that ever happen? —Very seldom.

14,178. (*Sir F. Smith.*) You are harbour-master here?—I am.

14,179. Are you aware whether the works conducted by Mr. Walker have had any effect in lowering the bar?—There is a considerable improvement in the depth of water on the bar. Whether it is owing to the extenston of the piers or the removal of the stones on the nine-foot bar, I cannot say. There has been a great deal of improvement in that part through the Narrows down to the bar, particularly in the present year.

14,180. Do you know the amount of alteration?— Do you mean the quantity of material taken up?

14,181. No, the depth to which the bar has been lowered?—2½ feet.

14,182. Can you speak to 2½ feet from your own soundings?—From my own soundings.

14,183. Are they recent?—About a month ago I sounded the bar and found eight feet at low water.

14,184. When had you previously sounded?—I get a return from the pilots every month, and I frequently sound myself.

14,185. Is it a regular progression, or does it go by fits and starts?—No, the bar has improved during the last six months.

14,186. To any extent?—In 1849 the *Lady Faversham*, drawing 4½ feet, touched on the bar.

14,187. All that you require to make the Tyne a desirable harbour is to deepen the bar?—The distance between the nine-foot bar and the bar might be deepened at the same time.

14,188. What is the extent of accommodation in the harbour?—There is a good deal of room for shipping. We have 362 ships moored on the north side of the river here. We have had 512 ships moored in South Shields; at Wall's End 163; from Wall's End to Newcastle 414. That was on the 3rd of January 1857.

14,189. Was the whole amount of that shipping in the Tyne at that time?—Yes, on the 3rd of January 1857.

14,190. What is the total?—Making 1,250 ships in all. We have one dock open now and another will be open early in the ensuing year, which we calculate will hold 800 more.

14,191. Are you able as harbour-master to say whether the trade of the Tyne has increased very much?—So much so, that only in the month of September 819 vessels arrived in the River Tyne from foreign ports.

14,192. Have you at any time observed a number of ships in the offing waiting for a rise of tide to come in here for refuge?—I have frequently.

14,193. What is the greatest number?—From 50 to 100 sail sometimes.

14,194. Waiting off the port to come in?—Yes.

14,195. And do collisions occur on these occasions?—I have never seen many collisions.

14,196. Do you know the coast south from here?—No, I have passed, but I know very little about it. I commanded a ship belonging to the Tyne, and I never had her here for ten years.

14,197. (*Mr. Lindsay.*) As harbour-master, what are your limits? Have you charge of all ships which come into the Tyne?—As far as Bell Point, between five and six miles up the river.

14,198. Are all the ships bound to either side below that point under you charge?—Yes.

14,199. Is it your duty to give directions how these vessels shall moor?—Yes.

14,200. Supposing that a harbour were constructed so as to admit vessels at all times of tide, that is, if the pier were carried out to five or six fathoms at low water—and large ships run for this harbour in distress in strong south-east gales, how would you deal with them?—There is room now to bring vessels up drawing 18 and 19 feet, and with the facility of steam tugs we should soon have them placed at their moorings.

14,201. Do you think there would be much chance of damage to ships running in in heavy gales of wind?—There might be, but very little of that.

14,202. There is not much damage now from ships running in?—Very little indeed.

14,203. What is the greatest number of ships which you have known to leave the Tyne at any one tide?—330. When the *Hecate* was here two officers were stationed in her to count, and they counted that number. That is the greatest number I have ever known.

14,204. What is the greatest number which you have known to come in?—I think I have known 300.

14,205. Do you keep any return of the wrecks which take place upon the bar or in the immediate neighbourhood of the Tyne?—I have not entered in my journal the number of ships which have got ashore.

14,206. Have many been ashore during the 12 years that you have been here?—A great many.

14,207. In your opinion, what proportion of those ships would have been saved if a harbour had been constructed such as I have named?—I think, most might have been saved if the piers had been extended. There are such facilities with steamboats, and they are very active. We always keep one close to the weather pier, so that if a ship gets any way disabled a steamboat is sure to grapple her, bring her into smooth water, and place her at her moorings.

14,208. Have many lives been lost?—Not so many as we might expect, because of the great exertions of the life-boats.

14,209. How was the wind when the greatest number of vessels went ashore—south of east or north of east?—More go on the hard sand with the wind north of east. They go on the rocks with the wind south of east.

14,210. Is south of east a much more dangerous wind for life?—Yes.

14,211. As it has been your duty to get returns, and as I am glad to know you have paid great attention to the subject, I wish to ask you as a practical man who has watched the progress of the bar, do you think that if the piers were extended to five fathoms or 30 feet at low water, that that depth of water would be maintained?—I think it would, because we have a cross tide to keep the piers clear, and there is so much dredging as well, that we should be sure to keep the openings.

14,212. You think then if the piers were carried to the crest of the tide, where the tide runs along the coast, the effect would be to scour away the sediment brought down to that point?—I think so.

14,213. To scour away and scatter it?—I think so.

14,214. Then do you think that the water would be maintained at somewhere about five fathoms?—It might silt up, but I do not think it would silt up very fast.

14,215. And that for the reason named, the effect of the sea tide?—Yes.

14,216. (*Capt. Washington.*) You stated that you had great accommodation at the Northumberland Dock. Do you know recently what draught of water can go into it?—Ships have gone to sea from the docks drawing 18 feet of water.

14,217. At high water and spring tide?—Yes.

14,218. And from the Jarrow Docks?—I expect the same depth at the Jarrow Docks. We have not completed the dredging at the entrance, but we are in a fair way to do so.

14,219. Will that dock accommodation be sufficient?—No, from the increase of the trade we must increase the dock accommodation.

14,220. Where will be the best position for a new dock?—I think at Coble Dean. I have always had that opinion. If the piers were carried out a fine dock could be made at the Low Lights.

14,221. There was a proposal for a dock at the Low Lights?—There was.

14,222. Which should take vessels of a larger draught of water?—It would depend on where the entrance was made.

14,223. The object would be to take into that dock the larger class of vessels—as large as could pass the bar?—As large as could pass the bar. In fact, it would be of very little use to place a dock there for the small ships.

14,224. You stated that the foreign trade and the size of the ships are increasing?—They do, very much.

14,225. It is only limited by the depth of water over the bar?—In a great measure.

14,226. If there were deeper water over the bar, the ships would increase?—I have no doubt that large American ships, which we should have had here, did not come from London in consequence of that.

14,227. And if the depth of water on the bar which is supposed could be obtained, you have no doubt

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that the Low Light docks would be carried out ?—I think they would when the piers were extended.

14,228. Would the extension of the piers cause those works to be carried out with greater facility, with less risk, and at less expense ?—A great deal.

14,229. (*Capt. Sulivan.*) You said that there had been an extra depth on the bar, but you did not feel certain whether it arose from the piers or the removal of the stones by dredging, I think ?—By dredging. At the same time we have taken up a very large quantity of boulders—one of five tons weight. We had to slip the drdger from her moorings, and drop it on the land. We could not get it into the barge.

14,230. Have those boulders been removed from the bar ?—They have.

14,231. Where you have now increased water ?—We have taken up in addition the bottom of a ship with 35 feet length of keel, and, strange to say, an anchor on the top. When the wreck was placed on the Spanish battery it stood a foot and a half high.

14,232. Were those wrecks where the shallowest water was found on the bar ?—No, inside it.

14,233. Is the nine-foot bar still further inside ?—Considerably.

14,234. Has the nine-foot bar been deepened by dredging ?—In fact there are three feet difference on the stones as compared with the depth before we commenced the dredging.

14,235. Has the deepening of the nine-foot bar and the removal of the wrecks tended to keep the current in the channel and so throw more strength on the outer bar ?—No doubt.

14,236. Might that account for the extra depth of water on the bar ?—Yes.

14,237. Might that have occurred if no piers had been built, if you had removed the same material from the channel ?—It might, but one thing is the effect of the sand on the south side—the sand forming the morticing line. We have dredged a portion on the Black Scarf, and we have taken that off, which I think is a great improvement to the channel too.

14,238. Would that dredging have assisted to deepen the channel if no piers had been built ?—It would.

14,239. Has sand accumulated ?—The bar inside has. It has increased considerably too at the south side of the pier.

14,240. Has it very much accumulated outside ?—Very much.

14,241. Does the sand travel round the corner ?—I have seen sand coming round the pier end.

14,242. When the pier is extended to the extent now proposed, is it probable that the sand will fill up ?—Perhaps time will do that, but it will be a very long time first.

14,243. You say it is increasing at the pier ?—The inner pier.

14,244. Is it also increasing towards the part which is finished—towards the end ?—It is not very far out from the end.

14,245. If in the course of years the sand accumulates outside until it reaches the south pier, will not the effect be that it will meet the sand coming out of the harbour, and the two will be stopped at the entrance ?—That is more an engineer's question than a sailor's question, but it will be a long time first. The south pier must be carried beyond the bar line.

14,246. Would the sand continue to accumulate at the back of the pier, however far out it was carried ?—It might.

14,247. If it did not accumulate outwards would it not go over the pier into the inner harbour ?—I think not.

14,248. If it did not come over and the sand was accumulating, must it not be spreading outwards towards the pier head ?—It might spread out.

14,249. You said that from 50 to 100 vessels have been waiting outside for the tide at one time ?—More than that.

14,250. Do you think that under ordinary circumstances any harbour of refuge made south would ever require to take more vessels in a single gale than now often come into the Tyne under similar circumstances in a single tide ?—It might happen from different circumstances, from the many ports and the immense number of ships. There is a large fleet from Sunderland and Hartlepool which is gathered together previous to a gale coming on.

14,251. (*Capt. Vetch.*) When did the deepening of the nine-foot bar first take place ?—We have been dredging off it about two years.

14,252. What is the present depth ?—Eight feet on the stones. That is on the nine-foot bar. Over the stones there is from eight to 14 feet.

14,253. Well, how much was there on the stones ?—Only five feet before we commenced dredging, where there is now eight feet.

14,254. Whereabouts are those large boulders found ?—Just inside the bar, with the lights nearly in one.

14,255. A considerable distance from the nine-foot bar ?—Yes.

14,256. And I think you gave it as your opinion that the deepening out of the nine-foot bar in some degree unburied the wreck and the boulders ?—I think it had an effect on the tide in making the tide run truer.

14,257. You rather attribute the deepening of the bar to that effect than to the piers ?—One combining with the other perhaps.

14,258. Both combined have tended, in your opinion, to lower the bar two feet ?—Two feet—in fact more than two feet. During one year we had not five feet on the bar all the year round.

14,259. Taking these piers as they now exist, and so far as they are carried, do they serve to save lives out of vessels coming on the sand ?—There has been no instance of that.

14,260. Should such a case occur, do the piers give a greater shelter and a greater chance of getting the crews out ?—The piers make the bar smoother, I think much smoother.

14,261. (*Mr. Coode.*) When did your dredging operations cease on the nine-foot bar ?—About two years ago we commenced working.

14,262. Are you working on the nine-foot bar up to the present time ?—Yes, until last week ; we were working there from May until last week.

14,263. Have you any reason to think that the bar will grow up again ?—Not from the stones, as big as a person's head, and the shingle which we took out.

14,264. There is no deposit of sand ?—There is no sand, or very little indeed.

14,265. You spoke of having taken soundings,—did you refer them to a fixed point ?—Of course I have a point for soundings.

14,266. You have a standard to which all your soundings are referred ?—Yes, certainly.

14,267. The increase of depth has extended over some years ?—Yes.

14,268. For how many years has the depth been increasing ?—For the last three or four years ; certainly for the last three.

14,269. How long since were the piers commenced ?—About that time.

14,270. Did you notice any increase prior to the commencement of the piers ?—A little.

14,271. Has the increase been gradual and regular ?—For the last year more than the previous.

14,272. What has been the increase during the last twelve months ?—2½ feet ; 1½ feet on the stones.

14,273. Do you not think that to have an efficient harbour of refuge it should be available by night as well as by day ?—Yes.

14,274. You spoke of the necessity of steam tugs to get vessels into the anchorage. How would you deal with a vessel in a gale of wind on a dark night ? Would you still attempt to take her to a safe anchorage by steam tugs ?—Certainly.

14,275. Then you would rely on that just as much as on a good anchorage ?—Yes ; there is little fear

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but that ships will get into a good berth if a steamer gets hold of them.

14,276. Will you have no difficulty on a dark night and during thick weather ?—Never any difficulty but that I think we should always overcome it.

14,277. (*Chairman.*) I think you talked of a considerable number of vessels waiting off the port for a tide to run in ?—I have seen them frequently.

14,278. How many have you seen ?—From 50 to 100.

14,279. That happens in heavy, blowing weather ?—Yes.

14,280. Do vessels on such an occasion stand backwards and forwards under close-reefed topsails, or do they heave to ?—They keep an offing until the tide suits them.

14,281. With deeply-laden colliers have you ever known them to suffer damage from the sea breaking on board ?—Yes I have.

14,282. Considerable damage ?—No, knocking away a stern boat of a dark night.

14,283. Have you ever known a vessel lie to under storm sails which could not carry close-reefed topsails ?—No, I never saw that.

14,284. And therefore I am to understand that these deeply-laden colliers can haul to the wind with close-reefed topsails in a heavy sea without suffering damage from the sea breaking on board. They bow the sea well ?—There have been instances of damage.

14,285. They do not get into the trough of the sea and suffer from the sea breaking on board of them ?—Very seldom.

14,286. And when these vessels run into port, though not actually in the breakers, are they often pooped ?—Very often.

14,287. Do you mean in the harbour's mouth ?—Outside the bar I have seen the sea break into a ship.

14,288. Does that happen frequently ?—Frequently.

14,289. (*Mr. Lindsay.*) You speak of a bar. I understand the bar to be a sort of hillock. Is it a hillock or part of a long flat ?—It is a rising of sand with deeper water inside and outside.

14,290. And is there deeper water to the southward and northward also ?—Yes, there is.

14,291. Then, in fact, it is an accumulation at the entrance of the harbour?—It is a good width across it.

14,292. What is the extent ?—About 400 feet, east and west.

14,293. How far does it run north and south ?—About 700 feet.

14,294. (*Capt. Washington.*) Can you, without much trouble, mark upon the plan where the stones were dredged up ? Can you mark where the five-ton stone and the wreck you spoke of were taken up, because we have quite understood hitherto that they were on the bar ?—Yes ; all the large stones were taken from the place that I have marked as near as possible, and the wreck too. I have marked them on chart 1,934.

14,295. Then it was not the shore part of the bar ?—No.

14,296. Nor directly in the track of navigation ?—Yes.

14,297. Was it not rather on the south side of it ?—Rather ; it was just off the Spanish battery.

14,298. Has much benefit arisen from the use of the dredger in the Tyne ?—From dredging, a great deal.

14,299. It has been rather a recent practice to dredge in the Tyne, has it not ?—We have increased the use of the dredger.

14,300. How many have you ?—We have three.

14,301. Are they constantly employed ?—Yes. The Jarrow Dock Company have one now at the entrance of the Jarrow Dock.

14,302. How much can they lift in a day ?—We can take 2,000 tons, but that is a very great day's work.

14,303. How much horse-power—20 ?—More than that, but the dredgers are not in my department ; I have nothing to do with them.

14,304. They have never been applied to the nine-foot bar except at the stones ?—They move them about considerably, both east and west, north and south.

14,305. Do you know the breadth of the nine-foot bar between the deep water ?—It is a great deal.

14,306. Is there a deeper channel over there ?—A great deal deeper.

14,307. How much ?—There are 13 or 15 feet of water.

14,308. From that part ?—From that part.

14,309. Do you think it likely there are any wrecks or stones on the main bar ?—It is possible, but we have not ascertained any except what we have grappled with. The diver has been over and we know of none.

14,310. It appears to be a simple deposit of sand ?—In fact borings were taken, and Mr. Brooks reported that it was sand down to 18 feet.

14,311. (*Mr. Coode.*) Have you a copy of the result of Mr. Brooks' borings which you could put in ?—I have not.

14,312. (*Chairman.*) Supposing Mr. Walker's plan for the extension of the piers and the additional dock accommodation which you expect to have, carried out, can you furnish us with a chart showing the area in the river which would be strictly available for refuge purposes ?—Oh yes.

14,313. You can supply us with a chart at your convenience, with the refuge part marked in it ?—Yes.

14,314. Will you also put down the area in acres ?—Yes.

Mr. Robert Tully examined.

Mr. R. Tully.

14,315. (*Chairman.*) You are a pilot for the Tyne ?—I am.

14,316. How long have you been connected with the port in that capacity ?—Do you mean how long as a pilot ?

14,317. Yes, how long as a pilot ?—For 50 years and upwards.

14,318. Are you aware of Mr. Walker's proposed plan for the improvement of this harbour, so as to make it a harbour of refuge ; have you seen the plan ?—No, I have not.

Mr. Wake recalled.

Mr. William Wake.

14,319. (*Chairman.*) Did you understand the questions which were put to you to apply to the present channel, or to Mr. Walker's proposed plan ?—I understood to the inside of the harbour only.

Mr. Tully's examination continued.

Mr. R. Tully.

14,320. (*Chairman.*) Look at the chart before you, do you see the piers ?—Yes, I see them.

14,321. Do vessels running in with a heavy wind experience great danger from the sea breaking right across, the entrance of the river ?—Yes, it breaks right across.

14,322. Do you suppose that the facility of getting into the harbour would be improved by the piers which you see there ?—Of course it would be very much improved indeed.

14,323. Is the weather so bad that pilots cannot get on board ships coming in ?—That is very often the case.

14,324. And you have a strong sea running, which

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breaks across the harbour ?—Yes, so that in thick weather you cannot see the sands and must not run in.

14,325. Do you speak of vessels being afraid to run in ?—If there is an easy sea they can come in with high water in safety ; but I have known occasions when the sea has been very high indeed, when they could not come in.

14,326. But, as I understand, in such weather the tugs cannot get out ?—It must blow very heavy indeed to prevent tugs getting out.

14,327. If a boat can live at sea, they can get out ?—If you can lower a boat down to put a pilot on board a ship they can get over the bars.

14,328. Is it a practice for tugs to get hold of ships before running in ?—It is so, with scant winds ; in fair winds they want no tugs.

14,329. In fair winds they never take a tug then ?—Sometimes they do, but it is only to put them in tiers.

14,330. To put them in their berths, not to prevent the risk of running in ?—Yes, that is it.

14,331. (*Mr. Lindsay.*) Do you know Hartlepool and Sunderland ?—Yes, I know the coast perfectly.

14,332. Whether do you think it is easier, in thick weather, to make Hartlepool or the Tyne ?—I have told you just now that you cannot see the road in thick weather.

14,333. But whether do you think it is easier to make the Tyne, the Wear, or the Tees, in thick weather ?—The Tyne, of course.

14,334. Why ?—You can tell the road by the soundings.

14,335. Then you think the soundings in running would guide you better in running for the Tyne than for the Wear or the Tees ?—For us it would, but not for the Hartlepool pilots. I don't know the soundings ; you gentlemen know them better, for you have sounded oftener than I have done.

14,336. Will you answer this simple question ?—I will answer anything.

14,337. Whether is the land of the Tyne, the Tees, or the Wear, seen at the greatest distance at sea ?—You can see the Tyne farthest, and it is a rocky shore ; the land can be seen further, and you know where Hartlepool pier is by the land.

14,338. What is the entrance most easily made out ?—The Tyne.

14,339. You say that the formation of the land in the neighbourhood of the Tyne makes the entrance easier to be made out by vessels ?—You have Tynemouth Castle before you and a beautiful light, and it is easier made out.

14,340. (*Capt. Washington.*) I should like to ask you, Mr. Tully, whether you have all the lights and buoys you want at the entrance of the Tyne ?—We have all the lights, I think, that are wanted. You want lights to carry you clear of the stones, but they are partly gone now.

14,341. And the leading lights lead you fairly in ?—Yes, they lead fairly in.

14,342. Is the Herd sand marked by a good buoy ?—It is a capital mark.

14,343. Is that put down by the Trinity Board of Newcastle ?—I believe so.

14,344. Not by the Trinity House of London ?—No, by the Board of Newcastle, I believe.

14,345. How many pilots have you on the Tyne ?—Two hundred.

14,346. Have you a steam tug to go out in ?—We have a steam tug, the *Robert Myhon.*

(*Chairman.*) Just let me make a remark: when an old pilot or an old seamen is under examination we are inclined to grant a little indulgence, but you must recollect the respect you owe to us.

14,347. (*Capt. Washington.*) How far do the Tyne pilots go ?—Sometimes to Flamborough Head, and sometimes to Coquet Island to the north.

14,348. And do you go out in blowing weather ?—We go out in fine weather, and sometimes are overtaken by strong winds.

14,349. Does the tug go out at night ?—At tide times, as long as the lights are lighted.

14,350. Do you agree that there is a greater depth over the bar than there was two years ago ?—Yes, the bar has been two feet better within the last two years or nearly so, I cannot say exactly, as I have not sounded, it may be a little more.

14,351. What is the largest draught which has come into the port ?—Ships have gone out drawing 21 feet.

14,352. Lately ?—Yes, more than once ; two or three times.

14,353. This year ?—Yes.

14,354. What is the rise of the tide at spring tides ?—These last springs it was 16 feet, if I am not mistaken.

14,355. (*Chairman.*) You have been so long a pilot, that you are acquainted with the condition of the vessels which sail out of this port ?—Yes.

14,356. Are they generally well found ?—Pretty fairly.

14,357. Looking at the vessels in the coal trade, would you be disposed to say that, as a general rule, they are as well found as vessels engaged in the foreign trade ?—Ships going a long voyage have an extra fit up. In the coal trade, a surveyor is put on board every six months to see that everything is in proper order.

14,358. I understood, from a previous witness, that although as respects their upper works they may not appear so good as other vessels are, yet, with respect to their bottom and underwater, they are the strongest vessels afloat : does your experience bear out that opinion ?—I do not know. A surveyor is put on board to see that they are good. A vessel on the letter A can command a dry cargo for a long voyage ; and when she is off the letter she can come into the coal trade and command a cargo of coals. Of course, such a ship cannot be so good as a first-class ship.

14,359. Then, referring to the question I have just asked you, do you or do you not consider the vessels in the coal trade to be such as have been described to me ?—What was that ?

14,360. As being sounder in their bottoms than any vessel afloat?—I do not think that. I cannot say that.

14,361. As a general rule, would you say that vessels of an inferior description are put into that trade when perhaps they are not fit for a foreign voyage?—So far as that goes, they are off the letter. They are old ships.

14,362. Now, as respects the gear aloft, masts, sails, and all which is most essential for vessels in rough weather, are they generally well-found vessels ?—I tell you that a surveyor is put on board to survey them and make them all good. He can order new topsails, new masts, and new yards, if they want them.

14,363. Under the system which you describe, are they good or are they not good, so far as you know?—They are good.

14,364. As respects these vessels which are deeply laden off this port in heavy weather, have you frequently seen a large number heave to or standing backwards or forwards?—I have.

14,365. And do you consider that these vessels bow the sea well, and are not exposed to any great danger in rough weather when they do so?—I have seen them make very bad weather, the sea washing right over them.

14,366. And under such circumstances has there been risk to the safety of the vessel?—Yes.

14,367. And do you consider that one of these vessels is safer hove to, or standing on a wind, than she is running?—I would say she is safer running.

14,368. She is safer running?—Yes. In the western ocean, where the sea is high, they can heave to, they tell me; but I think it is safer running.

14,369. Would you say that a vessel was safer running or hove to?—I would say running, in the North Sea here.

14,370. It has been given in evidence before us

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that vessels in the coasting trade always by preference run for their own port?—Yes.

14,371. Is that according to your experience?—Yes.

14,372. How do you account for that? what is the reason?—Because it is the best harbour on the coast.

14,373. You have mistaken my question. We have it in evidence that vessels belonging to particular ports, not the particular port of the Tyne, by preference in heavy weather run for their own port; each ship runs for its own port; is that in accordance with your own experience?—It is generally the case.

14,374. What is the reason?—The Tyne is the best port. There is more water and less expense than in any other port. If you put into Hartlepool there is 2*d.* a ton on the register; whereas you pay nothing here except for lights, a shilling or two shillings on each ship.

14,375. Then, do I understand that Seaham, Sunderland, and Hartlepool vessels run for the Tyne in preference, and not to their own ports?—That is generally the case.

14,376. They do not run for their own ports, but they run for the Tyne?—Generally, not always.

14,377. (*Mr. Lindsay.*) Within your long experience as a pilot, have you seen great loss of life in this neighbourhood?—I have seen a good many ships lost, but not many lives. The life-boat is always ready.

14,378. If it were not for the life-boat there would be a large loss of life?—That would be mostly the case. I have been in the life-boat taking crews out when they have been standing in the rigging for an hour or an hour and a half.

14,379. In what quarter was the wind when the largest number of vessels were lost?—There is more happen when the wind comes from the south. When the wind is north there are fewer come. When the wind is from the south it makes a larger quantity come back.

14,380. If there were a harbour here, would the greatest portion of the ships be saved?—I should say they would if they had fallen in with that harbour of refuge. I know you might make a harbour of refuge at Flamborough Head. If a ship is taken back close under the Head and looks to leeward, the first land she makes is a harbour of refuge.

14,381. If such a harbour were made, and ships were able to use it, you think a great number of them would be saved?—That is my opinion, with the wind on shore.

14,382. You spoke of the number of vessels driven ashore at the mouth of the Tyne. Supposing a harbour were made such as that named, and that these ships were able to use that harbour, would it be the means of saving them and the lives in them?—No; they would still have to come to the Tyne.

14,383. Just think for a moment. I asked if you had in your experience known a great loss of life and property at the mouth of the Tyne?—Yes.

14,384. And you said you had?—Yes.

14,385. Now, I ask this question; if there were a harbour of refuge at the mouth of the Tyne, would it have been the means of saving to a large extent of those ships and those lives that you saw lost?—It would.

14,386. (*Capt. Sulivan.*) You said that a person goes on board to see that the vessel is properly found?—Yes.

14,387. Does that apply to vessels insured in clubs?—Yes.

14,388. Does it apply also to those which are not insured in clubs, but insured in London?—I believe that the underwriters at Lloyds' have a man appointed to inspect them.

14,389. Do you believe that the vessels which run for this port, but belonging to ports south of the Tyne, come here because they think there is a greater chance of safety and deeper water than in their own ports?—Yes.

(*Chairman.*) Mr. Clayton, the Commissioners are disposed to say they have had evidence enough, but they are still open to hear other evidence if there is any one in particular whom you wish to call.

(*Mr. Clayton.*) Perhaps you will hear a ship's captain.

Mr. JOHN T. WAWN examined.

Mr. J. T. Wawn.

14,390. (*Chairman.*) In what way are you connected with the Tyne?—I have been a shipowner upwards of 30 years, and my family for half a century before that.

14,391. You have been present at this inquiry?—I have.

14,392. Will you make any statement you may think fit relative to the advantage or necessity of a harbour of refuge on this coast?—The necessity arises from the increase of the trade of the various ports, more especially of the Tyne. There are more vessels frequenting the harbour, and the number is increasing every year. If the entrance were improved, the harbour might be made a harbour of refuge of itself, and I think the piers constructed, especially that on the south side, will be the means of so improving the harbour as to make it a safe place in heavy gales of wind. The south pier prevents the sand from coming in. The north pier projecting further north than the south pier, the flood sweeps round the Trow Rocks, and sends over the sand to the south pier, and has filled the harbour much more with sand, because forty years ago we had south of the harbour what is called the Banks. When a youth I used to ride on these sands. The tide now rises, and the whole sand has disappeared. No doubt as the south pier progresses, the sand will find a resting place, and if we are once rid of it the south pier will prevent its coming back.

14,393. Then you concur in the opinion expressed by, I think, all the witnesses who have been examined, that an improvement of the several ports on the coast is better than the establishment of one large harbour further to the south?—Most decidedly, from the number of ships coming and going. If there is shelter under their lee, they will take it at the nearest point where they can do it with safety; and if these ports are improved there will be a great saving of life and property.

14,394. With reference to running back by preference to the port to which they belong, do you concur in the previous evidence, or do you concur with the last witness, who stated that ships belonging to other ports run in preference for the Tyne?—A captain will naturally run for that port with which he is best acquainted, if there is water enough. I think the Tyne captains will run for the Tyne, and that the Sunderland and Hartlepool captains will run for their own ports. But I believe that a great many Sunderland vessels take refuge in the Tyne in gales of wind, which they could not get now without having to go to Leith Roads.

14,395. Have you any means of furnishing a return of the vessels belonging to other coal ports which have taken refuge in the Tyne?—I cannot give you any return of the numbers.

(*Chairman.*) Perhaps, Mr. Clayton, you will undertake, if you can, to give us a return for one or two years, showing the number of vessels which have come here from the other coal ports?

(*Mr. Clayton.*) Coming to the Tyne as a place of refuge?

(*Chairman.*) Yes.

(*Mr. Clayton.*) I will do so.

Mr. WAWN's examination continued.

14,396. (*Sir F. Smith.*) Does the sand move to the northward along this coast?—The sand upon the flood tide generally moves principally to the southward. On the flood tide the sand is more lively than

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on the ebb tides. If you ride on the sand with the tide running it is like a quicksand.

14,397. How do you account for the accumulation of sand behind the south pier?—I think the flood tide has partly prevented the sand from entering the harbour, and that which has entered is depositing itself on the south side of the pier.

14,398. You think that the south pier arrests the entrance of the sand, which would otherwise enter the river mouth?—Yes, and therefore I think it the most valuable.

14,399. And do you think it will form a considerable accumulation and become all dry land?—I have no doubt of it, as it has been heretofore.

14,400. I suppose you have no doubt that two or three ports along the coast would be better than one, however large?—Most decidedly, because any port along the coast would be a harbour sufficient to take those vessels which are sometimes caught between here and Flamborough Head.

14,401. And if a port were sufficiently capacious you would still think it better to divide the money allowed by Parliament into two or three portions?—Most decidedly; and I do not think that Parliament can apply money to better purposes than to improve the ports along the coast.

14,402. It would save life as well as property?—No doubt of it.

14,403. (*Mr. Lindsay.*) Have the shipowners of the Tyne voluntarily taxed themselves to a considerable extent for the improvement of the river?—For works, in the first instance, so as to give accommodation to an increased number of ships instead of letting them lay at their anchors.

14,404. The construction of the present pier will be a considerable tax upon the shipping frequenting the Tyne, and consequently upon the owners of ships resident at Newcastle, North Shields, and South Shields. Can you tell us what was the feeling generally of those gentlemen as to the extra tax necessary for the construction of those piers? what was their feeling, as a body?—They consented to it, expecting to derive great benefit from it. The great source of complaint was that they were so long commencing the work after the tax was levied.

14,405. Was there a general feeling among the shipowners of the Tyne in favour of the piers?—I believe so much so that no petition went up from the shipowners against the piers.

14,406. Do you mean no petition against the tax which was necessarily imposed upon them?—Against the bill which imposed the tax.

14,407. Consequently they have been willing parties to this taxation, so as to improve the entrance of the harbour, and thus tend to save life and property?—Yes.

14,408. (*Capt. Sulivan.*) In dividing the outlay of money upon the different harbours you have mentioned, are you considering that it is not certain that the anticipated advantages will follow the outlay of that money?—I have no doubt of it myself, although I was surprised to hear one of the members of your body doubt it. I should like to know the places where piers have been injurious to harbours. If I knew a place I think I might be able to give some reason for it.

14,409. You are giving your present evidence with the conviction that increased accommodation and depth of water at the Tyne will follow an outlay of public money?—Yes, if you go into deeper water, with the immense scouring power you have.

14,410. Do you think that those who are responsible for the outlay of public money should be very careful, under the circumstances, to lay it out where there is not every certainty, humanly speaking, that the depth of water will be attained, and accommodation given to the trade?—I certainly think that you ought to be firmly persuaded in your own mind that it will be so. I find that the increasing trade is such, that if we get a larger class of vessels to the Tyne, we shall require the harbour to be improved, as far as it can be, for these ships.

14,411. Is it not the case that your present works are very like an experiment, with the hope that it will be followed by success?—As far as the south pier is concerned it is not an experiment but a certainty. It prevents the sand from coming in, and if you do that the harbour of Shields will become a great basin where a navy can ride, as well as ships frequenting the port find shelter.

14,412. In all these plans mentioned are you sure that the improvement will be followed by the greater safety of shipping?—Not so much anywhere as in the Tyne, but still to a certain extent they will be most useful and valuable.

14,413. And if it rested with you, with all the responsibility as to where a sum of public money should be laid out, either in a place where you had not a certainty that it would be necessarily followed by advantage, or at a place where you could make sure that for many generations the harbours would remain valuable as a harbour of refuge, where would you make that outlay?—I should really have doubts about laying it out in any of the spots named, because I think many of these places, from the immense quantity of sand found there, will be filled with sand, that they will be silted up.

14,414. But supposing, with all the engineering talent you could command, you were to think a harbour would be certain not to silt up, and that it would give a harbour of refuge for the passing trade—supposing that were the case, would you, with the responsibility upon you, recommend the public money to be laid out where there is no such certainty or preference in granting a harbour which you could rely upon for a long period of time?—I do not think I should recommend any money to be laid out on any place where the back water was not sufficient. There is the harbour of Ramsgate. It is a trap for shipowners. We do not care how soon it is lost, as we have to pay a passing toll.

14,415. That is quite foreign to this inquiry?—I will answer your question pertinently.

14,416. I am speaking of the ports you are alluding to, and my question bears directly upon the responsibility of laying out money where you are sure it will be usefully, to a certain extent, laid out, or risking it where you are not morally certain it would be useful, but as far as any man can give an opinion, which is doubtful, whether the advantage will or will not follow?—I certainly think you have the responsibility, and I cannot recommend money to be laid out unless the advantage will follow, and I think it would be very foolish to do so.

14,417. (*Mr. Lindsay.*) You were asked a question just now, if the construction of these piers was not an experiment, the result of which would be doubtful. Now, from your knowledge of the people of the Tyne, do you think that shrewd men, such as those who manage the affairs of this river, would be willing to tax themselves to the extent of 400,000*l.* if they were not perfectly certain as to the results which would follow that expenditure?—Certainly not. I have some doubts as to the north pier, but I have none as to the south pier.

14,418. Is it not the case, that when men spend their own money, as in the present instance, they make long and very cautious inquiries as to whether the expenditure of that money will produce the results for which they expend it?—Most assuredly. We find very often that public trusts are very much abused.

14,419. Were not inquiries made whether, for an expenditure of 400,000*l.*, they could have the depth of water at the entrance which they expect to have, in consequence of that expenditure?—Most assuredly. They made sure from the circumstance of the deep water coast near the entrance.

14,420. But did they take the opinion of very competent men, as engineers and nautical men, who were able to give an opinion?—I know they did.

14,421. You know that of your own knowledge ?—Yes; because I was present when that evidence was tendered, and the parties to whom it was tendered were convinced that it was sufficient to justify the expenditure.

(*Capt. Washington.*) As you have referred to something which fell from me, I should like to explain that I am not aware that I expressed any opinion as to whether the Tyne can or cannot be improved. A witness under examination expressed a very confident opinion that the Tyne would be improved by the works being carried out, and I simply asked in return whether he could name any river harbour which had been improved by piers to the extent he expected. So far from wishing to express any opinion, it is my hearty hope that the plan may succeed to the utmost extent of your wishes. If I did express an opinion it was not my intention to do so I merely asked the witness if he could mention any harbour which had been improved to the extent he supposed, because he assumed so very confidently. I am very glad you alluded to it. I was under the impression that you wished to put the question in this light, that the pier at the entrance instead of doing good would do harm. I asked to invite questions upon the subject. I wished to know what harbours had been improved, and hoped to give my own opinion with respect to them. The witness instanced Warkworth. That has not been quite a successful attempt. I did not follow it up, because I did not wish to express any opinion on the subject.

Thank you; I am much obliged to you for the explanation.

14,422. (*Capt. Sulivan.*) You said that every inquiry was made with respect to these piers, and that the parties would not have laid out their money without a firm conviction that the result would be equal to their anticipations. But you stated at the same time, that you doubted whether the north pier would be so beneficial as the south pier. Is not the north pier the very expensive part of the work ?—But I am not speaking of any works beyond those now going on. I confine myself to what they are at present. I approve of Mr. Rendel's plan. I wished the north pier or jetty were open, and I wished that as much tidal water as possible should enter the harbour, so as to increase the flow upwards to Newcastle. Unless the south pier is extended out further than the north pier, you are shutting the harbour mouth, and driving the current across the mouth, thereby reducing the quantity of water which would be useful inside for the improvement of the river.

14,423. I do not wish to ask you as an engineering question, but merely as to the fact, whether, as you have expressed a doubt respecting the north pier, it does not show that with every precaution you could not ascertain that the whole of the money expended would be laid out beneficially ?—I think that, as the works have proceeded, so the improvement has gone on, and I cannot doubt that the money will be beneficially expended.

14,424. You have heard of the failure of another work at Warkworth. Do you not think that the proprietor there used every precaution, and was quite as satisfied that the money laid out at Warkworth would be as much to the advantage of Warkworth as others are that the money laid out here will be to the advantage of the Tyne ?—As a coaling port, it is a mere creek.

14,425. I am aware what Warkworth is. But I ask you whether that person thought that if he laid out his money, he would for that outlay make it the port which he wished it to be ?—I have no doubt he did. But we had no railways then. If he had foreseen that railways would have conveyed the coal to the Tyne he would never have laid out one shilling there.

14,426. But does it not prove that a person may lay out his money and be disappointed in the effect that the money was intended to produce ?—Most assuredly.

14,427. Am I right in understanding that you consider the north and south piers as one project, and that of that project the south pier will render the greatest amount of service ?—I think so.

Mr. Martin Cay examined.

14,428. (*Chairman.*) You are resident in Shields ?—In South Shields.

14,429. You have been at sea ?—I have been 30 years at sea, in command of a ship for 22 years of that period, and am now residing ashore.

14,430. In what trade were the ships which you commanded chiefly employed ?—Chiefly in the coasting trade, but for one fourth of the time in the foreign trade.

14,431. And when you sailed foreign, where did you go ?—To the Baltic, to America, to the Mediterranean, and one voyage to India.

14,432. You have been present during the course of this inquiry ?—I have.

14,433. You have heard the question about vessels going north-about. Will you give me your opinion as to the necessity or advantage of a harbour at Wick for vessels going north-about ?—I would prefer taking a port on the other side, Long Hope. As a humane project, I think it well worthy of the country's money being laid out, considering the fishermen.

14,434. Therefore you consider that a harbour at Wick would be more for the advantage of the fishermen than for the advantage of the passing trade ?—I do.

14,435. Give me your opinion about Peterhead ?—I cannot see that there is any pretence at all for making a harbour of refuge at Peterhead. If the wind is one way the Firth of Forth is accessible, and if the other there is Cromarty.

14,436. You are disposed to say it would hardly be justifiable to spend the public money at Peterhead ?—I think so.

14,437. Have you run up the Firth of Forth with a gale of wind from the east ?—I have.

14,438. And in thick weather ?—In snowy weather, so that you could not see an object.

14,439. How far did you go up; to Long Hope ?—One time to Long Hope.

14,440. Do you consider it is easy of access, that it is now a good harbour of refuge ?—Assuredly.

14,441. By night and day ?—Yes.

14,442. And that Cromarty also is a capital place to run into ?—I have not been up there, but I believe so.

14,443. What is your opinion about a harbour in this district ?—I think one harbour of refuge would come far short of what seafaring men demand of the country, and much less than their necessities require. It would be cruel to place only one, for you could not tell where to put it. I think that Filey has greater facilities for giving refuge than any other place. I have been told of the number of docks, and the draught of water which we expect to attain shortly, and great advantage will be found from the piers, because the entrance will be completely defended, which it is not strictly now. They have two leading lights, but in running over a bar-harbour, people are not quite so cool as they are sitting in this room. Many lose their nerve, and are likely sometimes to take one side and sometimes the other. That would not be the case if the place were defined. They would then naturally run in the middle of it, and the number of wrecks would be diminished. More than that. A ship seeking a cargo can always get one here. Any damage can be replaced on very reasonable terms, and I do not see that such advantages are possessed by any other port in the neighbourhood.

14,444. Do you attach much importance to the weatherly position of the port for ships sailing again ?

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—The east-north-east becomes a more favourable wind for going away. The east-south-east is an embaying wind, because you cannot clear the Staples unless you carry a very tight sail, and going to the southward you can clear no place; with the wind east-north-east you have a better chance from here than from any more weatherly port.

14,445. Are east-north-east winds more prevalent than winds from the east-south-east?—I think the east-south-east winds are more prevalent in the winter time, during the frosty season.

14,446. Then you think the Tyne loses the advantage of being a weather port?—It does with the wind from east-south-east.

14,447. You have heard the question asked about heaving to and running. Is it safer for a heavily laden collier to heave to or to run?—It is safer to run in the North Sea.

14,448. Yes, if you can see where to run to. I am not now talking of danger from the land but of the fact. Is it safer to run than to heave to?—They do run, because vessels laden with coals are generally deeply laden, and they make rather bad weather when it becomes continuous.

14,449. Bad weather under storm sails?—They would make better reaching than heaving to. It is more open. They can haul more to the wind. If they are under reaching canvass, they can do much better than heaving to.

14,450. (*Sir F. Smith.*) Are you of opinion that one harbour alone would not suffice for the coast?—I think not.

14,451. Is that the result of deep thought?—It is an opinion formed from experience.

14,452. It is not an opinion formed to-day?—No.

14,453. If there is to be more than one harbour, you have no doubt the Tyne should be one?—I think so. It is a more northerly point.

14,454. You say that as the winds prevail from the south more than from the north, it would be more to leeward?—In some seasons one wind prevails, and in some another, but during the winter, when it is snowy, I should say the east-south-east.

14,455. Of course the perfection of security is to have as great a number of harbours of refuge as possible?—I think so.

14,456. And the more to approach perfection, the greater number of harbours you should have?—The more the better.

14,457. And you think the public money would be well expended upon them?—I think it cannot be better expended than in saving the lives of poor sailors.

14,458. You think that if the object is to save life and property, the Commissioners would be justified in recommending more than one harbour?—I think so, and I trust they will.

14,459. (*Mr. Lindsay.*) But supposing the Government arrive at the conclusion that only one harbour is necessary, looking to the saving of life and property, at which part of the coast would it be of most advantage, between Flamborough Head and the Farn Islands?—I think the Tyne has claims beyond any other place that I know of.

14,460. Leave the Tyne out altogether, would a harbour at Filey Bay or at Hartlepool do most to save life and property?—I should like to see a harbour at both places. It is very difficult to say which, but I would rather say, if the Commissioners think so, that it is better to have one at each place.

14,461. We cannot get all we want in this world. But supposing it rested between these two places, to which would you give the preference—Hartlepool or Filey, all things considered?—With the hope of getting Hartlepool at some future day, I should say Filey at present.

14,462. But supposing there were no hope of getting Hartlepool?—We must have hope; we will never give up hope.

14,463. Supposing there were no hope of Hartlepool for the future, and you were told there was to be only one harbour, and that it was to be either of these two points, which would you prefer?—I think I should prefer Filey.

14,464. All things considered?—Yes, all things considered. It is easily approached, in consequence of the boldness of the cliffs. Hartlepool is not. I remember being blown two miles off the Humber, and driven all the way to the Firth of Forth.

14,465. If it rested between the three points, Filey, Hartlepool, and the Tyne, taking into consideration the saving of life and property, which of the three would you prefer?—The Tyne.

14,466. Have you considered that?—I have well considered it.

14,467. And you are clearly of opinion that with all the objects in view you would prefer the Tyne?—Yes. Filey is very contracted in its space. It can never be *the* harbour of refuge. It would save a great deal of bad weather and loss of time, but it cannot help the ships which want it. But ships running for it would run the chance of disaster if the harbour was too small to hold those which went for it.

14,468. Then it is your opinion that if a harbour were made at Filey it might so happen that it would become so full that when ships drew nigh they would find no room to enter, and would consequently run great risk of doing damage to themselves or other ships?—Yes, or go ashore.

14,469. And therefore your fear of Filey is on account of its limited space?—Yes.

14,470. Would that apply to Hartlepool?—Hartlepool is not so limited as Filey.

14,471. Would it apply to a less extent to Hartlepool?—To a less extent.

14,472. Would it apply to the Tyne?—I do not think it would apply to the Tyne. If you take the water at low water it is perfectly safe, and there is safe mooring; it is not in a bight.

14,473. Then you think that the contingency is less likely to arise at the Tyne than at any other place?—Much less likely.

14,474. Supposing the Government decided upon a harbour for the east coast of Scotland, looking at the passing trade and the saving of the lives of those who are employed in it, which do you think would be the best point—Wick, Fraserburgh, or Peterhead?—I think Wick.

14,475. (*Capt. Sulivan.*) You said you would prefer two harbours under any circumstances to one?—I would.

14,476. Would you do so if the two harbours had less depth of water than one large harbour?—I think they would be more useful even then.

14,477. Do you believe that 15 feet of water will be gained by the present projected improvements?—It is so anticipated.

14,478. Then would not the Tyne become to a considerable extent available as a harbour to the north colliery ports?—It would.

14,479. Then if another were added somewhere southward of the Tyne, you would have the benefit of two harbours, and would not that more nearly approach the notion of two harbours of refuge instead of one, supposing even that the greater depth were realized at the Tyne?—If we get the depth we anticipate I think we shall get all that we want, and all that we desire. Still we want refuge for vessels which leave in the winter months and in unsettled weather, and cannot clear round, particularly small vessels, which never stay out two bad nights at sea if they can avoid it.

14,480. Then, in addition to the Tyne, a harbour to the south would be of great advantage to the Tyne trade?—No doubt of it.

14,481. You seem to have some difficulty as to which you would prefer, Filey or Hartlepool: do the advantages and the disadvantages make it difficult to decide between the two?—Truly so, there is a great trade at Hartlepool.

14,482. Supposing you found that engineers were of opinion that a deeper harbour for the same money,

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and of greater extent, could be obtained off there, would that be sufficient to turn the scale, and would you have the money laid out on the one that would give the largest amount of area, and the largest depth of water, and accommodate the largest number of ships?—It is very difficult to decide in the manner you put the question. I have been twice driven back from the Head, once to within two miles of the Humber.

14,483. Do you mean Flamborough Head?—Yes, Flamborough Head. I was near it both times, and if Filey had been available I could have got in. I could not run down in the bight for Hartlepool. A sailor is chary of running to leeward.

14,484. That is all in favour of Filey?—Yes.

14,485. But supposing the advantages were balanced, and you found that the largest and best harbour could be made at either one of these ports, would you choose it for these reasons?—I should like to know where the money is to come from.

14,486. The public money, the object being to save life and property?—I would say Hartlepool should do something to help themselves, and after that they could go with a good face and ask for public money. If they do not do anything to help themselves, how in the name of reason can they ask the Government to help them?

14,487. Set aside the Hartlepool interest alone, and consider the trade of the Tyne. If the outlay of public money either at Hartlepool or Filey would give you the largest harbour, would that be the best if they were on any equality in most other things?—If it must be, it will be, but at the same time I think they ought to help themselves.

14,488. You said you entertained a fear that vessels entering a harbour of refuge, if it were crowded, would be in great danger?—They would.

14,489. Where a harbour of refuge has smooth water inside, and a clean sandy beach at the bottom, as Filey and Hartlepool both have, would there be much danger to life or property, if a captain were to run his ship on the beach?—It is not a good beach. I have had a ship on that beach.

14,490. Which beach?—Hartlepool. I have had a ship ashore there. The repairs alone cost me 1,900*l.*

14,491. Would not the danger be increased by its being open to the sea?—It is open to the sea, no doubt.

14,492. But if it were smooth water, the danger of beaching would be reduced?—Yes, but it is a strange kind of harbour if you must run ashore. That is anything but a sailor's idea of safety. Please to let us keep afloat, if possible.

14,493. But I am putting it that the harbour is full, and that there is a breakwater outside giving smooth water?—There would not be much swell; but a great many vessels have been lost on Hartlepool beach within the last ten or twelve years.

14,494. But would not that be a harbour of refuge for saving of life?—It seems a brilliant kind of refuge when a ship has to run on shore. I cannot conceive the two things possible. It cannot be a harbour of refuge.

14,495. I take your own words. Supposing the harbour were crowded, it would still be a good harbour for the vessels which filled it?—It would, probably.

14,496. Would not those who run for the beach save their lives and very likely their property?—They would save their lives, certainly.

14,497. Do you know Filey?—Yes, I have been riding in the bay.

14,498. Is the beach clean?—I think it is, but I cannot say. I think I have heard old sailors say they used to scuttle vessels and let them be half the winter at Filey.

14,499. (*Capt. Vetch.*) Do you know the Pentland Firth?—Not very well. I have been through the Pentland Firth several times since I had the command of a ship.

14,500. You made some remark about Wick?—More by a chart and what I read of the evidence before the Select Committee of the House of Commons.

14,501. Putting altogether out of the question the coasting trade, and considering that of Wick, which has 1,500 fishing boats, and is frequented by many ships, making annually about 915 arrivals engaged in the local trade, would you consider that a proper case for a harbour of refuge for the protection of the fishermen and their vessels?—I do most certainly. I think it would be very worthy to have the public money laid out for such a purpose.

14,502. (*Mr. Coode.*) You referred to some old story of vessels being scuttled at Filey as an intimation that the beach was a good one?—I did. It struck me so, and also Mr. Schotton particularly.

14,503. Supposing a large harbour of refuge to be formed to the southward, and the Tyne with 15 feet of water, what acreage of shelter do you think should be provided—for how many ships should shelter be provided in the refuge harbour?—I think at Filey, considering the number of vessels which meet at Flamborough Head, as a sort of turning point, you would want room for 500 or 600 vessels, and at times that would be found little enough.

14,504. Do you think the same acreage required at Hartlepool?—I think so. Occasionally it would be wanted.

14,505. And assuming a harbour to be made at either of those places, you think accommodation should be provided for 500 ships at least?—Yes.

Mr. JAMES WHITEHEAD examined.

Mr. J. Whitehead.

14,506. (*Chairman.*) You are in command of a vessel trading out of this port?—Yes.

14,507. How long have you followed the sea?—40 years.

14,508. And how long have you been in command of a vessel?—More than 30 years.

14,509. Have you heard the evidence of the last witness?—The last witness and the last two witnesses.

14,510. Do you concur in their evidence?—No, not entirely.

14,511. State in what point you differ from them?—I differ materially from his idea of Filey being a proper place of refuge on this coast in preference to Hartlepool.

14,512. Will you state your reasons?—Filey is to windward; it is more out to sea. If I sail away from here, and am caught in a wind going to the south-east, I could not fetch Filey, whereas I might fetch Hartlepool, because it is less to windward. If I can get so far with an east wind, it may be reasonably supposed that I can get round the Head, and then I can fetch the Humber.

14,513. And as respects the advantage of having one great harbour of refuge, or improving the harbours on the coast, what is your opinion?—My opinion is, that if it were decided that there was to be only one, Hartlepool Bay is the place.

14,514. You think Hartlepool the place?—Hartlepool Bay; I would say Redcar.

14,515. Which should you prefer, to improve the ports which at present exist, or to have one harbour at Redcar?—I think it would be much better and less expensive to improve all the harbours.

14,516. Put the question of expense out of view, how would life be saved best?—There would be a better chance if all the harbours were improved.

14,517. Then do you concur in the opinion expressed, that any single harbour must contain 600 sail?—Yes, quite.

14,518. You fully concur in that opinion?—Yes. There is danger of a single harbour of refuge being overcrowded. Each port sometimes sends to sea a fleet of vessels which are caught in the same gale. They would go to their own ports; but if they go to

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the same place, there is the danger that they might crush each other to pieces.

14,519. Although there were 500 or 600 vessels, or even a larger number, perhaps a proportion would not take a harbour of refuge: how would you view that?—I should still give the preference to each returning to her own port, rather than making for a single special place.

14,520. They would prefer running to their own port to running to a strange port?—I should think naturally, if each port was equally available. If they knew that they could return to their own port with comparative safety, they would give that the preference, rather than run to another.

14,521. Why?—Because of their acquaintance with a place which they have been habituated to sail from and return to.

14,522. I understand by that, that a captain running for a place which he knows much better, has more confidence?—Unquestionably.

14,523. Do Seaham, Sunderland, and Hartlepool ships run into the Tyne sometimes?—The Tyne has the preference. I have been sailing from Sunderland, and instead of returning to Sunderland, I have returned to the Tyne.

14,524. And could you have gone to Sunderland?—Not with safety; but I knew I could come with greater safety to Shields, and therefore I preferred it.

14,525. (*Mr. Lindsay.*) Are you employed in the coal trade between this port and London?—Yes.

14,526. How long have you been so employed?—I have been more than 30 years master of a ship.

14,527. Supposing only one harbour were to be made between Flamborough Head and the Farn Islands, and looking to the saving of life and property, where would you make that harbour; at what point, if it were left for you to decide?—I would go into the Tees Bay.

14,528. You would prefer the Tees Bay to the Tyne or Filey?—Yes, decidedly, because it is right down dead in the bight. You can go there when you cannot get elsewhere.

14,529. Do you mean Hartlepool?—No, my mind carries me to the natural harbour at Redcar.

14,530. Then your idea is, that if there is only one harbour, it should be made at Redcar?—That is my opinion, decidedly.

14,531. But supposing that a harbour could not be made at Redcar sufficient to contain the ships?—I would go to the Tyne for the other.

14,532. As a single place, to be the only place, you would say Redcar?—Yes; but failing Redcar, I would give the Tyne the preference.

14,533. But I understood you to say that, looking to the saving of life and property, the money would be better expended in improving the present harbours?—Decidedly. The Tyne is much better than it used to be; it is almost a refuge as it is.

14,534. Supposing the Commissioners were to require your evidence in London, could you attend?—Yes.

14,535. Then, as you can give evidence in London, I will not trouble you with any other question.

14,536. (*Mr. Coode.*) Have you ever been detained off Flamborough Head by contrary winds?—Frequently; many times.

14,537. Have you ever run back?—I have run back to the Tyne and to the Forth; to Leith, on more than one occasion.

14,538. Would not on such occasions a harbour at Filey have been better situated than at the Tees Bay?—Decidedly it would; but if it had been in the Tees Bay I should have got equal safety.

14,539. Would not there be less risk in running nine miles to Filey than in running 50 miles to the Tees Bay?—Decidedly there would be less risk.

Mr. Charles Morris examined.

Mr. C. Morris.

14,540. (*Chairman.*) You are resident in Shields?—I am.

14,541. In what way are you connected with the port of Shields?—As captain of a ship for 30 years in the coal trade.

14,542. Are you a shipowner at present?—No; unfortunately, I have lost the ship in which I had a share.

14,543. You have been present in the course of this inquiry?—I have.

14,544. And you generally concur in the opinion as to the improvement of the three ports being more advisable than the establishment of one large harbour?—I do, assuredly.

14,545. Is there any point which has not been brought under our notice which it occurs to you to state to us?—I am sorry to say I think you are omitting Bridlington. There is an excellent harbour there for riding 400 or 500 ships with the wind north-west and north-north-east. I have known 70 laden ships take shelter in the bay, which dare not run across the bay into the Humber.

14,546. Bridlington, you say, is at present a capital anchorage in certain winds for how many vessels?—500 or 600 sail.

14,547. Bridlington being so good, would it not be advisable, as suggested by the previous witness, to expend the money somewhere else, where the anchorage is not so good?—We have the wind veering from east to east-north-east, and if we had protection by a curve from the Smithic Sand into the land, it would be complete.

14,548. With such a breakwater, how far would it protect you from winds to the southward?—From north-east to south-west.

14,549. Then, in point of fact, it would be a closed harbour?—It would be a closed harbour.

14,550. And you decidedly think that such a harbour would be of advantage to the coal trade?—Yes. I have missed Scarborough, and had to drive round the Head again; whereas, if there had been a harbour, I should have gone there.

14,551. Does your preference arise from the greater capability, or being, in your opinion, a more eligible place to put a harbour of refuge?—It is a more eligible place. Filey I do not admire at all, not on any account.

14,552. Supposing there was equal accommodation at Filey Bay, which should you prefer?—You must close in Filey from the south-east, and that is the only passage out. If you go south, as soon as the water flows over the brigs there is a rolling swell in Filey scarcely to be accounted for; vessels break their windlasses and then go to Bridlington. As soon as the wind goes to north-north-west there is no shelter.

14,553. I think we have it in evidence that a large number of laden vessels never get to the windward of Bridlington, so a harbour there would be no use to them?—It is a very easy reach to get round between the Smithic and the Head.

14,554. Blowing hard?—Yes, blowing hard.

14,555. But supposing a vessel under close-reefed topsails, and with canvas as much as she can carry, with a flood tide, can she manage it?—She might in some cases. It may be that small vessels would not attempt it.

14,556. (*Mr. Lindsay.*) Is it not the fact that when you weather Flamborough Head you can reach the Humber?—Yes, when it is possible to do so; but you are blocked under the Head so frequently.

14,557. Is it the case that the greatest number of vessels are caught to the northward of Flamborough Head and obliged to run?—When the wind is south-south-west they lie under the Head until the flood makes.

14,558. From your experience what particular point do vessels make for?—Most to the northward of Flamborough Head.

14,559. Then why do you prefer a harbour to the southward?—Because we are frequently caught on

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the deeps with heavy winds from the south and south-south-east.

14,560. In your experience have you known many laden vessels obliged to put back to the Tyne?—Frequently.

14,561. How many?—In 1854, when so many wrecks occurred, I bore up from Hartlepool and run for the Forth.

14,562. Was that because there was no harbour to take nearer?—It was night time and I dare not do it. It was on January 3, 1854, that we sailed from Seaham.

14,563. Supposing only one harbour was to be made between Flamborough Head, or including Bridlington, and the Farn Islands, at what point would you place it for the saving of life and property? —Decidedly at the Tyne. I recommend the Tyne if it can be improved as expected.

14,564. At the same time you think that even at the Tyne one harbour would not be sufficient?—I fear not.

14,565. Supposing a second harbour were to be made, whether would you have it at Bridlington or Hartlepool?—If Hartlepool were improved it would be a very safe anchorage. I have run for it, but before it was improved as much as it is now.

14,566. I am speaking of whether it would be better at Bridlington or Hartlepool. At what part would it do most good?—More ships would be caught at Bridlington, but of course they would be at liberty to run for Hartlepool.

14,567. Would you prefer it at Bridlington rather than at Hartlepool?—Not exactly, because Hartlepool is a very safe harbour, because it is easy of access to the south.

14,568. Would you prefer it at Hartlepool rather than at Bridlington?—If only one was to be made I should prefer Hartlepool; still I like Bridlington.

14,569. Supposing only one was to be made?—Of course I would give it to the Tees.

14,570. Do you mean Hartlepool?—I mean Hartlepool Bay from the Salt Scars to the Heugh.

14,571. Are you aware that ships have taken refuge at Hartlepool?—I have myself, under serious circumstances.

14,572. Are there as many which take refuge now at Hartlepool as in the Tyne?—Sunderland ships, if they have the preference, generally prefer Hartlepool.

14,573. I am speaking of all ships. Whether do more ships seek shelter in the Tyne or at Hartlepool?—I should think in the Tyne.

14,574. In what proportion?—Two thirds, I should think.

14,575. (*Capt. Sulivan.*) What shelter do they take at Hartlepool? Do they go into the inner harbour, or do they anchor in the bay?—They go into the inner harbour.

14,576. You said that the great objection at Filey was the difficulty of getting out?—I suppose it would depend how the mouth was contracted.

14,577. Supposing a breakwater built off the Brig, if a passage were left either to the southward or northward, would that obviate the objection?—I can scarcely be made of opinion that it can be done so.

14,578. If it could be done would that obviate your objection to Filey as a harbour of refuge?—No, I do not think it would. I never liked Filey.

14,579. Do you know Hartlepool Bay?—I do.

14,580. Do you know whether the depth in Hartlepool Bay is reduced since you knew it?—I believe so, but I cannot be positive.

14,581. You believe so?—I believe so.

14,582. (*Mr. Coode.*) Have you ever taken shelter in Filey Bay?—No, never.

14,583. Have you ever been driven back from Flamborough Head to the Firth of Forth?—Not so far generally. I never got to the northward of the Tyne until the heavy gale in 1854.

15,584. Do vessels find a difficulty in getting round Flamborough Head? Are they not oftener detained there than anywhere else?—Specially with south-south-west winds, but it is smooth water.

14,585. And those are the prevailing winds?—It is generally easy to get shelter under the Head, to south-south-east.

14,586. Are vessels detained a considerable time there?—Three or four days.

14,587. And exposed to risk for want of shelter in case a gale of wind comes on from the east?—Of course they are quite in danger of the wind shifting.

14,588. (*Mr. Lindsay.*) You said you had often run for Hartlepool?—Not often.

14,589. When you did run, did you get safely in?—No, I grounded on one side, and the ship alongside of me grounded on the other. If we had run for the Tyne we could not save the tide. 70 sail of ships came in at the same time.

14,590. You ran for Hartlepool because you could not make the tide at the Tyne?—Yes, and the ship was making water.

Mr. Mather handed in the names of two witnesses, and one was called.

(*Chairman.*) Before proceeding to the examination of the witnesses, I wish to ask you for the meteorological observations of which you spoke. Will you be kind enough to procure them for us?

(*Mr. Mather.*) Certainly.

(*Chairman.*) Who kept those observations?

(*Mr. Mather.*) The pilot-master at the mouth of the river.

Mr. JOHN JOBLIN examined.

Mr. J. Joblin.

14,591. (*Chairman.*) Do you command a vessel, or are you a mate?—Not at present.

14,592. How long have you followed the sea?—About 37 years.

14,593. In what capacity?—Fourteen years master of a vessel in the coal trade.

14,594. And previous to that, mate for any time?—Yes, as mate and a regular apprenticeship.

14,595. I understand that you, Mr. Joblin, and Mr. Croshier, are deputed to represent the body of seafaring men who have sent in a memorial to us?—Yes.

14,596. And you are fully in possession of their sentiments?—Yes, I believe so.

14,597. Would you prefer to make any statement, or that I should put questions?—I should prefer you to question me.

14,598. Have you been present during the course of this inquiry?—Part of to-day—not yesterday.

14,599. From what you have heard, you will have understood that the pith of the matter is, whether there should be one harbour in the neighbourhood of Filey or Hartlepool, or whether, with the view of saving of life, it would be better to spend the money in improving the three ports of the Tyne, the Wear, and the Tees. Representing your constituents, what is your opinion?—My opinion is, that if the harbours were improved it would be to the advantage of trade, and the means of saving life and property. I believe that one harbour of refuge would be of no use at all on this coast, or, comparatively speaking, of no use.

14,600. Can you give me an idea of the number of seafaring men whom you represent, because there are no names to this memorial?—I should think nearly 3,000.

14,601. Do you mean that that number were present at a meeting at which this memorial was agreed to or discussed?—No; the meeting was publicly called, but a number of the men were at sea. It cannot be expected that the number of men whom I represent would be at one time in the port.

14,602. How many were present at that meeting?—I cannot say exactly.

14,603. But about?—Not more than 200 or 300.

14,604. Were they from the different ports?—All from this port.

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14,605. Then what authority have men from this port to represent the seafaring men of Sunderland and Hartlepool?—I do not assume that authority.

14,606. I understood the memorial was from the body of seafaring men belonging to the three ports?—No; one port only.

14,607. Then these men at this meeting had distinct authority to represent the sentiments of their brother seamen? Were they deputed to do so?—No; they were aware of the fact that a Commission was instituted. A meeting was called for the seamen to express their opinion on the subject of a harbour of refuge. The memorial was got up and signed by the chairman, and the sentiments of the memorial are the sentiments of the seamen, which it purports to be.

14,608. You must understand that this is a very serious matter, and that I cannot take 300 men present at a meeting as representing 3,000 of their fellow seamen, unless they have a distinct authority to do so. I am perfectly willing to take such sentiments or opinions as they are willing to offer, but that is entirely a distinct thing from your being deputed to express the opinion of the whole body of seamen who belong to the port. Do you understand?—Yes.

14,609. And that was the fact which I wished to elicit, whether you had any distinct authority to bind them, from the men personally. Now let me ask you, whether, from your experience of their sentiments, you think the memorial does formally represent the opinion of a majority of the seamen belonging to the port?—I believe that meeting does formally represent the feeling of the majority of the seafaring men.

14,610. (*Mr. Lindsay.*) Are you secretary to some association?—Yes.

14,611. What is the name of the association?—The Royal Standard.

14,612. How many members are there?—Nearly 1,400.

14,613. As secretary, do you know the views of those 1,400 men?—I will not vouch for the views of the whole of those individuals; but their views upon the whole seem to me to hold with the opinion, that one harbour of refuge would not satisfy the wants of the trade upon the coast, that the present harbours ought to be improved, and that if they were, a great portion of the property and lives which are lost would be saved.

14,614. Are all those 1,400 men Tyne men? Are there any Sunderland seamen amongst them?—Yes, and Blyth men.

14,615. Looking to the views of those seamen and to the saving of life, if only one harbour was to be constructed?—It would certainly require more than only one harbour.

14,616. At what particular point do you think such a harbour would be the means of saving life?—Do you mean independent of the present harbours?

14,617. Yes?—I should not agree, as far as my opinion goes, that Filey should be one. It is a very contracted entrance and certainly not a safe place. I do not think there is any necessity existing for a harbour in Bridlington Bay. It is a safe roadstead, and with the wind to the southward laden vessels run in and take shelter there. I consider, myself, from my experience, that the Tees Bay would not be a good place for a harbour of refuge.

14,618. You said the Tees Bay?—I include from the Heugh to Redcar.

14,619. Tell me, in a word, if only one harbour was to be made, where would you place that harbour?—I think between Sunderland and Hartlepool.

14,620. I think! It is to be only one harbour?—If one harbour only is to be made.

14,621. You think between Sunderland and Hartlepool it would do more to save life?—I think the improvement of the present harbours would be considerably better.

14,622. (*Capt. Sulivan.*) Do you know of any place north of Hartlepool where the natural formation of a bay or point renders it easy to make a harbour?—It forms a natural bay from Hartlepool to Sunderland. I know no particular place which can be appropriated without considerable expense. In all places where there are harbours of refuge it implies that there should be room, considerable room. In dangerous times the harbours must be roomy for ships to take advantage of it, for there may be impediments to those coming in. Hence it must be a spacious place for a harbour of refuge.

14,623. For that reason would not the best place be where nature has formed a bay?—It would depend upon circumstances and the position of the place.

14,624. Supposing that at Hartlepool or Filey a good harbour would ensure accommodation, would either of those ports satisfy the wants of the south part of the district you have mentioned?—I do not think Filey can, because if you miss it there is nothing but hard cliffs to go against, and nothing but loss of life must ensue. If 150 vessels only can get in, and there are 100 following them, a portion would be saved, but a portion would be lost.

14,625. What position would you prefer, Filey or Hartlepool?—I would decidedly prefer Hartlepool to Filey; but still I have an objection to Hartlepool which I cannot easily get over, and I think at all times the Tyne is best.

14,626. From what you know of Hartlepool and Filey, which do you think would make the best harbour? which would give the greatest extent of deep water?—Do I understand that you are referring to Hartlepool Harbour or Hartlepool Bay?

14,627. Hartlepool with the corner turned into a breakwater, or Filey?—Of course, I must naturally prefer Hartlepool.

14,628. (*Sir F. Smith.*) I think that, in answer to the last question, you said that if the same accommodation could be obtained at Hartlepool and Filey you would prefer Hartlepool to Filey?—Yes, simply from the fact that there are so many vessels in the locality. It is easy of access, and it frequently happens that vessels are taken before they reach so far south as Filey. It often happens that they leave Seaham, Sunderland, and Shields, and meet with contrary winds, quite a storm, and they would be glad to avail themselves of a harbour of refuge at Hartlepool.

14,629. They would come to the Tyne if the bar were reduced?—Yes, the Tyne has already advantages which a harbour of refuge at Hartlepool could not have.

14,630. What do laden colliers draw?—From fourteen to sixteen feet.

14,631. Then sixteen feet over the bar would not suffice for those?—They could contend a little and wait until to tide rose.

14,632. But as you stated that they draw sixteen feet, they would require a little more water, I suppose, if it were blowing fresh?—Of course they would.

14,633. What would a vessel drawing sixteen feet require over her draught?—At least five feet in extreme weather.

14,634. That would be twenty-one feet. What does the tide rise?—In spring tides sixteen feet.

14,635. That is, how much per hour?—I have seen some tides rise much more rapidly than others; but about two and a half feet per hour.

14,636. They would dodge about for two hours before they could come over the bar, according to your calculation?—Yes.

14,637. Is there any remedy for that?—Nothing, except engineering.

14,638. Do you think you would remedy it by carrying the piers out to deep water?—I think you would.

14,639. How far out would you carry them?—To seven fathoms water.

14,640. Have you taken into consideration that Hartlepool is silting up?—I believe it is slightly. That is the opinion of the fishermen.

14,641. You have not heard that Filey is silting up?—No, there is no silting at Filey.

14,642. So that whatever water you got there by

forming a breakwater, you would retain, would you not?—I should think you would at Filey.

14,643. But you would not retain it at Hartlepool?—I used to hear, when trading there, pilots and fishermen say that there was not so much water in the bay as formerly.

14,644. But you do not know of your own knowledge?—No, not at present.

Mr. JAMES CROZIER examined.

Mr. J. Crozier.

14,645. (*Chairman.*) How long have you followed the sea?—Forty years.

14,646. And of that time how long in command of vessels?—I never commanded any vessels yet; I have just been a seaman.

14,647. Have you been mate in a vessel?—Yes; I have been mate of a collier.

14,648. You were present during Mr. Joblin's examination?—Yes.

14,649. And you heard the explanation which I gave him as to the extent to which we could receive your memorial as representing your brother seamen, and you perfectly understand my explanation?—Yes.

14,650. That being the case, would you prefer to make a statement, or would you prefer that I should put questions to you?—Well, I can generally say that all the seamen in this river think that if there was only one harbour of refuge to be made, it should be in the Tyne.

14,651. Then, I understand you to say that is the general opinion of seafaring men?—That is the general opinion of the people here.

14,652. And they are prepared to prefer distinctly the improvement of the three ports to having one large harbour in the neighbourhood of Flamborough Head?—Yes; and they reckon the Tyne as good a place as any which they can prefer to the improvement of those harbours.

14,653. (*Mr. Lindsay.*) Do you agree generally in the views stated by Mr. Joblin?—Yes.

14,654. You concur in those views generally?—Yes.

14,655. Have you anything to add to them—anything which we have not heard?—Yes. I have travelled the seas for 30 years, and I have often been caught during that time on this coast. I have very seldom been out of the coal trade myself during these last 20 years, and oft times I have been caught very short; and I have been caught off Flamborough Head and off Tuffitt, but ships in general are frightened to run to Hartlepool because of the broken water. They come to Shields and sometimes to Leith, but I have not been to Leith Roads myself.

14,656. They are not so afraid to come to Shields as to come to Hartlepool?—No, considering the broken water in the bay. My opinion is, that I think to have a refuge in the Tyne is preferable to any other place that I know of.

14,657. Then you think a harbour of refuge at the Tyne would do most to save life?—Yes, I do.

14,658. That is your opinion as a sailor?—Yes.

14,659. (*Capt. Sulivan.*) Supposing you were caught in an east or east-north-east gale off Flamborough Head, which would be the safest to run for, Hartlepool or Filey, if there were a harbour of refuge in both?—I would sooner run to Hartlepool than Filey with a gale of wind from the east-north-east.

14,660. Supposing you could fetch either, and you had your choice. You made an objection to Hartlepool as a dangerous place to run for, and having broken water. Supposing there were harbours at Filey and Hartlepool, and you could fetch either, which would you choose as the safest place to run for?—It all depends what kind of a harbour you do make at Hartlepool.

14,661. Supposing there was an equally good harbour at Filey?—I would sooner run for Filey with the wind east-north-east.

14,662. Which would be most available in an east-north-east gale?—I reckon Filey.

14,663. Do you know whether there is less water in Hartlepool Bay?—I cannot say.

14,664. Have you struck more heavily of late than you did some years back?—It is about six years ago since I went in, and then we struck.

(*Chairman.*) Before Mr. Crozier and Mr. Joblin leave, I wish to say, that although we do not receive their memorial as expressing more than the sentiments of 300 seamen, there is nothing to prevent their having a memorial drawn up, and having it signed by any number who may choose to sign, and that can be forwarded, properly authenticated, to our Secretary. I think, Mr. Mather, these are the only two witnesses whom you wished to have called.

(*Mr. Mather.*) Yes.

Mr. KENDLISH examined.

Mr. Kendlish.

14,665. (*Chairman.*) You are a North Sea pilot?—Yes.

14,666. Do you belong to this port?—Yes.

14,667. For what period have you been a pilot?—For 21 years.

14,668. And for what period a master?—Fifteen years besides the 21 years.

14,669. Have you been present during this inquiry?—Occasionally.

14,670. Do you generally concur in the opinion which has been given to us, that the improvement of the three ports, the Tyne, the Wear, and the Tees, is preferable to one large harbour of refuge?—I should say that one harbour of refuge is wanted.

14,671. You say that one harbour would be preferable to the improvement of the three?—No; the Tyne improvement of itself.

14,672. State to me your opinion, whether you consider it more advisable to improve the Tyne, the Wear, and the Tees, with the view of making them harbours of refuge for the saving of life, or whether it is more advisable to have one large harbour at Hartlepool or Flamborough Head?—One harbour of refuge, and let the Tyne and the others go on improving—the Tyne to go on improving, as it has improved of late immensely.

14,673. Where would you consider the best site for that one harbour of refuge?—Where the greatest number of ships are passing or repassing, consequently Filey Bay.

14,674. (*Sir F. Smith.*) You reckon that the Tyne is doing its own work?—Yes.

14,675. Therefore whatever is done should be done somewhere else?—Yes.

14,676. But do you not think that if the shipowners of the Tyne are doing a great deal, not only for themselves, but for the nation, they have as much right to be assisted as those who are doing nothing?—I do not understand you rightly. The Tyne is improving.

14,677. I know that. I will put the question rather more simply. The Tyne shipowners are doing a great deal towards improving the Tyne, at their own cost, without any help from the nation?—Yes.

14,678. But in order to do all which is required, a much larger sum is needed than is already available?—I do not know how to answer that question. We are assisting the Tyne.

14,679. I take it for granted that you would not object to a portion of the national funds coming to assist the Tyne?—None whatever.

14,680. And if there is any to spare you would like that to be applied to other harbours?—Yes.

14,681. Supposing the Tyne completed, partly by national funds, where else would you apply the national money, with a view to save life and property? Supposing that you had to indicate the position,

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what point would you fix upon ?—On the coast from Duncansby Head up to Flamborough Head.

14,682. (*Mr. Lindsay.*) Where do you belong to ?—I belong to Shields.

14,683. You are employed as a North Sea pilot ?—I am retired.

14,684. Were you employed in taking ships to the north and to London ?—I have been pilot of H.M. ships all round the Orkneys, and to Portsmouth and Sheerness.

14,685. Do you think that a harbour of refuge is necessary on the north-east coast of Scotland ?—Yes.

14,686. Where is the best site, Wick, Fraserburgh, or Peterhead ?—I should prefer Wick. I was in it last year ; I have been in it frequently.

14,687. Looking to this coast, and supposing that the Commissioners of the existing harbours were making no improvements, and spending no money, and looking alone to the site, which, in your opinion, would save most life and property ? At what particular point would a harbour of refuge do most good between Flamborough Head and the Farn Islands ?—There is no place which I can point to where you want it more, both for light and laden vessels, than Filey Bay.

14,688. Looking at all considerations, if only one harbour was to be made, is it your opinion that it ought to be made at Filey in preference to Hartlepool or the Tyne ?—Supposing the Tyne is going on as it is ?

14,689. I want to know your opinion, supposing that no improvements were going on at the Tyne ; I want your opinion as to the best position within those limits ?—I know.

14,690. Supposing the Tyne were not completed ?—There is no other point I can point to you but Filey Bay.

14,691. Tell me the place which you are in favour of ?—That is the only place I can point to, Filey. It would frequently be clear of shipping, but that is the place to run to in gales of wind from the south-east and south-south-east.

14,692. Do you think it would do more to save life and property than the harbour of the Tyne ?—No ; the harbour of the Tyne must go on improving. When a vessel goes so far southwards as the Head she does not want to be bearing up to the Tyne or Leith Roads.

14,693. But whether do you think a harbour at the Tyne or at Filey would do more to save life and property ?—At the Tyne, of course. It is the best weather port we have on the east coast of England.

14,694. Then it is your opinion that a harbour at the Tyne would do more to save life and property than at Filey Bay ?—I cannot answer that question. The Tyne is one place to run to for refuge at present, or Leith Roads, but a harbour at Filey is wanted. When ships get southward of the Head, and are obliged to run back and cannot take the Tyne, they are obliged to go to Leith Roads. If there were a harbour of refuge at Filey they would go into Filey.

14,695. You would like to have a harbour of refuge at Filey, but you would like, also, to see the Tyne improved ?—Yes.

14,696. To which would you give the preference ?—I would give the preference to Shields.

14,697. (*Capt. Sulivan.*) Supposing that those improvements are going on at the Tyne, and 15 feet of water, as it is said, are obtained, then do you consider the best outlay of public money is upon a harbour of refuge further south ?—The Tyne improved to 15 feet would make it a harbour of refuge at low water.

14,698. Supposing that to be the case then, do you consider the next best place would be a harbour of refuge in Filey Bay ?—Yes.

14,699. You know that there are works going on at the Tyne to improve it ?—Yes.

14,700. And that if they answer there will be a greater depth of water than at present ?—Yes.

14,701. Then if the works succeed there will be more depth of water ?—If the piers go off to five fathoms no doubt it will be improved.

14,702. But if the present works fail to give increased depth then, would it be certain that any outlay of money would improve it ?—If it were four fathoms it would be improved.

14,703. Do you believe that 15 feet of water or more will be obtained by the present works ?—With the present works more than 15 feet.

14,704. Will it be a valuable harbour then with more than 15 feet of water ?—It would.

14,705. Then would you have no harbour south and try to get more depth than 15 feet at the Tyne ?—There would be 60 miles difference for us to come back.

14,706. Then you would rather have two harbours, than one having 15 feet, and another further south, than have that at the Tyne deeper than 15 feet ?—If the Tyne had more than 15 feet there would be only one harbour from Flamborough Head to Duncansby Head.

14,707. Then you consider two harbours better than one deeper one ?—Yes, one at the Tyne and one at Filey.

14,708. Have you had much experience at Hartlepool ?—Very little. I was never but twice in Hartlepool in my life.

14,709. Then why do you speak so confidently that it is inferior to Filey ?—It is in a bight. You cannot clear the land.

14,710. Then supposing it is in the depth of a bay, would you not fetch in more surely than at a more weatherly point ?—No, I should say not. It is a bad place to get in.

14,711. Would Filey be a good place to get out of if the wind were north of east ?—If the wind were east-north-east you would be able to get on your passage to London.

14,712. Is the beach good at Filey for beaching upon ?—Yes, a good sandy beach. When I was last at sea, in December, 200 vessels were riding in Filey, and I came home from Flamborough Head with the wind east-half-south against me.

14,713. (*Mr. Coode.*) Do many vessels get shelter under Flamborough Head in going to the southward ?—Dead under the Head.

14,714. Because they cannot get to the southward ?—Yes.

14,715. Does that often happen ?—Frequently. When it is blowing strong it is the only shelter you have.

14,716. If a ship cannot get in, what does she do ?—Dodge under the Head to see whether she can get a chance in a few hours. There is quite a roadstead off Filey Bay, and the ships go in to anchor.

14,717. If the wind goes to the south-east might you not be in danger ?—If you are going to the northward.

14,718. But with proper shelter you could hold very comfortably at Filey ?—You could hold very comfortably. By the plan I have seen you could lie there in any wind.

14,719. Have you talked with experienced masters as to the best site for a harbour of refuge on this coast ?—I have had conversation with some.

14,720. What is the opinion which you have gathered from them ?—Their opinion is for Filey. It has a good outlet, and in my opinion, in northerly gales, there would not be so many ships run for Bridlington Bay as there have done.

14,721. (*Mr. Lindsay.*) Have you had conversation with others besides masters and pilots ?—No, none besides nautical men—seamen.

14,722. Has anybody asked you to give evidence here to-day ?—There was a gentleman asked me if I knew anything about Filey. I told that him I had rode out many gales of wind there.

14,723. Who was he ?—I do not know his name.

14,724. Where did you meet him ?—In the street. He said he was looking out for experienced men who knew Filey, and he asked me if I would go and give evidence.

14,725. And you said you would ?—Yes.

Mr. EDWARD MACE examined.

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Mr. E. Mace.

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14,726. (*Chairman.*) How long have you followed the sea?—Thirty-eight years.

14,727. How long in command of a vessel?—Twenty-four years come Christmas.

14,728. You have been present during the course of this inquiry?—Yes, partly.

14,729. Will you now give me your opinion whether it is better to improve the three ports of the Tyne, the Wear, and the Tees, or to have a single harbour in the neighbourhood of Flamborough Head? I should prefer one about the neighbourhood of Flamborough Head.

14,730. Will you state your reason?—I have been trading to the Tyne for the last 24 years, and I have looked in vain oftentimes for a harbour of refuge along the coast, and I have been one among many congregated under the Head hove to. I have dodged about according to the nature of the wind and looked in vain for a harbour, and could not find it.

14,731. Did you hear the evidence about Bridlington Bay?—I have heard some.

14,732. If we are told that Bridlington Bay is preferable as a site?—It is not my opinion.

14,733. Why?—Because oftentimes you cannot get round the Head with the wind to the southward.

14,734. You have heard the opinion expressed by the witnesses that you would want a harbour so large that it would be very difficult to make one large enough at Filey. What is your opinion about that?—I should think it very desirable if it could be done.

14,735. If it could be made a large harbour, what number should it be made to accommodate?—Not less than to hold 700 sail.

14,736. But supposing that a harbour to hold 700 sail would cost two millions of money, do you think that Filey to hold 300 would be of service in the meantime?—Undoubtedly it would.

14,737. And would you consider it still more desirable, if in the formation of a harbour the extension of it hereafter should be kept in view, if it should be found to answer. Do you understand the question?—Not properly.

14,738. You say that this harbour, to be of real service, should hold 700 sail. You have also told me that one to hold 300 sail would be of great service. Would it be of still more service if in the formation of the harbour to hold 300 sail it was kept in view that if the trade were found to resort to it it might be increased. Would that increase its value very much in your opinion?—I think so.

14,739. (*Sir F. Smith.*) You have had great experience on this coast, I think you said?—Yes.

14,740. Did you ever see 700 vessels off Flamborough Head at one time?—Not so many, not at one time.

14,741. Then why do you think you must have a harbour to hold 700 ships. They do not require a harbour of refuge all at the same time?—Those bound to the south do.

14,742. You have never heard of 700 wanting shelter?—Yes, I have.

14,743. In what year was that?—In 1826.

14,744. What month?—I cannot tell.

14,745. Bound north or south?—Bound to the south, because they were laden ships.

14,746. Chiefly colliers?—Chiefly colliers.

14,747. Was it summer or winter time?—In the winter time.

14,748. It is a very large number. Supposing that it were found impossible to form a harbour to hold 700 ships at Filey, and still thinking that 700 require refuge, where would you apply the funds to take in the residue of those which could not be taken in at Filey. Assuming that a breakwater was made to give as much capacity as possible, and only 300 could be taken in at Filey, what would you do with the other 400; where would you accommodate them?—I would make another harbour in the Tyne.

14,749. Could you take 400 ships in the Tyne in addition to the ordinary trade?—I should think so.

14,750. Where would your anchorage be?—In the Tyne.

14,751. Yes, but where?—I have known in the Tyne as many as 1,200 vessels.

14,752. You have room for your ordinary trading vessels, but you are not prepared to take in 400 bound elsewhere besides, are you?—I should think that the Tyne would hold them, with the improvements which are talked of.

14,753. Would it not be dangerous with so many ships about the mouth of the harbour and in the offing?—If there was a harbour of refuge they would come in one after another.

14,754. They would all try to run in, you know; remember, 400 vessels all struggling for the same entrance?—Many of them would not run in at all. Some of the superior ships would keep to sea.

14,755. Would it not lead to collisions?—I think it would.

14,756. Have you seen the wreck chart?—No.

14,757. Do you know the Firth of Forth?—No, I have never been north of the Tyne.

14,758. The Firth of Forth being naturally a good harbour of refuge, and a great many collisions having occurred off it, do you think that those collisions have occurred from a number of vessels trying to get in at one time?—I dare say they have.

14,759. If you place a harbour of refuge at each end of your limit, do you not leave the centre part very much unprovided for?—I do not understand.

14,760. If you form a harbour at one extremity—at Flamborough Head, Bridlington, or Filey,—and another here, do you not leave a large space unprovided for?—Yes.

14,761. Would it not be better to have three harbours?—The more you have the better.

14,762. Would not that tend very much more, in your opinion, to diminish the loss of life?—I think it would.

14,763. (*Mr. Lindsay.*) Supposing there was only to be one harbour between the Farn Islands and Flamborough Head, where would you prefer it?—In the neighbourhood of the Head, because of the number of ships which congregate there.

14,764. Do you belong to the Tyne?—No; I belong to London.

14,765. Did any one ask you to come here?—A gentleman asked me.

14,766. Do you know him?—No.

14,767. Did he put any questions to you?—No; he asked if I would give evidence for Filey.

14,768. There was no other conversation?—I broached the subject to him. I did not know that he felt any interest in harbours of refuge.

14,769. Did he speak first?—Yes, he spoke to me first.

14,770. What did he say?—He asked if I would give evidence for a harbour of refuge. I said there was one very much wanted about here, and I had felt the want of it myself often times.

14,771. Did anything else pass?—I said that I had no objection to give evidence; I would speak the truth if I came here. There is certainly a harbour of refuge wanting for ships trading between here and London. I have been trading between here and London for the last 20 years.

14,772. Do you think the expenditure of money at three places would do more than at one?—I would rather see one large harbour of refuge.

14,773. Do you think that would do more to save life than the improvement of the Tyne and Hartlepool, so as to admit ships at all times of the tide?—If you improve them, I think it will be more an advantage for shipping.

14,774. Supposing you could make a harbour at the Tyne, which vessels could enter at all times of the tide, whether do you think such a harbour would do more to save life and property than such a harbour at Filey?—I should still say Filey.

14,775. (*Capt. Sulivan.*) Do you think the London

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masters trading to the colliery ports generally will agree with you?—I think so.

14,776. Do you not think that a London master is quite as likely to give independent evidence as any master in this port or any other colliery port?—Certainly I do.

14,777. Do you think there will be any difficulty at any time in getting the London masters to give evidence in London?—I do not think there will be much difficulty in doing so.

14,778. Supposing an improvement of the harbours to the depth of 15 feet in this harbour, will that, in your opinion, give a harbour of refuge to that extent here?—Yes; and a harbour of refuge to the south will prevent laden ships running back to the Tyne.

14,779. Is it for laden ships that you generally desire a harbour of refuge?—Yes, decidedly for the laden ships.

14,780. Speaking of the number of ships off Flamborough Head which would avail themselves of a harbour of refuge at Filey, do you consider that a harbour there would be useful, not only as a stopping place, but actually for saving life and property, by saving the risk they would run in running back?—Decidedly they would, for there is more risk off Flamborough Head than at any part of the coast I know of.

14,781. Do you know Hartlepool?—I have been there only twice.

14,782. Would vessels caught in easterly gales more easily reach Hartlepool than Filey?—I do not like Hartlepool. I was drove ashore once. We were taken off the Head with the wind dead east. There were 50 ships; 14 went ashore, and three foundered in the bay. I always steer clear of Hartlepool if I can.

14,783. If there had been a harbour of refuge there, would not those ships have been saved?—In a harbour of refuge you are always safe.

14,784. Where were those vessels?—Off Whitby. That was in November, 1841.

14,785. Would they have been saved if there had been a harbour at Filey?—In my opinion not, when caught off the Head 10 miles.

14,786. Was the wind too far northward of east?—The wind was dead east. We could not fetch the Tyne or the Wear. We bore up for Hartlepool and went on to the beach; 14 of us I counted in the morning.

14,787. From what you know of Filey, if the wind had shifted east-north-east would you have been able to get round the Head?—With a great deal of ease. The course is south-east-south. If the wind was east-north-east they would haul out.

14,788. From what you know of the custom of trade, do you think that if there were a demand for ships' anchors and cables at Filey, the trade would supply the demand there?—I believe they would.

14,789. Although there is nothing there of the kind now?—Trade will follow the ships, I have seen that in my experience.

14,790. Do you know the beach at Filey?—I do.

14,791. Is it a good beach for beaching?—Yes.

14,792. Supposing the harbour was crowded, and it would be a great risk for any more to anchor, would vessels running on that beach, even if the harbour were overcrowded, be likely to save the lives and the property in them, although they could not anchor?—It is my opinion that they would save both life and property.

14,793. (*Capt. Vetch.*) In 1826 you counted 700 vessels off Flamborough Head?—I did not count them, I heard that such a thing had taken place.

14,794. Where were they bound for?—Bound to different parts; to the south.

14,795. What direction?—To the south. They were brought up under Speeton Cliff, where they ride when the wind is southerly.

14,796. They were unable to proceed on their voyage?—Yes.

14,797. Where did they take shelter?—They were riding under Speeton Cliff. That is in Filey Bay.

14,798. Where did your ship run to on that occasion?—I was not there; I said I had only heard of such an occasion.

14,799. (*Chairman.*) Of course you know Yarmouth Roads very well?—Yes.

14,800. What is the greatest number of vessels which you have known lying there?—In Lowestoft Roads, 1,700 sail.

14,801. Have you ever found Yarmouth Roads so crowded that there was difficulty to find anchorage for a vessel?—Yes, but only once.

14,802. (*Sir F. Smith.*) You stated that where he ships go the trade will follow. From your own experience you say you know that will be the case. Tell me what case you have known in your own experience?—I say from what I have seen.

14,803. Tell me where your experience has been?—Even at the Tyne the trade follows the ships.

14,804. I do not think that is a case in point, because the ships which come to the Tyne come where the trade is; you said that your own experience proved to you that the trade would follow the ships. I want to know the case which has proved that to you?—If a trade springs up, the trade follows, where the ships go. There is Lowestoft I can mention for one instance.

14,805. That is a case in which the trade has followed the ships. Do you know any other case?—No; but it is naturally so.

14,806. I will ask one other question to strengthen your evidence. You said that you were asked to give evidence before the Commissioners, but that you were not asked to give evidence in reference to harbours of refuge in general, but in favour of one locality?—In favour of the part I wanted myself.

Previous questions put by Mr. Lindsay having been read over from the short-hand writers' notes:—

14,807. In reference to those questions, you were asked to give evidence in favour of Filey; I wanted to know where you came in contact with the gentleman who asked you; was it in the street?—At the New Quay.

14,808. Did you accost him, or did he accost you?—He said, will you give evidence? I said, what for? He said, for Filey. I said, yes; I have seen the necessity for a harbour of refuge in Filey Bay for the last 17 years.

14,809. And that is all that passed?—Yes, I would go to London to speak for a harbour in Filey. More than that, I warrant me, I speak the sentiments of one half the maritime population out of the port of the Tyne.

14,810. Have you ever consulted anybody to ascertain that fact?—Yes.

14,811. Because you are speaking as if you had authority for saying that?—It is merely from conversation which I have had with different people, different ships' people. When we go to London we lie in crowds, quarter to quarter, and we hold conversation upon the different ports of the coast as to harbours of refuge.

14,812. And it is the general feeling that Filey is the place?—I believe it is.

14,813. Have you ever heard Redcar mentioned?—I might.

14,814. Have you ever anchored in Filey Bay?—Yes, several times.

14,815. Where bound for?—For London.

14,816. Laden?—Yes, we were waiting for a change of wind to get round the Head, and after knocking about for three or four days we were glad to lay up, and get a little rest.

14,817. Do you think the great objection to Filey is the fear of the wind from the east?—Yes.

14,818. You have heard the evidence as to the north coast of Scotland?—I have, but I was a long distance off.

14,819. It is stated, that it is very desirable to have

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a port where vessels can come in, to give the worn-out seamen rest and refreshment?—Yes, I think so.

14,820. How many vessels were there in Filey Bay on the occasion to which you refer?—About 130.

14,821. Was there good shelter there?—It was then.

14,822. From what winds?—South and by west.

14,823. How would you place a breakwater to give the protection necessary for your large fleet of vessels?—It is a harbour partly formed by nature. The Brigs run off in an east-south-east direction. Extend those Brigs. You can run it as far as you like.

14,824. How far would you run it?—I am not a judge of building breakwaters.

14,825. You have been there often?—I have seen the necessity of a harbour by the quantity of shipping riding there.

14,826. You have on idea of the extent of the breakwater to get the acreage which you want?—It might be a mile, or a mile and three quarters, but I think a harbour of refuge can be made very well at Filey, and it has been wanted for a long time past.

14,827. (*Capt. Sulivan.*) Were you in great danger at Filey of being caught on a lee shore if the wind had gone to the eastward?—Yes.

14,828. On the coast of Scotland, would you say a harbour should be placed where a ship can go off on either tack?—I know nothing of Scotland. I have never seen Scotland. I have never been driven to the north of the Tyne.

14,829. But if there were a point of coast where a ship could go off with the wind abaft the beam, would she be in any danger?—If a ship can go off with the wind fair, I do not see any danger of her going ashore.

14,830. (*Chairman.*) You wish to make some statement?—I beg to inform you, gentlemen, that I have no interest in coming here this evening, and I merely came to give evidence in favour of a harbour of refuge somewhere.

14,831. Upon our return to London shall we be able to have some masters of colliers before us?—Oh yes, every one of them, and they will speak the same sentiments which I speak here.

(*Chairman.*) Is there any person present whatever who wishes to tender evidence on the subject of this inquiry?

The short-hand writer was directed to minute "No answer."

(*Mr Gray.*) I have not been solicited to give evidence, and I shall give such evidence as I am able, having served an apprenticeship, and being now a shipowner of this port, if you think proper to examine me. I, to a great extent, disagree with most of the evidence which has been given.

Mr. William Gray examined.

Mr. W. Gray.

14,832. (*Chairman.*) For what periods have you been in command of vessels, and at sea?—I was for about 15 years in command of a vessel. I served an apprenticeship, and was mate of a ship besides.

14,833. You have been present during this inquiry?—I have.

14,834. State in what point you disagree from the previous evidence?—In my opinion no tidal harbour can be considered as a port of refuge, and I do not consider that any improvement in either of the three ports—the Tyne, the Wear, or the Tees—can make them anything more than actual tidal harbours. I have no objection to all those three harbours being improved by Government aid; but at the same time I would not be disposed to consider them as harbours of refuge, such as I consider a harbour of refuge should be, a place where a large ship as well as a small one might enter night or day at any time of tide.

14,835. State where, in your opinion, is the most eligible site for a harbour of refuge, such as you propose?—I consider the very depth of the bight mentioned by Mr. Poppelwell and Mr. Joblin, that part of the coast north of Hartlepool, the deepest part of the bight between Hartlepool and Sunderland, that being the deepest part, drawing a line from the Farn Islands to Flamborough Head. A harbour being placed in that position would consequently be to leeward of all vessels which stand in need of it, and would be accessible by a greater number of vessels than if placed at the point of Flamborough Head. The great bulk of the vessels leaving these ports may be caught on the coast before they get to Flamborough Head, and, consequently, could not reach Filey Bay unless they were far enough to windward. I have no objection to a port at Filey Bay, because if a vessel is at sea and can reach Filey she would never come down in a bight, because Filey would be a better loose from.

14,836. Are you acquainted with the land about Hartlepool?—I traded there for nine months.

14,837. Is the land easy to make in thick weather, blowing very heavy from the eastward?—No; the land is low there.

14,838. Would you consider that a disadvantageous circumstance as respects placing a harbour of refuge there?—I consider that a ship going out of one of these ports has some idea of where her position is. The land to the north of Hartlepool is higher, and has some landmark. If there were a harbour there it would be a breakwater, and it would be bold close to the cliff, so that you could see before you got into any danger.

14,839. (*Mr. Lindsay.*) You stated, as your opinion, that no harbour can be called a harbour of refuge unless it is accessible at all times of the tide, and either by night or day?—Not such as I would call a harbour of refuge.

14,840. That is, a harbour of refuge in the strict sense of the word, in your opinion?—Yes.

14,841. Well then, if the places named to-day, Hartlepool, the Wear, or the Tyne, could be made so that they would admit ships at all times of the tide, and vessels of all sizes, would you not consider them harbours of refuge in the strict sense of the word?—I look upon it as an impossibility.

14,842. But supposing that it could be done?—But any place that can be made a place to enter at any time of tide with any size ship must be admitted to be a safe harbour of refuge.

14,843. Why is it a matter of greater impossibility to make either of these places a harbour of refuge than it would be to make one at the site proposed, to the north of Hartlepool?—I do not catch the question.

14,844. You say that if those harbours could be made accessible at all times of tide, then you would consider them harbours of refuge; but you consider it impossible to make them so. Why is it more impossible to make those harbours accessible at all times of tide than to make one to the north of Hartlepool?—Suppose you do deepen the water at the bar to 15 feet by extending the piers, still you have shallow water in the harbour of Shields. Consequently, with 15 feet on the bar, with a heavy sea, it would be no good to large ships.

14,845. Supposing that the piers were extended to 30 feet of water?—Then you must deepen the harbour, you must take away the in-grounds, you must take away the middle grounds; you must deepen the narrows down to the bar. Now, you cannot cross over to the north side to the moving berths, although they are the lowest in the Tyne.

14,846. Do you not think the Narrows would deepen to the same depths as the bar?—I cannot answer that question. I cannot see that it is possible, and I do not think that it is credible.

14,847. You cannot see that it is possible?—I do not say that it is impossible.

14,848. Because I understood you, when you commenced, to say it was impossible?—Looking to the

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Tyne as it is, I think it is impossible to make the Tyne a harbour of refuge. In the present condition of the harbour of Shields there is not more accommodation than will accommodate the present trade of the port. I have seen the harbour filled with ships. A notice signed W. Wake, "That ships cannot come down from the Spouts, as there is not room for them in harbour," is of frequent occurrence in the winter season with gales from the south-east.

14,849. And if the dock accommodation were to clear the river would that remove your objection to the Tyne?—As a harbour of refuge, I cannot say that it would ever remove my objection. Docks will improve the harbour gates, but as to making a place to save life, I cannot see any place along the coast adapted, except by a breakwater and some space to lie in.

14,850. If the harbour here were deepened to 15 feet, would it not save as much life as anywhere else?—It would be better for ships to come in.

14,851. And in that case the lives of their crews would be saved?—But you cannot call it a harbour of refuge to have to run ashore to save life.

14,852. Would it be necessary for ships to run ashore?—At low water it would.

14,853. If the channel were deepened to the same depths?—If it were deepened to the same depth to admit all the way in, and there was room for all of them in, but considering that in a south-east gale there is always a collection of ships here, as I have heard the harbour-master state, and many times I have seen the harbour-master at a loss to find places to put the ships after they come down laden.

14,854. Looking to the question of site. We will suppose that the Tyne, the Tees, and Filey Bay all afforded equal facilities as harbours of refuge. Then at which of those points do you think the construction of a harbour would do most to save life and property?—If they all possessed the same amount of facility to save life, I consider the Tyne or Hartlepool, inside the Tees, that is, supposing that inside the Tees there was room for any number of ships.

14,855. If they afforded equal facilities, am I to understand that you would prefer Hartlepool?—Supposing equal facilities, I should say the depth of the bight.

14,856. That is, that either Hartlepool or the Tyne would be better than Filey Bay?—Decidedly so.

14,857. (*Capt. Sulivan.*) Do you consider that the public money, if laid out to obtain a permanent harbour of refuge, should be risked on a site where it included within its boundaries a tidal river?—No.

14,858. Do you think that the first object in expending the public money to get a harbour of refuge should be to find a place where there was no chance of a tidal river, or any other cause, bringing silt and sand into it, if such a place could be found?—Most assuredly.

14,859. Do you further think it a desideratum, where nature has partly made a harbour and a smaller amount of money will enclose a larger area?—I think that idea should be a subject of consideration for the Commissioners.

14,860. Do you know, north of Hartlepool on that coast, any bay, such as Hartlepool Bay or Filey Bay, where the indentation of the coast partly makes the harbours, so that a pier run out from the head would enclose a sufficient area?—From Hartlepool here it runs out to the east, and the bay is indented as far north as Seaham.

14,861. How many miles is that?—Four or five miles.

14,862. How can you enclose that bay with a breakwater which should involve an at all moderate amount of money?—I cannot answer that question.

14,863. Then supposing you had to go to either Hartlepool or Filey, supposing they were equally safe from silting up, and putting aside what you have heard about Hartlepool silting up, which is the best place, do you consider, to lay out money?—My own private opinion is, that sand naturally tends to gather on Hartlepool Bay. Sand on the flood being more alive and tending to drive south, Hartlepool Bay is continually silting up, and consequently a harbour there would have that tendency; but if that were removed I would say in that bay, because it is down in the deep part of the bight, and drawing a line from the two outer nabs or heads, Flamborough Head and the Farn Islands, it affords a harbour of refuge to the largest number of ships.

14,864. You think that more vessels would fetch it in dangerous gales of wind?—Decidedly.

14,865. But supposing, from what you have stated, that there is some risk of Hartlepool continuing to silt up, and engineers and surveyors had discovered that in Filey there was no such risk, would you consider Filey a very useful place for the colliery trade as a harbour of refuge?—Considering that Filey would be available in a heavy gale of wind for a very small portion of the ships on the coast, I consider Hartlepool would be preferable to Filey Bay. Ships at Flamborough Head can always fetch Hartlepool or the Humber.

14,866. But I ask you, supposing that Hartlepool was silting up, allowing that if it is not silting up, it is the best place, would it be desirable to give some shelter to ships at Filey Bay?—The more shelter for ships the better, but for laying out the public money I think a better site can be found than Filey Bay.

14,867. South of Hartlepool?—No, north of Hartlepool. By making a breakwater to the north you would shelter Hartlepool from the north-east, and Sunderland from the south-east winds, and consequently it would be advantageous to both those ports.

14,868. Would not a breakwater necessarily be of enormous extent and in very deep water to afford any shelter to Sunderland and Hartlepool?—It would require a breakwater of three miles long to accommodate a fleet of 500 sail.

14,869. In what depth of water?—I dare say you must run it off in 10 fathoms of water.

(*Chairman.*) Is any one present from Warkworth. We have your memorial, Mr. Harrison, and we are quite prepared to go on with the matter if the deputation is here.

(*Mr. H. John Harrison.*) Unfortunately all our witnesses have gone off to Warkworth again.

(*Chairman.*) What course do you wish to propose? You can lodge your memorial and send further documentary evidence to London.

(*Mr. J. Harrison.*) Then you wish it to be in writing?

(*Chairman.*) Yes.

(*Chairman.*) Is there any person present who wishes to tender further evidence with respect to this inquiry?

No answer.

Sittings at North Shields closed.

BLYTH.

Friday, 15th October 1858.

PRESENT :

Sir FREDERIC SMITH.

Captain VETCH. | Mr. COODE.

After inspecting the harbour works, the Commissioners adjourned to the harbour office, where they proceeded to receive a statement from

Mr. JAMES ABERNETHY, engineer to the Blyth Harbour and Dock Company, who laid before the Commissioners a plan of Blyth harbour, on a large scale, showing the extent of the works executed, and of the tidal estuary at the mouth of the river Blyth. He said, the harbour of Blyth may be termed a tidal estuary ; the river Blyth, which is a small stream terminating about four miles from the harbour mouth, by a dam across the head of the estuary, the navigable entrance channel to the harbour being maintained entirely by the ebbing and flowing of the tidal current. It is not, therefore, in the proper sense of the term a river or bar harbour. Previous to the year 1843, the entrance channel, extending from the eastern shore seaward, a length of 5,000 feet, was completely exposed to the action of the easterly storms. The entrance channel to the harbour has now been protected for a length of upwards of 4,000 feet, by the formation of a breakwater on its eastern side, thus converting what was formerly exposed upon sea shore into a sheltered haven. Dredging operations have also been carried out, and are in progress for the purpose of deepening and straightening the channel throughout its whole length. Powers have been obtained for the formation of docks on the western side of the entrance channel ; but previous to the construction of this work it was necessary to protect the site by the formation of the eastern breakwater. Contracts have been entered into for its final completion in a short period of time. The total length when completed will be 4,500 feet, at a cost of 35,600*l*. I have had some conversation with pilots and shipowners, and they are of opinion with the people of Tynemouth and of other ports, that the improvement of the existing harbours on the north-east coast of England would better serve the purposes of the shipping than the formation of a great harbour of refuge at any one given point. Entertaining this view of the matter, they would submit that the port of Blyth has some claims for consideration, inasmuch as at high water during the prevalent south-easterly storms light colliers driven in those storms northward of the Tyne mouth are very frequently in the habit of taking refuge in the port of Blyth. I have here a statement.

14,870. (*Sir F. Smith.*) Is that statement signed by any person ?

(*Mr. Abernethy.*) It is. It is signed by Robert Oliver. It shows that on the 30th of March 1850, and the 31st of March, no less than fifty-eight vessels took refuge in the port of Blyth during a south-easterly storm.

14,871. (*Sir F. Smith.*) Can you furnish the Commissioners with a copy of that statement ?

(*Mr. Abernethy.*) I can do so. Loaded colliers also in south-easterly gales are very frequently driven northward of the Tyne mouth, and are obliged to run as far north as the Firth of Forth for shelter. By the extension of the eastern breakwater, now constructing at the port of Blyth, as far as the rocks called the Beacon Bushes, aided by the dredging operations, a depth of ten feet could be obtained at low water of spring tides, which would enable the greater number of the laden colliers, at a very early period of the tide, in case of south-easterly storms and missing Tynemouth, to take refuge in the port of Blyth; the extension of the breakwater to this length would cost the sum of 29,000*l*. The trade of the port of Blyth is on the increase.

14,872. (*Sir F. Smith.*) Will you furnish the Commissioners with that return from which you are reading ?

Mr. Abernethy undertook to send to the Commissioners a statistical return of the trade and revenue of the port of Blyth. Mr. Abernethy also undertook to instruct the harbour master to give to the Commissioners a return of all vessels, laden and in ballast, that have taken refuge in the port of Blyth for the last five years.

14,873. (*Capt. Vetch.*) Do I understand that the length of the pier down to the Beacon Bushes has been contracted for ?—No ; only as far as the parliamentary limits, as shown here upon the plan, called the Outer Beacon. It is not proposed at present to carry it further.

14,874. (*Sir F. Smith.*) Do you intend that vessels coming in here shall go alongside of wharfs or swing at anchor ?—You will observe that we have here a very wide tidal estuary which forms the Blyth harbour proper, and by dredging it might be increased to admit a very considerable number of vessels.

14,875. I presume you contemplate that vessels will ground here ?—We propose to have floating dock accommodation for foreign-going vessels which come here for steam coals.

14,876. Do I understand that you are going to make a dock ?—We propose to construct a dock, as shown on the plan, a tidal basin of 4½ acres area, and a dock of 15¾ acres.

14,877. You contemplate that ?—Yes.

14,878. Have you funds for that purpose ?—At present we have not funds ; the expenditure has been devoted entirely to the construction of the first necessary work, the eastern breakwater.

14,879. Until these docks are completed you are really not in a state to take in a number of vessels ? —We can take in a large number of ordinary class colliers, but not coppered vessels, which require floating-dock accommodation ; they object to lie on the shore.

14,880. What will be the depth of that channel throughout to seaward ?—The dredging operations are for the purpose, in the first place, of straightening the exceedingly tortuous and narrow existing channel, as well as of deepening it so as to ensure a depth of 17 feet in the first place at high water of ordinary spring tides, to be afterwards increased to 21 feet on the construction of the docks.

14,881. I believe colliers generally draw from 15 to 16 feet of water ?—That would be the largest class of colliers.

14,882. Have you a smaller class to take less water ? —We have a great number of colliers of a smaller class and a number of foreign vessels from France which do not draw more than 8, 10, or 12 feet water.

14,883. For these you will have ample depth of water at high water ?—Yes.

14,884. In fact it would be only a high-water harbour ?—But by the extension of the breakwater to Beacon Bushes, aided by the dredging operations to which there is no limits——

14,885. Except the limits of funds ?—Except the limits of funds——The port of Blyth might be made accessible to the ordinary class of colliers at low water of spring tides, and we find from experience that the additional depth obtained by the dredging is maintained.

14,886. Is there no silting up or forming of bars? —No, inasmuch as the entrance of the channel is preserved by the out-going current ; we have, as you will observe, 350 acres of tidal estuary above the

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entrance, which would keep and maintain the additional depth which we obtain by dredging.

14,887. There is no set of sand from the tide ?—There was a slight tendency for the sand to set in from the direction of the ebbing tide, but by the construction of the half-tide breakwater upon the western side of the entrance channel that tendency will be obviated.

14,888. Are there any rocks seaward of the harbour mouth which would make it difficult for vessels unacquainted with the port to enter at night ?—By the erection of proper leading lights in the direction of the entrance channel, under all circumstance vessels could enter with safety ; but, undoubtedly, the port would be rendered more safe in all cases if the pier was extended to the rocks called the Beacon Bushes, about 1,000 feet from the proposed termination of the present pier.

14,889. What depth of water is there round the Beacon Bushes ? What are the soundings ?—The soundings show a depth from 7 to 12 feet at low water spring tides round the Beacon Bushes ; and a depth of 3 feet at low water upon the rocks.

14,890. Are there any other dangerous rocks above the Beacon Bushes ?—There are not.

14,891. So that by daylight foreign vessels would have no difficulty in seeing their way into your harbour ; and at night you would exhibit a light which they would see ?—They would be greatly aided by the exhibition of a light on the point of the breakwater proposed.

14,892. Do you propose to give to the Commissioners any drawing explanatory of your system of breakwater ?—I propose to furnish the Commissioners with a detailed drawing explanatory of my system of breakwater at Blyth and at other sites, under different circumstances.

14,893. When will the Commissioners have these drawings ? Will they be sent to London ?—In London I propose to advise the Secretary to the Commission when I shall be ready to appear before the Commissioners.

14,894. Can you give any idea when we shall have the required drawings, in order that we may expect you, so as to arrange our other duties ?—I think within a period of a month from this time I shall be prepared.

14,895. (*Mr. Coode.*) What is the material forming the bed in the upper part of the harbour ?—Chiefly sandy and alluvial matter.

14,896. Have you had any perceptible increase over a series of years ?—We have not. There is an extensive creek lying to the westward of the main estuary into which the tide ebbs and flows, and in which there has been no perceptible deposit for a long period of years.

14,897. The water is perfectly still within that creek ?—It is perfectly still, and it is pure sea water.

14,898. Is there any accumulation at the back or the eastern side of the breakwater ?—I find that the beach is slightly raised since the formation of the eastern or half-tidal breakwater ; and one object which I wish to attain is, to confine the outgoing current between the western breakwater and the eastern breakwater, so as to do away with the tendency of the sandy point, opposite the outer beacon, to extend to the eastward. I find that the action of the outgoing current will have a most beneficial effect in the removal of that point.

14,899. What is the nature of the material at the back of the eastern half-tide breakwater ?—Sand.

14,900. Have you found any material accumulation since the construction of that breakwater ?—The beach has been slightly raised since the formation of that portion of the half-tide breakwater, and I am desirous that this effect should be produced, so that the whole amount of the outgoing tidal current may pass down the entrance channel proper, instead of passing out as originally over the sands to the westward of the entrance.

14,901. Do you think you can furnish to the Commissioners a detailed drawing of the construction of Blyth breakwater at any early period ? When will you undertake to do it ?—As far as the construction of the Blyth breakwater is concerned, I can furnish it within a fortnight from this period.

14,902. I had reference also to the proposed improvements of which you spoke ; you spoke of other sites with which you are connected, can you name any earlier period than a month to furnish the drawings ? —The drawings will be very numerous, and I shall have to devote much time to them. I have to furnish details for the Aberdeen harbour, Fraserburgh harbour, Mumble roadstead, in the Bristol Channel, and also for the port of Blyth, so that the drawings will be very numerous.

14,903. (*Sir F. Smith.*) I am obliged to you for the information you have given the Commissioners ; would you like to present any memorial ?—I think the ship-owners would like to send a memorial in.

Very well, and if there is any individual here anxious to say anything to us, we shall be happy to hear him. We can also see any person in London ; we would be happy to do that.

(*Capt. Vetch.*) We cannot reach London for a fortnight yet.

Sir Matthew White Ridley stated, That many vessels which previously took in only a portion of their cargo of coals, now can take their whole cargo in, without keeling off at sea.

Mr. Abernethy re-examined.

Mr. Abernethy.

14,904. We have deepened the channel to the extent of three feet throughout.

14,905. (*Capt. Vetch.*) How far have you extended the breakwater in any one week ?—We have extended the breakwater 130 feet in one week.

14,906. (*Mr. Coode.*) Were those piles fixed at or above the level of low water ?—In that case the breakwater piles were fixed at the level of low water of a low spring tide.

14,907. (*Capt. Vetch.*) Was the hearting complete as well as the piling to the extent of 130 feet in one week ?—It was.

14,908. You have a contract in hand for those works? —We have a contract in hand now for the completion of the breakwater to the outer beacon, and the formation of a lighthouse at its termination.

14,909. What is the length of it ?—365 feet beyond its present termination. The contract for the completion of the pier to the outer beacon, including a lighthouse, is 6,800*l.*

14,910. In what depth will that pier terminate ?—Three feet of water at low spring tides.

14,911. At what period will the present contract be completed ?—The 30th of June next year ; of course the lighthouse is additional work, and it will require more time. The work might have been done in a shorter period.

14,912. How much of that sum is for the pier, and how much for the lighthouse ?—It was a lump sum.

14,913. Could you give us your estimate for the lighthouse independent of the pier ?—Yes, I will do so.

Mr. Abernethy agreed to furnish a copy of the plan of Blyth harbour and works on the Commissioners' scale.

The proceedings then terminated.

SUNDERLAND.

Friday, 15th October 1858.

PRESENT:

Admiral Hope (Chairman).

Mr. Lindsay.
Captain Washington.

Captain Sulivan.
Mr. Evans, Secretary.

SUNDERLAND.

15 Oct. 1858.

Mr. J. S. Robinson.—On behalf of the commissioners of the River Wear, and as their clerk, I beg to submit a memorial from them, and which, with your permission, I will read.

Port of Sunderland.

To the Royal Commissioners appointed to inquire into the subject of Harbours of Refuge.

The Memorial of the Commissioners of the River Wear and Port and Haven of Sunderland in the county palatine of Durham,

Humbly showeth,

That your memorialists view with the highest satisfaction the visit of a Royal Commission to this port, to inquire into the best means of affording increased protection to the valuable property constantly jeopardized on this dangerous coast, and to the still more valuable lives that are so frequently sacrificed for want of shelter for shipping in stress of weather.

That your memorialists, as being the public body intrusted by Parliament with the government of this harbour, under an Act passed in the year 1830, and comprising amongst their body the representatives of every class connected as well with the shipping as with the trade and commerce of the port, and the manufactures and minerals shipped therein, feel deeply interested in this truly national subject, and earnestly hope that through the aid of the knowledge and experience combined in the present Royal Commission the best means that can be discovered will be speedily adopted for the saving of life and property upon this coast.

Your memorialists, with some degree of pride, refer to the works that have been carried on under the superintendence of themselves and their predecessors for the improvement of this harbour, by means of which Sunderland has been raised from a small fishing creek to its present position, although still inappropriately designated a creek of Newcastle. This vast progress has been obtained by a very large outlay of money, as may be learnt from the fact that during the last 30 years your memorialists have expended upwards of 450,000*l.* in improving the harbour.

Your memorialists, however, in referring to the present trade of this port, must not omit to mention how greatly that trade has been increased by the construction of those magnificent docks immediately south of the harbour.

That in order to meet the requirements arising out of the increased size of vessels entering by the river entrance, as well as to improve the bar, and to render more tranquil the lower parts of the harbour, your memorialists determined, if possible, to carry out some external works, with a view of obtaining these objects, and accordingly, about the end of last year, resolved upon consulting the eminent harbour engineers (Messrs. Stevenson of Edinburgh), who on several former occasions have advised your memorialists as to matters connected with the port, and they were requested to prepare a plan to effect the desired objects at as small an estimated outlay as practicable.

The result of the investigations of those engineers is contained in their plan and report dated April 1858, which is handed in. The estimate of 180,000*l.* mentioned in that report is, in the opinion of your memorialists, a larger sum than, keeping in view the trade of the port, it would be wise and prudent for them to expend.

Your memorialists do not forget that they have powerful and enterprising competitors on all sides, and it is only by making Sunderland a place of cheap shipment that they can hope to secure and retain the coal trade properly belonging to it. At present the tax levied on coals produces fully two-thirds of the entire revenue; and if the full toll authorized by Parliament, which is 6*d.* per chaldron, were levied, the proportion would be much greater; but, for the above reasons, your memorialists at present only levy 3*d.* per chaldron. This rate is higher than the coal rate levied in the river Tyne, where the charge is only 2*d.* per chaldron. The only other material source of revenue is a tax of 1*d.* per ton per voyage, paid by shipping for three voyages in the year only. From these two sources a revenue, which now amounts to about 18,000*l.* per annum, is collected.

Such was the state of matters when the attention of your memorialists was first drawn to the subject of a harbour of refuge. Situated on a rocky foreshore, exposed to the heaviest seas of the German Ocean, and visited by the very large fleets of vessels that trade to the harbour and docks, the necessity for refuge accommodation at this place is too apparent to demand further notice, and is, indeed, painfully confirmed by a glance at any of the recent wreck charts, in which the long lines of black marks opposite to this port too clearly point out the correctness of this assertion.

Evidence will be submitted by our engineer, Mr. Meik, who has been for many years a resident in Sunderland, showing the sad proportion of shipwrecks upon that part of the coast within the jurisdiction of your memorialists as compared with any other portion of coast in the United Kingdom.

Our engineer is prepared with details of many of the most important storms that have visited this coast during the last few years, and will also give much information as to the number of shipwrecks and casualties during those storms, from which it appears that by far the greater number of vessels have been lost in their return voyage from London while in ballast, and with a wind to the southward of east. He will also be able to furnish full particulars of the number of vessels leaving and entering this port, with their tonnage.

It was after a careful consideration of all the circumstances of the case, as well as from the personal observation of your memorialists, that they unanimously arrived at the conclusion that one general harbour of refuge at any one part of the coast will not give that real and practical security and protection to life and property which the necessities of the case demand.

Your memorialists concur in the statement so forcibly brought out in the evidence given before the Committee of the House of Commons upon this subject, that a master will always make for his port of destination.

The great bulk of the coal trade must necessarily be carried on at the Tyne and the Wear, both north of Hartlepool, where it has been suggested a harbour of refuge should be formed; and your memorialists are of opinion that were such a harbour established at that place it would not be available for vessels during a south-east gale, bound for either of the above ports.

Your memorialists therefore have no hesitation in stating that in their judgment the best mode of providing safe and available shelter is by the improvement of the most important harbours upon the coast, so as to make them easily accessible for the class of vessels trading to them.

With this view your memorialists again consulted Messrs. Stevenson, who have submitted a design which meets with the approbation of your memorialists and of the public generally in this locality, as calculated to afford an effectual protection both to life and property, as well as to improve the whole of the lower portion of the harbour, which at present, during heavy seas, is unavailable for shipping.

The estimate for these works is 300,000*l.*, but it is impossible to entertain the idea of burthening the trade of the port to such an extent.

Your memorialists will be prepared to contribute to the utmost of their power to carry out so great an improvement to the harbour; but as the lives of hardy sailors ought, in their opinion, to be a nation's care, they humbly submit that the improvement of the harbour of Sunderland is an object towards which Government assistance may with propriety be granted.

Your memorialists therefore humbly pray that they may be heard in evidence in support of the facts stated in this memorial, and that their views may be maturely considered and favourably entertained by your Royal Commission.

And your memorialists will ever pray, &c.

(Signed) Joseph Simpson,
Chairman to the River Wear Commission.

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Mr. Thomas Meik examined.

14,914. (*Chairman.*) You are the engineer to the commissioners of the River Wear ?—I am.

14,915. For how long have you been connected with the port in that capacity ?—For 13 years.

14,916. Will you now proceed to make any statement you may wish relative to the port, observing that at present we only wish to have from you such a statement as will enable the Commissioners who are present to fully understand the evidence which is to follow. The special engineering evidence we wish reserved until we are joined later in the afternoon by Sir F. Smith, Captain Vetch, and Mr. Coode, the members of the Commission who are engineers by profession ?—Will you, in the first place, allow me to explain this model ?

14,917. Take your own line ?—This model has been prepared for the purpose of showing the coast and harbour of Sunderland. The River Wear passes through the town of Sunderland, and enters the sea through two piers at the mouth of the harbour. The south dock has lately been constructed to the south of the port. There is a south outlet attached to the dock. The commissioners' boundary extends from Souter Point on the north to seven miles along the coast to Ryhope Dean. The model does not go so far as that, but nearly to Ryhope Snook. The front shows the roadstead for the anchorage of ships before entering the harbour, and also the projected works which the commissioners have referred to in the memorial just presented. These plans on the wall show the works, and these are the different designs proposed at the harbour's mouth. Here also is the dock and outlet. That is a chart of the north-east coast, which is generally taken to extend from Flamborough Head to the Farn Islands, a distance of 115 nautical miles. You see the situation of the port of Sunderland in the centre. It shows the coast and the different ports along it, and the principal ports are all mentioned on the chart. I shall then hand in an account of the wrecks which have taken place at Sunderland since 1852, kept by the commissioners of the River Wear. It gives an account of the vessels, light or laden, that have been wrecked at the entrance of the harbour. This account agrees pretty nearly with the Admiralty lists. It is not expected to be so correct, because it is only an account of the ships that have been wrecked near the end of the piers. In six years 78 vessels were wrecked at the entrance of this harbour, making an average of 13 a year. In the Blue Book published by the Select Committee of the House of Commons the average was taken at $19\frac{3}{5}$. You will find that the proportion of light to laden is as 2 or $2\frac{1}{2}$ to 1. We have principally light vessels wrecked at the entrance of this harbour returning from London in ballast. They come in great crowds and large fleets. Sometimes we have as many as 200 entering in one tide; and you may suppose, from the narrowness of this harbour, there is great difficulty in these large ships getting in together. Although the regulations are as good as can be adopted, accidents do happen; and it is to avoid these accidents at the mouth of the harbour that the commissioners of the River Wear now bring before you these proposed works. You will find also that the number of vessels driven ashore with the wind northward of east is 17; the number driven ashore with the wind southward of east is 48; vessels driven ashore with the winds east 13; making altogether 78; the proportion driven ashore with the wind northward of east to those with the wind southward of east being as three of the latter to one of the former. The majority is with the wind southward of east. Out of the 78 wrecked, 68 were bound for Sunderland (showing that vessels try to make their port of destination); to other ports 10. As you proceed further, and after the return for six years, you will find a detailed register of wrecks for 1854, from the Admiralty register. 1854 is the last year, I think, that detailed accounts of the wrecks were published by the Admiralty. The accounts since published by the Board of Trade do not go into the detail of each particular vessel. On looking over the proportion I have stated, they are rather more than I make out. I may mention that the general class of vessels that come to this port are colliers or coasting vessels. Their tonnage is not very great; from 250 to 350 tons is about the average; and they draw generally about 9 or perhaps 10 feet water when light. This is the class of vessels that the accidents generally happen to when they run for the harbour. We have not, in certain winds, at low water, depth to take in these vessels; so they are frequently kept in the roads till high water; and, as I mentioned just now, great loss has happened therefrom. I will draw your attention to the storm which happened on Tuesday the 3d January 1854. Upwards of 1,300 sail of vessels left Yarmouth Roads for the northern coal ports with a fair wind, many of them being bound for Sunderland. Soon afterwards a strong breeze sprung up from the south-east. It increased to a gale, which lasted the whole week, and was considered one of the most violent storms which had been witnessed on this coast for 32 years previous, causing an immense loss of shipping between Flamborough Head and the Farn Islands. At Sunderland, on the morning of Wednesday the 4th, the wind south-south-east, with a heavy sea rolling, upwards of 120 ships entered the harbour. Owing, however, to the swell outside the piers, and to so many vessels pressing in together, there was considerable confusion, and several received extensive injury. On Thursday the 5th there were behind the north pier 12 vessels, behind the south pier 2, in the Potatoe Garth 12, and in the south beaching basin there were 5 vessels, making a total of 31. The storm still increased in violence during the day, and the loss of life and property along the coast was fearful. On the forenoon of Friday the 6th a schooner was observed off Souter Point with a flag of distress flying, and her sails all shivered. The crew, in the last extremity, took to the long boat, which was instantly overwhelmed by the waves, and all on board drowned.—The next gale that I refer you to was in the same year. The evening of the 14th of November was very fine and sea smooth. About 55 sail brought up in the roads, with the harbour's mouth open. The tide before, I think, 55 sail had entered. These 55 sail that brought up were too late for the tide, and had to anchor in the roads. During the night a heavy squall came on from the south-east. Numbers of these vessels in consequence dragged their anchors, and were driven to leeward of the harbour. The gale increasing in the morning of the 15th, between 7 o'clock and noon, 15 out of the 55 sail were driven on Roker Sands, in the forenoon at eleven, and no assistance could be rendered them whatever. Property to the value of 20,000*l.* was lost on that occasion. The wind south-south-east to east. It thus appears that during a space of a few hours 15 vessels, or about one per cent. of the entire number of vessels wrecked annually on the shores of Great Britain and Ireland, were driven ashore in broad daylight, and an immense amount of property destroyed. It is considered that if a harbour of refuge had been in existence to the south of this port it would have afforded no security for these vessels. Indeed it can be stated, without fear of contradiction, that a local harbour of refuge alone could have saved them from destruction. The wind was so strong from the south-east, and these vessels lying so close in, it was impossible that they could have made to the southward. If such a work as proposed had been in existence these vessels could all have entered the tide before, because it was from want of depth of water principally that they were kept outside. There are other accounts of gales which I need not go over, but this account gives a report of these different gales that have happened along the coast. The loss of life, I may mention, is not great at this port. On one occasion, in October 1852, early in the morning, between

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three and four o'clock, two vessels were wrecked between the piers. It was a dark, stormy morning, and I think one was a French lugger, and the whole of that crew was lost; the other was a brig called the *Napoleon*, and five out of seven of her crew were lost. At the end of 1854 there was a remarkable case of a vessel, called the *Mary Graham*, that left the harbour, and went out to sea. I believe she went out for the purpose of saving water over the bar. She anchored outside, and during the night a heavy gale sprung up. There were different opinions as to the cause of her loss, but she broke away with a length of chain hanging over her bows. The wind was from the north-east; she drifted along, struck on what is called the Stone Head, and of the crew, with the lumpers and others on board, 25 out of 26 were drowned. I may mention again, that if these works had been constructed at the harbour's mouth there would have been no necessity for this vessel to have gone out. These two instances are about the principal instances of loss of life that have happened at Sunderland within late years. Vessels being wrecked near the entrance of the harbour, the Commissioners of the River Wear have had for a number of years rockets in readiness, which apparatus is now passed into the hands of the coastguard. In six or seven years they have saved 135 lives. This accounts in a great measure for the small loss of life at Sunderland. In December 1850 a large fleet of vessels ran for the harbour, and about 50 were stranded on this Potatoe Garth inside the harbour; this was principally owing to the confusion that existed, and the narrow space of the harbour for such an immense crowd of ships. Five or six or more became total wrecks. This has since, perhaps, in a great measure been obviated by the South Dock Harbour entrance, which takes ships in. This relieves the lower part of the harbour from the crowding of vessels. But I may mention that even with the accommodation of the South Dock the space is too small for the number of vessels that sometimes crowd into Sunderland Harbour. We want increased space when these vessels run in in strong easterly winds, to enable them to bring up, and get up the river into security. The commissioners have on different occasions directed their attention to remedy these evils, and especially the heavy range of sea which runs up Sunderland Harbour. I know no harbour where so heavy a sea runs in; I can only compare it with Aberdeen. A very heavy sea runs in there. I have never been there, but I understand it is so. When accommodation is most required the lower reach cannot be used from this heavy range. The commissioners formed a beaching basin on each side of the harbour, and different works, to try to check this range of sea, but it still continues to a certain extent. The two piers in a great measure lead this sea up the harbour. The new works outside, and which will be described by Mr. Stevenson, are intended particularly for the purpose of stopping this range which runs up the harbour. I may also mention that this range, and the strong set of tide, brings large quantities of sand to the harbour's mouth, and causes accumulations on the bar, which varies in depth very much, from four and five feet to two feet. Sometimes we have hardly two feet upon it; and the loss of one or two feet at the bar of a river where such immense fleets enter is of the most serious consequence. I will now put in a statistical table of the trade of this port, with the number of ships inwards and outwards, the duty paid, the duty received on coals and shipping, and the revenue of the commissioners, from 1846 to 1857. Here also is a financial statement of the commissioners' revenue. I have also here an account of the soundings on the bar, which I shall put in. There has been a great deal done in this harbour by dredging. The commissioners expend 5,000*l.* annually upon the dredging of the harbour. In fact the ships' berths are kept open by dredging; by artificial means. They have this season done a great deal of dredging upon the bar, and they have been enabled through this dredging to bring the bar into the state it formerly was in. I do not know how long it will remain so. We hope it will continue now in a good state. I have got an account of the dredging work done in this harbour for a number of years past. The commissioners have received this plan of the proposed piers from Messrs. Stevenson of Edinburgh. I have considered the plan myself, and I have made observations upon it. So far as I have been able to judge, and go over it, I think it will be a most beneficial plan for the entrance of this harbour. I think it will be the means of remedying in a great measure those evils which I have endeavoured to describe to you, and which cause the wrecks that happen at the mouth of the harbour. I have also on different occasions taken the opportunity of going in a steamboat along this coast, and after full consideration of the best means of providing shelter for those immense fleets that frequent the coast,—for, as I have already shown you, 1,300 sail have been known to leave Yarmouth Roads,—and I believe there have been 700 or 800 sail at one time in Bridlington Bay, which is the best shelter south of this port for a fleet to lie in; when these fleets get embayed, if a place could be found at one spot suitable for a harbour of refuge, capable of containing a fleet of that kind, I doubt whether it would answer the purpose, because I think, from what I have seen at the entrance of this harbour, if such a fleet of 700 or 800 sail ran for one harbour it would end in confusion and loss. I think that if the improvement of the various harbours along the coast where these fleets generally run to could be effected, especially as it is well known that sailors will run for the port of destination on this coast, that would be the best means of remedying the existing evils, and affording the best shelter for vessels overtaken by storms. I have considered what the effect would be of a large harbour if it were placed to the south of this port, anywhere along the Yorkshire coast. I have shown to you what happened in 1854. A fleet such as that caught off Sunderland could not have reached any harbour to the south, and it would be, I consider, an injustice to these vessels if they had not accommodation given to them equally with those which are caught further to the southward. I think if three or four of the principal harbours were improved so as to take in the fleets that generally run for them, a great deal of loss would be prevented. In this plan the proposed work is not called a harbour of refuge; it is merely proposed to give shelter to the class of ships that run to the port. There would be 18 feet water at low water at the pier heads, and I think then in any storm a light collier might enter between these two piers. At all events an hour or two would be the utmost they would have to lie in the roads. At present it is only for about four or five hours, during the top of the tide, that vessels can enter the present harbour. At other periods they must lie off the harbour's mouth, and then, when these storms I have described happen upon the coast, these vessels are lost. That is the opinion I have arrived at from careful observation and visits at different times along the coast, and I do not know of a site where one large harbour, and only one, sufficient for the shipping, could be formed on this north-east coast. There is a difficulty in getting a site, and the work would involve a large expenditure of money. Any work such as an insulated breakwater of stone thrown out on this coast could only be formed at a great expense. We know what Plymouth breakwater has cost, where almost at all winds, except one, craft could go out and deposit stones at sea. Here, on this coast, I do not think craft could go out during more than three or four months of the season, and then during the winter season the stones would be driven about, and it would take years to do the work. I have fully considered the expense of works of that kind, and having been off in all weathers laying down buoys and moorings in the sea, I know how seldom the weather admits of even our ordinary work being done.

BIBLIOTECA DEL C.C.A.M.

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Mr. T. Meik.

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Chairman.

14,918. Excuse my stopping you, but you are now touching on questions which you must go through when the engineers arrive; I mean questions as to the mode of construction and the expense; so, if you can, reserve that till later.—Then I will put in this return of the shipping that enter and leave this port. I have got returns of shipping to show the rise of this port, but they happen to be in manuscript, which show the comparison between the Tyne, Wear, and Hartlepool during the years 1853, 1854, 1855, 1856, and 1857. I will be prepared afterwards to go into these returns, if you wish.

14,919. Those you have in manuscript?—Yes.

14,920. Can you at your convenience furnish our secretary with a copy?—Yes.

14,921. Do you wish to enter into a statement respecting it?—No; merely to hand it in.

14,922. Does that conclude your statement?—That is my statement for the present.

14,923. Then, as you will be before us later in the day, I shall refrain from asking you any questions except one. You stated that when these works are carried out there will be 18 feet of water at low water spring tides at the pier heads. Now, in the plan I have before me I find 12 and 13 feet marked in the fair way?—Allow me to explain this. You will find there are two plans; Messrs. Stevenson's first plan was for 14 feet, and they were again consulted, and gave an enlarged plan, the 17 feet plan, which is the same as the model.

14,924. I see.—I think from 17 feet to 18 feet is the quantity which will be given by this latter plan.

14,925. (*Mr. Lindsay.*) Are the inner piers the piers which are contemplated by the River Wear commissioners to be carried out at their own expense?—There was no arrangement come to with reference to the expense, if they were to be carried out. Messrs. Stevenson were merely asked to give plans at as low an estimate as possible.

14,926. When did he send the second plan for the inner pier?—He was consulted at the end of last year, and I think his report is dated April or March of this year.

14,927. And the plan for the outer piers are plans which Messrs. Stevenson have more recently sent in?—Yes.

14,928. You spoke, I think, of a south-east gale, and said that during that time this fleet of vessels could not have found shelter at any place to the southward?—Yes.

14,929. That would depend altogether upon the position where these ships were caught when they were obliged to bear up?—Exactly so.

14,930. Where did these ships come from?—They were lying off the harbour in about six or seven fathoms water. A large fleet came up in the night; about 110 sail; about half of that entered the harbour; the other half could not, and they brought up in the roadstead, and before the next tide the gale rose.

14,931. Then the gale rose during the time these ships were anchored in the roadstead, and consequently no harbour of refuge to the south could have been of any value to them; but would a harbour to the north have been of any value to them?—Very few of these ships rounded Souter Point; some did, but with the greatest difficulty; 15, as I have mentioned, were driven ashore.

14,932. Whereabouts were they driven ashore?—To the north of the harbour.

14,933. You have said just now that the greatest number of accidents that take place are within the harbour?—No; at the entrance of the harbour.

14,934. Have many lives been lost?—Not many, in proportion to other places.

14,935. Is that on account of having very efficient lifeboats?—Lifeboats and rockets.

14,936. But say that various ships were running for a harbour such as this in a heavy easterly or south-east gale, they would be still obliged to run up the river, because they would find no shelter within these piers for anchorage?—There is a space of 110 acres between these piers, and the pilots inform me that ships would be in comparative safety between these breakwaters.

14,937. Would any ship bring up between these breakwaters?—Pilots tell me that they could. I do not state it upon my own authority that they could.

14,938. Tell me something about the amount of money which has been expended in dock accommodation here. I see there are two docks; one to the north, and a great work to the south. Tell me what has been expended from first to last on docks or piers?—The dock to the north is a very small one, and is very difficult of access. It is too near the end of the piers. There is generally a heavy sea on the gates, and for some months in the winter time very few vessels can enter the dock; a very limited trade goes on there. That dock may be taken, I think, as having cost in round numbers 100,000*l.*

14,939. What has been the cost of the great dock?—The great dock is of great magnitude, and 700,000*l.* has been expended on it already.

14,940. Is that expenditure going on?—I am not connected with the docks; but I do not think much work is going on there now.

14,941. Do you know what water there is at the pier end at the south dock?—I do not know, from my own personal soundings.

14,942. Speaking to you as an engineer, if the scour of the river, and the enormous dredging, which costs 5,000*l.* a year, does not give a greater depth than two, three, or four feet at low water at the piers now, how do you intend to deepen that front when you make the piers so that ships during a heavy gale of wind may be able to enter, and run up the harbour for safety; how do you expect to deepen and maintain the depth of the channel?—If you observe the outline of the coast on which Sunderland is situated, you see it is considerably embayed. The entrance to the harbour at one time stood bold to the foreshore; since the works of the south outlet were run out it is now embayed. Sand and materials driven along the beach lodge at the entrance, where the conflict takes place between the tides and the scour of the river, and that has led to a heaping up of sand-banks.

14,943. Then it is the sand from the sea which makes the bar within the present piers?—That is my opinion.

14,944. More than the sediment from the river?—Yes.

14,945. Consequently the making of the proposed piers will, in your opinion, prevent that flow of sand coming in as it does now, and filling up the channel?—That is my opinion.

14,946. There was a word in the memorial which struck me very much, and I will ask you a question upon it. Looking to the enormous trade of this place, and considering that more than a million of money has been spent here on the accommodation for shipping, the memorial said Sunderland was "a creek of Newcastle." Is it really the case that a port of such importance is a creek of Newcastle?—Unfortunately it is, I must say; it still pays dues, and very heavy dues, to Newcastle.

14,947. You, a great and enterprising port, still pay dues to Newcastle?

14,948. (*Mr. Lindsay.*) What tribute do you pay to Newcastle?—In the shape of primage dues, I think it is 1,300*l.* annually.

14,949. Do you mean that the shipping, trade of the port and the people of Sunderland pay 1,300*l.* annually to Newcastle?—I do. In the Blue Book of the Shipping Commission it is not very clearly stated what is paid by Sunderland to Newcastle; but I have asked different parties connected with shipping, and they tell me that 1,300*l.* is a low estimate; some say it is more.

14,950. When one man pays money to another he expects to get something in return for his money, and I fancy it is the same with towns. Now what do you get in return for this 1,300*l.* you pay to Newcastle?—Nothing that I know of.

14,951. (*Capt. Washington.*) Are buoys or lights or anything given to the pilots out of this sum by the Trinity House of Newcastle?—The Trinity Board have charge of the pilots here; but I do not know of any money being given to them. I know lately they wished to make a charge upon the pilots which they resisted, and the pilot management altogether at this port is considered by many shipowners very defective.

14,952. Whom does the pilotage depend upon?—I believe entirely upon the Trinity House of Newcastle. There was a board here, but a few years ago they resigned. Another has been appointed, but I do not know whether they act or not; but I believe there is still a board here.

14,953. Do the Sunderland pilots pass before the Trinity House of Newcastle?—They do. They are obliged to go to the Trinity Board of Newcastle to get their licences; and their licences are withdrawn by the Trinity Board of Newcastle.

14,954. In giving an account of the harbour, you stated that the range was very great between the piers; to what does it amount?—On the 1st of March 1858, during a severe storm, wind east to east by south, the force of the wind 8, during a snow storm, 10, sea breaking in 10 fathoms water, the height of the wave at the north pier head was 8 feet; that wave at the north dock entrance was 9 feet, having increased in height owing to the contracted nature of the entrance. There is a marked difference between this entrance and the outlet of the south dock: there the wave is reduced as it goes in; at the north dock entrance it is increased. This is a difficulty we labour under here, and which many engineers have been consulted with regard to, viz., this range, and it has not been yet altogether overcome. This same wave afterwards, when it gets to the breakwater on the north shore, is reduced to 4 feet. When it gets to a jetty on the south side, called the tidal-gauge jetty, it is reduced to 3 feet 6 inches. At the pier works on the south side it is reduced to 2 feet.

14,955. Then do I understand you to say that a wave 8 feet high at the outer pier heads gradually diminishes, and is lost at about three quarters of a mile?—Yes; after being increased at the north dock entrance to 9 feet.

14,956. When you speak of that height of wave, do you mean that the vessels rise and fall to that amount?—Yes, I mean what the vessels scend.

14,957. I believe some works were executed on the south side to obviate it; have they had any effect?—Two beaching basins were formed on the south side, a large one and a small one; but they have not had altogether the desired effect.

14,958. Do you happen to know what the scend in Shields Harbour is?—At the Low Lights it would be in such a storm, three or four feet; it gradually diminishes from the middle sand.

14,959. Do you happen to know what it would be in a similar storm at Aberdeen?—I generally consider it much the same as here. Mr. Abernethy has told me that at the dock gates they have had a range in heavy storms of from two to three feet.

14,960. What is the width at the entrance of the proposed harbour?—The width between the pier heads will be 800 feet; that is according to the last plan of Mr. Stevenson.

14,961. Do you consider that 800 feet at the entrance will be ample for any vessel to take in a gale of wind?—Quite sufficient.

14,962. Do you know the width of the entrance of Kingstown Harbour?—No.

14,963. You said a large number of vessels sometimes ran for the harbour at the same time. What is the largest number you have known to enter at one tide?—About 200 sail. I cannot tell the exact date when these vessels entered. In December 1856 as many as 400 sail entered in four tides.

14,964. What might be the average draught of water of these vessels?—Generally light colliers, drawing from 9 to 13 feet water, perhaps.

14,965. Will these vessels be able to enter at half tide, or not till full tide?—Not till about two-thirds. Generally they run for four or five hours.

14,966. Will they enter upon a falling tide?—I have known vessels to enter upon a falling tide, but it is dangerous to do so.

14,967. It is not the usual practice to enter a harbour upon a falling tide?—It is not, with such a narrow entrance as the present entrance to Sunderland Harbour.—I consider that if these piers were extended vessels could enter with a falling tide.

14,968. In the present state of Sunderland Harbour ships may arrive off here, and possibly may have to wait 8 or 10 hours before they can enter this harbour?—Yes.

14,969. You mentioned that 135 lives had been saved at the immediate entrance to Sunderland Harbour; during what period was that?—From 1846 to 1856; that is 11 years.

14,970. That was by means of lifeboats belonging to the port, and by rockets and mortars?—Yes. May I mention that a remark has been made by a gentleman with regard to a part of my evidence, which I should like to correct. Ten hours is not the time; it is generally about six or seven.

14,971. Do vessels seldom enter upon a falling tide?—Seldom.

14,972. Suppose a vessel then arrived one hour after high water, how long will she have to wait?—Till half tide of the next tide; and it depends upon whether they are neaps or springs, and it would also depend upon the draught of water.

14,973. (*Capt. Washington.*) In the very valuable returns you have laid before the Commissioners, the most valuable I believe the Commissioners have received in any part of the United Kingdom, I observe that you give the details of gales of wind, and the number of wrecks that have occurred in particular gales?—I do.

14,974. Are we indebted for them to your own inquiry?—Yes.

14,975. And at present you say only summaries of the wrecks are published?—Only summaries are published by the Board of Trade.

14,976. Would it be of advantage generally, do you think, if the details of wreck were published every year?—I consider it would be of great advantage to all parties connected with shipping.

14,977. You quite understand that no public board of the Government would go to unnecessary expense; but if the information were considered valuable there is very little doubt that probably it might be attended to, if you really thought it of value?—I think the money would be well spent to publish these returns in detail, as they were done before.

14,978. Is that the general feeling; I mean among seamen?—I should say so.

14,979. And it is a fact that you yourself have derived very great benefit from the details of certain wrecks that are published here?—I have on frequent occasions.

14,980. (*Capt. Sulivan.*) I will merely now put some questions to you on points not bearing on any engineering evidence, but reserving that till the afternoon. With reference to what Captain Washington has just said, do you mean that the general public, or special parties, such as engineers, who are interested in a question of this kind, would use those details if published by the Board of Trade?—I have always found these details very much run after, and very much sought for. I have had frequent applications at the office from different parties for information as to ships that have been lost, and in regard to ships receiving casualties. Any detail of this kind, especially in a court of justice, would be of great advantage.

14,981. For any special cause are you aware that these details can be got by any parties applying for them?—By any parties that know such details are there; but it is only few in the immediate neighbourhood that know of them.

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14,982. All who know that the abstract of those returns given by the Board of Trade is made up from the whole of these details must know that the details are in the office, and available, if required?—Yes; but the great advantage is getting these details in a printed form, not to have to apply to one party or another, but to have them as general information furnished by the country.

14,983. You are aware what the amount of printing and the expense would be in publishing the whole of these 1,100, 1,200, or 1,300 in detail?—No doubt the expenditure for printing would be very large, and no doubt the commissioners of the River Wear think they have gone to a good deal of expense in printing these documents; but I think it is well-spent money.

14,984. Do you think they would be so generally useful that it would warrant the outlay necessary for them?—That is my opinion; but I may be wrong.

14,985. You said that in this heavy gale that Mr. Lindsay asked you about, that the vessels were anchored outside; but in a still greater gale, with more wrecks, I think you said it came on shortly after they left Yarmouth Roads?—That was in January 1854.

14,986. Yes; the principal gale, when so many wrecks occurred. In that case would all these vessels have been caught south of Flamborough Head?—I cannot say exactly, not knowing the coast; but a nautical witness will tell you at once.

14,987. I think you said they were wrecked here on the 5th?—Yes.

14,988. And it came on soon after leaving Yarmouth Roads on the third?—I believe so.

14,989. Then would not the whole of these ships that wished to have run for a harbour of refuge, had one existed anywhere in that bay, have been able to take that harbour of refuge, and so have saved wreck?—I think that in looking over the evidence already given before the Royal Commissioners in different places, it was stated———

14,990. I beg you will answer my question without going into the evidence given at other places. If the gale caught these vessels between Yarmouth Roads and this place, would a harbour of refuge somewhere in this bay, that they could have entered at all times of the tide, in all probability have saved them?—I do not consider that a harbour of refuge could be made on this coast to hold them.

14,991. But if a large number of vessels were running for this bay, and a gale caught them, would not such a harbour of refuge be valuable for them, and better than any tidal harbour?—If I knew the extent of the harbour, perhaps I might tell the number of vessels that was to be sheltered in it.

14,992. Supposing a harbour of refuge sufficient to take the number of vessels requiring it, would not these vessels have been able to run for it, if the harbour had been sufficiently large and easy of access so as to avoid confusion from a large fleet of that kind entering?—Undoubtedly, if they got into it, it would afford shelter to them.

14,993. Is not the great confusion and difficulty of entering these harbours by fleets of vessels at once caused by their having to wait for the tide, and coming in when the tide is high, all flocking for it at that time?—No doubt, so far; but still vessels running into harbours generally run one after another in crowds; as soon as one vessel enters, the others immediately run after.

14,994. If a harbour were accessible at all times of the tide, would it not or might it not very much reduce the number of vessels crowding to enter it, when they could enter it as they came upon the coast?—That would depend upon the size of the fleets taking it.

14,995. You have applied your remarks more especially to light vessels as having been lost in the neighbourhood of Sunderland. Are the loaded vessels that sail from Sunderland ever lost on their voyage to London?—Frequently, to the south of the port.

14,996. Then for these vessels the remarks that you have made do not so directly apply?—They do not.

14,997. Then if you found that by the return six loaded colliers are lost yearly for one light, and nearly the same proportion of these not colliers (coasters and others), would you think a harbour of refuge should more especially be directed for the saving of the laden colliers?—I do not know particularly for laden vessels. I would look to the majority of vessels, whether light or laden; the majority are light, and therefore I think a harbour of refuge should have on this coast reference to these vessels, perhaps more than to laden vessels.

14,998. In what way are the majority of the vessels light?—Because the trade of these northern coal ports is principally to London. It is an export trade; they go to London, and take cargoes up to London, and they return light and in ballast.

14,999. Then there is an equal proportion on an average on the coast of laden and light vessels?—The laden vessels do not go in such large fleets as the light colliers.

15,000. I am asking you as to the number. If the vessels go up loaded and come down light there is an equal proportion of laden and light at sea?—I should say there was a majority of light vessels wrecked.

15,001. I am not asking you that. I am asking you as to the proportion of vessels. You said there was a majority of light vessels wrecked?—There is.

15,002. But if the returns published show that six to one light are wrecked, would you then consider that light vessels should be the ones most considered in a harbour of refuge?—I have no doubt that the majority of six laden to one light exists about Flamborough Head, and there a harbour of refuge for laden vessels would be of great assistance, but that proportion does not exist towards these northern ports.

15,003. The proportion of light vessels in the northern ports being wrecked, I presume, is caused by their generally running light for their ports?—Generally it is.

15,004. But if six laden vessels are lost to one light in any part of the coast between this and London, and in addition to that, if every life in a loaded vessel is much more risked than in a light, then would you consider that for a harbour of refuge to save life and property the loaded vessels should be more especially considered?—On a part of the coast where this happens certainly loaded vessels should be more considered.

15,005. I am speaking generally of the trade between the coal ports and London, without regard to the part of coast; the part of the coast where it is selected as the best possible spot for the saving of life and property, wherever it may be. I ask you whether if six laden to one light are lost, and if there is a still larger proportion of loss of life, whether a harbour should not have special reference to laden vessels?—On such part of the coast where they exist, I have no doubt; but my evidence has been with reference to the port of Sunderland, and there, where light vessels are in proportion, that does not apply.

15,006. But if Sunderland loaded vessels are in danger further south, and if the loss of life and property is much greater in loaded vessels, is not the first consideration a harbour of refuge for these loaded vessels?—I generally consider the first consideration is for light vessels on this part of the coast.

I will not ask you any more questions on this subject after that answer.

15,007. (*Mr. Lindsay.*) In spending the public money, is there not something more to be considered than the light vessels frequenting this particular part of the coast?—I think still the impression is on my mind that the principal works should be directed to the shelter of those light vessels that run down here in such large fleets.

15,008. But if the object of this Commission is to inquire into the best mode of saving life and property,

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and if the public money is to be spent having that object in view, is there not something more to be considered in the spending of that money than that which affects a particular description of vessels in a locality? —I cannot help saying that I think the improvement of the existing harbours will be the best manner in which the public money can be spent upon this coast; that is giving a general answer to it; it would be far more advantageously spent than in one enormous harbour.

15,009. Then I understand it is your opinion that the improvement of the existing harbours along the coast would be more beneficial to the saving of life and property than the same sum of money spent it any one particular site of the coast?—Yes.

15,010. But if it should appear that there are five laden vessels lost frequenting this coast to every light vessel, and that there are ten lives lost in laden vessels to one in light (the saving of life being the all-important consideration), and if it should appear that the bulk of the laden vessels belonging to Sunderland and the northern coal ports are caught in gales of wind somewhere in the neighbourhood of Flamborough Head, and if it should appear that a harbour of refuge could be made in that neighbourhood would you then hold the opinion that it would be advisable to spend the money at one site there, as well as to improve the existing harbours?—I have at different times endeavoured to answer, that a harbour in the neighbourhood of Flamborough Head for laden vessels going south with the wind south of them would be of the greatest advantage, and would be the means of saving a great many lives. If three or four of the northern ports were improved, and one harbour, principally, say, for laden vessels going south, was made to the south of them, I think the shelter on the coast would be complete.

15,011. Now I understand you; and the sum and substance of your opinion is this, that, looking to the saving of life and property, the existing harbours ought to be so improved as to admit, at all times of the tide, if possible, the vessels frequenting this coast; and, secondly, that the public money should also be expended in the construction of a harbour somewhere about Flamborough Head, for the saving of life, and property, more especially of laden vessels?—That is my opinion.

15,012. You said in answer to a question that you thought if an abstract of these wrecks was published it would be of great value?—I do think so.

15,013. It would be of value, you thought, to guide seamen and master mariners, as showing how losses had taken place, and consequently would put them on their guard to see if possible that they could avoid similar losses in future?—That is quite my opinion.

15,014. Then you said expense was no consideration?—Not a great consideration.

15,015. And you said you thought they would be read to a considerable extent?—Yes.

15,016. Whether do you think the expense of publishing these valuable returns would produce more beneficial results than the publication of the large number of like books which we have upon the bog lands of Ireland, and so forth? Would not the money be a great deal better spent upon the publication of these details, and be more read, than the generality of what is published by the House of Commons?—I think they would. I have got a horror of blue books.

15,017. (*Chairman.*) Would not a harbour of refuge at Hendon Bay be the means of saving both life and property, whether in light or laden ships, whenever ships are caught under the circumstances you have mentioned in that bay?—That is a matter I have not particularly directed my attention to.

Mr. DAVID STEVENSON examined.

Mr. David Stevenson.

15,017. (*Chairman.*) You have had under consideration the improvement of the entrance to this harbour, I believe?—I have; for the last seven years I have been employed.

15,018. Will you now proceed to make any statement you wish relative to the proposed improvements, bearing in mind that our colleagues, who are more especially competent to judge upon these questions, will join us later in the afternoon, and that we shall wish anything that especially relates to engineering to be reserved for that time?—I shall endeavour to state as shortly as I can, without entering upon engineering technicalities or details, what I think is necessary should be known before you hear the nautical evidence in this case. The objections to the present harbour of Sunderland are threefold:—first, there is the small depth of water on the bar, which Mr. Meik has stated varies from 18 inches to 5 feet; there is, in the second place, a very large amount of sea which at present exists at the entrance of the present harbour, and which in some cases is as high as 13 feet; and there is, in the third place, what has been called the range in the lower part of the harbour, and which occurs in consequence of the entrance of the sea at the outer harbour's mouth. It was, I believe, considered that when the south entrance was made these defects would be in a great measure overcome, in consequence of vessels using the south entrance; but I believe it will be proved in evidence that in point of fact this is not the case, and that at present all or nearly all the vessels enter the port of Sunderland by the old entrance. The south entrance is used chiefly by vessels leaving when laden, because there is a greater depth of water there. I think a glance at the plan will show that the south entrance, from its very short distance from the pier heads to the dock gates, is much too short for vessels running in during heavy seas, and consequently, as I have stated, the practical result is that vessels do in point of fact enter by the old harbour. The wrecks and casualties in consequence have already been mentioned, and of course I do not enter upon that. Now the object in view in the preparation of the plan which has been referred to by Mr. Meik was to overcome as far as possible these defects; and it is necessary to the understanding of the plan that I should state that the bar at the entrance of the present harbour consists of sand through which there is a channel kept open by the tidal scour. This bar varies in depth and also in position; sometimes it is close to the pier heads, and sometimes it is 500 or 600 feet in front, those variations depending entirely upon the variations of the tide, wind, and freshes. I may state that the whole of this bar consists of sand and some small pebbles, but at all events that there is no part of it that consists of matter brought down by the river. The matter brought down by the river is deposited in deep holes above, which are made by the dredger, to form berths for the vessels in the river. The bar is in short like all tidal estuaries having sand at the mouth caused entirely by the heaping-up action of the sea; the channel forming the entrance to Sunderland, which is a channel kept open through this beach, the depth of which is not the normal depth of the beach, but a considerably greater depth. That depth is maintained solely by the tidal action. The effect of the sea is to fill it up; and suppose a barrier were thrown across the harbour's mouth, we should have a flat and continuous line of beach formed right across the harbour's mouth. The consequence of this is, that the sea during heavy easterly gales heaps up the sand towards the pier heads. In proof of this I may advert to this section, which shows the channel of the river, and you will see that where the tidal currents are allowed to act without being interfered with by the action of the sea, as at the Potatoe Garth for example, where the harbour is wide, you have actually a much greater depth of water than you have at the outer part of the harbour, even where the scouring current is directed and prevented from spreading by the two piers, showing very clearly that if you can secure the unobstructed action of the tidal scour at the mouth of

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the harbour you will maintain the same depth that you have now within. If what I have said be correct as to the origin of the bar, it follows that two methods may be pursued in order to improve it; one is the increase of the back water in the inner part of the harbour, giving the tidal scour the preponderating influence over that of the sea; the other is the protection of the harbour's mouth from the action of the waves. In my report of 1852 the subject of back water is treated of, and I shall hand in a copy; but this present plan is based upon the fundamental principle of protecting the present entrance from the action of the sea, so as to allow the tidal scour to have free course, and to produce the full amount of deepening effect unobstructed. In order to do that I propose the plan which is shown on this model, consisting of those two piers; and I wish the Commissioners to understand that this is purely a local measure. The plan proposed is for the improvement of the entrance to the present harbour of Sunderland. It is not a harbour of refuge. My opinion is, that in the first place the effect of these piers will be to reduce the sea at the mouth of the present harbour, and what has been called the reductive power of the harbour, that is, the proportion in which these waves will be reduced, will be in the ratio of about 1 to ·3. What I mean by that is that a wave of 9 feet at the entrance of the proposed new piers will be reduced to a wave of 3 feet when it approaches to the present harbour entrance. That reduction of the sea will permit the tidal scour to act almost unobstructedly; and I think I am stating what I should consider a very moderate allowance when I say that after these piers are constructed the minimum depth at the bar and entrance of the harbour of Sunderland will be, not the less certainly, but probably more than the maximum depth at present. That is the first improvement. The second is the reduction of the scend due to a wave of 3 feet instead of a wave of 9 feet; and the third improvement is almost, I may say, the total abolition of the range in the lower part of the harbour, rendering the whole of the lower part of the harbour available for berthage and the general purpose of shipping. On the subject of the estimates, and also on my reasons for drawing these deductions, which are of course purely engineering, I shall not enter at present; but these are the improvements which I most confidently anticipate from carrying the prepared works into effect.

15,020. (*Chairman.*) We should like to have tracings of these improvements, as they have been referred to?—I shall take care that you have them.

15,021. (*Mr. Lindsay.*) You say that the object of carrying out these piers will be for a purely local purpose. Do I understand you by that to mean that you have not in contemplation the construction of a harbour of refuge, which vessels not belonging to the port of Sunderland would take in distress?—Not a general harbour of refuge, certainly; but in designating it a purely local improvement I should at the same time add that I firmly believe that were this plan carried out it would prevent the casualties which at present occur at the mouth of Sunderland Harbour. Since I knew the harbour, seven or eight years, many wrecks have occurred which, had these piers been put up, would have been prevented.

15,022. You have no doubt the whole would have been prevented?—I should not perhaps say the whole; a vessel still might possibly have gone to the back of the pier; but the great number would have been saved.

15,023. A question was put to Mr. Meik about a harbour of refuge at Hendon Bay. Where is that?—It is about a mile to the south of the south dock.

15,024. Have you ever given that a glance, to know if such a site would be suitable for the construction of a harbour of refuge?—I have seen the place repeatedly, but my only information on the subject is that contained in the Admiralty chart.

15,025. But looking at it with your ready eye as an engineer, so well accustomed to the construction of harbours, do you think it is a site where a harbour of refuge could be made?—My idea is that there are no prominent engineering facilities for the construction of a harbour of refuge there; and if the Admiralty chart is correct, which I assume it to be, there is a very great deal of rocky ground in the inside; but not having specially surveyed it I should not like to speak confidently on it.

15,026. (*Capt. Washington.*) Mr. Stevenson's statement is so clear that I shall not ask any questions; can you tell us the scale of the model?—It is 18 inches to a mile.

Mr. Robert Anderson examined.

Mr. Robert Anderson.

15,027. (*Chairman.*) You are a commissioner of the River Wear?—I am.

15,028. Do you also appear as representing the Marchioness of Londonderry?—Yes; but not particularly in that character.

15,029. But the Marchioness of Londonderry is connected with Seaham, is she not?—She is.

15,030. To whom was sent a notice that a deputation was to be sent here, if they felt any interest in this question?—I was not at Seaham at the time, and therefore have not seen that notice. I wrote to the person at present in charge at Seaham, and asking, if he thought it was necessary to be present, that he would be here; but I have received no answer.

15,031. Seaham Harbour is the property of the Marchioness of Londonderry?—It is private property altogether, and I have no instructions from her ladyship respecting this Commission. If you think proper to make a harbour of refuge in front of Seaham, I have no objection.

15,032. Are you aware whether the gentleman in charge there gave any public notice to the seafaring portion of Seaham of this inquiry, and that they would be heard here by deputation if they wished?—I am not.

15,033. But it is to be recollected that our inquiry is mainly, not for the purpose of improving the harbours for commercial purposes, but for the purpose of saving the lives of the seafaring men who are employed on board the ships; and therefore we wish that not only the gentlemen who own the ships, and who are connected with shipping property, should be here, but we wish also that the seafaring men, who are actually exposed to the risks and dangers, should be represented at our meetings, and therefore you will oblige me if you will publish a notice to the seamen of our wish to that effect, and state that we shall be very happy to receive in London any deputation the seafaring population may wish to send to us to represent their opinions upon the subject?—I will take care to do so.

15,034. How long have you been connected with the port as a commissioner of the River Wear?—Three or four years, I think.

15,035. You are not a nautical man?—Yes, I am.

15,036. For what period were you at sea?—Twenty-two years.

15,037. For what period in command of a ship?—Eighteen.

15,038. In what trade were the vessels chiefly employed that you commanded?—For the first three years I commanded a collier, afterwards a transport ship, and I also served my apprenticeship in the transport service; then I was in the North American trade and the Mediterranean.

15,039. You are well aware of the objects of this inquiry?—Perfectly.

15,040. Will you now proceed to make to the Commissioners any statement which you may have to offer relative to the advantage or necessity of one single national harbour of refuge on this district of the coast?—I think, that it will be very difficult to construct a harbour of refuge on this coast that would embrace all the views the Government have in this inquiry. A single harbour of refuge, wherever and however constructed, would not answer the purpose

of saving life and property. It might answer if it was intended for a naval station, and large ships using the harbour; but it would not certainly have the effect of saving the lives of the seamen, nor the property of the owners. For instance, it has been said that light vessels coming from the ports of the south, where they have delivered their cargoes, always steer for the port they are bound for; and the question was asked of Mr. Meik if those vessels that left Yarmouth Roads on the 3d January 1854 would have taken refuge in any port to the south, if such had been constructed, instead of continuing their course to the ports of their destination. I am quite of opinion that with a wind from the east-south-east, which I believe at that time it was, they would have held on their course, in the hope of arriving at their port of destination, and passed any port of refuge, unless they happened to be disabled, and then, with the wind at east-south-east, having arrived at the northern ports, it would be quite impossible for them to have gone to the south again, and to have taken advantage of any harbour in that situation. This applies to light vessels, and therefore I think the improvement of the present harbours, if it can be accomplished by the united efforts of the parties who have charge of those harbours, with the means at their disposal, and assisted by a grant from Government, would attain the object of saving life and property to a greater degree than one single harbour of refuge in any situation on the coast. At the same time, having said so much about light vessels, I observe, in passing, that the number of vessels which have been stranded here in the years of which you have already received evidence, of the 78 altogether 23 are laden vessels, not light vessels, and the remainder light, 55; so that they are not all light vessels. Then it frequently happens that great loss of life takes place with laden vessels; colliers are very deeply laden; and I think it would be a very essential advantage to laden vessels if a harbour to shelter a fleet of laden vessels were constructed anywhere near the neighbourhood of Flamborough Head. I have seen frequently, myself, 50, 60, 70, or perhaps 100 sail of laden vessels, when they are caught dodging under the head,—I dare say a sailor will know what that means,—with a gale of wind from the south-south-east. And there are two ways of effecting this object; one would be by making a breakwater upon the Smithic Sand and Bridlington Bay, or lengthening the Steel out at Filey Bay. Either of these would effect that object to a considerable extent, and from the capacity of Bridlington Bay it would certainly be a very useful naval station. I believe there is not more than 10 or 11 feet water at low water upon the Smithic Sand, which lies before the bay, and it might very easily, by stones that could be got very conveniently, be converted into a very good shelter for shipping riding in Bridlington Bay; and as the tide runs through that bay with considerable velocity from south-west to north-east it would never silt up, but would keep perfectly clear. That is one advantage of Bridlington Bay, so far as laden ships are concerned. With respect to the entrance of this harbour, there can be no question but that if the piers could be carried out to 18 feet water at low water light colliers would come in at any time of tide. If there was 18 feet at low water spring tides, it would be sufficiently deep to admit light colliers or any vessels that come to load in the dock. For instance, large ships drawing 12 to 13 feet in ballast could come in almost at low water in any weather, which would be a great advantage certainly to the saving of life; for it is not very many months ago since two large Dutch East Indiamen were wrecked. I do not know that any of the crews were lost, but the vessels were totally lost. I dare say you know very well,—Captain Washington does,—that the lifeboats on this part of the coast are effectually manned by the pilots, and are very useful indeed in saving life, so that comparatively few lives are lost, when you look to the great destruction of property, but still it is desirable that every means should be adopted to render lifeboats unnecessary, for it is a very unpleasant service, and I am quite of opinion that if these piers were made to the extent shewn in Plan No. 2. this harbour would certainly be quite sufficiently safe and easy of access at almost any time of the tide for the description of vessels, though they are much larger now than they used to be, that trade to the port. With respect to this entrance being, as people say, almost superseding the necessity of this improvement, by the construction of the south dock, I can refer you to the return of vessels that have entered this port up to the present period, and by which it will be seen that the very great bulk of the shipping still enter by the old entrance, imperfect and bad as it is. Therefore it shows the impracticability, to a great extent, I think, of vessels using that very useful outlet as an entrance, because the locks are so very near the sea that they must be operated upon to a very considerable extent by the undulation of the water. In this year, not to trouble you with going further back, up to the 31st July the vessels that have entered by the harbour are 3,339, that is the first half of this year, of a tonnage of 437,036 tons. The number of vessels entering by the south outlet, which is perfectly practicable, easy, and convenient in fine weather for ships of almost any draught of water,—and so far it is a great convenience for laden ships arriving with cargoes,—they have deep water, and can enter by this entrance when they cannot enter by the other at all,—the figures, I say, are by the harbour entrance 3,339, and 84 by the south entrance. Now, leaving by the river are 2,374 vessels.

15,041. (*Capt. Washington.*) Is it for six months or the quarter?—Oh, it is for the quarter. I beg your pardon. The proportions are the same; 2,374 have left by the harbour, and 1,023 have left by the south outlet. Of these 1,016 were loaded in the dock and seven in the river. It is very common for vessels of great depth of water to load in the river, pass through the dock, and so take advantage of the deep outlet to go to sea.

15,042. (*Mr. Lindsay.*) In what space of time did the 1,023 leave?—In the quarter ending the 30th September.

15,043. 1,023 left, and only 83 entered by the south entrance?—Yes.

15,044. The 2,374 left by the harbour, in what time?—In the same three months. I only mention these figures to show that the harbour is extensively used at present for sailings.

15,045. (*Chairman.*) Is there anything further which you would like to add to your statement?—Nothing; only what applies to this port will apply to the other ports, of course. The Tyne and Tees, if they were improved,—though it is presumptuous, perhaps, to say anything on such a subject,—but if a sum of money was to be appropriated by the Government for the saving of life and property,—it would be dependent certainly on the amount, extent, and nature generally of the work which was intended to be made,—but I should think a very good and judicious appropriation of that money would be to give as much as could be afforded to the improvement of the three harbours I have mentioned on this coast, Sunderland of course being one of them, and the remainder to construct a harbour particularly for the accommodation of light vessels, where the greatest loss of life is to be apprehended, because vessels that are deep laden do not go so near the shore when stranded. Then I think the object would be realized, particularly if in the arrangement accommodation could be afforded for those vessels that are likely to have charge of the defence of the coast. We cannot tell how the war may be conducted, if there is a war; but I apprehend that a different class of vessels would be employed to what were employed during the last war, and in that case these very harbours, the Tyne, the Wear, and the Tees, and particularly Bridlington Bay, would be all very good naval stations for gunboats and steamers of a lightish draught of water, say 16 or 17 or 18 feet.

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Chairman.

I remember that in the last war there was always a guardship or frigate lying in Shields Harbour.

15,046. Then I think you have mentioned as an eligible situation for a harbour of refuge which you propose in the neighbourhood of Flamborough Head, Bridlington Bay ?—Yes; I mentioned that merely on account of what was said, and what I knew to be the case of the loss of life which I know occurs in laden colliers, and it was for saving these valuable lives that I mentioned these two cases, because they are exactly to the point. If a vessel gets round Flamborough Head, there is the Humber under her lee, and the Humber is a very safe port of refuge for ships of any size and description, though it is rather difficult of access.

15,047. Suppose a harbour of refuge is made in the neighbourhood of Flamborough Head, would you prefer the south side of the head to the north side as the site for the harbour ?—I do not think I am capable of giving an opinion about that, for it would depend upon the nature of the breakwater erected upon the Smithic Sand. If there was one high enough, and anything like the Plymouth Breakwater,—and it would only be like the apex of a cone, for it is very shallow water,—I think there would be room for a very large fleet of vessels to ride under the lee of that breakwater. On the other hand, I do not think there is much room in Filey Bay for a fleet of ships.

15,048. The question I put is not engineering, but nautical. On which side of the head, north or south, supposing you could find a site, would you put it for the purpose of saving life in laden ships ?—I think they are equally good. If the breakwater is sufficient upon Smithic Sand ships would ride perfectly smooth. It would be a low breakwater, and made with very little expense.

15,049. Is it the case that it frequently happens that laden ships get as far south as Flamborough Head, and are then taken in heavy weather, and not able to weather the head ?—In that case Filey Bay would be the most eligible place.

15,050. Taking the facts of the case in view with which you may probably be acquainted, which would be the best site, north or south of the head ?—I should prefer myself the south side, if I had the harbour to make; but I am not engineer enough to know the merits of it sufficiently. It would be what sailors call a better loose if you could go out at either end of it. There might be channels out to the west and east ends, both good deep-water channels. The one nearest the shore would be the shortest of the two, but both would be deep enough.

15,051. (*Mr. Lindsay.*) You and I are sailors, and I want to put a question to you as a sailor. Is it the case that easterly winds are the most dangerous on this coast ?—It is.

15,052. If a ship could weather Flamborough Head could she not get to the Humber ?—She could, if not disabled.

15,053. Then what would be the good of a harbour of refuge at Bridlington, as you recommend, considering that fact; would it not be as much wanted to the south of the Humber as it would be to the north ?—Quite true; but I am speaking of winds when a ship could not get to the southward; the very prevailing winds there are south-west and south-south-west, which blow very hard.

15,054. Which are the most dangerous winds ?—Easterly.

15,055. Then when a ship could weather Flamborough Head could she usually reach the Humber?—Yes, if not disabled; and then she would not of course get into a harbour if it was made there.

15,056. If she could not weather Flamborough Head, then might she get into Filey ?—Yes.

15,057. Is it often the case that a laden vessel is caught to the northward of Flamborough Head, and obliged to run for the bight of the bay here ?—No, I do not think it; there are instances of the kind which have frequently occurred, I believe. I have known vessels driven from Flamborough Head, I dare say as far north as Leith Roads; but that was a very extreme case.

15,058. Why did they go there ?—Because there was no port they could take.

15,059. With the chance of saving their ships and lives ?—Not unless it was Holy Island, and people are not much acquainted with that.

15,060. Is it often the case that laden ships are obliged to put back ?—I do not think it is very often the case.

15,061. I asked the question because by the returns of the proportion of losses of laden vessels I see it is as 6 to 1 of light vessels on the whole coast ?—On the whole of England ?

15,062. It includes the whole of England ?—Very probably, but that will not apply to this particular coast.

15,063. But it will apply to this coast in part. Of the laden vessels lost on this coast, are they usually vessels that have put back after they have made considerable progress south, or are they vessels which are usually lost in going out of the harbours, or very shortly after they have gone out of the harbours ?—I think they are usually lost in contending to get their passage, and, perhaps losing a mast or bowsprit, they drive on shore.

15,064. In the bight of the bay ?—Yes; sometimes vessels are lost in putting back to the harbour ?—I have known several lost in putting back to the Tyne, and have got ashore at the Black Middens at the entrance. They very seldom put back here, laden ships, because it is so difficult to enter.

15,065. Looking to this coast as a whole from Flamborough Head to the Farn Islands, where there is no shelter for shipping to take at low water, and say that Government should arrive at the conclusion that only one harbour was to be made, looking to the saving of life first, and the saving of property second, and the facilities to commerce in the third place, at what point would you consider the construction of such a harbour would tend most to save life and property ?—Well, I must say that is a very difficult question to answer.

15,066. I want your opinion upon it; just consider it for a moment ?—It is a dangerous thing to make a harbour of refuge in a deep bight of a bay, because if you happen to miss it you are sure to go on shore; but if you make it in a place where you can haul off either on one tack or the other you have a chance; but there is no chance if you make a harbour in a deep bight.

15,067. There is a very strong opinion in favour of Hendon Bay?—It is equally situated between the Staples and Flamborough Head. Suppose you could construct a harbour of refuge at anything like a cost that would be at all reasonable and proper to spend upon it, it is a place where a fleet might proceed either north or south. Whitburn Steel projects out to the sea a long way, and between that and the north pier there is good anchorage. Then there is Hendon Smooth, where the ground is good near the shore; further out it is very rocky. I should be very desirous of seeing a harbour of refuge constructed where it would be most useful for the saving of life and property, but I think that would be best effected in the way I have described.

15,068. Then if confined to one harbour, the particular site you are not prepared to give your opinion upon ?—No.

15,069. But, to make it a little more general, whether do you think it would tend most to save life and property if made somewhere between Flamborough Head and Scarborough, or if made somewhere between Redcar and the Tyne ?—Well, with a view to saving life in laden colliers, I think somewhere in the neighbourhood of Flamborough Head is the best place. I have seen very large fleets of laden colliers take shelter under Flamborough Head, as it is now, standing in and off under reefed topsails, and under great risk of running foul of each other.

15,070. Then, looking to the saving of life, you

think it will be a better situation somewhere in the neighbourhood of Flamborough Head ?—I do.

15,071. Then, looking to the safety of property, where do you think ?—Well, I think both life and property go together.

15,072. I ask the question because people distinguish between life and property. By the efficient management of lifeboats, much to the credit of those who reside in this northern district, while there is a very large amount of property lost, it appears that the lives are saved of all on board ; therefore I would like you to distinguish property from life,—where would a harbour be best for the saving of property ?—I think the improvement of the present harbours would be the means of saving property.

15,073. But do you think a site between the limits I have named, Redcar and the Tyne, would do more to save property than a harbour between Flamborough Head and Scarborough, or do you think a harbour between Flamborough Head and Scarborough would also do more to save property as well as life ?—The lives, you know, are perilled in laden ships, and the property is perilled also ; lives are not so much perilled, although they are perilled greatly, in light ships ; if you make only one harbour of refuge, of course it would be applicable for the saving of both ; you cannot in that case separate life from property, because they go together either into the harbour or not into the harbour ; there can be no division between the two risks, you know. I think it is a very great point to have a place sheltered for laden colliers; they are laden very deep, and not over well manned ; and in these pinching times people are obliged to go as near the wind as they can, and consequently loss of life is a greater national care than it would be in other circumstances.

15,074. Then, life and property considered, if only one harbour is to be constructed you say it should be somewhere between Flamborough Head and Scarborough ?—I think that is a very good situation, with a view to the saving of laden ships.

15,075. Well now, knowing the enormous trade along this coast as you do, is it your opinion that if only one harbour is to be made we will require a very large one ?—I should think so ; it must be a very large one ; it would be for a national object, and it would be, I imagine, intended both as a naval station and as a refuge for vessels in the district.

15,076. Does that arise from the fact that, speaking as a sailor, when very large fleets of vessels run for it, and so crowd the harbour, and other ships in distress are obliged to seek shelter, they may run down to a place where there might be certain destruction either for themselves or for other ships if there was not room for them?—A case of that kind might occur, but it would be very rare, because light vessels never start for an anchorage but with a good leading wind. They would not go into a harbour of refuge if they had the chance of making the port they were bound for.

15,077. I asked the question because yesterday a master of a ship stated that in Yarmouth Roads he had known 700 or 800 vessels at anchor at one time ? —I never did.

15,078. And that he had known congregated off Flamborough Head at one time 700 or 800 vessels ? —He might. If there were 700 or 800 vessels there would not be room for them in Filey Bay.

15,079. Then, looking to the object which this Commission has in view, I think you expressed an opinion, Mr. Anderson, that if the expenditure of the public money is to do the good which the Government desires it should do, it should be expended first on the improvement of the three existing harbours, Sunderland, Tees, and the Tyne, and that, secondly, it should be expended in the construction of a harbour somewhere in the neighbourhood of Flamborough?—I think so.

15,080. Then, whether do you put the improvement of the existing harbours first or second ?—First. I beg I may not be misunderstood. I do not look to Government taking upon themselves the improvement of the harbours.

15,081. Yes ; but, looking to the saving of life and property, you in the first place consider that the three harbours you have named ought to be improved ? —Yes.

15,082. In the second place, then, there ought to be some harbour especially for laden ships in the neighbourhood of Flamborough Head ?—Yes ; between Flamborough Head and Newbiggin Point. I give my opinion about Flamborough Head with regard to the laden ships because I know that is the place where they most do congregate, but I do not pretend to say which is the best place.

15,083. Take, for instance, the construction of this pier ; do you mean that Government should give the whole of the money that would be required to construct these two piers, or, supposing the piers were to cost 300,000*l.*, do you mean that if the district or the parties interested in the district raise 150,000*l.* by means of a tax or otherwise upon the shipping entering it, that Government in that case should give another 150,000*l.* ?—I mean that we shall be very thankful to receive all the Government will give us, and that we will endeavour to make up the remainder as well as we can.

15,084. But as Mr. Stevenson says the piers will be of great value locally, do you think that if Government agreed to give 150,000*l.* the parties interested in the district ought to give another 150,000*l.* ?—That is a question I do not think I am competent to answer, for, although I appear here as one of the river commissioners, I am not in possession of the opinion of the commissioners ; but whatever Government thought proper to give, the commissioners would endeavour to make up the rest by loan, or somehow or other, so that the port might be improved.

15,085. Then as you are a commissioner of the River Wear, and have a delicacy in speaking in regard to your own place, and as I am not speaking in regard to the Wear, but in regard to principle, we will take either the Tees or the Tyne, and say, that if the Tyne people were willing to raise 200,000*l.* to extend the piers so as to make a harbour that ships could take at all times of the tide, do you think that Government should in that case give 200,000*l.* ?—I was connected with the Tyne a great many years, and if I may give my opinion with respect to the Tyne I think the exertions the people of the Tyne are making now to improve their harbour entitles them to the consideration of Government, and they have clearly proved that they intend to do all they can ; but I cannot say in what proportion each party ought to give.

15,086. But do you think the parties interested in the particular districts ought to be required to make up some proportion of the sum requisite to construct harbours of refuge ?—Oh yes, certainly, according to their means, and I have no doubt they would be very willing to do it.

15,087. What is the depth of water at the entrance of the south dock at low water spring tides ?—I do not know. I was told the other day by a gentleman connected with the dock that they had 10 feet at low water.

15,088. Is it generally considered a much better entrance than the present entrance of the river ?—Oh, decidedly, it is a deeper entrance ; there is four feet more water, I should suppose.

15,089. And a straighter channel ?—A perfectly straight channel.

15,090. How is it that so many ships continue to go in by the north entrance ?—Because they cannot open the gates ; there is very little more span than the width of a good ship, and you cannot run into them in a gale of wind.

15,091. There is a very limited space at the entrance of the dock gates ?—Yes ; I do not know the distance exactly, but you will get that information correctly from the gentlemen who represent the dock

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company. What I have said is only from second hand, and I beg it may be taken with caution.

15,092. (*Capt. Washington.*) You are a river commissioner ?—Yes.

15,093. In giving an account of the vessels entering and leaving the port, you gave them only for one quarter ?—Only for a quarter.

15,094. Will you turn to page 1 of the return, and give them for the whole year, that is, for the year 1857 ?—I shall be very happy to give them. In the year 1857 there entered by the harbour 10,346 vessels, and by the south outlet 398 vessels, making a total of 10,744. Then the sailings by the harbour were 6,904 vessels, by the south outlet 3,991, of which 3,991 3,717 were loaded in the dock, and 274 in the river, and passed through the dock to sea, making a grand total of arrivals and sailings in the year of 21,639.

15,095. Do you know if that includes the vessels which did not pay customs' dues ?—I do not know ; but there is a return for 1857 of these which pay customs' dues.

Mr. MEIK recalled.

Mr. T. Meik.

15,096. (*Capt. Washington.*) The present return does not give the whole of the arrivals and sailings of the port of Sunderland ?—It cannot be obtained for 1857 till the present year. No return has been kept of light ships that enter.

15,097. For some months and quarters ending December you distinguish between those that pay port dues and those that do not ?—Yes ; and a considerable number do not.

15,098. And are they included in this return ?—They are not.

Mr. ANDERSON recalled.

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15,099. (*Capt. Washington.*) The vessels that do not pay customs' dues are passengers' steamers, ballast keels, hoppers, and fishing craft, and they almost entirely use the old harbour ?—Yes ; there are only 17 in the month ending 31st August of 243 tons each that have used the dock, and the hopper vessels are vessels that carry the ballast out to sea.

15,100. You see that 600 vessels arrived and sailed in one quarter. May we further understand that the same number will arrive and sail each quarter ?—Of vessels not paying customs' dues, do you mean ?

15,101. Yes.—There are 307 arriving, and 296 leaving the harbour, which makes 603.

15,102. May we assume that there are four times that number in the year enter and leave the port of Sunderland ?—You may.

15,103. That is in addition to the 21,600 ?—Yes.

15,104. Can you tell me the whole revenue of the port for 1857 ?—20,428*l.* is the River Wear commissioners' revenue.

15,105. Do you know how much of that is available for the improvement of the river ?—The ordinary expenses are about 12,000*l.* a year ; but the commissioners have reduced their revenue by 1*d.* a chaldron, and they are now receiving only 3*d.* a chaldron instead of 4*d.*, which was considered very high ; and I may mention that nothing pays here but coal, culm, and coke, and shipping goods imported into this port do not pay anything for the maintenance of the river ; they pay a primage to the Trinity House of Newcastle, which I believe is the reason why they are exonerated from paying anything elsewhere.

15,106. Of the whole amount of harbour revenue, how much is applicable to improvements in the river ?—Well, there will be in round numbers about 3,000*l.* or 4,000*l.* a year. The revenue for the present year, supposing that the quantity of coal shipped was the same as in 1857, which I suppose it will be, or a little more, will be about 11,142*l.* for coals, and 5,570*l.* for shipping, which will make us a gross revenue of 16,712*l.* Taking the current expenses at 12,000*l.*,—I am not quite clear that these figures are correct, but they are very near,—there will be 4,412*l.* left.

15,107. You were for many years chairman or secretary of the Lifeboat Association at Shields ?—I was.

15,108. Are the lifeboats here in as good order as they were at Shields ?—I believe they are ; but I do not know anything more about them than seeing them.

15,109. You do not take any interest in them ?—No. I believe they are quite as good at Shields as any in the Wear.

15,110. (*Capt. Sulivan.*) You said a harbour near a point was better for refuge than one in the depth of the bay ?—Yes.

15,111. I think you said because a vessel could go off on either tack if she missed it ?—Yes ; whichever way the wind was she would be in a position to take advantage of that wind.

15,112. And go off on one tack or the other ?—No; that she could go off on either tack.

15,113. If a vessel was embayed, and could not get out on either tack, is she not more in want of a harbour of refuge than one in a place where she can go off on one tack ?—Certainly.

15,114. Then, all other things equal, would not that rather tend to place the harbour of refuge in a bay than near a point ?—In a case of that kind it would.

15,115. As saving a greater number of embayed vessels ?—Yes. There is one thing I would say ; laden vessels are not often embayed ; they hold well to windward; light vessels do get embayed because they are leeward, and therefore are more likely to be embayed than laden vessels.

15,116. Then am I understand by that that it is the general custom of laden vessels to keep an offing till they get Flamborough Head ?—Always, if the wind is easterly.

15,117. Do you know whether, when this south entrance to the dock was constructed, it was supposed that that would make a better entrance to the harbour of Sunderland than the old one; and did the parties who laid out the money on that think that they were insuring a comparatively safe entrance to these docks, and one that could be used in preference to the old harbour entrance ?—Well, what they thought it is impossible for me to say; but there is no doubt it is a very good entrance in fine weather, and capable of admitting vessels of great draughts of water, but it is only available in fine weather, as the returns show.

15,118. These works, therefore, so far as improving the entrance in the most dangerous times in gales of wind, may be considered a failure ?—Well, I do not think it is a failure, comparatively, because I cannot imagine they ever could imagine that an entrance through a dock could be available in gales of wind easterly.

15,119. I am alluding more especially to the piers which I see running outside that lock, and which bear on a small scale to it something like the proportion that Mr. Stevenson's piers bear to the present entrance, and I want to know whether the entrance between these piers has proved as safe as was expected for vessels to take in heavy weather ?—Vessels can take them in heavy weather, no doubt ; but there is no place for them to run into like a river after they are in. There is a marked difference between the two. By those piers of Mr. Stevenson's, when a vessel runs in, she gets into comparatively smooth water, for it is expected that the waves will disperse, and lessen in height, of course, and then vessels can run up the river. Vessels may go very safely in between the piers into the south entrance; but what are they to do afterwards.

15,120. By vessels running up the river when inside of Mr. Stevenson's piers I suppose you allude to the

time when there is water enough for them, and not at all times of the tide?—They run up as soon as there is water, and means will be taken to deepen the water in the harbour where the pier works are going on. The commissioners are now at work increasing the tidal water by taking away the sands out of the river, so as to get a greater area of tidal water, and consequently a greater scour. We do not expect that these piers will improve the harbour and river and do everything that is required. There will be an immense expenditure incurred also by the commissioners in cleansing out the river, and this is now going on.

15,121. I think you said there would be gentlemen who knew more of the entrance and circumstances of this south harbour than you do?—Certainly; I know very little of it.

15,122. (*Chairman.*) What description of vessels are generally used by the coal trade? We had it in evidence the other day, that although they did not look very well in their upper works, their bottoms were sounder and better than any other vessels afloat. Is that your opinion?—I have not been conversant with the sort of vessels in the coal trade, but I believe it is so. I know from experience that they are a better class of vessels now than they were 40 years ago. They are subject, I believe, to annual surveys by the underwriters, and they must be kept in a certain state of repair to be insurable, and therefore there is that guarantee for their soundness. The bottoms are, I believe, kept in very good repair.

15,123. Then, comparing them with the vessels in the foreign trade, should you say that, generally speaking, they are as good, as respects their hulls, as the vessels in the foreign trade?—I would not say they are as good as those very valuable ships that are built for the East India and distant trades; but they are quite as good, and some are better, than many of the ships which trade to Archangel, the Baltic, and short distances.

15,124. Therefore you are disposed to say they are as good as the smaller class of vessels that sail foreign?—Quite as good, and perfectly as seaworthy, I should say, as a class of shipping.

15,125. As respects the way they are found aloft, masts, sails, rigging, rope, should you generally consider them very much improved within the last 40 years too?—I think it is quite as good as it was. They are subject also to annual survey by the underwriter, both in hull and masts, therefore there is no reason why the one should not be kept in as good order as the other; and they all now have chain cables, which are supposed to be very good, as they are not liable to decay as rope was; the ground tackle is therefore very good.

15,126. And aloft, are they as well found as a similar class of vessels that sail foreign?—I should say so.

15,127. Of what use would Filey Bay be to laden vessels leaving Sunderland or the Tyne if caught suddenly with a gale from the south-east shortly after leaving port?—None at all.

15,128. (*Mr. Lindsay.*) That would arise because Filey Bay would be considerably to windward?—Yes.

15,129. What use would Filey Bay be to vessels caught with such a gale of wind off Flamborough Head?—They could run in, and it would be a very good shelter.

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15,130. (*Chairman.*) You are a resident in the port of Sunderland?—I am.

15,131. For how long have you been connected with it?—I was born in Sunderland, and have been here ever since.

15,132. In what capacity are you connected with the port?—I am a shipowner, and commissioner of the River Wear.

15,133. Have you been at sea in former days?—Yes; I served my time, and continued at sea several years.

15,134. Were you a commander of a vessel?—Yes, for several years.

15,135. In what trades were the vessels chiefly employed that you commanded?—The Baltic and North American trade.

15,136. You are aware of the objects of this inquiry, and you have been present, I imagine, this forenoon?—I have.

15,137. Will you state to the Commissioners your opinion of the advantage or necessity of one large national harbour of refuge on this district of the coast, or whether you are of opinion that the improvement of the several ports, the Tyne, the Tees, and the Wear, would be the most advantageous for the purpose of saving life?—My opinion is very decidedly in favour of the improvement of the several principal ports on the coast, and my reason is principally because the trade of this coast is peculiar to itself, and nothing like that on any other coast. If a general large harbour of refuge was made on any part of the coast, I think it would not answer the purpose of saving life and property to the extent that the improvement of the existing harbours would do, for this reason, the coal trade is carried on quickly, and its very life and spirit is expedition. It is the interest of every one connected with the ship,—owner, master, and crew,—being paid by the voyage, to make the voyage as quickly as possible, and they never consider a refuge, except under the most extreme necessity, but always run at any risk for the port of destination, the port where they are to load and sail from. Despatch in the coal trade is the very life and soul of it, and the coal trade is the principal part of the navigation on this coast, and for these reasons I think that if the harbours, four or five, or any number that might be thought advisable, could be made accessible at low water, or any time after the tide has flowed a little, and after the tide has fallen considerably, it would be decidedly the best means of saving life and property.

15,138. Then, taking into view the fact which you have stated, that despatch is the very life of the coal trade, would it not be an advantage for loaded vessels that have got as far on their voyage as Flamborough Head, in the event of meeting a strong southerly gale, to have some port they could put into there, instead of running back to the Tyne, the Tees, and the Wear?—That to a certain extent might apply; but the mischief, the loss of property, and a good deal the loss of life too, arises principally out of light ships. Laden ships keep on a fair course, but light ships all run for the harbours, and especially with the wind at east-south-east and that way, so that no harbour of refuge they would ever think of; they would run down at all risks; and if they are too late for the tide they have to depend upon their anchors to keep those light ships off the land; indeed it would not be the interest of any party connected with the ship that they should take a harbour of refuge to the south of the place they are bound for.

15,139. That is, light ships?—Yes.

15,140. I can perfectly understand that light ships, running down from the London river, their great object is to make their port where they have to be loaded; and light ships, in the event of meeting strong north-easterly winds, have a very good harbour of refuge already, have they not, under Flamborough Head?—Yes.

15,141. Putting aside light ships altogether, and taking the case of loaded ships that have got as far as Flamborough Head, or nearly so, if these ships met a strong south-easterly gale, would it not be for their advantage, instead of running back to their own ports, to have a harbour in the neighbourhood of the head,—on the north side of the head,—that they could put into and hold—if I may so express it—what they have got of their voyage?—That would only be in case of a south-east wind. With the wind more to the eastward they would when they rounded the head

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fetch the Humber, which is a good and safe harbour of refuge.

15,142. But I allude more especially to vessels that have rounded the head?—The only place I know of is Filey Bay.

15,143. Then would a harbour of refuge in Filey Bay be of use to laden vessels?—My own opinion is,—not a very great deal. A harbour much north of that would be more so, I think.

15,144. Will you state your reasons why a harbour much north of that would be of more use?—With the wind at south-east ships, unless they have sprung a leak or got disabled, could keep to sea and go off, with the wind to the south-east; it is with the easterly gales that the most mischief is done, when they will scarcely go off on either tack. Then if the wind is well easterly, if they round the head, they can the Humber.

15,145. Then, so far as the saving of life goes, you would say that with the wind at the south-east a harbour of refuge is not required, vessels being able to stand off on the starboard tack?—Not so much; our dangerous wind is from the south-south-east; that is, where they cannot keep off the land; but loaded ships generally keep as good an offing as they can possibly do; light ships always run in for the coast; that is where the great loss of life occurs more in light ships than loaded ones; they run for their ports, and if they are half an hour too late for the tide, and the black ball is hoisted, they must bring up in the roads; they are so close in they can do nothing else, and it is about six or eight hours before they can take the harbour. If the harbours were improved that those vessels could take them when they come down, for instance, the Tyne, Wear, and Tees, and other ports, all this would be avoided, and the immense loss of property avoided. Besides these ports would be accessible to loaded vessels of smaller size as harbours of refuge; for instance, if they make six feet water at the entrance of the Tyne and three fathoms here, there is very little doubt that loaded vessels would be able to take those ports as well as light vessels at high water. Light vessels would escape by taking them at low water. Indeed small loaded coasters now take the Tyne; but if there were six fathoms there, and three fathoms here, they would take those places instead of running back to Leith Roads.

15,146. So far as your experience goes, has the loss of ships off this particular port been greater of light than loaded?—Yes.

15,147. Are you aware that it has been stated, I think in evidence before the Select Committee of the House of Commons, that on the whole coast the loss of loaded ships is very considerably greater than the loss of light ones? Can you give me your opinion as to that fact?—Not on this coast, I think.

15,148. Not on this coast?—My impression is that the reverse is entirely the case. We have rarely a laden vessel lost in this immediate neighbourhood. I have seen eight come ashore from their anchors here within half a mile of the pier heads; they had laid at low water till the tide flowed; whereas if this improvement had been carried out every one of them would have come in with the greatest ease.

15,149. Can you tell me if Sunderland vessels frequently run for the Tyne in heavy weather in consequence of not being able to get into their own port?—Laden vessels do sometimes. Generally speaking, we have had a smaller class of vessels at Sunderland, and when they have been taken with south-east gales, and did not like to keep the sea, they frequently have run for the Tyne; and in many instances where laden vessels have run for the Tyne they have fallen to the leeward, got upon the Black Middens, and the ship and life has been lost; and if these improvements were carried out ships, instead of taking these bars in broken water, for in easterly breezes the water breaks heavily in front of these harbours, the sea would be heavy, but it would run much more easily, and there would be much less danger, and ships would get into comparatively smooth water before they got to very short water.

15,150. (*Capt. Sulivan.*) You said laden ships off Flamborough Head did not generally require a harbour of refuge in south-east gales, because they could go off on the starboard tack, yet you have since said that loaded vessels put back to the Tyne, and even to the Firth of Forth, and that even vessels bound for this port run to the southward of it?—Yes.

15,151. Is it the case that in south-east gales many loaded vessels have to bear up, notwithstanding that they can go off on the starboard tack?—Yes; they bring up, because they do not like to contend.

15,152. Do they not lose much ground and time and incur expense by their having thus to bear up?—Not as a general rule; that is if they bear up for the Tyne. There is a difference between bearing up for the Tyne and a port at a distance. The one would not be a mighty matter to the other. We do not consider it a very great distance between here and any port south of us.

15,153. If vessels bear up for the Firth of Forth, or even for Sunderland, when they are down off Flamborough Head, is it not a great loss of time compared to what it would be if they had a port near Flamborough Head to go into?—Of course it would; it is eighty miles distance.

15,154. Are not vessels running back that way often lost, when a harbour there might have saved them?—I do not think so.

15,155. You do not know a case of a loaded vessel running back, and then being lost, that would have been saved had there been a harbour of refuge fit at all times of the tide to receive them?—Not within my own immediate recollection.

15,156. You say the wrecks on this coast are principally light vessels; do you mean that more light colliers belonging to the northern colliery ports are lost than laden ones on their voyage between this and London and back, or do you mean that the wrecks in the immediate neighbourhood of this place are more light than loaded?—There is no question about it, that in this immediate neighbourhood, the very large majority of the vessels lost are light vessels; the loaded vessels are more frequently lost considerably to the south.

15,157. Take the vessels belonging to Sunderland trading to London or anywhere with coals during the year, then what do you believe the proportion to be of loaded and light colliers?—I cannot say; I must distinguish the ports if I am to give any opinion.

15,158. There are a larger portion of loaded colliers lost near Yarmouth Roads than there are light colliers?—Decidedly. In the Swin and about Yarmouth Roads loaded colliers are frequently lost.

15,159. Is your allusion to light vessels principally with reference to the advantage of the improvement of this particular port or these northern ports, and not with reference to the saving of life and property to the whole collier trade, whether loaded or light; am I to understand that?—Well, that of course is the view I take.

15,160. Without reference exactly to the place where these vessels are wrecked, do you know what the usual idea is as to the proportion of Sunderland vessels that are lost? Are they more generally lost during the year with their cargoes on their way south, or in ballast on their way north?—I cannot speak to that.

15,161. (*Chairman.*) You have a good knowledge of the vessels employed in the coal trade?—I have.

15,162. Are they generally well-found vessels aloft, as far as regards their sails, rigging?—I daresay they are fairly found for the trade; they are employed in short voyages.

15,163. And how should you say they are found compared with vessels of similar size that go foreign?—Well, vessels going long foreign voyages as a matter of necessity have to be kept better found than vessels with two or three or four days' passage. They are

always arriving at one port or the other, and any deficiencies are easily made up.

15,164. But as these vessels that are employed in the coal trade see a great deal of bad weather, and are in the vicinity of land and danger, it appears to me it is quite as essential or more so that they should be as well found as those that go foreign, as far as the safety of the crews are concerned. Would you be disposed to say that?—Yes; only they are a short time exposed, and practical men know that a ship exposed a long time to the weather and labour in the Atlantic ocean is very different to a ship in the coasting trade, where she is only exposed to a gale of wind now and then. The prevalent winds are off the land here.

15,165. Yes; and therefore what I allude to is, that when one of these vessels finds herself on a leeshore, and is obliged to work off that leeshore, if she can, to save the lives of the people on board, and also to save the ship, do you think that her ropes and sails are as well calculated for that as those which are generally found in the foreign trade?—I do not know that I can say that that is the case, generally speaking. I think I would not be wanting in saying that I think the vessels which, generally speaking, are employed in the coal trade, are equal to the vessels employed on long foreign voyages.

15,166. Of the same size?—Yes, of the same size. Generally the vessels going long foreign voyages are A 1. vessels. There are a great many second-class and third-class vessels in the coal trade.

15,167. But A 1. craft does not apply to the gear aloft, which is the most essential thing for the saving of life on a lee shore?—They are, as long as vessels keep tight; but frequently vessels in heavy gales of wind, which only occur occasionally, do not depend so much on their gear aloft, but they turn leaky.

15,168. As respects the hull, do you consider they are as sound and good, considering that they are not, as you say, A 1. vessels, as the vessels of the same class employed in the foreign trade?—Decidedly.

15,169. And on the whole, if you were working off a leeshore for your life, would you rather be in one of the colliers or one of the vessels that go foreign?—Permit me to explain my opinion on that. I would rather be in the average of the colliers than in an American fir-built ship, which all trade foreign.

15,170. But in an English-built ship which trades foreign?—Well, if she was of the same class and the same kind of vessel I would as soon take the one as the other; but the thing is there are so few of these second-class vessels in the foreign trade; it is carried on principally by first-class vessels,—the long voyages.

15,171. And with reference to the gear aloft, upon which the safety of the vessel mainly depends in working off a leeshore, would you feel as comfortable in a collier as in one of the vessels going foreign?—Not generally.

15,172. Now as to the statement with reference to the outlet of the south dock, what is your opinion of it? Has it answered the purpose for which it was intended?—It has answered the purpose exactly that it was intended for. It was never intended as a separate entrance. It was never intended except as a south outlet. Our trade principally depends upon loaded vessels going out of the place. The large proportion of vessels that come in are in ballast, and they depart loaded. It is called the south outlet, and the very name of it distinguishes it. It was never intended except for ships passing through in fine weather as an outlet.

15,173. Therefore I understand you to say the object of this southern outlet was, in the first place, more especially for ships that were leaving the port?—Yes.

15,174. And that, in the second place, it has answered its purpose as an outlet for ships that want to come out at the south dock?—Yes.

15,175. For ships of large draught of water?—Yes; and I would like to make a statement as to the position of the River Wear commissioners in asking for some assistance to improve this harbour. The revenue of the commissioners last year was rather upwards of 20,000*l.*, the whole of which is available for harbour purposes, except the interest of 35,000*l.* which is borrowed, and the officials' salaries. Well, my own opinion is, that the commissioners would not be warranted in expending so large a sum of money as 300,000*l.* in improving this harbour, as it would not in my opinion have the effect of increasing their revenue, except to a very small extent; and my reason for thinking so is, that the vessels coming to this port, if they load to a large draft of water, must leave at the south outlet, it having answered the purpose, and enabled them to load from 20 to 23 feet water. The captains never think about getting in; therefore we may suppose that the opening of this south outlet has increased our trade to almost the extent it will be increased; therefore we would saddle ourselves with the interest of a large sum of money for the improvement of this entrance, without in any way, or at least to a very small degree, increasing our revenue; and I think if this improvement was to have the effect, and if each of the harbours gave something to carrying out these improvements, the Government ought in some measure to assist us. Our revenue last year was 20,000*l.* We have reduced the dues on coals 1*d.* per chaldron, which will reduce this revenue 3,000 and odd pounds. Our ordinary expenditure is from 12,000*l.* to 14,000*l.* a year in dredging, keeping the harbour in order, paying salaries, and such like; and then we have the interest of the 35,000*l.* Now if we are to spend so large a sum as 200,000*l.* or 300,000*l.* it would saddle us with interest at the rate of five per cent. per annum, to the extent of 15,000*l.* a year, and I think, as the improvement of the harbour is the best thing that can possibly be done for the saving of life and property, we should be assisted by the Government.

15,176. (*Mr. Lindsay.*) Are you one of the commissioners of the River Wear?—Yes.

15,177. Then I understand that the revenue at present is about 20,000*l.* per annum?—It was last year.

15,178. And you expended about 12,000*l.*?—Our ordinary expense varies from 12,000*l.* to 14,000*l.*

15,179. What do you do with the difference?—Reduce the dues.

15,180. Have you reduced the dues materially of late years?—At the last meeting we reduced them 1*d.* per chaldron.

15,181. Well, but are you of opinion that if piers such as these were constructed it would be of any great advantage locally?—In the saving of life and property.

15,182. No. I want to know if you think they would tend to increase the trade of the place, and benefit the town and port?—It will not increase the trade of the place materially.

15,183. You think not?—I think not. I gave my reasons just now.

15,184. I was not here?—That the south outlet has increased our trade to almost the extent to which it may be supposed, and it does not depend upon the entrance. Ships coming in here do not inquire how they are to get in, but at what draft of water they are to get out. They make sure that if they can get out at 20 or 22 feet laden they will always get in at from 9 to 13 feet. Unquestionably, therefore, we may calculate that the south outlet has increased our trade, I should suppose well on to one-fourth or one-third. What I wish to be understood is, that the improvement of the inlet will not improve our trade materially.

15,185. Say the Government were disposed to aid in the construction of such piers as those pointed out, would the River Wear commissioners be disposed to contribute towards it, and to what extent?—I have no idea to what extent. No doubt they would contribute to what might be considered reasonable, according to their revenue, for the improvement of the harbour and the advantage of the port.

15,186. Well then, looking to the advantage of the

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port, what do you consider reasonable?—I do not know.

15,187. Say it is to exceed 300,000*l.*, what do you think would be a reasonable sum for the commissioners to pay for that?—I think, myself, one-third of it.

15,188. Do you think it would be unreasonable if the Government agreed to give 150,000*l.* towards it, that the commissioners should give another 150,000*l.*? My own impression is, that if we contributed one-third of what it cost, we would do well.

15,189. What is the largest vessel that has loaded here since the south entrance was opened?—About 1,700 tons. She took in about 2,200 tons of coal, and drew somewhere about 22 feet water.

15,190. And what were about the largest-sized vessels that used to load here before the south entrance was opened?—Well, it was not safe, with any chance of getting out to sea in a reasonable time, to load her beyond 16 feet.

15,191. So that in point of fact the south outlet has enabled you to admit ships and to load ships drawing six feet more water than before?—Yes, about that; and that has attracted a trade in ships that we could not have had by any other process, therefore, I say, the power of sailing is the thing that is inquired for, because everybody knows how he is to get in, but not as to how he is to get out.

15,192. But the difficulty before was that ships on account of the heavy sea and the little water on the bar were detained here in great numbers unable to get to sea?—Yes.

15,193. Therefore the south outlet was made to facilitate their getting to sea at a greater depth of water?—Yes.

15,194. And it has answered that purpose?—Yes.

15,195. I know you and your family have taken a great interest, always, in Sunderland. Tell me something about the "Creek." This creek puzzles me. Tell me something about this tax which you pay to Newcastle. You are called a creek of Newcastle, to my surprise. And we are informed that you pay tribute to about 1,300*l.* a year. Is it a tax upon shipping, or a tax upon goods and some trifling tax upon shipping also? On all timber, all goods imported, or———?—Primage.

15,196. On all goods imported?—Yes.

15,197. Is there any tax on exports as well as imports?—I think not, but I am not sure.

15,198. Will any other witness be able to tell me about this?—I am sure I do not know, but I can tell you that the whole town is very much dissatisfied.

15,199. Can you send to our secretary an account of what you pay?—We have no means of getting at it but through the Trinity House of Newcastle or their servants.

15,200. You know what you pay?—We know what we pay in particular cases, but not the whole amount.

15,201. Have the people of Sunderland remonstrated in regard to the payment of this?—Oh yes; the Shipowners' Society had a court trial on the subject.

15,202. Then there will be some gentleman from the Shipowners' Society who will be able to tell us more about it?—The secretary is here.

15,203. (*Capt. Sulivan.*) Will you be kind enough to explain to me how it is as to the harbour and docks? Do the vessels entering the docks by either entrance pay equally to the river fund, or are the south docks a separate trust and a separate fund?—They pay equally to the river fund, that is on dues and ships, but those which use the docks pay dock dues, in addition, to the dock company.

15,204. If a vessel were to enter by the south dock entrance, and only go into the dock, and not to go to sea from that entrance, would she pay river dues the same as if she came in, and went out through the main entrance?—Precisely.

15,205. (*Chairman.*) If you wish to add anything to your statement we are prepared to hear it.—I would wish to give another reason or two for giving the preference to an improvement of these harbours over one large harbour of refuge. No harbour of refuge, however convenient, however large, however suitable, south of this place, can be made available by ships coming down. They would at all risks pass it. If a gale caught a fleet in Yarmouth Roads, if there was a refuge harbour in the bay, and they could take it, they would pass it. It is their interest to make the voyage as quickly as possible, and they would pass any harbour with the wind at east-south-east blowing hard, and take the chance of getting into their ports when they arrived off them. I do not think, so far as the trade of this coast particularly is concerned, that any single harbour of refuge in any place or position would answer the purpose that the improvement of the rivers would do; that is applying it to the peculiar state of the trade along the coast.

15,206. And the reason you have just given has a special application I understand to light vessels?—Yes, because our loss on this coast principally arises from light ships coming down here, when there is no water. Then, if these ports were improved to the extent that is contemplated, they would be able to take these ports as they come down. I have a decided objection myself to making a large harbour of refuge at the bottom of a deep bay, for two very principal reasons; in the first place, when ships run for a harbour of refuge it generally happens to be in thick snowy weather; if they miss the port on either side there is nothing for them but to go on shore; there is no chance of hauling off on the other tack; in the next place, still keeping in view the trade of this coast, when the wind in some measure moderates, or gets round to the south-east or north-east, in a deep bay vessels cannot get out to proceed on their course; there will be a stoppage to trade; whereas if there is to be one harbour of refuge it would be much better, in my opinion, if it were made in something like a straight course, or on a projecting cape, if it could be made so.

Mr. Alexander Noble examined.

Mr. A. Noble.

15,207. (*Chairman.*) You are superintendent harbour-master of the port of Sunderland?—I am.

15,208. For how many years have you been connected with the port in that capacity?—Nearly eleven.

15,209. And previous to that did you follow the sea?—Yes.

15,210. Will you state the number of years?—Sixteen.

15,211. And of those years were you in command of vessels at any time?—I was for nearly nine years.

15,212. And the vessels which you commanded were chiefly employed in what trades?—In different trades; I have commanded on this coast; to the East Indies and other parts.

15,213. Did you ever command ships in the Baltic trade?—I was once there.

15,214. And in the American trade have you gone north about?—I have.

15,215. How many voyages?—I have been, I should think, 5 or 6 times across the Atlantic.

15,216. Are you aware of the objects of this inquiry?—I am.

15,217. Will you state any opinion you entertain as to the necessity or advantage of one single harbour of refuge on this coast, or whether the improvement of the three ports, the Tyne, Wear, and Tees, would be more advantageous for the saving of life?—Practically speaking, I would sooner see the present harbours improved than one given harbour to be made in a given place, because light ships that come round Flamborough Head they generally steer a direct course down to the different ports of Shields, the Tees, and Sunderland, and if a harbour of refuge were placed in any given

spot those vessels that had got opposite to and with an east-south-east wind could not fetch back again ; for instance, if a harbour of refuge was in the Tees Bay, and ships north of that bound down to Sunderland or to Shields were caught in a gale from the east-south-east they could not fetch back.

15,218. As respects laden vessels, what is your opinion as to harbours of refuge; laden vessels making their passage to the south ?—Comparatively speaking, with the number of ships that leave and arrive off these ports, very few laden ships are lost ; some are lost between Flamborough Head and this port.

15,219. Do you consider a refuge harbour is not required for laden ships ?—I would sooner see the present harbours improved than a harbour of refuge in any given spot.

15,220. Well, now suppose it was decided, notwithstanding your opinion to that effect, that there should be a large harbour for ships employed in the coasting and coal trades, where would you place it between the Tyne and Flamborough Head ?—I would place it as near Flamborough Head as possible.

15,221. Will you state your reasons ?—Because it is a promontory that runs into the sea, and ships generally make for that point, both coming and going; and if vessels were caught off there with a gale of wind they could run with the greatest safety into Bridlington Bay or Filey Bay, if it was big enough. I think it would not be advisable to place it further north than somewhere about Flamborough Head.

15,222. Well, you have heard the reasons that have been given by one or two of the previous witnesses as to their preference for a harbour of refuge at a place like Flamborough Head to one in the bight of a bay. What is your opinion on the subject ?—My opinion is, as the witnesses have already stated, that when it is necessary to take these harbours of refuge it is generally very bad, thick, hazy weather, and you do not perhaps exactly know where the ship may be; a man might feel timid in running down into a deep bight like Tees Bay. He would generally hang out, to try to make the bold land like Flamborough Head, so that if he could not fetch it he could go off on the other tack.

15,223. Are you acquainted with the land in the neighbourhood of Hartlepool ?—I am.

15,224. Is it land which is easy to make in blowing and thick weather from the eastward ?—No ; it is low land in Tees Bay ; but it is good land at Redcar.

15,225. Is it therefore easy to make or not ?—I should say it is rather dangerous to make. It is dangerous to run down into that bight.

15,226. Are you aware whether Sunderland ships run into the Tyne in bad weather frequently ?—Sometimes they do. Laden vessels of heavy draught of water go past our port, and knowing there are two or three feet more water on the bar at Shields they take that in preference to taking our port ; but laden vessels run to our port also.

15,227. You know Yarmouth Roads ?—Yes.

15,228. How many vessels have you ever seen lying there at one time ?—I should think 600 or 700 sail off Lowestoft Roads.

15,229. And were these vessels light or laden chiefly ?—The greatest number were light ships.

15,230. And has it ever occurred to you, in running through Yarmouth Roads, to find them so crowded that you could not get anchorage for your vessel ?—I have seen it very thronged sometimes, and bowsprits carried away, and that sort of thing, in bringing up.

15,231. Give me your opinion: suppose we are to have a large harbour of refuge, as to the number of vessels it ought to be calculated to contain to be really of service, taking into view that in heavy weather and in the night-time men cannot pick up a berth very nicely ?—I should think it ought to be able to contain 1,000 or 1,500 ships, to be of any use to the number of ships I have seen on the coast.

15,232. But will you reconsider that number ; because, although that number might be on the coast at any time, are you of opinion that they would accumulate to that extent during the week or ten days' blowing weather, taking into account that the light ships would naturally run for their own ports ? Perhaps there would not be that number if the ports were improved along the coast.

15,233. Would you be disposed to make the number something less than 1,000 or 1,500, on consideration ? —I should say you ought to have provision made for a great number, according to the size of the ships.

15,234. You are still disposed to adhere to your former number ?—Yes.

15,235. (*Mr. Lindsay.*) Then holding the opinion you do, if one great harbour of refuge is to be made it ought to be such as will contain on an emergency 1,000 or 1,500 ships ?—Yes ; but I would not like to see that harbour made and the present harbours not to be improved. My opinion is, that in preference to a harbour being made the present harbours of Shields, Sunderland, and the Tees ought to be improved.

15,236. Then knowing the coast as you do, and no doubt thinking in your own mind that you do not see any site where a harbour of that size could be made, I suppose that is one reason why you advocate the improvement of the existing harbours so as to admit vessels at all times of the tide ?—Yes. I am not aware where such a harbour could be made ; but it is absolutely necessary that something should be done on the east coast here to prevent the loss of life. If a harbour of refuge was made even at Flamborough Head to contain these 1,000 ships, this would be of no use if a vessel got opposite it with the east-south east ; they must still reach down to the north, and they would be in the same predicament as at present.

15,237. It would depend upon the position they were caught in, in a south-east gale, would it not?—Yes ; but if you take the returns of losses that have occurred, you will find that two thirds of the ships that are wrecked on this coast in 1854 were lost to the north of Hartlepool. You have 40 at Shields and 43 at Sunderland.

15,238. Whether is the entrance of the harbour at the Tyne, the Tees, or Hartlepool, or the Wear, easiest made out by a ship at sea ?—We generally reckon that Sunderland is best to pick up.

15,239. Why?—Because we have the Tunstall Hills, for one thing ; they are seen at a great distance, and they are seen when you cannot see the land.

15,240. Are these hills far behind ?—About a mile and a half.

15,241. But to a sailor going along the coast, anxious, in rather thick weather, to make out the entrance to the harbour, which entrance is easiest made out ?—I should say the Sunderland and Durham coast is as easy as any.

15,242. You think the entrance to Sunderland is as easy as the entrance either to the Tees or to the Tyne ?—It is decidedly better than the Tees.

15,243. Better than the Tyne ?—I do not say better than the Tyne ; Tynemouth Castle light is a capital mark.

15,244. The lighthouse is easily made out ?—Quite easily.

15,245. You have been 13 years harbour-master here ?—Eleven.

15,246. Has the sand to the north and south of the pier been accumulating during your experience ?—It has accumulated to the back of the north pier.

15,247. Then has it been accumulating at the south pier ?—It has.

15,248. Then it has been accumulating at both piers ?—Of course it has.

15,249. Then I see by this plan that the sand has gathered out till it has got to the extremity of both piers ?—Yes.

15,250. Then it has been growing gradually out ?—It has.

15,251. Has sand accumulated at the groins to the east of the south dock ?—It has.

15,252. And made the bank ?—The bank has been made to make the dock works.

SUNDERLAND.

Mr. A. Noble.

15 Oct. 1858.

Mr. Lindsay.

15,252*a*. But were the groins put down for the purpose of making the land?—Yes; of assisting.

15,253. And a pier then in reality is something similar to a groin; it collects sand on each side of it?—Not if we run it into the sea.

15,254. These two piers are run out into the sea?—No; they are embayed.

15,255. But still they project out to sea?—They are much more embayed now than they were previous to the dock being made.

15,256. You do not alter your opinion that the sand has grown gradually out to sea till it reached the end of the pier?—It has accumulated at the north side and south side as well.

15,257. If it had accumulated and made land at that particular point, and if it had accumulated, making land at these groins, why would not the effect be the same upon the proposed north and south piers as well?—The reason is, that the proposed piers will throw the entrance of the harbour more into the tideway and into the sea tide, and the tide sluicing past the entrance of the harbour will keep it clear.

15,258. When you were the captain of a ship you sailed to America, north about?—Yes.

15,259. Do you know anything of the coast between Aberdeen and the Pentland Firth?—I know nothing further than just passing.

15,260. Are you able to offer an opinion as to whether you think a harbour would be of most value, looking to the saving of life and the saving of property, and the facilities to commerce, at Fraserburgh, Peterhead, or Wick?—Considering the trade you have got from the northern ports of England to the Baltic, and North America, the safest place for a ship to run to is the Firth of Forth.

15,261. But I am speaking of north about between Peterhead and Wick. Do you consider yourself competent to answer?—I do not.

15,262. (*Capt. Sulivan.*) You said you thought the sand would not accumulate behind the piers because the tide would sweep by the entrance; would that have anything to do with preventing the accumulation at the back of the piers in the corners inside that line of the tide?—I am of opinion that if the piers are formed in the way projected the inside of it will be comparatively smooth.

15,263. I am speaking of the back of the piers. The sand moves along the coast, and accumulates at the back of the piers, as Mr. Lindsay was speaking about. You said the sand would not accumulate at the back outside the piers?—No; because the tide running along the coast would prevent it.

15,264. Even supposing that would prevent the sand accumulating at the mouth of the harbour on the change of tide, would that in any way affect the sand accumulating at the back of these piers projected, as it has accumulated at the back of them?—I do not think any sand of consequence will accumulate.

15,265. Where has the sand come from?—It has been a work of time.

15,266. Then a work of time would be likely to accumulate the sand out there?—No; the beach there is a sandy beach of itself. North of that it is a rocky beach.

15,267. Where does the sand come from that has filled up and added to this beach? It must have come from the sea, must it not?—No; there was sand at Roker.

15,268. Is the line of the sand further out towards the pier head than it used to be?—No, I do not know it is.

15,269. Where has the sand come from?—It has been stirred up along the coast.

15,270. Then will not the waves stir it up along the coast and bring it into the proposed piers?—There is very little sand at the back now.

15,271. (*Chairman.*) You heard the questions I put to two of the former witnesses relative to the state of the vessels employed in the coal trade?—I did.

15,272. Do you fully understand the object of them?—Yes.

15,273. Now give me your opinion, first, as to the state of the vessels employed in the coal trade, with respect to their sails, masts, rigging, and gear aloft. Whether are they as well found as vessels of the same size, generally speaking, in the foreign trade?—The greater part of the ships that belong to this coast of England are insured ships. They undergo an inspection by the clubs' agents that belong to the different ports, and it is their duty to inspect them from time to time to see they are in proper order. They do so, I believe. There are some vessels that I see in this port at different times, which I believe, from inquiries I have made, are many of them uninsured altogether. They will not receive them in the clubs; they are not fit to go on salt water, some of them.

15,274. As respects the hulls of these vessels, what would you say about them?—Well, it is out of my jurisdiction, any further than seeing these vessels. I should say, generally speaking, that the north country colliers, and vessels trading along the coast, are good wholesome strong ships; and I believe if they were not they would be condemned by the agents of the clubs; at least it is their duty to do so.

15,275. And therefore, generally speaking, you would say, as respects their hull, so far as your own opinion goes, they are good?—I would say so, generally speaking; there may be exceptions.

15,276. Can you give me any idea of the proportion of these vessels that are so bad that no clubs will insure them?—I cannot do so; I only see them occasionally in my duties.

Mr. JOHN GRAY examined.

Mr. J. Gray.

15,277. (*Chairman.*) You are inspector for the clubs at Sunderland?—Inspector of materials.

15,278. Do I understand by inspector of clubs, insurance clubs?—Yes, the three principal insurances at the port in which second-class ships are insured; second-class ships using the foreign trade and coasting.

15,279. And are these mutual insurance clubs?—Yes.

15,280. Are you a seafaring man?—Yes; my earliest recollections are of the sea. I was brought up to the sea.

15,281. How long were you at sea?—From a boy of four years old.

15,282. Till how long?—Till I was 38. Four years ago I was appointed harbour master for the east district of the port reaching from the bridge to the sea.

15,283. So that altogether you were 34 years at sea?—In early life my father had a small vessel, and I was brought up in the summer time with him.

15,284. For how many years have you been in command of vessels?—Something like 16 or 17 since I first took the command of a ship, and I was constantly in ships trading to London. It was one of the oldest ships belonging to the port, the *Cynthia* and was built by Mr. Alison, one of the commissioners.

15,285. You know the coast?—Well.

15,286. And you are aware of the object of this inquiry?—Yes.

15,287. You have been present during the whole of our inquiry?—Not during the whole of the early part.

15,288. Give me your opinion as to the advantage or necessity of a single harbour of refuge on this coast, or whether the improvement of the three ports, the Tyne, the Tees, and the Wear, would be more advantageous for saving life?—Where is the single harbour of refuge to be placed?

15,289. Perhaps it may be necessary that I should explain to you that I ask the questions, and you answer them?—I will endeavour to do so. The im-

provement of the three ports would accomplish more than one harbour of refuge on a limited scale.

15,290. What number of ships would you be disposed to say a harbour of refuge on a sufficient scale would hold?—I would not like to say the number of ships, but Yarmouth Roads is about, as near as I can recollect, 10 miles in length; there is about a mile and a half of good anchorage; Lowestoft Roads is about two miles and a half, and half a mile of good anchorage, and I have been riding there when these roads have been crammed from one end to the other.

15,291. And under the circumstances you have mentioned, were these vessels chiefly loaded or light, or were they a mixture of both?—They were light colliers. There might be a mixture of foreign ships bound to the north, but they were principally light colliers bound for the district between the Tees and Blyth.

15,292. You have heard the evidence given to us by some of the previous witnesses, that light colliers invariably run for their own ports?—Yes; it is a sailor's duty to make for his own port; the port he is bound for.

15,293. That being the case, and the large number of vessels you saw in Yarmouth Roads being principally light, would you be disposed to say that a harbour which would hold 500 or 600 sail might be of use?—It might be. If you could make a harbour fully the length of the Scroby and other sands lying at Yarmouth you might do some good.

15,294. Would a harbour of refuge for loaded ships going south be useful somewhere in the neighbourhood of Flamborough Head?—If placed in the open part it would not accomplish the end in view. It might save a loaded ship, in an isolated case or two if it was placed in a separate place, and kept to itself, but it would not accomplish anything in that way if it was placed in the open of any of the ports.

15,295. Are you acquainted with Filey Bay?—Yes; I rode out one of the heaviest winds that ever blew upon this coast there.

15,296. And are you acquainted with Bridlington Bay?—Yes; by cruising inside of it and out.

15,297. And how many vessels were at anchor there at that time?—I cannot say, but they were riding that thick that when the wind veered they fell under each other's bows and sunk each other.

15,298. Can you give me an idea of the number of vessels that was there at that time?—I should think something like 500 or 600 sail, and several ships could not find refuge there, and had to go to the Humber.

15,299. And these principally were light?—They were.

15,300. Therefore with a heavy north-easterly wind Bridlington Bay does afford very good anchorage for a considerable number of ships?—Yes.

15,301. Now, at Filey Bay at present, with the wind from the south-west or south, and so forth, how may vessels could find anchorage there?—About 150 or 200 sail; not more.

15,302. Suppose a harbour of refuge was made in Filey Bay that would hold from 500 to 600 sail, are you of opinion that it would be of use to laden colliers bound south?—Decidedly; it would save several of them. I do not say it would be as much use as a harbour of the same description made in the bight here, where there is sufficient room for the sand to work to the eastward of it.

15,303. Now, with reference to the opinion you have given about a harbour down in the bay, would you prefer a harbour of that kind to a harbour in Filey Bay?—Not right in the bay, but in one corner, to allow the silt to work past; the silt all comes from the northward.

15,304. Such being the case, is there any particular site of the coast from the Tyne to Flamborough Head that you would be disposed to point to for such a harbour of refuge?—One is about as good as the other. Souter Point is better than Hartlepool. But if Government were inclined to make a harbour of refuge they would soon find a site.

15,305. (*Mr. Lindsay.*) You stated that a harbour of refuge, if it could be made at Filey to hold about 500 sail of vessels, would do great good?—It would do some good.

15,306. But you thought it would do still greater good if it was down somewhere between Redcar and Tynemouth?—It would do more harm than good if placed in the open of a bay.

15,307. Do you mean in the deep bight of a bay?—Yes; it must be distant from a port, or the ships using that port going in and ships seeking refuge would confuse each other, there would be such a number of ships.

15,308. Is it your opinion that if it rested between Filey and Hartlepool you would give the preference to Filey?—I would not say that. I have never sounded in Runswick Bay, but I like that place; it would decidedly make the best Government harbour on this coast.

15,309. If it rested between Filey and Hartlepool, would you give the preference to Hartlepool?—No; I would not give the preference to Hartlepool; it is the worst place along the coast.

15,310. Then you would give the preference to Filey?—Yes, because it would keep the vessels clear of a port. It would be exclusively for the ships it was built for. In the opening of a port it would become the trade of the port, and in ten years it would be increased double to what it did in the previous ten years.

15,311. You object to Hartlepool being made a harbour of refuge, because the expenditure of Government money there would tend so materially to increase the trade of the place for a time?—For a time it would.

15,312. Do you object to it on that account?—Yes; but not altogether.

15,313. Give us other reasons. I want your reasons as a sailor why you would prefer Filey to Hartlepool?—Because ships only that need refuge would go to Filey; but when ships have to seek refuge at Hartlepool the ships bound there, especially ships that are light, will run in before them, and if there was a fleet of ships they would fill it up, and confuse them, so that it would do more harm than good. And I mean, in point of equity, it would be injustice to others to improve Hartlepool and her docks in preference to the docks making in the Tyne.

15,314. I want you always to keep in mind one thing, that is, that the object of spending the public money is to save life, and then property next. Looking at these two things, the loss of life about here and the loss of property, if it was left to you to spend the money whether would you spend it at Filey or at Hartlepool?—If it was determined that Filey or Hartlepool should be the place, I should say Filey.

15,315. That is your opinion?—Yes, for laden ships.

15,316. Say that it rested between Filey and the Tyne, and presuming that it was possible to make a harbour at the Tyne to receive the largest description of vessels at all times of the tide, whether do you think, having these objects in view, it would be better at Filey or at the Tyne?—For laden ships I should give the preference to Filey.

15,317. But looking to both laden and light ships?—If for laden and light ships, I would place it in the centre of the district between the Tees and Blyth, so as to allow each ship every facility of getting to it.

15,318. Then is it your opinion that the harbour should be somewhere about the place here?—I do not say this place—not in the open of this place,—although it is as good as Hartlepool. It is about, as far as I can recollect, the same distance from Hartlepool Pier to the five fathom line as it is from one port to the ten fathom line, and it is three miles out to good clear ground.

SUNDERLAND.

Mr. J. Gray.

15 Oct. 1858.

Mr. Lindsay.

15,319. When you say between Hartlepool and Blyth, what particular place do you refer to?—I do not say any particular place. I say the centre, to allow ships at each extremity to get out. They have now to go round Souter Point, which is a queer awkward point with the wind at east to get round.

15,320. Are there many ships lost on Souter Point?—No; they have no business to be lost there.

15,321. You say it is a queer place to get round; what do you mean by that?—It lies off a little bit; about seven or eight miles.

15,322. Then the substance of your evidence is this: that the expenditure of the public money would be better used in improving the existing harbours, so as to make them accessible at all times of the tide, than any one great harbour?—Three places in preference to one.

15,323. But if the Government said there was only to be one harbour, you would give the preference to Filey over Hartlepool, and a preference to Filey over the Tyne; but you would not give a preference to Filey over some site between Hartlepool and Blyth?—Yes; between the Tees and Blyth.

15,324. But you are not prepared to give the site?—I am not. If good holding ground can be found in the immediate district, this is the place; but it ought to be distinct, to keep it from becoming over crowded.

15,325. How many clubs do you inspect for?—Three.

15,326. How many ships are there in those clubs?—About 275.

15,327. Are they what are called first-class ship clubs?—Oh no; there are first-class ships in them, but they are principally second-class.

15,328. In what trade are they chiefly employed?—The North American, Baltic, lower ports of the Mediterranean, and coal trade.

15,329. Do you often find it your duty to refuse a ship on account of being bad?—I have a ship in hands now that I will not allow to go to sea without being put in order.

15,330. Are there many ships sailing out of Sunderland to your knowledge that are not in the clubs?—I cannot say the actual amount, because as many more are insured in other clubs, but many of them are ships that we would not allow to remain in ours; there would not be a fair risk on our ships.

15,331. Are there other clubs that assist them?—Yes; in London, Shields, and Whitby.

15,332. Are you more particular here?—Yes; our committee are very particular.

15,333. Are there many ships sailing out of Sunderland in the coasting trade, to your knowledge, that are not in any clubs?—Very few; I do not know any, except it be Mr. Gideon Smailes' ships of Whitby and Mr. Barker's of Shields. They are not insured.

15,334. Why?—I suppose he can make more money of them that way.

15,335. They have a number of ships?—They are a club of themselves.

15,336. It pays then, on account of the number of ships, not to insure?—Yes.

15,337. Are there any or many ships, to your knowledge, sailing along the coast, that are so badly found and so inefficient in the hulls that the clubs will not have them?—I do not know of any; very little; they all get insured somewhere.

15,338. But I am speaking of the clubs. Are there many ships sailing along the coast that the clubs in the north of England will not admit?—There are clubs in the north of England that will insure them.

15,339. So that there are hardly any ships employed in the coasting trade that are not insured in some club or other?—They generally are insured; an ill-found ship is an exception to the general rule; only we cannot expect second-class to be found as well as ships only twelve months old.

15,340. Do you know whether many ships founder on this coast from being badly found?—Not from being badly found. The trade is carried on in very old ships, and some of them have very hard squeaks sometimes.

15,341. When I refer to being badly found, I refer to the hulls being in bad order, as well as the masts and cables, and you do not think many are lost from want of proper attention being paid to these?—No; but a poor man, if he has a little money, can lay hold of an old ship much easier than he can of a new ship, and for that reason they purchase these old ships, go in them themselves, and carry on the trade.

15,342. (*Capt. Sulivan.*) Do I understand you to say that for laden ships alone you would prefer Filey to other ports?—Yes.

15,343. But for laden and light ships you would prefer it somewhere on the coast between Hartlepool and Blyth?—Yes.

15,344. For laden ships alone, would you prefer a harbour somewhere on the coast in this bay near Sunderland to Filey?—Yes; with sufficient depth of bight for the silt to work through it.

15,345. If a harbour were made at a point, with no port inside it, would a smaller harbour supply the wants of the passing trade than if it were made in a port where there was a trade coming to it also?—Decidedly.

15,346. (*Chairman.*) With reference to coasters being well found, do you mean by well found well found in stores, or well found also in their rigging gear and sails?—My department is principally for the rigging gear, and with that I am determined to do my duty, and that they shall be well found as second-class ships. I am appointed for that purpose, and they must keep their ships in order. If times were better we would have them better found still.

15,347. Then, as a general rule, you would say that the running gear sails and masting, which are really the vital things of consequence when a vessel is off a lee shore, are as good as they ought to be, considering the style of the vessel?—Yes.

15,348. Is a second-class as well found with her running gear as a first-class ship?—It may not be, when a ship is only one or two years old; but when a ship becomes five years old many second-class ships are as well found.

15,349. I understand you to say that, as a general rule, the ill-found ships are vessels that are owned and sailed by men in not very good circumstances?—Yes; and that induces the most of them to remain in the coal trade. I knew an instance of the oldest ship in the port; she was a rotten old ship; but still none of the ships, whether old or not, could make passages with her.

15,350. If a general harbour of refuge was preferred would you have it at Hendon or Hartlepool for the saving of life and property? What part of Hendon Bay would it be?—At the north part, where there is hard ground, there would be a better harbour of refuge than Hartlepool, for this reason, the tide goes in round Hartlepool Heugh, and it would silt up; there is less water at Hartlepool Bay than at any other part of the coast.

15,351. Then I understand you to say that you are of opinion that Hartlepool from its natural disadvantage is unfit as a site for a harbour of refuge?—Yes; it would become overcrowded, and what it is now it would then be on an extended scale, and the remedy would be worse than the disease.

Mr. William Simpson examined.

Mr. W. Simpson.

15,352. (*Chairman.*) You have followed the sea?—Yes.

15,353. How many years?—Sixteen.

15,354. And how many years have you been in command of a vessel?—Twelve.

15,355. And the vessels you have commanded have been chiefly employed in what trades?—The coal and Baltic trades.

15,356. How many voyages have you made to the Baltic?—I have been employed in the Baltic trade

for seven years, and made three voyages a year, nearly.

15,357. And you have returned home pretty late in the year?—Yes; I have come home in January.

15,358. And where did you, taking your departure from the Baltic, say, either from the Scawe or the Naze of Norway, with the wind hanging at southward and westward, how would you make your passage?—In winter we generally endeavour to make Flamborough Head.

15,359. But with the wind hanging to the southward and eastward that is not possible?—If it is not possible to get hold of Flamborough Head we come to the northward.

15,360. And do you stretch right across?—Yes; as long as your ship lies any way to the west-north-west, or any way that can keep her head to the northward.

15,361. How far north have you made the land?—Buchan Ness.

15,362. You are aware, of course, of the object of this inquiry?—Yes.

15,363. And that it extends to a harbour of refuge on the north-east coast of Scotland between the Firth of Forth and the Pentland Firth, as well as a harbour of refuge here?—Yes.

15,364. Give me your opinion whether a harbour at Peterhead would be of advantage or not to the Baltic and Archangel trade?—I think a harbour at Peterhead will be of very great service to both the Baltic and Archangel ships, because generally Archangel ships have to call at Peterhead for orders, and late in the season they generally get them far north.

15,365. And what would be the most eligible site for a harbour of refuge for those trades on that district of the coast?—I think Peterhead.

15,366. Are you aware that Wick is a large fishing port, and lies at the entrance of the Pentland Firth, the navigation of which is very difficult?—I believe it is.

15,367. Taking into view the large number of fishermen who go out of Wick, and also the difficulties of the navigation of the Pentland Frith, and that the object of this inquiry is to find a site for a harbour of refuge which will save life, would you still give the preference to Peterhead?—I should think Peterhead more suitable than Wick. There is a very heavy tide runs off Wick; the ebb goes for about three hours to the northward longer than the flood runs, and ships crossing the Moray Frith are not apt to fetch Wick when they can fetch Peterhead.

15,368. What is the longest passage home from Elsinore that you have ever made to this port?—Twenty-two days.

15,369. Was that an average passage in the fall of the year?—Yes.

15,370. And what would you call a bad passage?—I call that a very bad passage. I have come from Elsinore to London in five days, and I have done it in twenty-two, and ten.

15,371. And was the weather very coarse when you did it in twenty-two?—Yes.

15,372. And your people, did they suffer much from the cold and wet and hard work during the passage?—Yes; and we generally suffer more when we get off the coast, because there is to be a better look-out kept on the coast than in the middle of the North Sea, there are so many ships.

15,373. What are the prevalent winds in the North Sea in the fall of the year?—From south-east to south-west.

15,374. And what is the worst weather?—The heaviest gales are from the south-east.

15,375. What kind of weather do they begin with, and with the wind from what direction?—When the wind gets to the southward of east we have generally thick blowy weather.

15,376. How do the south-easterly gales end?—They generally go round to the east-north-east and north-west.

15,377. So that they back round to the northward?—Yes.

15,378. Does it blow hard from the north-west?—Generally very hard.

15,379. And with reference to this district of the coast, what is your opinion in reference to a harbour of refuge; one or three?—I think three would be more beneficial than one.

15,380. Will you state your reasons?—One reason is, that we generally leave Yarmouth Roads with a very heavy fleet of ships in the winter. I have come down to this coast with as far as 700 sail; and with easterly winds you generally like to keep a good offing, and the weather is generally thick. You come down and make the Head; sometimes you do not, and it is very bad keeping a reckoning in a tideway with a fleet of colliers. After getting to the north of the head we generally run into Hartlepool or Sunderland, to make the land, and after you get down upon the land it is very bad getting off with a light ship, and if there was only one harbour of refuge perhaps it would be over late to reach it. If there was three you might manage to hit one of them, and therefore I think the improvement of the three harbours would be better than one.

15,381. Therefore for light ships you would have no hesitation in saying what should be done?—No.

15,382. Now as respects the loaded?—I have gone out here with as many as 150 laden ships, and on one occasion we got to Whitby, and it came on a very heavy gale of wind from the east-south-east, and I got back to Leith Roads. I could not take either Sunderland or the Tyne with a ship 14 feet water, and I had great difficulty in getting round the Farn Islands. If there had been a harbour of refuge at Sunderland or the Tyne I should have been able to save two lives. I lost two men from the deck and a boy on that occasion.

15,383. What do you say to Filey Bay as a good harbour of refuge for laden ships?—It is a very good holding ground when you are well in, but if you are not it is very bad; the ground is hard and chalky, and the anchor will not hold. The ship will run into the bay with the wind south. I think Filey Bay a very suitable harbour of refuge, because many a time a ship may go out here, and she will reach up as far as the head, and will not go round the head. If a vessel can round the head she can go to the Humber with an ebb tide. If she will not go round there is nothing but coming back; and if you have to put a ship under close reefed topsails for two or three days there is nothing but Leith Roads.

15,384. Then you are of opinion that a harbour of refuge at Filey Bay would be of great advantage to loaded vessels going south?—Yes.

15,385. And that if that were done, and the three ports were improved, we should have arrived at a thoroughly good system?—Yes.

15,386. (*Mr. Lindsay.*) Out of that fleet were there many ships obliged to run for Leith Roads?—A great many.

15,387. Were there many casualties to these ships in running?—A great many of them were clean swept before they got to Leith Roads, and many accidents happened there by ships driving from their anchors. About 15 ships put into Leith.

15,388. Did any of them lose their masts?—I do not know; several lost their yards.

15,389. And several had their decks swept?—Yes; several from this port lost everything from their decks.

15,390. And these ships were obliged to run for Leith because there was no place of refuge on this coast where they could enter with safety?—Yes. I could have got into the Tyne or Wear, but the ship drew too much water. It was low water.

15,391. (*Capt. Washington.*) Could you have taken a harbour of refuge at Filey or Hartlepool?—I could not reach Filey.

15,392. How was the wind?—South-east to east. The gale came on from the south-east first. I was

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then abreast of Whitby, and it rounded till it got to the east.

15,393. And the fleet generally were abreast of Whitby?—Yes; between Hartlepool and Whitby.

15,394. You could have run for refuge in Tees Bay?—Tees Bay is a very bad place to run for in a gale of wind from the south. The Yorkshire land in a gale of wind from the south is very often capped, and you cannot make out objects; not only that, but the sea breaks very heavy in Tees Bay, and no man likes to go to Hartlepool with a laden ship, because you are almost certain to get your deck swept before you get into port. Only in January last three ships capsized in Tees Bay. They were light ships, making for Hartlepool in a gale of wind, on the 4th January, and a laden ship, a foreigner from Norway foundered, before she got to Hartlepool.

15,395. Then there is no place along the coast where you think you could place a single harbour?—I think Hendon Bay is decidedly better than Hartlepool, provided one harbour is to be made.

15,396. Is not Hendon Bay rocky?—Some parts of it is.

15,397. Do not you see rocks on the beach?—Yes, at low water.

15,398. Would you rather run on rocks than a sandy beach?—A sandy beach.

15,399. On a sandy beach life is pretty sure to be saved, even if the ship is lost?—Generally.

15,400. (*Capt. Sulivan.*) Do you consider it important that wherever a harbour of refuge is made there should be a clean beach inside it for ships to run on if they have lost their anchors or have a difficulty in bringing up?—Decidedly so. Many a time a ship when she goes for a harbour is half full of water, and when you get in you want some place to lay her in to get it out. You are not able to pump it out, and the crew might not be able to keep up the whole night.

15,401. It would be dangerous to have a rocky shore inside?—Decidedly.

15,402. Supposing the first object of a harbour of refuge is to save life and property, do you know of any ship being caught off Buchan Ness in a wind that could not get off on one tack or the other, either by running to the southward towards the Firth of Forth, or northward into the Moray Firth?—If a ship is caught between Buchan Ness and the Bell Rock she will always go to Peterhead, when she cannot go round Peterhead to go to Wick, and if you can get to the southward you either have the Tay under your lee or the Firth of Forth.

15,403. But when you have made Buchan Ness, can you tell me any wind that would compel a ship to go ashore, if she could not hold her own to windward, or go off on one tack or the other?—Wind at east-south-east is the worst wind on that coast, or south-east by east.

15,404. Then a ship off Buchan Ness, with such a wind on the starboard tack, would she clear the land easily to the northward?—No; she would not go round the Pentland Scar.

15,405. You mistake me. Would she clear the land off Buchan Ness and have the Moray Firth under her lee?—Yes, she might.

15,406. Then no ship off that port would be in danger of loss of life from wreck because she could not get off on one tack or the other?—She would not.

15,407. You said the sea breaks heavily in Hartlepool Bay; will you tell me about the distance out, or about the depth of water where you found it?—I have come across the bay with a light ship when the sea has been breaking in 10 fathoms water.

15,408. Suppose a harbour made at Hartlepool in 5 or 6 fathoms at low water; do you mean that the sea would be breaking dangerously for vessels outside that?—Yes; I have seen vessels turn over in Tees Bay.

15,409. Outside where the breakwater would be?—Outside of 10 fathoms.

15,410. (*Chairman.*) If in one of these laden colliers you were caught in a very heavy gale of wind and a very heavy sea, are you safer running or hove to?—These laden colliers in the London trade generally go out very heavy, and they strain in the bottoms, and when at sea in a gale of wind for 24 hours they generally begin to make water, so that when you have nothing but two close-reefed topsails it is time to seek a harbour of refuge, and she is perhaps, not very well manned. A ship carrying 320 tons has 8 men, 4 for a watch, and out of these there are 2 boys, and where the men have to stand at the helm 4 hours, and get a spell at the pumps every hour or hour and a half, for 6, 12, or 14 hours, in bad weather, you want a harbour of refuge, and when caught in that bay it is impossible to carry canvas on the ship to get out of it.

15,411. Now I gather that you consider it a very essential point to be considered that in bad weather the people on board these ships get so worn out and done that refuge is really necessary for the safety of the vessel?—Yes.

15,412. Is a loaded collier in very heavy weather safer scudding or hove to?—In a heavy gale a loaded collier will not run; they are too deep; they will not steer if you run them; they broach to, and the sea sweeps their decks. You must keep them under two very close reefed topsails. Sometimes the gale is so hard that you cannot keep a fore topsail on them, you take it off, and they drive on shore.

15,413. Then you are safer fore-reaching than attempting to scud?—Decidedly.

15,414. And when they are fore-reaching, do they never fall off into the trough of the sea, and get their decks swept?—Very oft.

15,415. Then heaving to is safer than fore-reaching?—Yes.

Mr. Joseph Henry examined.

Mr. Joseph Henry.

15,416. (*Chairman.*) You are a pilot of the port of Sunderland?—I am.

15,417. For how many years have you been pilot?—I have been a full licensed pilot about 21 years.

15,418. And previous to that did you follow the sea?—Yes.

15,419. And how many years were you at sea?—31 altogether.

15,420. Did you ever command a vessel?—No.

15,421. Have you been present during the course of this inquiry to-day?—Yes.

15,422. You are aware of the object of our coming here?—Oh yes.

15,423. Give me your opinion as to whether the improvement of the three ports, or one harbour in the neighbourhood of Flamborough Head, would be best for saving life?—Well, my firm opinion is that if Sunderland Harbour had three fathoms water at low water, according to Mr. Stevenson's plan, there would be a vast amount of life and property saved in a gale anywhere from the north-east to south-east, because when ships are coming in from the eastward they can take this place better than any other place; the sea is not so strong. I have taken all the bars, both Shields and Hartlepool, in gales of wind, and never saw any of them like Sunderland, provided there was plenty of water. A ship drawing 14 feet water could come in with a strong easterly wind, if there was 18 feet on the bar.

15,424. If there was to be such a thing as a harbour of refuge on this coast, where would you place it?—I have been in every port, creek, and bay from Flamborough Head to Holy Island, and I would prefer Hendon Bay, because there would be more water.

15,425. You tell me Sunderland is easier to run into in heavy weather than the Tyne; why?—Because the sea is not so strong, I do not care which way the wind blows from the east.

15,426. Have you been in Filey Bay?—Yes; I have been riding there three days in a gale of wind from north-north-east.

15,427. And of course you had a very heavy sea rolling in?—At low water it was very well, but when the tide got over Filey Brigs there was a nasty rolling sea.

15,428. How many anchors had you down?—Two.

15,429. What was the size of the vessel?—About 250 tons.

15,430. What scope of cable?—Seventy fathoms of one and sixty of the other.

15,431. What yards had you aloft?—We had the two top gallant yards sent down upon deck to make a ride stone of.

15,432. The holding ground I presume would be very good?—Capitally good, but you must be well to windward of where the fishing boats ride.

15,433. What do you think of Filey Bay as a harbour of refuge?—I do not approve of Filey Bay, because I think when there is a gale of wind many of the ships are caught between Hartlepool and Tynemouth.

15,434. But why should most of the ships be caught when there is a breeze of wind between Hartlepool and Tynemouth?—I will tell you. I have seen a very heavy fleet go out of Sunderland and Shields with the wind from the north-west in winter-time, and frosty. I have seen it come on again to the east-north-east, and that is a very bad wind, and it has got as far as east-south-east, and has blown very strong, and ships have had to go to the northward, and get into Leith Roads, and some of them have been lost where if there had been a harbour of refuge in this bay very likely they would have been saved.

15,435. But if the wind at east-north-east and east-south-east came a few hours later, would they not all be down off Flamborough Head?—They might be caught off Flamborough Head as well as in this bay, but still they are often caught between this and Flamborough.

15,436. Taking your experience of what has happened, are you disposed to say that ships are more generally caught in the neighbourhood of these ports than in the neighbourhood of Flamborough Head?—They are.

15,437. (*Mr. Lindsay.*) Have you been long a pilot?—Twenty-one years.

15,438. From your long experience you must have seen many a bitter gale on this coast?—I have.

15,439. Say the Government resolve to spend the public money in the construction of only one harbour, at what place do you think between Flamborough Head and the Farn Islands should it be made?—I would put it in a bay.

15,440. Why?—Because ships might be caught in a bay, and might not weather the point.

15,441. At what point now do you think would it do most to save life and property?—I would prefer it in Hendon Bay.

15,442. Now tell me, if it rested between Hartlepool and Filey Bay, having always the same object in view, which of these two would you prefer?—I would prefer Filey. Hartlepool is a very dangerous place to make; it is very low land, and a very heavy sea breaks there, and there is the Tees and Hartlepool outset, so that it is a very uncomfortable place to take, especially in rough weather.

15,443. Whether is the entrance to Sunderland Harbour, or Hartlepool, or the Tyne easiest made out?—I would prefer the Tyne to be first, and Sunderland next; the Tyne has the castle, and we have the Tunstall Hills; two conspicuous hills just south of the harbour; and we can see them a long way off; but Hartlepool is really a very bad place to make.

15,444. It is in fact, in nautical phraseology, a blind place?—It is; and before there was a lighthouse it was a very bad place to make.

15,445. You said there was a heavier sea at the Tyne than at Sunderland?—Yes.

15,446. Then suppose you were running with a ship in distress in an easterly gale, and you had but one object in view, the saving of the ship and the lives of the people on board, and say there was the same depth of water to get into Sunderland as there would be to get into the Tyne, and say you were in a position that you could run for either with the same facility, which would you take? I would take this, because the bar is not so heavy as at Shields, and ours is a long bar.

15,447. Do you know the reason why it is a heavier sea at the entrance of the Tyne?—No; but the ebb tides are very strong.

15,448. Say there was a number of vessels caught out at sea, and that 50 of them laden deeply were obliged to run into the proposed harbour here,—I am speaking of ships that could get in, and had not too great draft of water,—would you hesitate to be one of the 50 to run for it?—No. Give one another time, and let them go in rotation, and there is no danger in going up this harbour.

15,449. Say you were the last of the 50 that got in, where would you bring up?—At the Potatoe Garth, if deep enough; that is where they are going to dredge. I would bring up anywhere I could. There is no danger in bringing up when you are in.

15,450. Then you would not hesitate to be one of the 50 of these deeply laden ships to run in?—I would not, if there was water over the bar.

15,451. (*Capt. Washington.*) You have been many years a licensed pilot?—Twenty-one years.

15,452. Where did you receive your licence from?—Newcastle-upon-Tyne.

15,453. Do you hold that licence now?—Yes.

15,454. How many licensed pilots are there belonging to Sunderland?—One hundred and sixty-six.

15,455. Does the Newcastle Trinity House interfere with these pilots at all?—Yes; they have full jurisdiction over them.

15,456. And do they ever exercise it at all?—Yes; they have exercised it upon me, as one.

15,457. How?—Well I will tell you. They wanted us to pay a tax of 6*d.* a ship that we came in with. Government did not make that tax, but it was a bye-law they made; so we appealed to the Board of Trade, and we had Mr. Fenwick for us, and they said that they did not want to tax us, and that they never made the byelaw; and they took my licence, because I went to the Board of Trade to speak against that byelaw.

15,458. And the Board of Trade would not support the Trinity House in doing it?—No. They said they could not make any law to tax me or any other pilot without going to the Board of Trade.

15,459. You have got your licence again?—Yes; last month.

15,460. Only suspended for a short time?—I was suspended twice on that account; once four months, and next about six.

15,461. Do you know the Farn Islands well?—Yes; I have been in Holy Island Harbour.

15,462. Is that a safe place for vessels?—Yes, if they are well acquainted with it.

15,463. It would not be wise to give any inducement to vessels to run for it?—No.

15,464. You consider Hendon Bay would be the best?—Yes.

15,465. Do you think they could get space there?—Yes, they could get a good space.

15,466. Would that be of any use to the vessels belonging to the ports to the southward?—I think it would be a very useful place; but there is nothing beats the improvement of their own harbours.

15,467. I think it is a south-easterly gale that you want most shelter from?—That is the worst wind.

15,468. Where does that usually catch the fleet?—Between here and Whitby in the bays.

15,469. Would you have them run all the way back from Whitby to Hendon?—They have to run back to the Tyne, and sometimes to Leith Roads.

15,470. When down at Redcar they can make a harbour?—It is not a bad place.

15,471. Would that assist vessels, if it could be made?—It is a very dangerous coast on each side, if they were missing it; all the way to the northward of

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it are dangerous rocks, and then to the south there is a dangerous sand.

15,472. That is what is called the Tees ?—Yes.

15,473. You said there was a difficulty in making the land about Hartlepool ?—Yes.

15,474. But a vessel running down would get hold of the land at Huntcliffe, would she not ?—Yes ; but I am speaking of coming from the northward.

15,475. Coming from the southward they could make it ?—Yes ; Huntcliffe is very good land.

15,476. What distance is that from Hartlepool ?—About a dozen miles.

15,477. It is only in coming from the northward that Hartlepool is difficult to make out ?—That is the worst of it.

15,478. You think well of the proposed works at the entrance of Sunderland ?—Yes, I think much of them ; I think it would be a very good place when they are carried out.

15,479. You would have no hesitation in running for this place in a gale of wind, suppose the works were carried out ?—I would not.

15,480. Do you think it likely they will maintain the depth of water ?—I think it is, because when they project the piers out they would get a better run for the tide when the piers are so far out ; there will be a heavy out drift for the water, and I believe it will keep clear.

15,481. What do you say at present is the scend between the piers and the harbour ?—They will scend four feet when they come in ; but there is a difference in ships.

15,482. Do ships often miss the entrance, and go north and south ?—Yes ; especially if they are running nigh the ground, they will not steer, and I have known them go to the back of both piers, even with a fair wind. I have seen ships lost on these Roker rocks with three or four men.

15,483. How far do you go to pick up ships ?—To Flamborough Head and the Coquet Island.

15,484. Have you anything but cobles ?—In the winter time we have a steamer, when we cannot proceed with the boats. The dock company would not let us "bide" in the docks, and we cannot get to sea without the tide is well flowed, and there may be ships ashore before we get out.

15,485. Are you speaking of the steamer ?—Yes. We formerly lay in the middle basin, and about 40 of us used to get to sea, and catch the ships at low water before they get in ; but the dockmaster would not let us stop there though we paid 20*l.* a year.

15,486. What could be his objection ?—I do not know. We paid 37*l.* 10*s.* for six months for that boat lying there, and for towage.

15,487. You do not mean that the dockmaster would prevent the pilots lying in the most useful part ?—I do say so ; positively that is a fact.

15,488. (*Chairman.*) What extent of good anchorage ground could be obtained in Hendon Bay if a harbour of refuge were made there?—I think about all the south part of it, perhaps half of the bay.

15,489. Have you lately sounded in Hendon Bay ?—Yes. I was sounding about three weeks ago. I was one of the men who were there. It is very good to the southward ; the northern port is not so good. It is rather hard. I do not think there is better anchorage on the north-east coast.

Mr. William Simpson re-examined.

Mr. W. Simpson.

15,490. (*Chairman.*) What do you think of the proposed improvements of this harbour ?—I think if carried out they would be a great benefit to the ships that trade to the port.

15,491. At what time of tide could vessels enter ?—Light vessels could enter at all times of the tide, and loaded vessels would come in after the first quarter flood at 14 feet water.

15,492. (*Mr. Lindsay.*) You said you thought it would be a great advantage to the trade of the port ; but looking at it as a place of shelter, say you were one of 50 laden colliers caught in a gale of wind, all of which were running for this harbour as it would be when the piers are carried out, and that you did not belong to the place, but were obliged to take a harbour, because the easterly gale was so strong, would you hesitate to run for it as one of the 50 ?—Not at all.

15,493. Where would you bring your ship up ?—Opposite the Potatoe Garth.

15,494. Would it require to be deepened to give you room ?—Yes ; that is, it would require to be dug out, and that is their intention, I believe.

15,495. (*Capt. Sulivan.*) At what time of the tide would you run with a loaded vessel into this Potatoe Garth ?—A vessel of 13 feet water would come in there the first quarter flood, if the improvements were carried out.

15,496. What depth of water would you get where the bar now is ?—18 feet.

15,497. All the way in ?—No.

15,498. Suppose the bar is only removed to the depth of the present inner part, which is only four or five feet, then how would the 50 vessels get refuge ?—Why, it would be very difficult then.

Mr. Thomas Sutton examined.

Mr. T. Sutton.

15,499. (*Chairman.*) You are a pilot of the port of Sunderland ?—Yes.

15,500. For how many years ?—14 years a licensed pilot.

15,501. And previous to that ?—A fisherman.

15,502. For how many years ?—The rest of my time.

15,503. You have been present during this inquiry to-day ?—Yes.

15,504. Do you generally concur in the opinions which the former witnesses have expressed as to the improvement of the three ports being more likely to be advantageous for the saving of life than the establishment of one large harbour of refuge ?—I do.

15,505. And does that apply equally to loaded as to light ships ?—It does.

15,606. You are well acquainted with the coast between Flamborough Head and the Tyne ?—Yes.

15,507. Suppose it is decided to make a large harbour of refuge somewhere on this coast, where would you prefer to place it ?—I can scarcely tell you that, because Hendon Bay is one half of it smooth, and the other half hard ground and good anchorage, therefore I think the improvement of the harbours would be decidedly better.

15,508. Which of the two places would you prefer, Hartlepool or Filey Bay ?—Hartlepool.

15,509. Will you state your reasons ?—Because Filey Bay is decidedly covered with high land, and it is a good inbight ; besides, when ships are running for a harbour of refuge they like of course to make sure. In dark snowy weather you cannot see the lights on a highland; they would be capped.

15,510. Is your chief objection to Filey Bay that the lights would be high, and would be capped ? Suppose the lights were placed on the breakwater ?—They would be equally as bad.

15,511. Why ?—Because when a ship is running for a harbour it is generally the case that the lights are capped, either with fog or haze, on account of the highland.

15,512. Then would you prefer that laden vessels should endeavour to keep the sea, instead of running for a harbour of refuge ?—No ; they must come to their own ports.

15,513. Will not the lights in their own ports be equally capped and difficult to see ?—In their own

ports the land is not so high, and every man likes to steer for his own port, because he is well acquainted with it.

15,514. You have heard the questions put to some of the witnesses as respects running down into the bight of a bay for a harbour of refuge ?—Sunderland lies entirely in a bight.

15,515. And you do not consider that an objection? —No.

15,516. (*Mr. Lindsay.*) You say if it was to rest between Hartlepool Bay and Filey, you would give the preference to Hartlepool ?—Yes.

15,517. And if it was to rest between Hartlepool and the Tyne, and the same depth of water could be found in either place, which would you prefer, Hartlepool or the Tyne ?—A harbour of refuge is neither fit for the Tyne nor Hartlepool.

15,518. But I asked you if it rested between Hartlepool and the Tyne which would you prefer ?— I would prefer the Tyne.

15,519. Why ?—Because it is a much safer place. The land is not so high about it. About Hartlepool, on the port hand, in going in, the land is very high, and of course counter-tides go about there, and the sands are constantly moving.

15,520. Have you taken a ship into Hartlepool ?— Yes.

15,521. Was it blowing a gale of wind ?—It was not blowing an extreme gale. About a double-reefed topsail breeze.

15,522. Have you ever been in as pilot of a ship ? —No ; but many a time with a pilot boat.

15,523. Have you known many accidents to ships running for Hartlepool ?—Many a one.

15,524. And lives lost ?—Plenty.

15,525. In running for the bay ?—Yes.

15,526. How did it happen ? Did the ships get on shore ?—They did.

15,527. At what part of the bay ?—Both north and south of Hartlepool.

15,528. Holding the opinion you do of Hartlepool, why do you prefer it to Filey Bay ?—Because more accidents happen between Filey Bay and Sunderland than on any other part of the coast.

THOMAS BOLTON examined.

15,529. (*Chairman.*) You are lighthouse-keeper to the commissioners of the River Wear ?—Yes.

15,530. How long have you been connected with the port in that capacity ?—Ten years.

15,531. And previous to that were you a seafaring man ?—I was a sea carpenter for about five years before that.

15,532. During the period that you have been lighthouse-keeper has it occurred to you to see many accidents in consequence of vessels getting to the back of the piers in endeavouring to take the port ?— A great many.

15,533. And has much loss of life ensued in consequence ?—Yes.

15,534. Have you kept any account of the accidents which have come within your knowledge ?—I have.

15,535. Have you kept any account of the winds at the lighthouse ?—I have.

15,536. For the whole period you have been there ? —Yes.

15,537. If we wish you to do so, could you furnish to the Commissioners a copy of your register for the last three years ?—Yes.

15,538. What are the heaviest winds on this coast? —East-north-east to east-south-east.

15,539. And are these winds generally accompanied by thick weather ?—Yes.

15,540. At what distance can you see to seaward generally during this heavy thick weather ?—Not more than half a mile.

15,541. In blowing weather have you ever been watching ships running in for the port ?—Always.

15,542. When you saw them running in, has it ever appeared palpable to you that they have run clear of the entrance of the harbour, from not having been aware of their position ?—Some have. Most of the accidents occur by ships striking the bar and piers.

15,543. (*Mr. Lindsay.*) Will you look at this return of wrecks which has been published, and tell me if that return is made up from the account you have kept ?—They are the same as I keep.

15,544. Have you seen many of these ships go on shore yourself ?—I have seen the whole of them.

15,545. What proportion of the wrecks would have been prevented had there been such piers as those which are contemplated ?—The whole of the ships would have been saved.

15,546. Would the ships driven on the south rocks have been saved if these piers had been constructed ? —Yes ; we would have had a considerable deal more water, and ships would never have to wait for flood tide, but would run in if they had 18 feet water.

15,547. Was it that they became unmanageable on account of the rolling sea, and drifted on the south rocks ?—Yes.

15,548. (*Chairman.*) Have you seen many vessels come on shore waiting the tide ?—Yes.

15,549. Are you disposed to say that a larger number of the vessels that have come on shore and have been lost has occurred in that way than in running ?— The whole of it is for want of water on the bar; and in January 1854 a large fleet was off, and if we had had water on the bar, as now proposed, these ships would have come in that night, and all have been saved.

Mr. JOSHUA WILSON examined.

15,550. (*Chairman.*) What is your occupation ?— I am a merchant and shipowner of the port ; I am also a member of the trade and commerce and shipowners' societies ; but I wish to give my individual views, and not as representing any body.

15,551. For how many years have you been connected with the port ?—From my boyhood, and more closely connected since I came to have a ship in 1821.

15,552. Have you been present during the inquiry? —I have.

15,553. Being aware of its object, will you give your opinion to the Commissioners ?—I differ in my views from those that have given evidence. I give the preference to a single harbour of refuge, or two, as the Government may see fit to grant the money, and I am decidedly of opinion that that harbour of refuge should be in Tees Bay. If I may be allowed I will give the particulars of a gale of wind that occurred when I was a young man, 32 years ago, which may be taken as a type of other gales, and which will show my reasons for preferring the Tees Bay. I may say that I think it was at the commencement of this month in 1826 that we had a gale of wind, on Saturday. I took a walk on Sunday morning on the pier between 9 and 10 o'clock, and the wind was blowing from the north-west. The whole of the silt comes in with wind direct east, and the gale commenced from that, and continued during the whole of that day and night, and on Monday it blew an exceedinglysevere gale, the wind east and east-south-east. I went down about tide-time, about four o'clock, to the corner of the barracks at the moor, and it was then stated that there was a ship riding dismasted in the roads. It was so thick I could not see her, but I saw several ships close in about the broken water, and they evidently could not reach the port. They were to leeward ; they therefore put about, and would have to go southward. Next morning, the wind northward, and clear, I saw a vessel dismasted in the roads. My father and I went to Newcastle to attend one of our meetings, and we there met a

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Shields captain, who, with my father, had a ship on her passage from London, and as we had had the wind so far to the north they both agreed that their ships could not have left the Thames; but next day my father found that the other ship was ashore at Stannington, and that our vessel, which we expected was still in the river, had put into the Tees. On the Tuesday morning about three o'clock she had been off Hendon Rock, and could not weather the harbour, and they put about with her head towards the south-east. They could not get off, but drove along the coast. It was before Hartlepool Harbour was made. The captain would have run in behind Hartlepool Heugh, where he thought she might have been got off at a slight expense, but it so happened that the mate knew the Tees; it was before it was buoyed or lighted; and he got into the foreyard, and told them how to steer, and he steered her safely into the Tees. Our vessel, with five or six more, were all that got into the Tees. In that gale 24 ships were on shore between Seaton Snook at the entrance of the Tees and Hartlepool; and I have spoken to a pilot of the Tees who has a very distinct recollection of it, and he says that in that gale there were 53 ships ashore between Sunderland and the mouth of the Tees, including, perhaps, a few behind the north pier. There might be about half a dozen on shore behind the two piers. Since the port of Hartlepool has been made I have an impression that there has not been so many wrecks strewed along the coast between Seaton and Hartlepool as previously. That was a time when the coal trade was much less than it is now; no coals were then shipped south of the Wear; yet it shows what a destructive gale it was. These ships were caught in the bight, and could not get out on either tack. When our ship turned about the wind was east and by north. I consider that a harbour of refuge at Sunderland or the Tyne would have been of no value to the ships that were to leeward of it, and that with a harbour of refuge at Filey or thereabouts ships could not have got to it. It must be in the bight of the bay to save the ships. That is a type of the gales not unfrequent on this coast, and these are the gales in which most of the ships are lost. Of course some ships miss the harbour in coming in; but it is in these gales that a harbour of refuge is most required. I am in favour of a harbour in Tees Bay, for a harbour of refuge, in preference to improving these ports. I have no great faith in the improvement of the ports so as to make them fit for a harbour of refuge. I would rather prefer to see a harbour of refuge made at Redcar. Redcar has a great many advantages that Hartlepool has not. I have studied the question for many years, and I feel considerable objection to Hartlepool. There was Mr. Rendel's plan for enclosing a quantity of ground at Hartlepool; but I believe it is now very much given up, on account of that they seem aware it would silt up. Indeed, a small pier has been run out from the Heugh lately, and inside the pier where it was rocky it is now sandy. The short pier is silted up in the bay. It has improved it as a sea-bathing place, but I do not hear that it has improved it as a port. In reading the evidence before the Commissioners on Harbours of Refuge, I see there is an idea of forming a stone breakwater parallel with the coast. I think it would be a very expensive undertaking. I do not see where the stone could be got in the immediate locality, and it could only be carried out during a few months in summer. But my principal objection to that is that I think it would be apt to silt up. I have noticed that the broken wave moves the sand along the shore, and forms the bar; and I consider that the wave would wash the sand in behind the shelter, and where the wave lost its transporting power there the deposit would be formed. We see a similar thing inside Holy Island. If Holy Island could be removed, the sea would act on the sand inside, and clear it away to the south; and I feel very much afraid that if an extensive work was made off Hartlepool the sand would collect inside, and it would be merely a question of time as to how long it would take to silt up. There is a great deal said about the scouring power of the tide in moving sand. I have not much faith in that. To the south of Hartlepool there are the Long Scar Rocks. They are about half-tide rocks, and if the tidal scour was the governing power to scour the sand off we would have deeper water inside these rocks than either at the north or south of them, but it is actually shoaler water inside these rocks, where there would be more scour if the tidal current had any effect, than it is north or south, where it should be comparatively inert. I can easily account for this accumulation from the fact of the wave breaking on the rock; but I notice it constantly on the coast, that the accumulative action bears an inverse ratio to the transporting power of the wave, that as the transporting power of the wave decreases the accumulation increases. I was at Marsden a few weeks ago; that is near Souter Point; and I noticed that between a rock and the shore there was always a rise in the sand; and when a ship has come ashore, in a tide or two there is a rise of sand occasioned by the shelter from the waves. This is my great objection to a pier parallel to the shore. I am afraid it would sand up inside. Mr. Calver's plan of a wave screen I consider would have less objections, because a portion of the wave goes through, but if it reduces the wave the theory of the plan will be weakened, and I cannot depend on the tide, which runs about a knot and a half an hour inside Hartlepool Bay, keeping that bay clear, because tide at a knot and a half an hour will only act on silt and small sand, and it will scarcely act on gravel or shingle. There is a certain agency by which the base is maintained in statu quo; but if you put a shelter you interrupt and put an end to that agency. Mr. Smeaton found this out when making Yarmouth Harbour. As long as they carried out the parallel piers it kept deep inside; as soon as they turned the cant the accumulation began, and he found the accumulation was in proportion to the shelter. Therefore I do not put much faith in the proposed plan for Sunderland Harbour in increasing the capability of the port as a harbour of refuge. I am afraid the sand would collect behind the sheltered piers. The sand would wash along the shore; and the principal is from north to south. It would pass the end of the north pier, form a bar across the entrance outside, as it is now, and the tidal current of this river would have a breadth of 800 or 900 feet to keep clear, instead of the present breadth of 390 feet. We know that when a groin or jetty is put out at right angles to the coast the sand accumulates behind until it fills up, and then it passes. I consider that would be the case here as well as at the Tyne piers. Indeed, I was looking over the evidence given before the Royal Commissioners, and Mr. Walker not only admits that the sand will accumulate inside his proposed piers at Shields, but he also says that it will greatly accumulate inside the south pier. He says the channel will keep clear. I consider that in course of time if these views are carried out we shall have sand inside these piers, as it does on the beaching ground on what is called the Polka Hole. The sand comes in there; and I have repeatedly seen the commissioners remove it by dredging. Before the north pier was lengthened there was a sandy beach running inside the south pier, and it got so high that it was scarcely covered at neap tide. When the north pier was lengthened so as to send a drift in to be caught by the south pier, then it gradually wore away by the action of the current. Therefore I am afraid that with this larger entrance the sand would come in, and fill the inside; that we should be at a great expense, without making the harbour much better; and the same applies to the Tyne. The current would lose its force in meandering through the sand. I think that formations at the entrance of a river are objectionable. The flood tide comes in round the north with a south-west set; there is an eddy at Hendon Bay that runs round the south pier; now, there are no parallel

piers to bring them into a focus, and give them one set, but one would have a tendency to go to one side and the other to the other, which would make very inconvenient eddies. I may also state that harbours, where there are strong currents running out, are not suitable for harbours of refuge, because after we have an easterly gale we have a great deal of heavy rain, and a great deal of freshets running out, and a ship cannot take the harbour. I think it is scarcely the province of the Government to assist individual parties in making improvements for carrying on trade. My idea of the improvement to be carried out is, that there should be a breakwater from Roker to some rocks called the Knocks, very similar to what has been done at Newhaven in Sussex; and I would do nothing more. The action of the sea on the rocks would give the drift which comes from the northward a seaward direction, and it would pass the harbour mouth in deep water, and make little or no bar, so that the entrance of our harbour then would be more in the position that the dock entrance now is; for if you have time to go down you will notice at the jetties that are put between the dock and the shore that the drift passes the two first jetties, but from the rocky shore outside it does not pass the third jetty, and therefore there is no drift at the entrance to form the bar, and we have little or no bar; sometimes there is a slight accumulation of silt, but you have no bar. A similar plan to that proposed for the north breakwater has been eminently successful at Newhaven; and in the parliamentary reports Mr. Walker says, he does not know a harbour that has been so much improved as Newhaven by the putting out of that jetty to the northward. A south pier would be apt to catch the drift in its passage southward. Indeed our ancestors, about a hundred years ago, recommended a south pier to be made to let in the flood tide, but it only acted as a groin, collected the sand, and made the harbour worse; and I am afraid the south pier, according to Mr. Stevenson's plan, would have a similar effect in stopping the drift in its passage southward. I may also state that Redcar is the most likely place, though I know there are objections to it, to form a harbour of refuge. The rocky nature of the coast, I believe, will be such that it will not sand up. The only accumulation will be silting up. But where sand washes in it is much more serious than merely a deposit of silt, which is mechanically held in suspension by the water, and there would be much less silt on that part of the coast than there would be to the north of the Tees at Hartlepool, because the flood tide comes in from the sea clean, and the ebb tide moves off to the north, and the silt would leave Redcar. The site which has the least objection is what we must look to; and if Redcar were made a harbour of refuge the entrance should be made like a bottle-neck, or the bows of a vessel that has wave-line bows, because a hollow curve, with a concave side towards the sea, appears to be naturally formed best to resist the action of the waves.

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15,554. (*Chairman.*) Have you in your possession any plan of a harbour of refuge at Redcar?—No; I merely give an opinion of the locality. There is a plan of Redcar in 1850. The site has often been indicated; and if the soundings are good, I thought you might consider it.

15,555. What you have handed in is, I see, a parliamentary paper. We are in possession of that.—Yes, I thought you would be.

Saturday, 16th October 1858.

PRESENT:

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Mr. WILSON's examination continued.

15,556. (*Mr. Lindsay.*) I understood you yesterday to say that you preferred one great harbour of refuge?—Yes.

15,557. To the improvement of the existing harbours?—Yes.

15,558. Did I understand you to mean by that, that in your opinion one great harbour of refuge on the coast would do more to save life and property than the improvement of the existing harbours?—Yes.

15,559. You thought it would?—Yes.

15,560. Did I understand you further to say, that, as to a site, you preferred Redcar to any other site for such a great harbour on the coast?—Yes.

15,561. As this is a subject which I know you have studied, not merely with the view to save property, but with a feeling of humanity for the saving of life, and as it would appear that you have also looked at it with the eye of an engineer, will you tell me how you propose to make a great harbour of refuge at Redcar; because, looking at the chart on the large scale of the Tees Bay, I, as a sailor, knowing nothing of engineering, am anxious to know how you can make such a great harbour as that which you have in view at Redcar. Look at the chart, and tell the Commissioners the manner in which you propose to make such a harbour?—There was a plan which I gave in yesterday which shows an enclosure of 470 odd acres, some of which is available, and I consider that an entrance might be made to that, provided the ground inside was found any way suitable, and perhaps that would hold 300 or 400 sail of ships which I consider would be as many as would require a harbour of refuge at one time on this coast.

15,562. Do I understand you to mean that you would propose constructing that harbour between the Salt Scar Rocks on the one side and the East Scar rocks on the other?—Yes.

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15,563. But between those points I find a great many rocks. There are the High Stone Rocks, and the Off Flash and the Middle Flash Rocks; and there are also a great many shoals. How do you propose,—after you have run your piers along the Salt Scar and the East Scar, — how do you propose to make the harbour? Do you propose to excavate?—I would take those high rocks in the centre which are shown above high-water mark down to about low-water mark; and except in the immediate neighbourhood of the piers, there would be a considerable depth of water for the larger vessels. If those inner rocks were taken down to the level light vessels could run past, and, if necessary, beach on the sand inside, and there would be a sufficiency of deep water outside for them to ride at anchor. But one of the great reasons for preferring Redcar is, that from its being a rocky shore, I have great hopes that it will not silt up. There is no drift to fill the harbour up. I know there are objections to it.

15,564. But, as a sailor, I do not see how it is possible to get anchorage ground for 300 vessels within the limits you have named. However, I will not follow up this part of the examination, but leave it to Sir F. Smith, Captain Vetch, and Mr. Coode, who are familiar with engineering points. —Perhaps I may be allowed to remark that I do not consider 300 vessels would come in at a time. They generally calculate for docks ten ships to the acre. I

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consider that vessels would come in and anchor at the entrance, and after a while drop up the harbour and berth themselves. I think it would be very seldom that more than 200 or 300 ships would come in, and then not all at once.

15,565. Do you mean to have the vessels moored tier and tier, or at anchor ?—Moored tier and tier.

15,566. Would you think it correct to have a harbour of refuge where vessels were obliged to moor tier and tier ?—If a harbour is to be made on the coast, would you not think it right to select such a site where a ship would run in and drop her anchor ?—And subsequently raise her anchor, and drop up as they do in entering our harbour now. That is our idea.

15,567. You deal with ships entering a harbour for refuge as with ships running now for Sunderland and Shields ?—Yes.

15,568. You prefer that to Filey or Hartlepool where ships might run in, drop their anchors, and lie at anchor ?—With smooth water I do not think it necessary that they should be at anchor.

15,569. As a shipowner of considerable standing, and one who has given great attention to the subject, supposing it should be found that Redcar is not considered a proper place, or rather that there are engineering difficulties in the way, which would prevent its being selected as the site for a harbour of refuge, and looking along the whole coast, what point would you then prefer, considering that there was to be only one harbour, and having regard to the saving of life and property ?—As far as my knowledge goes, the next place which I should fix upon would be a little south of the proposed harbour in Hendon Bay. There are the White Stone Rocks immediately south of the Hendon Rock, and if a pier were run out from the shore to those rocks, and another pier to Ryhope Snook to meet it, I should not have the same objection to it which I should have to the other plan of a harbour in Hendon Bay.

15,570. Looking at the chart, you will see that it is a perfectly straight line of coast all along. Do you think a straight line of coast a place at which to put a harbour ?—I consider that there are objections to it, as to other places, but I feel there are less objections to that than any other. There may be sites between here and Hartlepool. The nearer Hartlepool the better ; but I think it would be preferable to Hartlepool myself.

15,571. Are there any reasons why you object to Hartlepool, beyond its liability to silt up, which I think is your main objection ?—That is my great and principal objection.

15,572. Is that your only objection ?—If a parallel pier, or wave screen, were put off Hartlepool Heugh, I think it would be an excellent place.

15,573. Would you then prefer Hartlepool to the site of the Ryhope Snook, if you were not afraid of the silting ?—If I were not afraid of the silting I think the locality better, because it is nearer the bight. In the gale which I mentioned yesterday ships which had weathered the Ryhope Snook could not have taken it. Vessels which make the land about Hartlepool east of north, say east-north-east, if they made Hartlepool would have no harbour of refuge, but all vessels to the north of that would. Vessels which made the land to the south could not reach it.

15,574. Supposing that there were no chance of Hartlepool Bay silting up, would you then prefer Hartlepool to Redcar ?—I do not know why I should, unless on account of the anchorage ground.

15,575. Would you, looking to the saving of life and property, prefer Hartlepool as a site to Filey Bay? —Very decidedly.

15,576. Would you prefer Hartlepool to the Tyne, speaking as if you knew nothing of engineering ?—I would decidedly for light vessels. For loaded vessels I would like the Tyne about as well.

15,577. (*Sir F. Smith.*) You prefer the Tyne for light vessels ?—No, for loaded vessels, and Hartlepool Bay for light vessels.

15,578. (*Capt. Washington.*) You have so long studied the question of harbours, Mr. Wilson, that I shall be glad to hear your opinion on the proposed design for the improvement of Sunderland Harbour, if you have anything to say in addition to that which you said yesterday ?—I may state in addition to what I said yesterday, that I consider the improvement of this harbour is much required for the trade of the port. That we now require more water than we did before we had the dock, that large American vessels, drawing 14 feet of water, come in here to load coals, and in an easterly breeze, and south-east gale more particularly, which is a fair wind from London, they cannot run into the new entrance. There is no ground to tack up, and they take the bar, and very awkward it is at neap tides when there is no water to spare. I have given the subject much attention, and as I have stated I prefer a breakwater from Roker to the Knocks to Mr. Stevenson's plan.

15,579. In an east-south-east direction from Roker ? —Yes. I would allow a curve concave to the north, and let it finish at the Knocks, and go no further.

15,580. Its extremity would be in what depth of water ?—Its extremity would be on the Knocks itself.

15,581. What benefit do you expect to arise from that ?—If you will allow me, I will go into a description of the formation of the bar. I never recollect our bar being better than it was about this time of the year in 1851. Considerable pains had been taken in dredging the channel. Our bar in very good times is considerably below the zero of low-water mark. I may here state that the zero which I speak of is a foot below that used by the Admiralty. That six feet on the bar would be seven feet according to the Admiralty chart. It had continued good for some months; then towards the latter end of the year, we had a succession of east and north-easterly gales. I did not see the accumulation, but in the ensuing summer I saw a great accumulation of sand behind the north pier, and I noticed from the seaweed being young that it must have been covered in the winter. There was a large accumulation of sand behind the north pier. Perhaps I may be allowed to explain how easterly gales cause this sand to come from the shore. All my observations lead me to believe that the flexion of the wave is cumulative. That the wave washes the detritus along the shore when not at right angles, but in an on-shore gale the direction is seaward. I do not attribute that to the alteration of the wave, but to the current created by an on-shore gale. Smeaton observed, that, in a pier a mile long, the water was raised at the end four inches above the natural level, which was eight inches higher than that on the windward end, the depression being equal to the elevation. That necessarily causes the current to flow in an opposite direction. The current is driven to windward to make the equilibrium. I have gone to a hole 20 feet in diameter; I have taken a stick and stirred it up at the bottom. I have seen an under-current go to windward, while the sand went in another direction. I have always noticed that, according to the slope of the shore, an on-shore, gale first acts on the sand, then the small gravel, and then the large gravel; though, after a heavy gale, I have noticed the rough shingle higher than previously ; but all that is acted on by the current is carried down, and sometimes when the lower part of the shore about low-water mark was flat and sloped further inland, I have noticed the sand washed down on the slope, and deposited like a bar on the flat.

15,582. Would you apply that theory to Sunderland Harbour ?—Yes. I apply that theory to Sunderland Harbour. If the back draught is not strong enough to scour the sand, but merely to give any matter which is suspended by the wave a seaward direction, the on-shore gales act on the sand, and give it a seaward direction. Then the north-east swell drives it first to the north pier across the bar, and it diverges a channel to the southward ; then in process of time it goes gradually further and further

south, and the current breaks out a channel to the north. Then we see a different stage of the process, and that is the process by which our bar is formed, for after these easterly gales our bar became worse than I had known it for several years, because the accumulation of the sand had been larger. Mr. Walker, in his report, states, that when the Sparrowhawk is high to the north of the Tyne the bar is good.

15,583. I wish to ask you what book that is?—It is published by the Commissioners of the River Wear, and contains the engineers' reports on Sunderland Harbour. This groin which I was speaking of to the Knocks would interrupt the drift in its passage to the north, and would take it to a rocky point, and immediately to the northward there is a sudden deepening of the coast, and the sand, instead of passing into the harbour, would pass into deep water and pass by in 17 feet of water. It is similar to Newhaven, but I consider this a better locality than that, because Palmer notices a rocky shore giving a seaward direction. I consider it is the rocky shore which occasions the new entrance to be so good. Here, within a mile of the old entrance, we have an entrance without any bar. A few weeks ago, not stormy weather, but a swell on breaking over the north-east pier of the new entrance, I saw a vessel drawing 21 feet of water towed into the entrance, although there might be three or four feet lift. And on these principles I consider that if a simple breakwater were carried out to the Knocks, the bar would be continually in the best state as it would have remained if there had not been an accummulation behind the pier to be forced on to the bar. There are some remarkable facts connected with the same subject to be noticed in the plan of the Wear, showing the mouth between 1837 and 1857. You will notice the short pier to the southward, halfway down the sand grew up; but the pier was carried further out and lessened the inshore draught, so that, had they put stone to preserve the sand from the action of the wave there it would have remained. All along the shore to the south the waves gain rapidly, and that sand not having protection of the draught it was the same as on the south-east shore at Dover. I think this breakwater which I propose would act in the same way, and allow the sand to pass by in deep water as it does at the new entrance. The silt passes No. 1. and 2. groin, but does not pass No. 3. groin, showing that it goes off to sea, and consequently there is no bar. There is a slight accumulation sometimes of a few inches, but that is easily got rid of.

15,584. Do we understand you to say that you believe the reason there is no accumulation at the south entrance is the projecting ledge of rocks 600 yards to the northward of that entrance?—Yes; it is rock all along. It is rock from the Commissioners' boundary at the north groin to the entrance. It is rock which gives a seaward direction.

15,585. Do we understand you to say that from the present pier heads to the south entrance the deposit, or rather the beach, is decreasing?—The beach is decreasing.

15,586. That is certain?—As it goes to the south it decreases.

15,587. Were the groins put to collect the sand?—Yes.

15,588. And to retain the present breach?—The two north ones do retain some, but when you get to the south ones I never saw any.

15,589. In fact, the ledge of rocks is a natural groin and prevents the accumulation of the sand?—The pilots inform me that the sand drift which is at the entrance of the harbour passes the south entrance outlet in five fathoms of water. Objections are urged to the plan which I support on account of its embaying the harbour; and also it was the only reason which engineers gave against carrying out the piers, the notion that doing the works would embay the harbour. That is a notion which I have never admitted; I cannot find any ground for it. It is said that the bar is worse than it was 100 years ago; I may remark that the foreshore of the dock was brought forward before the bar was in a good state. The dock was first opened in 1850. Here are two sets of soundings put upon the chart, one in black ink and one in red ink. They refer to two different data, the black figures to the Admiralty datum, and the red figures to the Commissioners' datum, which is a foot below. To compare you have to add a foot, and you will see that there is very little difference, not much.

15,590. Do you know by whom the soundings in red ink were taken?—They were taken by order of the Commissioners' engineer.

15,591. But by whom?—I do not know. I am not a Commissioner, and I do not know.

15,592. To return to the original question, are you, or are you not, of opinion that Mr. Stevenson's design will improve the entrance to Sunderland harbour?—I think it would not improve it. I think, as I stated yesterday, that the sand would wash in behind the piers in every place, wherever there was a ledge as in this beaching ground.

15,593. Do you think it would be the means of saving life? Supposing the pier heads were in 18 feet at low water could not vessels run within the piers at all times, and so save life and property?—I doubt the 18 feet being maintained, because it is a well known and acknowledged fact that if you carry out works in a bar harbour the bar follows it. I think you would have more water at the entrance by running out a single groin, because by running out to 18 feet of water the current would have less power to keep it clear.

15,594. Why will not Mr. Stevenson's north pier act as beneficially as the pier you propose from Roker's Rocks?—I consider that it is continued too far. It would be more likely to have sand lodge behind it, but the other terminates in rocks, and immediately to the north there is a great hole where sand would not lie. I think Mr. Stevenson's pier more likely to accumulate sand.

15,595. Does Mr. Stevenson's north pier run off from Roker's Rocks as you propose?—Yes; but it runs further.

15,596. Then you think that extended so far out it might be the cause of the bar following?—It might be. The other terminates at rocks where sand, I think, possibly might accumulate behind it; I do not say positively that it would.

15,597. Then do we understand you to be of opinion that a bar would form outside the pier heads as designed by Mr. Stevenson?—Yes; the same as outside the heads of the Tyne piers; and I may state that I have an objection to this form of pier. Suppose that a ship takes it in a gale of wind, which is so strong, that she misses it; she comes ashore near the end of the pier, and probably is upset with her head towards the sea, and from the great slope of the breakwater the comparative peril of her fall with her head to sea would be more dangerous.

15,598. Do you know the proposed width of the entrance?—The first 900 and the last 800 feet.

15,599. Did you hear the pilots say yesterday that they did not anticipate the slightest difficulty in taking the entrance to such a harbour?—Of course they would consider it with the wind in; but of course we know that of a large number of ships some would miss. I know pilots object because vessels would come on the rocks.

15,600. Is the freshet out of the Wear very great?—Yes.

15,601. At what rate does it run?—I think I have heard it said that it runs three or four knots an hour; but sometimes it runs down during the whole of the flood tide.

15,602. At those times is it difficult to take the entrance?—It is with a scant wind as well as a close wind to the north. I have noticed when the wind has fallen there is great danger. One vessel I noticed coming in with great difficulty by being warped to the north pier. The next vessel struck midships; they hauled her up, but she sunk when she got a little way up the harbour.

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15,603. Do you anticipate that it would be easier to take the proposed than the present entrance?—Provided the depth were maintained, but if the depth were not maintained I do not know that it would be better.

15,604. To return to the general question which is more the object of the Commissioners: You stated that a harbour of refuge between Flamborough Head and the Farn Islands should be placed somewhere about Tees Bay?—Yes; that is my view.

15,605. Is your reason this: because it is the deepest part of the bay?—Yes; it is the place ships run for. The embaying wind is east-south to east by north which are the worst winds which blow, and we have often the wind from that direction. An old captain here, rather shrewder than the rest of his class, observed that when the wind was north-east here and a low barometer, it was south-west in the channel. He used to make a wager at a public house, when he saw the wind north-east here and a low barometer that it was south-west in the Channel, and he invariably won. It was in that way we were mistaken about our ships leaving the Thames. The winds were different. Vessels often find the wind north of them after they pass Flamborough Head.

15,606. You have heard Bridlington Bay proposed by some as the best site?—I do not consider that it would be a benefit to make any alteration in Bridlington Bay. It is useful in north winds, and it would spoil it to alter it; it would rather injure it than otherwise. That is my idea, though not being a nautical man I cannot say positively. I consider Redcar a good position for holding vessels. Filey is rather too near the Humber. Vessels that take the Humber to the south can take the Humber, and Filey only covers the coast between the Humber and Filey; but in the Tees bay it would cover the whole coast. To a captain caught off Whitby, Filey would be no use; but he could run in here; and I think vessels generally make a run to clear the head, and generally, if the wind is far enough to windward, they run for the bay.

15,607. Drawing an imaginary line from Flamborough Head to the Farn Islands, have you any doubt that the right point for a harbour of refuge to save life and property should be in the bight of the bay?—I have not the slightest doubt, provided a good enough site could be obtained; a proper site.

15,608. Would you consider it very preferable to any site within seven or eight miles of the extreme of that line?—Very much so. Yes.

15,609. (*Capt. Sulivan.*) Do you consider that in laying out the public money for making a harbour of refuge, those who are answerable to the country and to the public for the laying out that money should, in the first place, secure, if possible, a site where, when a pier was built, the depth inside would be maintained as long as possible?—Yes; that is my view.

15,610. And do you think that if a place is selected in which there is a slight fear of silting up, or which has been silting up of late years, there is great risk of the money being spent uselessly?—Yes; but a very slight tendency to silt up is so great in all enclosures that we must run a little risk.

15,611. I said selecting a spot where there is a slight fear of silting up?—I think it is the duty of the Commissioners, if I may be allowed to say so, to select a spot which has the slightest possible risk of silting up.

15,612. If a position were very desirable for a harbour of refuge, but there was every probability from past experience of its continuing to silt up; and if there were another position less favourable, would you not think it objectionable to lay out a sum of money on the former, and that it was better to take the less favourable site if there were a less chance of its silting up?—Yes, that is my view; but it would depend on the comparison whether it is much less likely to silt up or not.

15,613. Do you consider that any outlay can be made with the probability of obtaining that object which you now think so important, if the piers include within their boundary a tidal river?—I think not. I think a site with a tidal river quite unadapted for a harbour of refuge in the true sense of the term, because there would be danger of a bar.

15,614. Do you think there would be any difficulty in finding a place where there was no river, stream or dock entrance running into the enclosure?—I think it would be very desirable to do so.

15,615. You have had great experience of all the trade and business of a port of this kind?—Yes.

15,616. Supposing a harbour were made in a place where at present there is no trade—no means of supplying ships with provisions, anchors, sails, and other things required for damaged vessels putting into a harbour of refuge—if a site were selected without those advantages, do you consider that the demand which would arise from those vessels would certainly be followed by parties taking capital there to supply that demand?—I apprehend that a small amount of capital would be invested in those things; but you would not have such a supply as may be had at Hartlepool, Sunderland, and Shields, and probably you would pay greater prices; but in this neighbourhood, with the steam boats, it would be very easy to send what was required.

15,617. Do you know in this neighbourhood any site where difficulty would arise from vessels putting in to get supplies and not being able to obtain them?—Scarcely, I think; with supplies plentiful and railway communication so great, it would not be any serious object.

15,618. (*Capt. Vetch.*) What is your plan?—This.

15,619. (*Chairman.*) Have we that in evidence?—I believe a copy.

15,620. That is the plan you referred to?—I have referred to several. It is Mr. Stevenson's plan which I referred to last.

(*Mr. Robinson.*) We shall be happy to supply the Commissioners with a copy.

(*Witness.*) This is a plan showing the pier from Roker.

15,621. (*Capt. Vetch.*) What is your profession?—A merchant and shipowner.

15,622. Are you acquainted with the coast of England in other places?—Not much, except what I can gather from books.

15,623. How long have you been settled at Sunderland?—All my life. My firm have carried on business for 100 years in the same place.

15,624. Are you well acquainted with the river and the outlet of it?—Yes.

15,625. Can you tell me how far the tide flows up the river?—With a high spring tide it flows as high as Chester bridge. I do not know how far that may be, but it runs seven or eight miles by the road.

15,626. What is the general depth of the river upwards which forms the mercantile port?—The port extends a little more than a mile up the river, and is kept clear by dredging; after that it shoals rather rapidly.

15,627. I asked how deep it was generally?—By dredging they keep it down to twelve feet at low water.

15,628. I do not ask what they do by dredging; I ask what is the depth of the river and in the port at low water?—The depth varies very much. In some places it is four, five, or six feet.

15,629. Is it eleven feet in some places?—In the holes I believe it is.

15,630. Is it generally nine feet above the bridge?—I am not aware.

15,631. Vessels go up at low water?—I doubt it. I cannot speak positively without looking at the diagram.

15,632. Looking to the fact that it is a tidal river, only eight or nine miles long, and that you have to dredge it, can you expect any great amount of scouring water?—Not a great amount of scouring water. The Commissioners are endeavouring to in-

crease it by dredging away some of the hard shoals, which will lower the low-water mark several miles up, and increase the tidal scour.

15,633. Supposing the improvements were all completed, would it contain enough tidal scour to clear a channel to sea?—I am afraid not with a broad entrance like the one proposed. The present entrance is only 370 feet, and it would not preserve one of 800 or 900 feet. I consider the present is rather too broad; that if the pier were made a little more to the south, and the entrance rather narrower, the depth would be better preserved than it has been.

15,634. Will you simply answer the questions? What do you consider to be the bar?—Across the ends of the piers from the end of the north pier to the end of the south pier. Sometimes it moves.

15,635. And what is the depth of water there now?—I think about four feet. I think four feet by the Commissioners' datum, and a foot more by the Admiralty datum.

15,636. What is the depth at the inner end of the pier—the least depth?—I believe it is deeper than the bar; four and five feet, or four feet and a half.

15,637. Have you known it as shoal as two feet and a half?—At low water, yes, I think I have; as near as I can tell. I have not sounded.

15,638. Is it not a bar to vessels passing out or in?—Yes.

15,639. Then that bar requires removal?—The bar or shoal.

15,640. Then, supposing the bar to be at the inner end, what do you consider to be the extent of that bar?—The inner end?

15,641. The inner end of the north bar; what is the length and what is the breadth?—I can scarcely speak as to the breadth of the bar.

15,642. What is a bar?—A bar is a bank of sand crossing the entrance of a river or estuary.

15,643. Then if it prevents vessels passing which are drawing ten feet of water it is a bar?—It is a bar.

15,644. Between the outside and inside of the bank, what is the breadth?—I do not know.

15,645. But to give a fair passage that bar must be removed?—Yes. It is not so broad as across to Shields bar by any means, and not so heavy a sea on it, because the water shoals more gradually seaward than at the Tyne.

15,646. Considering the small amount of water which returns on the ebb, do you think that capable of itself, to carry a clear deep water channel to sea? Do you think the return of the tide would suffice to clear out a deep channel?—I consider it would if the jetty from Roker were carried out.

15,647. Supposing there were two enclosing piers and arms?—Like the proposed plan. I do not think it would keep the channel clear. It is scarcely able to keep 370 feet clear, and it is proposed to have 800 or 900 feet.

15,648. When the waterway expands in width, will the current be maintained or lessened?—I think the current will be lessened. I do not know what the velocity will be—what will be the greatest scouring power.

15,649. Take the velocity as you have it when it gets into a large expanse opposite the pier; will the velocity be continued?—I think not.

15,650. Do I understand you to say that along the shore to the south, behind certain groins which you have named, the sand does not accumulate?—No, I never saw it pass that groin. I do not know the name of the third groin from the south. There are five groins. It is the middle groin.

15,651. Do I understand you to say that at the south entrance it has never silted up?—Sometimes it has been silted up. I do not know whether it is the height of the coffer-dam. There is an accumulation on the beaching ground, and it is swept into the channel; and some sand comes from the south, I am satisfied, sometimes.

15,652. To what extent has it been excavated?—The channel has been excavated twelve feet below the Commissioners' datum line, or thirteen feet below the Admiralty low-water mark.

15,653. Have you ever known it have less than six feet?—I believe it has had less.

15,654. Did you ever know it have only four feet and a half?—I cannot speak to my own knowledge. It has been silted up at times.

15,655. I think you said that from the mere position of your pier it would be able to keep the channel clear?—Yes; clear from a bar in the true sense of the term. I make a distinction between the bar and silting up. I am persuaded a large quantity of sand comes in from the south.

15,656. Then you conceive that the accumulation at the south entrance is not driven in by the sea, but comes from elsewhere?—Except near the dock gates; not the outer entrance. I do not think it is driven in by the sea; but near the dock gates a south-east gale drives it in.

15,657. If it comes in from alongshore would it not be easy to prevent it by groins?—Yes. I have mentioned that to the Commissioners.

15,658. Do you know how much money is spent in dredging it?—I do not know exactly.

15,659. Do you think it is 600*l.* a year?—I do not know. Not being a shareholder I am not interested.

15,660. (*Mr. Coode.*) As I am aware that you have been an observer of the movement of material along the coast, I should like to know the extent of coast over which your observations have been made?—My personal observations have been confined almost altogether to this locality.

15,661. Within what limits?—Within a few miles of Sunderland.

15,662. Do you mean 5, 10, or 15 miles?—Four or five miles.

15,663. Four or five miles north and south?—Yes.

15,664. If I rightly understand, you are decidedly of opinion that the movement is from north to south?—Yes.

15,665. You expressed disapproval of Mr. Stevenson's plan, but I think you approve of the plan marked with red lines. Perhaps you will explain in a few words what modification of Mr. Stevenson's plan you would prefer?—The plan opposite page 10 of the Commissioners' Book, Part 2, engineer's report on Sunderland Harbour.

15,666. Is it because you apprehend there would be no accumulation on the north side, or in a less degree as compared with Mr. Stevenson's?—I apprehend that all accumulation behind that pier will be in-shore, as you get off immediately behind the pier, where there is the greatest danger, it is so rocky; and the rocks are in such deep water to the north that no sand would be there.

15,667. Do I understand you to say that the pilots inform you that they have seen sand moving in five fathoms of water?—As I did not see it myself I gave it on the authority of the pilots. At 22 fathoms the bottom has generally silted. The small sand generally lies at that depth.

15,668. Have you a sufficient knowledge of the state of things in Tees Bay to be able to tell us whether the accumulation there, is principally from the Tees or from the sea?—I believe that the accumulation at the Tees Harbour mouth will be principally outside. Where the waves have any action, it is principally mud which is deposited. There are two drifts north and south. I consider it the focus of two drifts.

15,669. Does accumulation take place in Tees Bay both from northwards and southwards?—Yes; that is my impression.

15,670. Is that impression confirmed by observation elsewhere? Is that the principle you have observed to be in action elsewhere?—Yes.

15,671. You put in yesterday a plan of Redcar of which you approved?—Yes, generally.

15,672. Will you look at the small plan (390) pub-

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lished in compliance with a return of the House of Commons, 12th June 1851;—is that identical with the plan put in yesterday?—Yes, I believe the plans are identical.

15,673. You said that you would provide there an anchorage for about 300 ships?—I did not say anchorage. I said it would provide berthing, on an average of 10 ships to an acre.

15,674. Do you consider that 10 ships to the acre can find accommodation when putting in for refuge purposes in the middle of the night; or in a gale of wind that you could crowd 10 ships in an acre?—As I said before, I apprehend that 400 vessels will not come in in one single night; but one after the other, anchoring near the entrance. They will then weigh anchor and draw up to a berth, the same way that they do in our own harbour.

15,675. Do you not consider that a harbour of refuge, to be worthy of the name, should be available in all states of the weather, both by day and night?—Yes.

15,676. Then what number of vessels do you think could bring up with safety to themselves in a gale of wind, on a dark night?—I am not sufficiently nautical to give any idea.

15,677. You seemed very precise in your estimate of 10 ships to an acre?—I merely took that upon noticing that docks are generally built on the estimate of 10 ships to an acre.

15,678. But do you not think that docks and harbours of refuge are not exactly identical?—No, they are not identical until the ships get berthing.

15,679. You said that accumulation takes place from Tees Bay, both from the north and south winds?—Yes.

15,680. And I understand that you gave evidence that there has been accumulation there during the last 10 years. If you did not, perhaps you will say so?—I do not recollect referring to 10 years back.

15,681. Do you, or do you not, know whether there has been accumulation in Tees Bay during the last 10 years?—I am not aware of that, except that within the present century the channel to the Tees opens out much further to the north than it used to do. It used to come out more directly east than it does, which is a proof of accumulation, or a proof of diminution of scour; because there is inclosing land in the Tees the same as in the Tyne.

15,682. My question has reference to Tees Bay generally, rather than to the mouth of the Tees. Do you know whether an accumulation has taken place there within the last few years?—There was a pier run out within the last 10 years from the Heugh, and where there was rock there is now sand. That was the commencement of Mr. Rendel's plan, and as far as that plan has gone I think the sand has accumulated.

15,683. Do you not believe now that the tendency of any artificial work in Tees Bay would be to accumulate sand there?—Except at Redcar; I think that is very clear of accumulation, from the rocky nature of the ground.

15,684. Do you think there is accumulation everywhere in Tees Bay, except at Redcar. Is that your answer?—Yes.

15,685. Have you seen the wreck chart attached to the Report of the Committee of the House of Commons for 1857?—No, not for 1857. I have seen it for previous years.

15,686. Perhaps you will look at this wreck chart, which is a wreck chart which shows the wrecks for the last five years?—Oh yes; I have seen that before.

15,687. Will you tell me whether the great accumulation of wrecks is not on the range of coast between Blyth and Flamborough Head?—Yes.

15,688. You were asked just now some question as regards the supplies which could be furnished at any point where a harbour of refuge might be made; from the knowledge which you must have of this coast, will you tell me whether you think there would be any difficulty whatever, anywhere within that range, in furnishing a ship with supplies if she put in in distress and required them?—I certainly do not think that there would be any serious difficulty, because there are so many ports comparatively near,—you can hardly find a place where a port is not near.

15,689. Looking at the facilities of the electric telegraph for giving orders on the one hand, and the facilities of steam tugs and railways on the other hand for executing these orders for supplies, do you think there would be any material loss of time in sending these supplies?—A Middlesborough man put into Hartlepool three months ago; his pumps were out of order; there was some difficulty in getting new pumps from the man from whom he had ordered them, so one day he went across to Sunderland and took two pumps back by the train with him.

15,690. Then looking at the facilities of the present time as compared with former times, it would not be necessary, you think, that any large amount of capital should be embarked at any point where a refuge harbour might be constructed?—No; I think not.

15,691. (*Sir F. Smith.*) I had not the advantage, Mr. Wilson, of hearing your evidence yesterday; can you tell us what is the actual annual cost of dredging in this harbour?—I think it was stated yesterday at 5,000*l.* a year.

15,692. Do you think there would be any difficulty in removing the bar by dredging?—I think there would be great difficulty. You must have fine weather for the dredger to work. When there is any lift in the sea you cannot dredge. I, of course, mean the true bar; the shoal made is a different thing.

15,693. Would you require continuous dredging by your plan or by the plan which you support?—Yes; because the drift across the mouth of the river is sure to deposit.

15,694. Do I understand that the proposed breakwater which you support at the Knocks would not project so far seawards as Mr. Stevenson's?—No, it would not project so far seawards.

15,695. I presume that you have seen the harbours in the south of England?—No, I cannot say that I have, but I have seen drawings of them.

15,696. Do you imagine that the projection of a pier into deeper water is an evil?—I do not consider it an evil, nor do I consider it a good unless that deeper water can be maintained.

15,697. If it should be the case that, in the south of England it is the principle to follow the bar, and thereby remove it by carrying out the piers into deeper water, should you say that that principle is a wrong one?—My view of the drift of sand is this, that if you carry a breakwater at right angles to the coast the angle behind the breakwater will close up; and thus it will pass, unless there are rocks or some cause to send it into deeper water.

15,698. Then do you think it reasonable to suppose that if your short pier will not turn the sand coming northwards into the harbour, that Mr. Stevenson's longer pier will do that?—I think it possible that if the west pier were made without the south pier, there would not be quite so much sand come in. From going out further, and covering the harbour a little more, it would be more likely to stop the sand which goes to the north in south-east gales, and with a longer pier there would be more sand behind the north pier than with a shorter one.

15,699. Then the error which Mr. Stevenson has committed, in your opinion, is in going exactly to the point where he stops?—I think he goes too far, and the south pier will intercept the south drift and bring it into the harbour.

15,700. Then you would make the north pier as long as the south pier and the south pier shorter?—I would certainly make it shorter.

15,701. Is it not a fact that the longer the pier the longer the bar of sand drifts into the harbour?—I think not; a breakwater constructed at the Knocks would allow the drift to go by in deep water. It is a

very simple principle. Pilots inform me that sand goes by in five fathoms at the dock entrance.

15,702. Then you consider it of great value to go only to the Knocks, and you think Mr. Stevenson has done wrong in going further?—Yes; he has gone beyond the Knocks.

15,703. Then, as a matter of fact, the terminating at the Knocks is a great recommendation in the plan you support. I may say, as you have alluded to Newhaven Harbour, that having been there for many years, I know that it is the groins which have improved the harbour most?—Which Newhaven?

15,704. Newhaven in Sussex?—Yes, it was proposed by Mr. Stevens, the resident engineer, and approved by Mr. Walker; and Mr. Walker remarks that he had never known a harbour so much improved as Newhaven. Mr. Stevens, in the Encyclopædia, says, that his plan by leading the drift into the bay, has very much improved Newhaven.

15,705. Do I understand you to say that the east pier was projected by Mr. Walker?—The groin to the eastward of the east pier, occupying the same position to the proposed as our north pier; and it has had the effect of improving Newhaven Harbour. It was made in 1845, and Mr. Walker, in 1856, said, that he had never known a harbour so much improved as Newhaven.

15,706. I may tell you I was employed five or six years in connexion with the groin at Newhaven, and my opinion is that the projection of the pier caught the sand—not the groin but the pier; and therefore my impression of what has been done at Newhaven is quite different from what you suppose?—Not having been there I can of course only give you my views upon the subject.

15,707. Do you mean that the accumulation which comes round the north pier would form a bar?—Yes, I do. It does form a bar.

15,708. I think you have shown a short diagram in the Commissioners' book of the precise time when the sand moves, and the form of the island or shoal in the centre of the bar?—It afterwards moves further southwards.

15,709. That is with the piers as they now exist?—Yes.

15,710. But if the piers were not extended they would not have that effect?—I do not see why they should not. It is a mere question of time. When the space behind the pier was filled up, the drift would form a bar.

15,711. What would be the expense of a breakwater as recommended by you?—I do not know. I believe the Commissioners' engineer made an estimate, before it was originally projected,—before Mr. Stevenson was called in. I think I have heard of 20,000*l.* or 30,000*l.*, as being the sum.

15,712. Then you consider it would be a considerable auxiliary to Mr. Stevenson's plan; because if your groin were to catch the sand coming to the south it would prevent it coming to the north pier?—My view is, that if the pier could be carried eastward to the Knocks the sand would then pass uninterruptedly into deep water; that the water would be deep enough; but that if you went further it would interrupt the passage of the sand, and form an accumulation of sand behind.

15,713. You are for a more economical plan, and would shorten Mr. Stevenson's pier to the Knocks?—Yes.

15,714. And reaching the Knocks you would stop there?—I think the Commissioners ought to do it with their own money.

15,715. You think that to make the harbour complete Mr. Stevenson's piers should be shortened, and instead of that there should be a breakwater?—That is my view.

15,716. The Commissioners are told that sometimes there are from 600 to 700 vessels off Flamborough Head waiting to go to the south. If that should be the case—if there are sometimes 600 or 700 vessels waiting off Flamborough Head to go south——?—To the north you mean.

15,717. No; to the south?—No; they cannot shelter under Flamborough Head going to London. They would get no shelter there in a south gale.

15,718. In a south-west gale it is sheltered?—They do not require shelter, it is off the land fair for London, all the way to Yarmouth Roads.

15,719. Then under any circumstances, supposing that there are from 600 to 700 vessels lying off Flamborough Head, do you think any port can be made to take these vessels in if they should be forced to bear up?—Let the wind be as fair as it may, you will not have the whole make for one port. We know well that men will run for their own port. Evidence was given yesterday of the great risks which men will run in going for their own port, and 200 or 300 are as many as would run for one port.

15,720. But if you formed a harbour of refuge they would probably try to make for that refuge, would they not?—A portion of them would, no doubt.

15,721. Supposing that there were a number of harbours, beginning at Filey Bay and going down to the Tyne, do you not imagine that vessels wishing to go south would not rather go into a port close to Flamborough Head than go to the northward?—If there were a harbour at Flamborough Head which vessels could make, they would rather do that than go to the north, but still that is a mere question of expense; because I consider when a vessel is in a position to weather the head she is in a position to run to Redcar, and as to a harbour at Filey Bay the question is whether it is worth the expense to save laden vessels running further to the north.

15,722. It is not the saving of vessels running to the north that we have to consider, but the saving of life; and if it is shown to you that there would be a greater saving of life by having more harbours, surely you would not object to that?—I apprehend that it would not in fact make any great difference; but on that, of course, a nautical man will be able to give a better opinion. Still my view is this, that when a vessel can run to Filey Bay, she can just as well run to Redcar.

15,723. You said you could enclose 470 acres?—That is so.

15,724. Then at the rate of 10 acres to a ship you provide a range for 47 ships?—No; at 10 ships to an acre; and I suppose there would be space enough for 470 ships.

15,725. Then, in fact, you would not take in all the vessels which might run there?—At high water there would be an area of 470 acres.

15,726. What would be the depth of the water?—At the entrance there would be about six fathoms, and further in for half the distance there would be from four fathoms to six fathoms; then it shoals gradually from 4 feet to 6 feet, and so on to the sand.

15,727. And supposing that you had only one ship to the acre?—I am not nautical enough to say for certain, but I suppose that would be enough ground to swing a ship in. You would be able to take in 470 ships.

15,728. Is not Redcar considerably embayed in comparison with Filey Bay?—Yes.

15,729. That would be a disadvantage, would it not?—On the other hand I consider it an advantage rather, because when a vessel can get off the land she does not require a harbour of refuge. It is those which are embayed which require a harbour of refuge; not like such a coast as Flamborough Head or Peterhead.

15,730. Would they not most likely have to remain there until the wind shifts if they were in a deep part of the bay?—There are plenty of steam tugs at Stockton which would be able to take them out.

15,731. Would those steam tugs be available for the purpose?—Oh dear, yes. There is a greater number of steam tugs in the Tees in proportion to the tonnage than in any other port, because they have to tow vessels there a long way out of the harbour.

15,732. (*Mr. Lindsay.*) The whole tone of your evidence has been to the effect that you would prefer

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one great harbour of refuge to the improvement of the already existing harbours, looking to the consideration of saving life and property ?—Yes.

15,733. In answer to Sir F.Smith you have just now stated that, if from 600 to 700 vessels were obliged to put back to seek shelter, they would not all run for one harbour of refuge wherever that might be placed ; but that very many of them would run for their own harbours, is that your opinion ?—That is my opinion, certainly. It was the case with the ships in Bridlington Bay coming to the north, according to the evidence given yesterday ; many of them probably run a certain amount of risk in order to run for their own harbour, being light vessels they come in with a strong wind from half flood to half ebb.

15,734. Then that being the case, is it not the fact that the loss of life and property which we are here, as a Commission, to obviate for the future, takes place at the mouth of these harbours ?—Yes.

15,735. If that is the case would not the improvement of these harbours, so as to enable ships to take them at all times, if possible, tend, according to your own showing, to save life and property more than any one single harbour of refuge that you could put anywhere on this coast ? — Well, in the first place I have given my views. I doubt the improvement, and should prefer leaving it to the local authorities—to the Harbour Commissioners—to improve their own harbours, and then incidentally they would improve them as harbours of refuge.

15,736. I will only trouble you with one question further. Seeing that the Commissioners have taken full and competent evidence upon the subject, and that they find that these harbours can be improved, and that a depth of water can be maintained at them, would that change your views with regard to the views you have originally expressed as to your preference for one harbour of refuge in place of improving these harbours which already exist ? — I cannot say. I am a little of a free trader, and I like us to do our business ourselves without any Government aid.

15,737. But if it were shown to be certain that the money which the Commissioners of these harbours could by any possibility raise would not be sufficient to improve these harbours so as to make them accessible to vessels at all states of the tide, and thus to prevent the lamentable loss of life which now takes place, would you carry your principle so far as to say that these lives should still continue to be sacrificed rather than that the Government should come forward with money to aid in the improvement of the harbours ?—Under these extreme circumstances I might alter my views, but I do not consider that we are under these circumstances at present.

15,738. But of course you are aware that it is only under extreme circumstances, such as the saving of life and property, that the Government does come forward, and that there must be extreme circumstances proved before Government will come forward. If, therefore, you see no other means of preventing this loss of valuable life and property which now takes place on the coast than those which have been shadowed forth, would you retain the same views which you have now expressed ?—My own opinion is, that if there were a single harbour of refuge it would be optional with the captains whether they should take it or not. If the harbours were made the Government would have done its duty ; and if people would not use when they could Government would not be at all to blame. It is said that men like to make their voyage, and to do so they will run great risks ; but when a man prefers to run a risk in that way I do not see that the Government is to be called to account for any loss that may ensue.

15,739. (*Capt. Sulivan.*) Are you aware that, by the aid of the large works which have been constructed at the Tyne, the Commissioners are hoping to get a depth of 15 feet at low water ?—Oh yes.

15,740. If those works should be successful, and that depth of water should be obtained, they ought to be available as a harbour of refuge for all vessels which pass to the north of Hartlepool, for a large portion of laden vessels at low water, and for a much larger portion of laden vessels soon after low water ? —If they can make and maintain 15 feet of water it will be a great improvement, and will make it much better than it now is as a harbour of refuge.

15,741. I was asking you would it become available as a harbour of refuge for light vessels with 15 feet of water preserved at low water ?—Yes ; provided that depth is preserved.

15,742. I mean provided it is preserved. Then if that outlay is successful, it will give at Newcastle a very fine harbour of refuge, compared with what you now have ?—Yes.

15,743. But suppose it is not successful ; supposing that with all their outlay they should fail to get an increased depth, would that show that any further expenditure of money would be money thrown away ?— I think it would be. I may state that the present piers which are now thrown out, all act as a groin, and drive the sand further out to sea ; and it strikes me whether it would not be worth while, when the present contract is finished, to let the work lie for a time and see the effect.

15,744. I will repeat the question : Whether, if the operations now in progress at the mouth of the Tyne are successful, they will make a good harbour of refuge ?—Yes ; but I do not approve of a harbour of refuge at the Tyne so well as at Tees Bay.

15,745. Then if the best situation were found from Redcar along the coast for a harbour of refuge, and it were constructed there, would you not have the double advantage of having a harbour of refuge, and a harbour much better than it now is, at Newcastle ?— Yes ; more particularly for laden than light vessels. Shields would be better for improving to 15 feet.

15,746. From what you know of the nature of the coast, will you tell me what you think of Filey Bay ? From the nature of the rocky coast on both sides of it, is it a place likely or not likely to silt up ?—I have not been there, but I think there is not much danger of it ; because at similar places, at Scarborough and at Bridlington Bay, there is no silting up.

15,747. (*Mr. Coode.*) Have you ever followed the sea at any time ?—Never.

15,748. Do you know anything of the peculiarities or the dangers of the voyage between London and Newcastle, whether there are any peculiar difficulties at any point ?—Nothing particular, except that in the coal trade I consider that on an average ships are deeper laden, and not so well found, perhaps, on an average as foreign-going vessels.

15,749. You do not apprehend that there would be any difficulty in vessels running back from Flamborough and a little further, would not that distance make a great increase in the danger ?—That is my view.

15,750. Are you aware that the distance is 40 miles ?—I should think that it might be.

15,751. Should you not think there was danger in a full laden ship, such as you describe, running back 40 miles on a lee shore ?—I think it is scarcely on a lee shore with a wind so that she cannot make her passage. If a vessel can clear Flamborough Head she can go to the south, but with an embaying wind, which is east, I think she can run to Redcar.

15,752. You say if she can clear Flamborough Head ; are you aware that there are difficulties in clearing Flamborough Head ?—I have heard of vessels not clearing the head. I should think they could run to Redcar ; but not being a nautical man I do not give any opinion.

(*Mr. Robinson.*) I have now to apply to have Mr. Stevenson's examination finished, as he has attended here at considerable inconvenience.

(*Chairman.*) Before I proceed with the evidence of the next witness, there is a little matter which I wish to notice here. My attention has been called to a paragraph in the local paper of this day, in which it is stated, that up to the present moment no communica-

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tion has been received as to when the Commissioners will open their sittings in Sunderland, and that there must have been some extraordinary remissness on the part of those who should furnish that information. Upon that I have to observe, that for reasons which I shall mention hereafter, on the 2d of October, at Bristol, the Commissioners adjourned to the 13th to meet at Tynemouth. You will observe that between the 2d and 13th of October no business could be done that had not been previously sanctioned. Upon the 4th of October a communication was written from Bristol to the Mayor of Sunderland, informing him that the Commissioners would meet on the 13th of October at Tynemouth, and that two or three days' previous notice would be given of the day when they would meet at Sunderland; and to the best of my recollection it was noticed in the letter that the reason for not fixing the day was this: that it being the determination of the Commissioners to hear every thing which everybody has to say, it would be quite impossible before commencing an inquiry at any one place, to determine when that inquiry would be finished. Therefore, before we commenced our proceedings at Tynemouth, it was impossible to form any conception how many days we should remain there. We were placed in this difficulty, that if we had named a day we might have put you to the inconvenience of having to adjourn over that day. We thought the lesser inconvenience of the two would be to give the short notice which I have described. I find also, that upon the 6th of October, the letter I have mentioned was acknowledged by the mayor; and upon the 12th of October a letter was written by our secretary to the Mayor, stating that we wished to hold a meeting at Sunderland on Friday next, the 15th, thereby fulfilling, to the letter, the intimation that we would give you two or three days' notice. I will give you the reason why I have taken notice of this paragraph in the paper. Because it touches the value of this Commission, that every body who wishes to give us evidence should have a full and fair opportunity of doing so; and if the measures which we have taken for this purpose have not fully succeeded, it is our intention to sit subsequently in London, and parties who may wish to do so, will have the opportunity of forwarding memorials to us there; and, if we think proper, we can call them up to London to give their evidence there. I will further observe, upon the suggestion of one of my colleagues, that we had thought in the first instance, that one day might have been sufficient for Sunderland, and upon that supposition we gave notice to Hartlepool that we should be there to-day; but the moment we found the time for Sunderland was not sufficient, we determined to remain here, and to put the people at Hartlepool to the inconvenience of postponing their meeting until Monday.

(*The Mayor.*) I am very sorry that there should be some complaint that the meeting has not been advertised in the papers.

(*Chairman.*) There is no complaint as to that, because the letter is in the paper in which you state the cause why no advertisements were inserted.

(*The Mayor.*) I could not possibly advertise in the papers after I received intimation that you would be here yesterday.

(*Chairman.*) Was there no local paper?

(*The Mayor.*) There was one local paper, but not of any extensive circulation.

(*Chairman.*) I am aware of the difficulty of publishing advertisements in the newspapers, and you took the next best course, that of circulating handbills.

Mr. STEVENSON re-called.

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15,753. (*Chairman.*) Will you proceed with any statement that you may wish to make relative to the proposed harbour improvements?—May I say anything which I stated yesterday, or shall I begin where I left off, then?

15,754. Yes; begin where you left off?—I stated yesterday, when I concluded, that the effect of the works would be——

15,755. You will permit me to say, you are the best judge whether or not you should refer to anything which you said yesterday, for the elucidation of the subject. As Sir Frederic Smith, Captain Vetch, and Mr. Coode were not here, we must have it over again, if you think it necessary; but we have it on our minutes, and we shall have it published in evidence.—I am most unwilling to take up any time unnecessarily in making a statement over again.

15,756. It is suggested by Sir Frederic Smith that you should make some brief statement, to give the gentlemen who were absent yesterday some idea of the statements you then made?—The objections to the present harbour of Sunderland are three. The first is, the very small depth of water at the bar at the entrance of the harbour, varying from eighteen inches to five feet; the second objection is the extremely heavy sea at the present mouth or entrance; and the third objection, is the amount of range which enters the harbour, running up the lower reach of the harbour, and rendering the whole of the berthage very insecure and inconvenient. The cause of the bar at the mouth of the harbour, I think may be explained as follows:—The shore in front of the harbour consists of sand, through which a channel is kept open by the scouring of the tidal currents. From the high-water mark to the low-water mark the action of the sea upon the coast is to heap up the sand, and of course to fill up this channel, while the action of the tidal scour is to keep it open; and I showed a section yesterday which I think illustrates this pretty clearly. Here is the section to which I allude. Section 2 is through the channel and across the bar. Section 1 is immediately to the north of the harbour, and section 3 is immediately to the south of the harbour. Upon examining those sections, it will be found that Nos. 1 and 3 both incline regularly from high-water mark to low-water mark into deep water, but on examining No. 2 it will be seen that deep water is continued through the beach between the piers into the harbour. If the channel were closed,—if we could suppose such a thing,—the middle section would assimilate to that on either side; in other words, this channel would be wholly closed up. This closing-up action is the effect of every heavy sea, and consequently we have this bar shifting, sometimes driven up close to the pier heads, and at other times, as represented in the section, 400 or 500 feet from it. The next heavy sea will wash up the projecting part shown in the section, and will throw it up and remove the bar inwards. Upon looking at the longitudinal section, you have the bar at the outer end, upon which there is a small depth of water,—some 18 inches, I should suppose. You will also observe that opposite to the Potatoe Garth you have a considerable depth of water, which continues to some extent out between the north and south piers; but you will observe that coming to the outer extremity of the north and south piers we have shoaling commencing. Now, if the natural scour were unobstructed and unimpeded, it would maintain a deeper channel between the piers, where the channel is confined and the scour is naturally greater than at the open part opposite the Potatoe Garth. This affords a very strong indication of the prejudicial effect of the heaping up action at the mouth of the harbour to which I have alluded; and my opinion is, that the shoal water at the mouth of Sunderland Harbour is due entirely to the heaping-up action of the waves. If that be the case, two methods at once occur whereby this evil may be removed. The one is the increase of the backwater or scour, giving it a preponderating effect over the heaping-up action of the waves. The other is mo-

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difying the action of the sea itself. Upon the increase of tidal water I reported some years ago; but the present plan which is before the Commission is based entirely upon the principle of protecting the harbour mouth from the action of the sea. For that purpose the piers shown in the model have been designed. It is proposed to effect the object in view by running out two piers, one to the north and the other to the south. The effect of those piers will be threefold. In the first place, they will reduce the swell at the mouth of the harbour in the ratio of one to decimal 3, or, in other words, a nine-feet wave will be a three-feet wave at the mouth of the present harbour. This reduced action of the sea will enable the tidal currents to act with greater power, and it is not too much to expect, that after those piers are thrown out, what is the maximum depth of the bar now would be the minimum depth of the bar then. The second improvement is the reduction of the height of the wave at the pier heads, where, by reducing the action of the sea, you reduce the height of the wave in the proportion of nine to three ; and the third will be the improvement of the lower reach of the harbour. The range now complained of will be done away with. The estimate for carrying out these works is 300,000*l*. I do not know if the Commissioners wish me to give details of those estimates, and the prices of those works.

15,757. Can you let us have the details in the shape of some paper ?—I will give the details in a written statement, giving the prices of the different parts of the work, and also sections showing what sort of work is proposed.

15,758. (*Mr. Coode.*) Will you take care that your sections are reduced to the same scale as the Commissioners' established scale, of which you have been apprised ?—Yes ; I go on to state generally that as this is an exposed place, and that to some extent marine insects are found to affect timber-work on the neighbouring shores, it is proposed to construct these works entirely of stone. The pier heads will be brought up with the diving bell, and the rest will be rubble, and the superstructure will be rough blocks of stone, sufficiently strong to resist the action of the sea. With reference to the maintenance of those works, I should wish to say, that I have very carefully considered the subject, with the object of making up my mind as to whether there was in point of fact any danger to the existing works in constructing them ; or any chance of the works, after being constructed, not being maintained. It has been said by some of the witnesses that this north pier would act as a groin ; but it must be recollected that the construction of a groin to retain materials on a coast is an engineering problem, not always very clear or successful. There is one thing clear, however, that no man employed to project a groin for the purpose of collecting sand in that situation would ever give it the form of the outer portion of the proposed pier. It would not be a curved groin in a sloping direction from north to south ;—a groin of that description would have no effect in retaining the sand passing along the coast, provided (which I admit for the sake of argument, but which I do not admit actually) that the sand does travel in such quantities as was stated by the last witness. I have myself no fear whatever upon that subject ; but admitting that this sand is carried along the coast, and is to be carried along the north pier, you observe that the extremity of it, or the mouth of the harbour, is projected beyond the general outline of the coast ; and therefore, I have no hesitation in saying, there will be increased tidal scour across the mouth of the harbour, so that if we suppose sand is carried out, it will be carried outside the harbour, but I do not suppose that sand in any quantity will be carried out there in that depth of water. The effect of a pier is not like a groin ; a groin is generally a shelving structure from the high water downwards, not terminating in an abrupt bluff point as the pier does ; moreover, against the pier which is projected, there would be constant re-action from the waves, which would keep the whole sea to the north of it more or less in a state of disturbance, and would prevent deposit, even supposing that the sand did travel along the beach. This harbour as laid down I regard as a projection from the line of coast, creating at the mouth of it increased scour. The whole of the movement of sand which I have spoken about, and which has come under my observation here and elsewhere, takes place in shallow water. I am not aware that waves breaking in deep water (say 30 fathoms or any such depth), breaking in that depth in the open sea do disturb the bottom so as to produce a constant progressive motion. I am not aware that the waves disturb the bottom in this way even in three or four fathoms. No doubt there is a certain action at the bottom at that depth, perhaps a percussive. That is rather an obscure subject, but I do not see that there is any evidence at all as to any progressive movement whatever of sand in that depth of water. The wave, it appears to me, though it does break, still appears to break and pass over without producing progressive motion of the materials ; certainly it never acts upon the bottom to the same degree as when it comes in shallow water. We know that it acts upon the sand in shallow water, and by every day's experience we know that the tendency is to heap it up. If it were the case that the sand moved in deep water, we should certainly find after a heavy storm in all sandy bays, that water in two or three fathoms depth was sensibly shoaled. We shall certainly find in the course of years, I should say (if that were the universal law), that all sandy bays were filling up. Now any experience which I have does not lead me to such a conclusion. There is, in point of fact, no such general law that I have ever been able to trace ; therefore what I say is, that the pier heads being projected into that depth of water, there would be no tendency whatever for the sea to throw the sand into this harbour mouth. I have no difficulty whatever in my own mind in coming to the conclusion, that the entrance, when so formed, will be maintained. If you cast your eye over this model, you will see that at Souter Point, immediately to the north of Sunderland, we have a projecting shore. We have deep water keeping very close into it ; there is no foreshore ; there is no collection of sand there, and I attribute that solely to the action of the current in passing it. In fact, what occurs to my own mind in casting my eye on this Admiralty chart of the bay of Sunderland is, that the supposition (the mouth of the new harbour being here) that the foreshore would gradually extend, and that eventually, at some distant period, the point which is shown as the entrance of the proposed harbour would be dry at low water, with a beach extending in front of it, involves a change so great, and belonging to a period altogether so remote, according to my notion, that I confess I am not able to carry my engineering views to that extent. The quantity of material required to produce such an effect is something quite enormous, and where it is to come from I am really at a loss to know ; but I do not think that action will exist at all. I do not think, at this moment, there is any further remark which occurs to me, but I shall be happy to answer any questions which the Commissioners may think fit to put.

15,759. (*Chairman.*) In your evidence yesterday, Mr. Stevenson, I think you stated that you did not view this proposed improvement in the light of a harbour of refuge, but chiefly as a local improvement? —I did.

15,760. Now taking into consideration that any grant of public money will probably depend upon its utility for refuge purposes, will you state to me what area we may reasonably suppose will be retained for that purpose if this improvement succeed ?— The high-water area will be 150 acres ; the low-water, 95 acres. One fathom, 57 acres ; 2 fathoms, 31 acres.

15,761. That is the area outside the piers ?—That is the area enclosed within those new piers.

15,762. Outside the existing harbour piers ?—Yes.

15,763. Then will this improvement render available for refuge purposes a portion of the present harbour within the north and south piers ?—It will render available as a site for berthage the whole of the lower beach of the harbour from the Potatoe Garth upwards, which at present in bad weather cannot be used.

15,764. And what additional area would be gained? —I have not calculated that ; but I can have it done, and give it in.

15,765. Will you furnish our secretary at your convenience with an estimate ; not a very close estimate, but some estimate of the area ?—Yes.

15,766. As I understand you, the proposed improvement will give 18 feet at low water at spring tides ? —At the pier heads.

15,767. By dredging improvements, and whatever improvement arises from the scour of the river, what shall we have in this refuge area inside the north and south piers ?—It depends entirely on the operations which the, Commissioners of the River Wear will ultimately carry out ; if nothing is done but those two piers which I have shown, all I expect is, that there will be a low-water channel from the present pier heads, which shall nowhere have less than the present maximum depth of the bar ; but if the suggestions which are contained in the report I have handed in as to improving the upper part of the river are carried out, additional scouring power will be gained, and that depth will be increased. I am not prepared to say the exact extent, but no doubt to the extent of a foot or two.

15,768. And are you of opinion, that by dredging, that gain of a foot or two can be extended further ?— It would be, partly by dredging, and partly by the construction of training walls in the tidal part of the river.

15,769. By dredging, do I understand you to mean in the area I have mentioned ?—The dredging would be principally for removing the shoals in the upper part of the river so as to allow the tidal water to get further up, and to give a larger amount of it.

15,770. Can you state at what period of the tide this refuge area inside the north and south piers would be available for vessels which have taken shelter within the pier heads ?—Excepting a very small part of it at the outer extremity, no part of it would be available as anchorage at low water at all ; but about the period of the quarter or half tide it certainly would render the present entrance open for light vessels, and would also be a refuge or place where they might bring up ; but there is no object in vessels bringing up there, if they can get into the harbour, which is the great object to attain.

15,771. The depth above being always greater than at the bar ?—Yes.

15,772. (*Sir F. Smith.*) You have shown us three sections, one through the entrance, and one north and one south of the entrance ?—Yes.

15,773. Were those sections taken with great accuracy ?—They were ; they were taken from a contour plan furnished by Mr. Meik, the resident engineer, and I have every reason to believe they are quite correct.

15,774. Do you propose to give in those sections ? —Yes.

15,775. It will be convenient to mark the heights and depths so that we may not have to refer by compass, and if you will be kind enough to have that done upon the responsibility of some person who will sign the drawings ?—Very well.

15,776. When were they taken, at a distant period or recently ?—The date is not upon them ; but it was in the course of last year ; the date is not upon those documents, but I shall have the date put upon them ; it was some time last year.

15,777. It might be satisfactory if you could get sections taken at the present time so as to show what is the difference that has arisen in the intervening period ?—I will have that done.

15,778. Will you point out on the model the exact position of the bar where it now stands ?—It varies, not exactly from day to day, but certainly from week to week, but just at this moment it is a little without the pier heads of the present harbour.

15,779. So far as your knowledge goes, what is the extreme shifting of the bar ?—I think from the pier heads to about 400 or 500 feet in front seaward.

15,780. To what do you ascribe the shifting to that great extent ?—I ascribe the shifting to the effect of the outward current, in moving the sand thrown up by the sea, and depositing it at a point further seaward than the present pier heads ; thus when the bar has been driven close in between the south and north pier heads by violent gales we have at that place a large amount of sand. When the gales take off, and the scour begins to act, it is pushed by the action of the scour considerably seaward of the pier heads, and I think that is the cause of the variation of the position of the bar from the pier heads to 400 or 500 feet seaward.

15,781. You think that the bar is more formed of sand brought direct seaward than of sand brought along the coast ?—Yes ; it is sand thrown up and pushed seaward alternately.

15,782. That strengthens your opinion that there would not be any great movement towards the harbour's mouth if the north pier was formed ?—Yes ; there is to a certain extent periodical wasting and filling up on either side of the present harbour. In the course of last year, when I was here, there was a considerable amount of sand cleared away from the north pier heads, in consequence of a wrecked vessel lying there, and such changes are constantly going on. We have, as I said, always a constant action of the sea to fill up, while the action of the current is to scour it down.

15,783. What amount of backwater do you recommend being obtained, and can you obtain ?—As much as we possibly can. I cannot state from recollection ; but I gave the amount in the report which is given in.

15,784. A considerable amount ? — A considerable amount of backwater, and backwater which would act at the most beneficial time of the tide, being at the last of the ebb tide.

15,785. (*Mr. Lindsay.*) I have got one question to ask you, Mr. Stevenson. You stated, I think, and you gave reasons which struck me very forcibly, that you thought if the piers proposed were carried out you would be able to maintain the depth of water to what it is at the present time ?—Yes, the maximum depth.

15,786. And I think you stated, further, that you did not expect to be able to increase the depth of water between the existing piers more than about two feet ?—I think I said four or five feet.

15,787. You would increase it four or five feet ?— Four or five feet would be the increased depth.

15,788. Do you think the whole depth would then be six feet ?—Yes.

15,789. What would be the good of constructing those piers, for ships running to this place in distress in gales of wind would gain no advantage by them, if, while you had 18 feet at the proposed entrance, you would only have six and a half feet in the channel between the existing piers ; for ships in such gales of wind as I have pointed out cannot anchor within the piers ?—What I stated was that I regarded this as a local improvement; not as a harbour of refuge; and from the observations that I have made at the harbour, and particulars of the wrecks which have occurred, often even a foot or two would have saved the vessel. I have no hesitation whatever in saying that if by this improvement you obtain an increased depth of five feet, and a decreased send in proportion, that that would be a very valuable improvement to the harbour; and to that extent, and that extent alone, my remarks apply, unless a further improvement to increase the depth still more is carried out. But the present plan, and the plan which is before the

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Commissioners, professes to do what I have stated, and nothing more. There is this to be said about it, that suppose a stray vessel at or about low water, which cannot keep the sea, is forced to run for that harbour, she may let go her anchors, and if they hold for a couple of hours, she may run up the harbour; well and good ; but still even if she drives and goes on the beach behind either of the present piers, she would be in a very different predicament if the proposed new piers are carried out from what she would be in the present state of the harbour. In fact, if she ran on the beach within the proposed new outer harbour she would be under the protection of the covering piers, and certainly there would not be loss of life, and, I think, neither would there be loss of property.

15,790. Then I understand you to say that you will get six feet more at low water between the existing piers, which, with the send of three feet in heavy gales, will be nine and a half feet better than now ?—For ships entering, that will be the effect of it as regards extra depth.

15,791. Do I understand you to say that by extending the existing piers to the length proposed you will reduce the send in gales by three feet ?—I expect that the send will be reduced much more than three feet. With a nine-foot wave you will have a certain send. I am not prepared at this moment to say what it is; you cannot in fact say what it is, because it depends upon the build of the vessel almost entirely; but though I am not prepared to say what the send due to a nine-foot wave, as compared to the send due to a three-foot wave, may be ; I certainly think it is more than three feet.

15,792. But looking at the great difference of depth, between the existing piers and what there would be at the entrance between the proposed piers, do you think it necessary, considering the great difference of the depth, and the fact that within the existing piers there is no proper roadstead in gales of wind—considering the great difference of the depth, do you think it necessary to go to the expense of carrying out the piers to the depth you propose ? Would smaller piers not answer equally well, unless you could manage to get a greater depth than you profess to get in the channel between the existing piers ?—It would not answer equally well by any means. It would unquestionably improve the harbour, but it would not answer as well. In the first place, there is a manifest advantage in having the pier heads to project as far as possible to meet the difficulty, which has been so often stated to-day and yesterday, with reference to the sand, and you will not reduce the send to the same extent if the pier heads are put further in, because the reduction of the send depends upon certain data, and one is the distance of the pier heads to the point of observation, so that such a harbour would not by any means so well answer the purpose as the one projected.

15,793. I understand your reason is, the less chance of silting up by carrying your piers out to 18 feet ; and I understand, from the explanation which you have given in so clear a manner, that if they were carried out to only 14 feet there would be much more chance of silting up. But it appears to me that 14 feet would equally cover the entrance of the harbour, and therefore if the entrance in the prevailing heaviest gales were covered, would not the send be much reduced without carrying them out to so great a distance ?—No, it would not. In stating to the Commissioners that I believe the reduction of the wave would be in the ratio of 1 to decimal 3 I made use of a calculation founded on experience, and upon observations amounting to somewhere about 3,000, which have been made at different harbours within the last four or five years. The calculation is by a formula (the merit of which is not due to me, but to my brother, Mr. Thomas Stevenson), and in that formula the elements are the width of the proposed entrance, the width at the point of observation, and the distance from the proposed entrance to the point of observation. As you increase the distance from the proposed entrance to the point of observation you decrease the height of the wave; consequently if you withdraw the pier heads of the harbour further inwards, so as to approach more nearly to the pier heads of the present harbour, you will, in a certain proportion, decrease what is termed the reductive power of the harbour. If the Commissioners desire it, I shall be very happy to hand in a statement of the application of that formula, and also the observations which have been made upon the subject.

15,794. I think it will be very desirable for you to do so, if convenient ?—I will.

15,795. (*Capt. Washington.*) I think you have stated, Mr. Stevenson, that you do not consider there is any action of the sea on the bottom so as to raise sand and drive it into the harbour in a depth of 18 feet ?—That is my opinion.

15,796. Does that opinion hold good in a lesser depth, and if so state the minimum depth that you think is acted upon by the stroke of the wave ?—I do not say that the bottom is not acted upon at that depth by the stroke of the wave. I believe it is acted upon, but not at all in the same way, certainly, as when you come into shallow depths of water; the minimum depths, or the depth where that particular action takes place, must depend partly on the slope of the beach, and partly, of course, on the height of the wave, and I cannot give a general answer fixing at what depth this action commences.

15,797. Let us take this point. You consider the beach a tolerably flat beach off the entrance of Sunderland Harbour ?—Yes.

15,798. That is the usual slope of beach ?—Yes.

15,799. And that slope extends outwards without any sudden dip ?—Yes, it does.

15,800. How soon do you consider any action takes place on the bottom in easterly gales, so as it would raise the sand, and throw it into the harbour; or how near to the pier heads do you think such action does not take place ? Do I make myself understood ?—I think the answer which I gave before I must give again, that at present I cannot define or determine any particular depth; 5, 10, 15, or 18 feet. I cannot do that; but from my own observation, and from what I have invariably heard, I do not believe that there is in such depths as 18 feet off Sunderland the same action which we have in shoaler water as you approach the shore. There is a tendency to suppose that whenever you have sand you must have silting, which I do not hold. I know, for example, an instance which can be named, that of the Scrabster Pier, which extends into 12 feet at low water, and is founded upon sand, and has sand on either side of it, and there, there is a considerable sea ; not certainly such a sea as we have here; but there is no variation of depth on that pier consequent on the sand being moved by gales of wind, and on the shore there are the same indications which you have here and elsewhere where you have a sandy shore.

15,801. It was stated yesterday by a witness that in crossing the Tees Bay he had seen the sea break in 10 fathoms water. Do you consider that break does have any action on the bottom of the sea, and that we may expect the sand to be taken up at that depth, and taken into the harbour ? I do not think so. I have no doubt that in the place you mention waves have been seen to break ; but I am by no means prepared to say that these waves in that depth of water affect the bottom in the way which you infer.

15,802. Then, supposing a refuge harbour to be constructed at Redcar, would you anticipate any fear of that silting up from the stroke of the wave in Tees Bay, which is rather a shallow bay ?—As regards the mere question of silting up in such a depth of water, I certainly should not. I am not aware of the particular plan, or any plan proposed to be carried out there, but on general principles I should say certainly not.

15,803. Very good. To return to the river Wear:

Can you state in round numbers the area of the tidal river?—I am sorry I cannot say, as I have not looked at that report for many years.

15,804. How far up does the tide flow?—About seven miles.

15,805. And the rise of the tide at the pier heads at spring tide is how many feet?—About 15 feet.

15,806. I see it stated in the Admiralty chart that the maximum rise at spring tide is 14 feet 5 inches?—Yes; they rise to the 18-foot mark on the tide gauge.

15,807. Then, assuming it to be the case, the slope of the bed is 2 feet per mile?—Yes.

15,808. Do you propose very much to decrease that slope?—It might be decreased with perfect safety to the amount of 7 or 8 inches per mile.

15,809. Do you think it would be beneficial to the harbour to decrease that slope materially?—I have no doubt of that.

15,810. Is the one cause of bars the rapid stream coming out of rivers meeting the sea?—Not in this case.

15,811. Not in the case of the Wear?—Not in the case of the Wear.

15,812. That is not likely to cause a bar?—Unless the rapid stream brings a great amount of sediment, which in the case of the Wear is not the fact, for the material of which the bar is composed is pure sea sand; there is not a particle of alluvial matter brought down from above lodges on the bar. In point of fact, what is brought down is chiefly deposited in these shipping berths, and that creates a great amount of dredging, which the Commissioners have every year to carry out, to keep the shipping berths clear; but all the upper matters are intercepted before they reach the bar, and the bar, in my opinion, is due entirely to the action of the sea.

15,813. I believe that in the river Wear there is a larger amount of dredging than any other river in Great Britain, except the Clyde?—There has been a great deal of dredging.

15,814. Supposing the proposed piers were made, is there any reason why the same amount of dredging should not maintain and make an amount of channel through the bar?—I do not apprehend that if these piers were erected any dredging would be required at all at the bar.

15,815. But if continued, could you not get five or six feet or a greater depth be obtained?—Certainly. There is no doubt whatever if the refuse materials which, according to my information, are thrown into the river Wear all the way up as far as Durham, were otherwise disposed of, the dredging of the Wear Commissioners would be trifling in the upper part of the harbour, and they could in that case concentrate their works more in the lower part of the harbour, where dredging, no doubt, in conjunction with the works proposed, would maintain a much greater depth.

15,816. The depth between the two piers existing is five and a half feet?—Generally about that; between five and six feet at the inner end.

15,817. Would the foundation of the existing piers bear dredging to double that depth?—I think they would partly; they are founded, with certain protecting works, upon rock, and I believe especial examination was made by Mr. Meik with reference to that point.

15,818. Can you tell us the reason why, in the event of the proposed piers being erected, a channel of 10 feet could not be maintained from the Potatoe Garth out to sea?—I know no engineering difficulty; the reason is only a financial one.

15,819. Would that not enable all light vessels to be brought into the Wear in safety even at low water?—It would. Very few of them draw more than 9 or 10 feet; and with very little flood indeed they could come in.

15,820. Then supposing, again, the sheltering piers constructed, and a channel of 10 feet into a place of safety, dredged and maintained, would the Wear become to that extent a complete harbour of refuge?—It would, most unquestionably.

15,821. And you know no reason why that should not be done, except for want of funds?—No; I know none.

15,822. Can you roughly state the amount of money required to do that?—I cannot roughly, but I can after a little consideration give it in.

15,823. Will you be good enough to furnish such a statement?—I will.

15,824. (*Capt. Sulivan.*) Can you tell me when the north pier as it at present exists was lengthened?—About 15 years ago, I believe.

15,825. Do you know whether the sand, which now comes out to the north pier head, has grown out to the length of the new part, since it was added to?—I have no doubt whatever that it has.

15,826. Where has that sand come from, do you think? Has it travelled along the coast, or come in directly from the sea, or combined?—Well, it would be a combination. I attribute the collection of the sand immediately to the inner part of this north pier, to the sand thrown from the adjoining beach, which is a sandy beach.

15,827. Do you mean that the whole of the sand has come from the north corner of the beach, and diminished there as it has increased here, and that the beach has been accumulating between the rocky point and the north pier?—I do not know, as a matter of fact, that the sand has decreased at Roker Rock; it is very likely it will have diminished; if not I have no doubt that this sand which has accumulated at the north pier is just the result of what I explained before, namely, the superficial action of the waves at and about low water throwing up a quantity of sand, and like all beaches of the sort, it fluctuates in height, sometimes being a little higher, and sometimes a little lower, depending entirely on the waves; but I do not believe that there is any constant growing of that sand.

15,828. If you are right that the sand is not moved outside that depth, are we to consider that when a certain amount of sand has been thrown up inside the accumulation is all over, and there is no more to come in from seaward?—Certainly not from seaward.

15,829. You said that large amounts of sand came in from seaward to form that bar?—No; the bar is a mass of sand which is constantly changing its direction. Sometimes it is further out, and then by the action of the sea it is driven in. It goes, as I said, from the pier head to 500 or 600 feet further out.

15,830. Then do you think a fixed quantity of sand travels to and fro, not increasing by the sand brought in from the sea?—I believe it is very much of that character; in fact if it were not so it must increase. Now the quantity of sand at the mouth of the harbour has not increased much. It is a difficult subject to ascertain with anything like definiteness, because it is a channel; but even if it could be proved that the sand on the foreshore has increased, I am not prepared to say how far that is due to the embayment of the beach at and about the present harbour, in consequence of the extensive dock works immediately to the south, because before those works were formed the entrance to Sunderland Harbour was a far less embayed entrance than at present, and consequently I can conceive perfectly well that sand has accumulated there, and I confess that my own astonishment is that there has not been a more noticeable and a more decided increase of sand in consequence of these works.

15,831. If that has been increased it must be from seaward, I suppose. It cannot be increased from the southward as these groins cut off all communication from the sand travelling from the southward; therefore that sand must have come from seaward. Is that not so?—No, not necessarily. There was, and it cannot be disputed by any one, a very large excavation taken out of the harbour, and deposited in front of it, in order to make the site for the forming of the

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docks. That has been going on for a considerable number of years; how many I cannot exactly say; but I myself have seen repeatedly in some of my visits here that the sea at high water was working away that matter, and I have no doubt that matter must have lodged in and about the harbour mouth.

15,832. Can you explain how it is that it is covered by clean sand, as on the north beach, which has apparently come in between the groins to the mouth of the harbour, and is now comparatively a clean sandy beach?—The only explanation of that is this, that the sand is sometimes found in considerable quantities between the groins, and sometimes it is drawn out after particular states of sea; and sand between the groins and the north beach is sand which is occasionally washed up, and occasionally drawn back down south of the groins, and constantly shifting in this locality. I do not say that if there was a very heavy north-east gale it might not strike heavily, and wash some sand from one point to another; but the sand found between these points is sand tossed backwards and forwards by the sea. It is all sand moved in shallow water.

15,833. Do you know whether the cliffs are wearing away to the north?—I have never noticed any wearing away in a northerly direction. The rocky cliffs present the appearance of being under the slow action of the sea. To the south there is wearing away, but it is owing to another cause.

15,834. If you are right in your supposition that there is a fixed amount of sand at the bar, and that the sea does not bring in more sand, would not dredging in the channel give an increased depth of water, and so gradually remove and diminish the amount of sand within the piers, if no more were brought in seawards?—The whole of the bay in front of the harbour mouth is sand, and where the channel was dredged away the next heavy sea would fill it up. You may go on dredging and filling, dredging and filling, but how long you will have to work before you will have exhausted the sand I cannot say; but I do not think that could be termed a legitimate engineering.

15,835. If the sand is a fixed quantity, and no more is coming in, and the present piers are extended to the limit you propose, and the channel dredged out, the channel cannot fill up?—If you extend the present old piers a sufficient distance out you will get unquestionably a greater depth of water, but of course such an entrance will be wholly unfit for the purposes of navigation; moreover, the direction of the piers being at right angles to the shore would be very objectionable for the object in view, for the collection of sand, if there is any travelling sand.

15,836. I do not advocate that; I only illustrate your idea. If there is no more sand coming in than this, and this is a fixed amount of sand, it might be an exact calculation to take the piers to that limit, and to dredge out the channel?—Probably I may explain the thing. Supposing, once more, that the Wear was blocked up, and no tidal scour through the beach, you would have a continuous line of sand across the mouth of the Wear, but that saved would not rise higher than the nominal slope of the beach along the coast. That same action holds good at the present time, only with this difference, that through this beach in front of the harbour mouth which the sea is (if I may use the expression) trying to make and maintain, the tidal scour is trying to make and keep open a channel, so that if you dredge in the channel to produce a depth which is not the normal depth, but is something more than that, the consequence will be, that so long as there is sand on the adjoining beach it will come in and fill up the channel.

15,837. Supposing the increased scour which you propose should remove that bar to the depth given, where is the sand to go which it sweeps away?—The sand will be removed from the mouth of the harbour by the tidal current, and some of it will probably be collected inside of the north breakwater, some inside the south breakwater, some will be carried out altogether, but the quantity which has to be removed is so small that it will not be possible to trace its progress to any particular locality.

15,838. If a groin or pier, somewhat in the direction described by Mr. Wilson, were carried to the rock which he spoke of, would not that, if not successful to improve the harbour, be capable of being extended? If it were carried so far, and did not succeed, could not such a pier be carried further, so that any outlay in trying the experiment of the pier as a groin would be so much done towards the harbour if it did not succeed?—As my opinion is that such a plan would be of no earthly use whatever in having any effect upon the bar of that harbour, I conceive that it would be really more than useless to attempt to make it. I cannot, as an engineer, recommend the river Wear trustees to carry out that plan.

15,839. If any additional dredging were carried out to effect an increase of the back water in the upper part of the river, would there not be a stronger tide at the entrance of the harbour at ebb tide?—Not very much.

15,840. Whatever you added one way you would add to the strength of the tide, and make it more difficult for vessels to enter against that tide?—Unquestionably.

15,841. (*Capt. Vetch.*) You have mentioned and put some weight upon securing additional back water by deepening the river; will you state what additional amount of backwater you think you will procure above the present amount?—I cannot state the amount, but suppose in consequence an additional depth of about two or three feet.

15,842. Supposing the tidal water discharged by the river Wear is increased by this improvement which you speak of by dredging and lining by walls, what additional amount of water will you get returned above the amount now returned?—I cannot state that, from recollection. It is, however, stated in the report which I have handed in.

15,843. Do you think it would amount to one per cent.?—I should prefer to refresh my memory. I have not seen the report for seven years. I did not think it would be referred to, otherwise I should have read it previously.

15,844. But supposing it was two per cent., that would only increase the return of the water to the amount of one in 50; do you think that additional scouring power would be of any great benefit?—Well, I can only state my impression at the time when I drew up and made that report, and it was a very strong impression that the effect of the improvements would be so great as to render it a matter of decided importance to carry them out. With respect to the proportion I cannot give it from recollection.

15,845. If you give the proportion we can form an estimate ourselves?—That I shall do in giving in the estimate which has been called for.

15,846. Will you state of which of the two plans you are now speaking, No. 1. or No. 2.?—No. 2.; the large plan.

15,847. When these two arms are extended to the distance we see, there will be, no doubt, a large extent of still water where now there is very considerable commotion; and will not that have this effect, that if it is still water with an on-shore gale, a considerable quantity of sand will be driven in, and being lodged in that large extent of still water will be likely to settle there and silt up?—No; my opinion is that there will not be sand driven by the gales to which you have alluded into the harbour to any such extent as to produce the effect which you apprehend.

15,848. The shore is pretty gradually shelving seawards, and when the sea comes on shore it drives a certain amount of silt before it,—anything which is moveable; and if that silt is driven within a confined place, and where there is repose, that silt will be deposited, and in process of time will gradually accumulate to a considerable extent, will or will it not?—

If the silt is driven in, and comes into still water, as you have put it, unquestionably it will deposit; but then I have stated my opinion that there will be no silt driven in by the sea at the mouth of the proposed harbour, and therefore I do not think that result which you apprehend will follow.

15,849. If there were no out-flowing current from the river entrance now between the two piers, would it silt up like the rest of the shore, and become one continuous shore? I think you stated so?—Yes.

15,850. That being the case, we will presume that the present entrance to the river Wear is due to the amount of the backwater which comes down, and drives a channel through that fore-shore. Is that the case?—It is.

15,851. Then that backwater coming down the present channel is confined until it gets to the pier heads, and is enabled to keep open the access to sea which it does; but suppose that outside of those piers you enclosed a vast extent of still wtaer, would not the silt and sand brought down by the river deposit in still water?—In my opinion nothing is brought down by the river which would be deposited in the channel.

15,852. No silt?—No.

15,853. Then it is not turbid?—There is no river deposit on the bar.

15,854. I did not ask whether there was any river deposit or not; but there is a certain quantity of muddy sediment, which we can all see. If that is discharged into a still basin, will not that basin fill up?—I quite agree with you that would be the case, and that this sediment, to which you allude, discharged into a still basin, would be deposited. Such a deposit, in the case of this proposed new harbour, is very small indeed, and would be deposited towards the north and south piers; but that is not the heavy deposit, but matter which can be carried in suspension by water, and none of it will be deposited in the fair-way.

15,855. The river at present running to the sea drives a certain amount of silt before it, which enables an entrance to be preserved. But if these great piers are constructed outside, and a basin of comparatively still water is produced, will not the current between the piers flow upon one side or the other, and become a comparatively small power to carry silt to sea and out of the basin?—I do not think it will.

15,856. You think that it will leave the stream equally strong and intact across to the entrance of the new harbour?—I do not state that either. There will be a certain diminution in the velocity at the new entrance as compared with that at the present entrance; but at present the ebb tides (though not protected by a pier) go out from the mouth of the present harbour in the direction where the new entrance is to be; and I cannot see, if that is the case at present, that these piers, erected and protecting that stream, that the current would have a greater tendency to flow out on one side or the other. We have in some respects the same thing in the inner part of the harbour at the Potatoe Garth, where there is an open space, but where still the strength of the current maintains the centre of the space. In the centre you have the greatest velocity, and there you have, as a matter of course, the greatest depth. I do not see anything in the outer harbour which would lead to another result.

15,857. I speak of a general principle. If the backwater which escapes through the present pier heads has room to diffuse itself in all directions, that stream, not being confined, loses its velocity, and losing its velocity loses the power of suspension, and those particles suspended will descend to the bottom, and silt up. Is that the case, or is it not?—No. In this particular case the silt must be of that exceedingly fine description as to float in the water. If, on emerging from these north and south pier heads, we are to suppose (as you have supposed) that the direction of the scour will to some extent approach the proposed piers, then any silt held in suspension by that portion of the current will be deposited in and about the back of the south and north piers; but that minute and fine silt will not be deposited in the fair way *opposite* to the north and south piers.

15,858. Supposing the power of the river stream entirely destroyed, would it not deposit?—If there were no stream at all through this basin, and if water containing silt was to be projected into that basin, unquestionably it would deposit.

15,859. A certain amount of silt is maintained by a certain amount of stream. A large amount of stream keeps a variety of matter in suspension; but if the power of the stream is decreased, the power to keep various particles in suspension will cease, and will naturally deposit; so that, in the course of 50 years, say, you may expect to find somewhere a sand bank somewhat in the same state as Howth Harbour near Dublin?—I admit the truth of the general principle as to the capability of a stream carrying silt or other matter, depending upon its velocity; but I cannot agree that in this case the results which you anticipate will follow, because the bar, as I have said before, is dependent wholly on the action of the sea, and not on silt brought down by the river.

15,860. You do not think the sea will drive any sand into the harbour?—I think it will not.

15,861. You do not think the sea has any action, with a strong wave coming on shore, in driving in any sand?—I do not think it will, in that depth of water.

15,862. You do not think there will be any effect whatever?—I do not think sand (so far as my opinion goes) moves in that depth of water in the way we see the sand moving in shallow parts.

15,863. Then you do not believe that, with a fore-shore in 18 feet, a heavy sea will drive any particle of sand on shore?—I do not think that in that depth of water, sand will have constant progressive motion. As I said before, I find, in point of fact, that these sands do not, so far as I am aware, alter in their depth; and until such is proved by actual observation, I am not disposed to admit the progressive action at that depth of the waves.

15,864. You do not believe that under present circumstances sand has moved landwards by the stroke of the sea; but taking into account that you alter the condition of things, and provide still water, and protect it from the lateral motion, will you not then anticipate that a considerable amount of sand will be brought in?—No, decidedly not.

15,865. (*Mr. Coode.*) Have you before you the copy of a plan attached to the report made in April 1858?—Yes.

15,866. The soundings in black figures are by Mr. Calver; those in red by Mr. Meik?—Yes.

15,867. Can you tell us the period of time between the two soundings being taken?—Mr. Calver's soundings were in 1848.

15,868. The chart was in 1848. Are you sure that the soundings at the bar were taken at the same period?—No.

15,869. Can you ascertain, and give us something like the period which elapsed between the two sets of soundings?—Perhaps Mr. Meik will explain.

(*Mr. Meik.*) The black figures were taken by Mr. Calver in 1848; the red figures were taken in the early part of this year by Mr. Stevenson's and my own assistants, under my direction.

(*Mr. Coode.*) Have you taken any soundings since those which are marked in red figures?

(*Mr. Meik.*) A considerable number are taken every month.

Mr. STEVENSON's examination continued.

15,870. (*Mr. Coode.*) Have you ever had borings made on the site of the bar?—I never have. Mr. Meik has had some on the site of the bar; but I have had borings made on the lines shown in plan No. 1.

15,871. Is that the plan shown in red by the document before us?—Yes.

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15,872. Will you furnish the Commissioners with the result of those borings?—I can furnish a section and the line of both.

15,873. Do you find hard bottom in any place?—Yes; the bottom is rock, overlaid to the extent of eight and nine feet with sand and gravel at the pier heads, and gradually shoaling up to low-water mark.

15,874. I imagine you mean at the proposed breakwater heads?—Yes; of plan No. 1.

15,875. Do you say that you do not anticipate sand would move in a greater depth of water than 18 feet?—That is my opinion.

15,876. Have you ever seen the transverse section of Plymouth Breakwater?—Yes.

15,877. You are aware of the depth of water at which the long slope terminates?—There is a movement there to the depth of 12 to 13 feet of the rubble work. I am wrong; it is not so much, but 9 or 10 feet.

15,878. Have you seen a transverse section of the breakwater at Cherbourg?—Yes, I have.

15,879. Can you tell the depth in which the long slope terminates in that case?—Something like the same depth below low-water mark.

15,880. Is it 12 or 13 feet below low-water mark?—Yes, I think so.

15,881. If large material be moved to a depth of 12 or 13 feet, how can you reconcile that with your opinion that there is no movement of sand at only 18 feet?—The action of the wave in meeting such a breakwater as that at Plymouth or Cherbourg I conceive to be totally different from the action of the wave breaking in the open sea without meeting any obstacle whatever. And in the case of Plymouth or Cherbourg, where there is a sloping beach of rubble, I can conceive the roll of one wave meeting the other producing a state of matters, as regards the breaking of the wave, totally different from what you have in the open sea. My statement is, that I believe that sand in the open sea, in the depth of 18 feet, has not progressive motion; at all events, it is not ordinarily moved, but in very exceptional cases. My statement in that respect is merely my opinion, but founded upon the fact that I am not aware that at such depths there are such variations after storms as would lead me to conclude that such action is to be met with. That is the way in which I reconcile what I say with the well-known fact of the movement of these rubble stones to a considerable depth of water in these breakwaters.

15,882. Are you aware of observations made upon a natural beach on the coast of Dorset, where shingle has been moved to the extent of eight fathoms depth?—I am aware of that, and I account for it upon a different principle. I cannot conceive that any wave can be created in 8 fathoms in the open sea to move shingle at the bottom. But we know very well (for I have tested it myself) that there are very extraordinary under-currents in the ocean, for which it is impossible to account; yet they still exist, and to a great extent. I may mention one at Cromarty Firth, where an under-current runs at a velocity double that of the surface velocity, and we do not know the transporting power of such deep currents. Now, if we have such under-currents produced by tidal action, it is quite possible in the particular case to which you allude that the shingle may be moved, or it may be moved by some ground-swell or recoil of waves from the shore, but I do not think the movement can be due to the bonâ fide surface wave.

15,883. At any rate, shingle being moved at such a depth shows some movement to have existed?—I believe that in that particular case it has been well ascertained.

15,884. You said that you thought the material brought down by the river Wear was deposited considerably within the pier heads, and that the material immediately within was brought from the sea. Can you tell us the point of division between these two states of things; where the material brought by the river is deposited, and where the material brought in by the sea is deposited?—I took specimens of deposit in all the bays and creeks on the course of the river Wear, and I found that the presence of matter from above was more apparent at the upper portion, and that it gradually decreased in quantity until, I think, about what is called the South Beaching Basin; somewhere about there. I think that was the general result. I cannot state the particulars, as it is a long time since it was done; but at that time it was done for the purpose of ascertaining from where the deposit at different points were derived.

15,885. And the deposit of the river ceased generally about that point?—Yes.

15,886. Of what material is the bank of the Potatoe Garth formed, and also that which is called the Wave Basin?—There is sand thrown up upon it.

15,887. My question was as to the source from which the material was brought?—That is unquestionably sand from the sea; it is not from above.

15,888. Are these banks increasing in quantity?—No, I think not. I do not know any change since I first knew them.

15,889. Are they decreasing?—No. My impression is that they remain very much the same. There is sometimes a little more sand thrown up by the very heavy range to the top of the Potatoe Garth and Wave Basin. But Mr. Meik's evidence will be more valuable than mine upon that point.

15,890. Your answer is given from general observation?—It is given from my own observation, rounded also upon information which I have obtained through inquiries which I have made.

15,891. I hope you will transmit to us your observations on waves, as they will be very valuable to the Commissioners, and to the profession?—I shall do so.

15,892. (*Capt. Washington.*) I will ask you one question, Mr. Stevenson. Is the present entrance to Sunderland Harbour found sufficiently wide?—I think that if the depth of water was greater, and that if the piers, instead of being nearly parallel, diverged from the entrance ——

15,893. Diverged or converged?—Diverged.

15,894. Diverged trumpet fashion?—Yes—there would be no fault to be found with the present width of the present harbour. It is the small depth of water only and the great sea which causes vessels to lose steerage-way at the entrance.

15,895. What is the width of the present entrance?—370 feet, measured at the pier heads.

15,896. What is the width of the proposed entrance?—It is here 800 feet.

15,897. Cannot that be diminished with advantage?—I was going to say that the width of the proposed entrance I should not wish the Commissioners to suppose to be absolutely determined. If we can decrease the width we shall have greater stillness inside, and enable the tidal scour to act with more effect. But this is always to be kept in view, that having two entrances, the inner and outer, and the water in the outside basin not being absolutely still, it was thought an advantage for a vessel leaving the harbour to have a little latitude, therefore it was wished to have it as wide as possible.

15,898. Would you apply that to all refuge harbours?—I should apply it to all refuge harbours; the wider you can have the entrance consistent with the object in view the better; but I have no hesitation in saying that a width of 600 feet ought to be found sufficient.

15,899. Is that opinion formed from your own experience?—Yes; and from the opinion of seafaring men.

15,900. As an engineer, do you consider the width of 600 feet ample?—I should think so.

15,901. You have been shown a design of Hendon Bay; is it yours?—No.

15,902. Do you know whose it is?—It is Mr. Murray's, I believe.

15,903. Have you any idea of the estimate?—I do not know the length of the breakwater; but it must be some very large sum indeed.

15,904. Can you mention any sum?—From the length of the breakwater, and the exposed nature of the site, I think the sum would be very large.

15,905. Do you think it would exceed a million of money?—Speaking roughly, I should not be prepared to say that it could be made for a million of money.

15,906. In the centre of that harbour is there not a dangerous rock called Hendon Rock?—There are several rocks in the bay. The ground is very rocky; but I have never looked at it to detect its merits or defects.

15,907. You are acquainted with Hendon Rock in Sunderland South Bay?—Yes.

15,908. Is it marked by a conspicuous buoy?—No; by a very poor buoy.

15,909. Is it near the south entrance?—It is.

15,910. Are the White Stones marked by a buoy? No, not that I am aware of.

15,911. Do ships going out pass near those rocks?—They must pass very near.

15,912. One is not marked at all, and the other by a not very conspicuous buoy. Do you not think that a small sum of money could be well spent by the Trinity House of Newcastle in placing conspicuous buoys on those rocks?—Yes.

15,913. And you think that for the safety of the coast it ought to be done?—Unquestionably.

15,914. Are you aware whether the dock company are bound to place buoys upon those rocks?—No, I am not aware.

Mr. Thomas Meik recalled.

Mr. T. Meik.

15,915. (*Chairman.*) We took your evidence yesterday, Mr. Meik. Have you any thing you wish to furnish in addition; any statement which you wish to make in addition?—Very little indeed; I do not wish to detain the Commissioners with any further remarks, but merely to corroborate what Mr. Stevenson has said as to the improvement of the entrance and the effect of the proposed works. I quite agree with him as to what he has stated to you just now with regard to the effect of those works.

15,916. Therefore you only wish to corroborate from your experience Mr. Stevenson's statement?—I have been over the whole of the particulars, and minutely considered them, and so far I agree with them.

15,917. (*Mr. Coode.*) Have you a copy of Mr. Stevenson's design, dated April 1858?—Yes.

15,918. The soundings shown in red figures on the chart are taken by yourself, I believe?—They were taken under my direction by Mr. Stevenson's assistant and my own conjointly.

15,919. They were taken early in this year, I believe?—Either in March or April.

15,920. Have you taken any since? I understood you to say that you had?—We generally take soundings over the bar every month.

15,921. Can you state in general terms the changes which have taken place since April 1858?—If you will refer to Mr. Stevenson's reports, and to my observations upon them, you will see what has been the change of the sand banks.

15,922. To what do you refer?—To plan B.

15,923. That was in 1853?—Yes; but it shows generally the progress of the sand banks across the entrance.

15,924. Have you the results, or will your memory serve you sufficiently to state in general terms the changes which have taken place since April 1858. I do not wish you to go into detail?—Since April in this year a different course has been followed with regard to this bar than on any former occasion. The dredger has been down 12 times dredging on the bar sands.

15,925. Since April 1858?—Since the beginning of this year. It is only during the few months of the summer-time that we can go down on the bar. We have often been obliged to leave on account of the sea. We have found great changes on the bar by the dredger being there; but the changes are much the same as in former years. The diagram handed in shows the changes which have taken place.

15,926. Does it show the state of the bar as the wind changes?—It is given in to show the tendency to change.

15,927. As it is dated in 1853, I may ask whether the tendency remains the same?—It still remains the same; I mean that this year it would have been the same if the bar had been left in its natural state.

15,928. I wish to know, irrespective of the dredging operations, whether the tendency to change is the same in 1858 as it was in 1853?—Much the same.

15,929. Can you hand in to the Commissioners the result of any borings made on the site of the bar?—If you will refer to the large book which has been already handed in you will find them.

15,930. If I can find it there, that will suffice.—You will find it there.

15,931. I see a statement of wrecks which have taken place at the port of Sunderland. Within what limits have those wrecks occurred?—Within the limits of the port, which extends along seven miles of shore.

15,932. To what extent do they go northward, and to what extent southward?—They go northward to Souter Point and southward to Ryhope Dean, and perhaps about three miles beyond the extreme southward point of the model. Those are wrecks which came immediately on shore. It is not a correct account of all the wrecks which have happened at sea.

15,933. Nor does it give an account of vessels which have foundered off the point?—No.

15,934. It is simply wrecks which have come on the beach?—Yes; not any that have occurred a great distance off.

15,935. (*Capt. Washington.*) I think you said, Mr. Meik, that you would corroborate all the evidence given by Mr. Stevenson with reference to his proposed work. Do you include that portion of it in which he stated that he saw no difficulty, supposing the proposed sheltering piers were erected, in dredging that channel to 10 feet depth, and maintaining it from the Potatoe Garth to the outer pier head?—I do not think myself there would be any difficulty in keeping that depth open.

15,936. Would it not be the most desirable thing that could be adopted for the traffic of the Wear?—I have given the improvement of the harbour for a long period of years my utmost consideration, and after all the plans which have been suggested I prefer that of Mr. Stevenson to any that I have seen yet.

15,937. Are you aware that the detritus brought by the river is deposited in the berths for shipping?—I know that from my own practical experience. In visiting the dredging machine I have noticed the material which it raises in the harbour, and what is brought inwards. I should not perhaps go so far down as Mr. Stevenson went. I should say a little higher up, at a place called Foley end, where the material from the country ceases, and where it meets the sand from the sea.

15,938. What amount did you say was expended in dredging in the Wear annually?—About 5,000*l.* annually.

15,939. And you think that amount expended would do much towards making and maintaining the ten feet channel we have spoken of?—I think very little expense would maintain that channel between the piers, if it was once opened out.

15,940. May I ask you what those red buoys imply in the model?—They are ballast buoys, which the commissioners are required to put down by Act of Parliament, prohibiting ballast being thrown into the sea.

15,941. Within what depth?—Ten fathoms at low water.

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Capt. Washington.

15,942. Is that rule enforced ?—It is enforced, but I cannot say that it is altogether prohibited. Every effort is made to prevent the casting of ballast.

15,943. It is not impossible that some ballast cast at sea is washed by the sea into Sunderland bar ?—Not at all. We frequently detect it. I should say that tons of ballast were not only cast at sea but within the harbour, and we cannot prevent it, because there is no power to make a ship report on coming in in ballast. A ship may enter, and get her ballast discharged, without giving any notice, so that it is almost impossible to detect the casting of ballast. I frequently hear of cases, but we can never detect them.

15,944. And the commissioners have to pay heavily for dredging up that ballast ?—Thousands of tons of London ballast have been taken up in Sunderland Harbour every year. I speak from my own experience, from seeing the material which the dredger raises.

15,945. Do you know the rock called Hendon Rock ?—Yes, I do, very well.

15,946. Do you know the rock called the White Stones ?—I know it also.

15,947. Are they marked by proper buoys ?—Hendon Rock is marked by a buoy.

15,948. Is it a conspicuous buoy ?—Not very conspicuous.

15,949. I think the dock company are bound to maintain a buoy or beacon upon that rock ?—They are.

15,950. Do you consider the spar at present placed upon it complies with that obligation ?—From what I hear from the pilots, they do not like that kind of buoy. We had them formerly to indicate the ballast limits ; but have now got iron buoys, which are made so as to float upright.

15,951. And are far more conspicuous ?—They are far more conspicuous.

15,952. And ride equally well ?—Yes, and ride equally well.

15,953. (*Capt. Sulivan.*) Is the Newcastle Trinity House supposed to keep up the buoys on your coast for the money which is paid to them ?—I always understood that the money is paid for the support of old men and women.

15,954. Does their jurisdiction not extend down as far as this port ?—I do not know how far it extends.

15,955. How can their jurisdiction extend for the collection of dues, if there is no obligation to the same extent ?—I know that dues are collected, and nothing is done in the shape of putting down buoys.

15,956. Is there no jurisdiction over colliers in ballast ?—There is no authority, and there is no account kept of them, except one which was kept last year by the Commissioners.

15,957. With respect to the idea of Sunderland being a creek to Newcastle, has Newcastle no jurisdiction over those colliers coming in, and is there no law of any kind to prevent ballast being thrown into the harbour ?—We have got laws to prevent the casting of ballast, but the difficulty is to detect the abuse of the law. The law at present cannot meet it, on account of the Wear commissioners having no record of ships coming in, in ballast. The purpose of these buoys being put down was to prevent the casting of ballast within certain limits, and if persons are detected they may be taken before a magistrate and fined.

15,958. What is the penalty ?—5*l.* to 10*l.*

15,959. Do they strictly enforce it ?—Yes ; but the difficulty is to obtain proof.

15,960. Is there any river police ?—There is a river police, but they are not under the jurisdiction of the Wear commissioners.

15,961. Have those police rewards in every case in which they get a penalty inflicted ?—The Wear commissioners do not pay money as rewards in cases of that sort.

15,962. Do you not think that if the police knew they would get a good reward upon every conviction they would look more sharply after it ?—But then there is the objection of their trumping up cases, and it was the opinion of the commissioners as well as of the magistrates that it was better not to offer rewards.

15,963. In what way would a register enable you to get at the offenders, and control the abuse, if the police do not exercise the power strictly ?—If the commissioners of the Wear had the same power as the commissioners of the Tyne, where every vessel has to report at a ballast office, and receive a warrant stating where the ballast is to be taken out, and men appointed to see these regulations properly carried out, the abuse of casting ballast within the limits of the port would be stopped altogether. There is no power to board a vessel, and see that she has ballast in.

15,964. Has application ever been made to Government or Parliament to meet that difficulty ?—I do not know ; it has been frequently mentioned to the Admiralty that such an abuse is in existence.

15,965. (*Capt. Vetch.*) Captain Sulivan has nearly anticipated the only question I wish to put. I think you said that some 50,000 tons of ballast were deposited in the harbour every year ?—I said thousands of tons. I will not go to the extent of 50,000. I should say thousands.

15,966. Do you think it would be judicious to spend money in these improvements until that notable abuse is set right ?—I believe if the commissioners saw a prospect of the bill being carried out they would go to Parliament, and obtain further powers.

15,967. But the power to prevent ballast being cast could be had at very little expense. It would not be an opposed bill ; it would receive the support of Parliament and the Government. Why has it been delayed so long ?—The commissioners of the Wear are like most public bodies; they are afraid of a parliamentary contest. The expense of getting a bill through Parliament, if it is opposed, amounts to thousands of pounds, and that is what deters them from applying for such powers as Captain Vetch has suggested.

15,968. The opposition would come from the evildoers, would it not ?—Such parties are generally for getting up applications of that kind. They say they are generally done by engineers and lawyers for their own purposes, and are usually blamed.

15,969. (*Mr. Coode.*) Referring again to the wrecks, I see a detailed table of wrecks in 1854. Are the limits which apply to that table the same as apply to your answer to my former question ?—Yes ; as near as possible. I have calculated from the wreck chart within seven miles the number of vessels, and I have compared them with the Admiralty Return of 1854. I cannot insure its correctness to a vessel or two. There are two unknown, and other two doubtful ; but it is pretty correct.

15,970. Are the limits the same ?—Yes ; I did not go out of the limits of the port.

15,971. Have you a copy of a detailed table for 1854, taken from the Admiralty Wreck Register ? I find there the number of wrecks with the wind south of east 36, north of east 7, and it states the proportion of light to laden as being two to one ?—Yes.

15,972. Is it not a fact that the wind south of east causes vessels to come in towards port, and that the wind north of east entirely prevents laden vessels coming in this direction ?—I cannot give an opinion as to vessels sailing to and fro. I do not like going deep into nautical matters.

15,973. I should like to have your answer. Do you believe that laden vessels caught considerably south of this port would in northerly gales attempt to make for this port ?—I do not think it at all likely that they would ever attempt that.

15,974. (*Capt. Sulivan.*) You spoke of the expense of getting an alteration of these laws for the prevention of casting ballast. Do you recollect the Mercantile Marine Act being passed ?—Yes.

15,975. Was any attempt made at the time of the passing of that Act to get a clause inserted, at a comparatively trifling expense, to modify those laws which are thought to bear so heavily upon the commissioners

of the Wear ?—No ; there was no such attempt made.

15,976. (*Capt. Washington.*) Returning to the buoying and beaconing the approaches of the port, which is my special business, is there any other due levied in the shape of anchorage in connexion with the port, and to whom paid ?—There is a fund levied with respect to beacons and buoys, which amounts to 600*l.* a year, and I believe that is levied by the Bishop of Durham.

15,977. Is any part of that sum applied to these purposes ?—None whatever.

15,978. One more question in connexion with refuge harbours. Are all appliances for repairing disabled vessels to be found at Sunderland ?—All, I think, of the most complete kind. We have the best ships' carpenters in the world, and a graving dock, with facilities for docking a large class of vessels.

15,979. To whom are the Commissioners indebted for that beautiful model which I see before me ?—That model was made at the pier by the workmen, assisted by Mr. Lindsay, a carver and gilder in this town.

It does very great credit to all concerned.

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Mr. T. Meik.

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(*Mr. Meik.*) I am requested by the Wear commissioners to make a statement with regard to their income. The income of the commissioners was last year 20,000*l.*; and I stated that the annual expenses were from 13,000*l.* and 14,000*l.* They generally expend the whole of the balance upon works, and 4,000*l.* or 5,000*l.* were expended last year on extra works, for the improvement of the harbour ; for example, they have removed large rocks, and improved the harbour approach ; they removed a large sandbank situated up the river. These are additional expenses, so that they expend the whole sum, and the whole of the money which they receive goes in one way or another for the improvement of the harbour.

Mr. Young was called.

Mr. Robinson said Mr. Young was merely a contractor to speak to the details of the proposed works.

(*Chairman.*) We will not trouble you, Mr. Young, at present. We shall be always able to call upon you, if necessary, to corroborate Mr. Stevenson's figures.

Mr. Nicholas Wood examined.

Mr. Nicholas Wood.

15,980. (*Chairman.*) You are a resident in this town, and a director of the Sunderland Docks ?—I am.

15,981. You have been present during this inquiry, and are acquainted with its objects ?—Yes.

15,982. Will you now proceed to offer any statement which you wish to make relative to the advantage or necessity of a harbour of refuge for this district of the coast ; or whether, in your opinion, the improvement of the three ports of the Tyne, the Tees, and the Wear would be the best mode of preventing loss of life ?—I have given the subject my very serious consideration, seeing that as a coalowner I ship coals at all the ports in this locality ; on the Tyne, on the Wear, at Seaham, and at Hartlepool. I am also very much interested in the question as a shipowner ; and having given it very serious consideration, I have come to the conclusion that it would be extremely desirable, and I think of more importance than the establishment of any single harbour of refuge, that the existing harbours of these ports should be improved. I think it would be extremely desirable, and would lead to a great saving of life and property, if the harbours of the Tyne and the Wear and Hartlepool were improved. I have listened, of course, with very great attention, to what has been stated with reference to the improvement of the Wear. I am also one of the commissioners of the River Wear, but I am not prepared to offer any evidence upon the subject of the improvement of the harbour. I believe that the commissioners have agreed to leave that in the hands of their engineers, Mr. Stevenson and Mr. Meik ; and from what I have heard of the evidence of Mr. Stevenson, it has been very clear, and, I think, in most respects very decisive, with regard to the improvement of the Wear. Therefore, as far as that goes, I do not propose to offer any evidence, except to say that, looking at the chart of loss of life on this coast, considering the nature of the traffic between the several ports and London and back again, remembering that the vessels are constantly, as it were, spread over the whole of the distance between London and the ports, and that they make a point of always first of all reaching the port from whence they sail,—looking at all these circumstances,—I think that the improvement of the existing harbours would afford a ready entrance, and of course more entrances than one harbour of refuge, and would probably tend more to the saving of life in the aggregate than would the making of only one harbour of refuge on the coast. I do not mean to say that a harbour of refuge would not be extremely useful ; on the contrary, I think that, looking at the matter from a national point of view, it would. At the same time, I should beg to put the improvement of the present harbours almost as a sine quâ non in the settlement of this question. I think that that is the first thing which should be attended to, and the one which will produce most benefit ; but I am by no means of opinion that that would make the coast quite safe. I think there is a great question whether, in addition to the improvement of the existing harbours, it would not be desirable that there should also be a general harbour of refuge ; but I have already stated that I think the improvement of the existing harbours would be attended by a very great saving of life and property. As a dock director, I beg to lay before you a plan which was originally prepared by Mr. Murray, and has since been adopted by his sub-engineer, Mr. Riddell. This plan, in the first place, shows two breakwaters ; one of these is on the north of the entrance of the dock, to protect it from north-east gales. I need hardly state that the north-east gales here are extremely heavy, and that it is very desirable that the entrance to the dock should be protected from them. The directors have, therefore, projected a breakwater about 500 yards long, which is estimated to cost 44,000*l.* They have also projected, or rather proposed for the consideration of the Commissioners, because I should state that the dock company do not by any means intend to (indeed their means are such that they could not) themselves erect these breakwaters,—another breakwater on the south side of the entrance to the dock, to protect it from south-east gales, which, as some of the witnesses have correctly stated, are very prevalent on this coast. These two works the dock company propose to the Commissioners, with a view to the improvement of the entrance to the dock in case of heavy gales. They think that the erection of these works would enable vessels to enter the dock during such gales, and that, in addition, they would afford considerable shelter in the neighbourhood of the entrance, and would be of great advantage to shipping, and would, in the opinion of the directors, lead to the saving of life and property. I scarcely need state that the depth of the entrance to the dock is very considerable. The channel is excavated to a depth of 12 feet below low-water mark. The depth from low-water mark to the outer sill of the dock is 10 feet, and therefore, not being liable to be silted up in any way, that depth of water might very readily be maintained. It is only fair to state that that depth of water does not at present exist. The channel is deepened, as I have mentioned, but in taking away the coffer dams and the clay of which they were constructed the total depth has not been excavated, so that there is at present only about eight feet of water. Of course it only requires a little more dredging to make it 12 feet, which would be done if any works of this kind were undertaken, and that would afford an entrance to vessels in storms with a much greater depth of water than exists in

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the present entrance to the Wear. If the works which have been proposed by Mr. Stevenson to the Commissioners are carried out, the depth of the entrance to the river would be considerably more; but I beg to observe that in my opinion 80,000*l.* or 90,000*l.* would be well spent in obtaining an additional entrance to the dock, in addition to the works proposed on the Wear. [*The witness handed in the plan for works at the dock outlet.*] I also beg to lay before the Commissioners a plan which was projected by Mr. Murray for a harbour of refuge at Hendon Bay. The dock directors present that to you because it was laid before them by Mr. Murray. Mr. Riddell, the sub-engineer under Mr. Murray, will be able to give you a detailed estimate of the cost of those works, if you wish it. I will only say that they are estimated to cost 800,000*l.*, including the north breakwater, which I have already mentioned. If a harbour of refuge were made in Hendon Bay, the erection of the south breakwater would be unnecessary; but, including the north breakwater, the estimated cost of the works in Hendon Bay is in round numbers 800,000*l.* That includes an area of 800 acres; and if you lay this plan, which I produce, upon the Admiralty chart, you will see the depth of water at different points. With reference to the questions which have been asked by the Commissioners as to the best position on the coast for a harbour of refuge, I should state that, having considered the matter very carefully, I think that Hendon Bay would be a very good place for such a harbour. If you look at the chart of accidents you will find that the great bulk of them have occurred between the Humber and the Tyne. Thus a harbour of refuge in Hendon Bay would be in the middle of the district in which the great majority of accidents have previous to this time occurred. Not being a nautical man, I cannot give you any opinion, and should not wish to put myself forward as giving any evidence of a nautical character. However, from my slight knowledge of nautical affairs, and having considered the question very much with reference to my own ships, I think that this situation would be a very good one for a harbour of refuge, if it is in other respects suitable for the purpose. Flamborough Head and Filey Bay have been mentioned, and it has also been stated by some of the witnesses that a bay is not a proper place for the construction of a harbour of refuge. I think there is a good deal to be said on both sides of that question. There are two things to be accomplished by a harbour of refuge; you are to get in, and you are to get out. What knowledge I have of the subject leads me to think that it would be easier to get into a harbour made in a bay than into one made at a projecting point. For instance, in a north-east gale ships would sometimes have great difficulty in making Flamborough Head, but there would be no difficulty in getting into a harbour of refuge in Hendon Bay. Again, light vessels could make that in a south-east wind, which is one of the most dangerous to light ships. Vessels could make Hendon Bay as easily as any other point on the coast, and certainly very much better than Flamborough Head or Filey Bay. Therefore I think it is a very serious question whether Hendon Bay would not be a very proper place for a harbour of refuge. Shipowners and shipmasters, whom you will afterwards examine, will give you nautical evidence as to how far it is preferable to other places; but I beg to submit that in my opinion it would be a very proper place for such a harbour.

15,983. Will you put in that plan of the works proposed to be erected in Hendon Bay, as evidence? —Yes.

15,984. Then I understand, Mr. Wood, that primarily you would consider the improvement of the three ports we have already named as the most advantageous mode of proceeding?—I do think so.

15,985. Primarily?—Primarily. I think the improvement of those harbours would tend to a very considerable saving of life and property.

15,986. Secondarily, supposing that there were funds, national or otherwise, that could be used for the purpose, you would recommend the construction of a large harbour of refuge on some point of the coast?—I think so.

15,987. Now, under the circumstances of the three ports being improved, would you, in addition, place this harbour of refuge close to one of them?—Well, I place it there because I think that generally a harbour of refuge there would be as efficient as one at any of the other points which I have heard named. I think that, probably, as regards position, there would be no difference between Hendon Bay and Hartlepool, and the decision would probably depend upon the questions at which point the harbour could be more easily formed, and which of the two is more liable to be silted up. At Hendon Bay I think that there would be no liability to silting up. The plan proposes that a current shall pass within the harbour of refuge, and we know that there has been no silting up in Hendon Bay for years and years.

15,988. Then I understand that after the improvement of the three ports you would like a harbour of refuge either in Hendon Bay or at Hartlepool, as might prove most desirable on engineering grounds? —Yes. I do not object to the construction of a harbour of refuge in Filey Bay. On the contrary, that would depend very much upon evidence which I have not before me, and on which I am not prepared to form an opinion. It would depend very much upon the evidence of nautical men as to which position would be best adapted for saving life and property.

15,989. Therefore are you or are you not prepared to state that, always assuming that the improvement of the three ports comes first, the harbour of refuge should be in the immediate vicinity of one of these ports in preference to putting it in the neighbourhood of Flamborough Head?—I am, on the ground that I think it would produce a greater saving of life and property. There is also another reason: It would be of great advantage if in case of war you could have ships close at hand to protect the shipping of these ports.

15,990. (*Sir F. Smith.*) It has been the habit of your life to give every subject deep consideration, and I am quite certain that you have not come to any determination upon this very important question without deep consideration. You are not, I believe, a nautical man?—No, I am not.

15,991. But you are a shipowner?—Yes.

15,992. How long have you been a shipowner?— Well, I commenced being a shipowner a great many years ago, but more recently I have been connected with screw colliers.

15,993. You are also one of the directors of the dock company?—Yes.

15,994. You are well acquainted with Mr. Stevenson's project?—I am.

15,995. Do you, so far as you have considered it, think that that project is calculated to produce the effect he has in view?—I have not gone into it in an engineering point of view. I have not, in fact, gone into it as one of the commissioners. We have arranged that Mr. Stevenson and Mr. Meik should lay this before you, and give their opinion upon their own responsibility. Not having gone into the question, I should not like to take the responsibility of giving an opinion which I have not well considered. I do think, broadly, that, with the depth of water stated by Mr. Stevenson, the works he proposes would lead to a saving of life and property.

15,996. Then what you lay before the Commissioners is not a rival project?—Not at all.

15,997. It is auxiliary?—Auxiliary, so far as regards the south entrance.

15,998. Just so; with reference to the two piers? —With reference to the two piers.

15,998*a*. [*Referring to the plan of proposed works*

at the south outlet of the dock, put in by the witness.] Do you imagine that having these piers detached from the shore will not tend to produce silting within them in any manner?—The object of keeping these breakwaters so that you have a current between them and the shore is to prevent any silting-up within them. A moderately strong current will run between them and the shore, and will prevent any silting-up of sand.

15,999. You think it will have that effect?—I think it will.

16,000. The sand that came round the inner parts would not go into the opening?—We do not find from experience that any sand goes into the inside of the dock entrance. The piers, you will observe, point seaward, and that sends the sand, if there is any, away to sea.

16,001. They point in nearly an opposite direction to the piers of the harbour?—They do.

16,002. You think the old piers of the harbour are wrongly directed?—I think they are, for sending the sand past.

16,003. In fact they invite the sand to enter?—They do, to a certain extent.

16,004. Have you any reason to believe that the amount at which the cost of the harbour of refuge in Hendon Bay is estimated would be sufficient for its construction?—I have looked at it with Mr. Riddell, who is an experienced practical man.

16,005. And he satisfied you?—He satisfied me that the money would be sufficient.

16,006. I presume you have no doubt that along this coast some protection for life and property is needed?—I have no doubt at all that such protection is needed.

16,007. In a national point of view?—In a national point of view.

16,008. In recommending the improvement of the existing harbours, you do not advocate that improvement in a local so much as in a general point of view?—Certainly not; still I think that the local authorities of these harbours would avail themselves of the opportunity of improving them to a certain extent. Even in the case of the Wear there would have to be a deepening of the inner part of the harbour, in order to make it efficient, and the same or similar improvements would probably be required at the other parts. The authorities of each river would no doubt avail themselves of the opportunity to make such alterations; and I think it is of importance, that while you are constructing works which will produce a saving of life and property, you will also add to the commercial prosperity of the places where they are carried out.

16,009. You have no doubt that these ports will do a great deal, independent of Government means?—They have already done a great deal themselves.

16,010. So far they will do a great deal towards saving life in respect of vessels not laden?—They have; but that can only be carried to a certain extent. The great traffic is the coal trade, and we have to contend against rival collieries in the midland districts, the coals from which are conveyed by railway. Unless coals can be shipped cheaply it would be extremely injurious to the prosperity of these ports, and therefore the means of improving the harbours are extremely limited.

16,011. And are becoming more limited every day, in consequence of the increase of traffic by the railway?—In consequence of the competition from different railways.

(*Mr. Lindsay.*) [*Referring to the plan for a harbour of refuge in Hendon Bay, put in by the witness.*] This appears to be the greatest plan which has been brought before us during our inspection of the coast. I want to ask you one or two questions about it.

16,012. Do you know the length of the large outer breakwater?—No, I do not.

16,013. I have been measuring it on the plan, and find that this outer breakwater will be fully two miles in length?—I believe it will be somewhere thereabouts.

16,014. Besides this there is another breakwater just to the north of the pier?—To the north of the pier.

16,015. And that will be close upon 500 yards in length?—About 500 yards.

16,016. There is another stone breakwater to the south, which will be 500 yards in length?—But that south one would not be required if the large one was erected.

16,017. I am now speaking of the one furthest to the south?—That is a very small one.

16,018. Five hundred yards long?—It is principally of timber.

16,019. Well, of stone work your breakwaters would be at least two miles and a half in length?—I believe they are somewhere thereabout.

16,020. Besides wood work, about half a mile in length, so that the proposed breakwaters, with the pier, would be about three miles in length?—About two miles and a half; but if you are to have a general harbour of refuge, to include an area of, say 800 acres, I do not know that there is any situation on the coast where you could get it with a less extent of breakwater; to include so large an area you must have a great extent of breakwater.

16,021. Looking at Hendon Bay, the course of the land appears to be quite straight; there does not appear to be any projecting points in the formation of the land which would offer the usual facilities for the construction of a great harbour of refuge?—I do not know.

16,022. Looking at it on the ordinary charts, and examining it, as I did this morning, with the other Commissioners, I do not find any appearance in the land which would lead me to the conclusion that this Hendon Bay, so called, is a bay, because there are no projecting points of land?—To the southward the land juts out, but not, I think, so much as greatly to aid in shortening the breakwater. That is done on the principle that it should not touch the shore, that there should be a space between the shore and the great breakwater, so that there shall be a free action of the current along the shore in order to prevent any silting up.

16,023. But are you not aware of any other point along the whole of this coast at which the expenditure of an equal amount of money and the construction of the same length of breakwater would give a larger harbour of refuge than it would at this particular site?—My knowledge does not go as far as that. I give evidence as to what I fancy generally would be the result of making a harbour of refuge in Hendon Bay, rather than with reference to a rival one at any other point. Of course, in the course of your labours you will have laid before you other plans of harbours of refuge; but I believe that, so far as Hendon Bay is concerned, the plan which I have produced is something like what would be the result of constructing a harbour of refuge there.

16,024. You said that Mr. Riddell had told you that the cost would be somewhere about 800,000*l*. Now if it was found that the cost would be nearer 2,000,000*l*. would that in any way alter your opinion with reference to the construction of the harbour?—I think it would be fatal to a harbour of refuge in Hendon Bay.

16,025. You think it would be fatal to a harbour of refuge in Hendon Bay?—I think so, indeed. I could not advocate the erection in that bay of a harbour of refuge that would cost two millions of money.

16,026. Looking to the improvement of the existing harbours as the thing which ought first to be done, you would not then consider it desirable to expend, either at Hendon Bay or any other point on the coast, a further sum of two millions in the construction of a harbour of refuge?—I think it would require very serious consideration before two millions of money was spent on such a thing. I think in that case I should go back to the local harbours, and see whether

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they could not by the expenditure of an additional sum of money be made more effective in some way or other.

16,027. Rather than undertake an expenditure of that kind, you would see if the expenditure of a few hundred thousands more on the existing harbours would not tend to make them still more accessible at all times of the tide for ships of all sizes?—I think so. I think it would be very desirable, in the first place, to spend money on the improvement of the present harbours. That would not occupy any very great length of time. Its effect would be seen, and then probably it might be considered whether they could be further improved, or whether it was then desirable to erect a general harbour of refuge. There is no doubt that the improvement of the existing harbours, and making them accessible at all times of tide, would go a very long way in preventing accidents, because if these harbours were made approachable at all times of the tide I do not think you would see so many vessels lost along the coast. They go to seek shelter here and there, wherever they can pick it up, because they know that if they come to the ports they cannot get in; but if the ports were made so that they could have access at all times of the tide I think that, instead of seeking these shelters, and ultimately being driven ashore, they would go at once to the ports to which they belong, and therefore an additional saving of life would accrue, and there would be less loss of ships along the coast, because I take it that a great many of the ships which are lost at Flamborough Head and other points marked on the chart are lost because they cannot get into their own harbours, are necessarily obliged to seek any shelter they can obtain, and so, the gale increasing, are driven on shore, because with a south-east gale, and most of the vessels which are lost are lost in south-east gales, ships could lie along the coast from Flamborough Head to the Tees or to Sunderland or the Tyne, there would be no occasion for these vessels to seek shelter elsewhere.

16,028. I see laid down upon this plan which you have put in [*the plan of the proposed works at the "south outlet" of the dock*] a breakwater close to the north pier of the south entrance?—Yes.

16,029. I see there is also another breakwater of somewhat the same form, but greater in length, laid down not very far from the south pier of the same entrance. Are these works which the dock company had in contemplation to protect the south entrance of their dock?—No; they were not originally intended. The great object of the dock company was to make this an outlet rather than an entrance. It was at one time thought of making two passages, one for entrance and the other for exit; but the means of the dock company are not such as to enable them to undertake any additional works. They have spent a great deal more money than they originally intended. I believe the works are extremely well executed, and they are very efficient. The money has been very well spent, but still, in a commercial point of view, the docks are not paying very well, and therefore the dock company are not in a position to spend any money on these works. This passage is extremely effective as an outlet; large ships of 1,800 tons have loaded in the dock, and gone out; but these works are for the purpose of making it an entrance in case of storms.

16,030. Have the dock directors in contemplation the construction of any breakwater outside this south entrance?—No, they have not.

16,031. They do not, from their experience, think it necessary?—They think it will be very useful, especially for vessels taking the dock in case of storm. We know that there is there a depth of 10 or 12 feet of water; we know that that depth of water will not be diminished, and therefore it is very important that it should be made available in case of storms for the entrance of vessels. It is not a large sum which is required; these two jetties would cost something like 80,000*l.* or 90,000*l.*

16,032. Then from your evidence it appears that the object which the directors had in view in constructing this south passage as an outlet has been completely accomplished?—It has.

16,033. Therefore, if any breakwater was constructed outside, it would be to afford shelter, and to enable ships to take the south entrance when they could not take the north?—It would; and it has been projected for that purpose.

16,034. Then, to a certain extent, it would be a refuge; it would be turning the south entrance into what it is not now, into a harbour,—to a certain extent, of refuge?—It would.

16,035. From your great experience and knowledge of the coast, Mr. Wood, I should like to have your opinion upon one point; that is to say, supposing the Government adopted the views of which you have expressed yourself in favour, that is, the improvement of the existing harbours, do you think it would be advisable to lay it down as a rule that whatever sum the Government devoted to the improvement of any of these harbours the parties interested in that particular place should be called upon to pay an equal sum, or what proportion?—That will be somewhat difficult to arrange. In all these cases the first work projected is the extension of the piers. I do not know whether the Commissioners intend to go beyond erecting or assisting to erect these piers; but a considerable expense must be incurred within the harbours in order to make them efficient. It would be of no use having deep water at the entrance, unless there was deep water to a certain extent within, so that ships could be brought up after they got within the harbour. It would depend very much upon the situation of different ports what amount would have to be expended upon these works in each. I think that, as a general principle, it would be only right that a certain proportion of the expense should be borne by the local authorities, so that the works should be made efficient; but I do not think that it would be possible to fix any definite per-centage, because, as I said before, it would depend very much upon what was to be expended in making the works efficient. That, I presume, would be matter of negotiation, or some other mode of arrangement, between the local authorities and the Commissioners. I think the fixing of any general per-centage would hardly operate fairly towards each particular case.

16,036. The amount which each harbour ought to pay would depend materially upon the peculiar circumstances of the case?—I think it would.

16,037. But in all cases you are of opinion that as the improvement of these harbours would tend materially to improve the trade of the several places, the local authorities ought to subscribe towards the work?—I think, as a general principle, they ought, in proportion to their means; but I think that could hardly be arranged until the whole expense was before the Commissioners, so that they might know what additional expense beyond the erection of the piers was required in order to make the plan complete, because it is quite clear that unless the interior of the harbours is made efficient the erection of piers would be of very little consequence.

16,038. Now then, supposing that the three harbours which you have named were improved so as to admit the class of vessels usually frequenting this coast when laden at all times of the tide, should you then consider it advisable or necessary to have a harbour of refuge further south, say somewhat in the situation of Filey Bay?—I should not like to give any opinion whereabouts the harbours should be, because I have not evidence before me. Government could, however, afford to spend 800,000*l.* to 1,000,000*l.* for so laudable an object as that of saving life and property; and probably it may be advisable that, in addition to the improvement of the harbours, a general harbour should be made; but the safer plan would be to see to what extent the existing harbours would afford protection before spending a very large sum of money.

16,039. Then I understand that the substance of

your evidence is, that for the saving of life and property you would desire to see the three harbours you have named improved, so as to admit vessels at all times of the tide ?—It is.

16,040. And that in your opinion no money ought to be voted for a general harbour of refuge upon this coast until you see what would be the effect of improving the existing harbours ?—If I had to decide the question it would be a very serious consideration with me whether I should spend any money upon a large harbour of refuge until I was satisfied that the object could not be attained by several harbours, because those that have been mentioned are not the only cases along the coast in which improvements may be made in the entrances to different places. It may be that at some other ports the expenditure of a not very large sum may be extremely useful in affording shelter.

16,041. (*Capt. Washington.*) I did not quite understand which three harbours you recommended to be improved ?—The Tyne, the Wear, and I do not very well know how to deal with Hartlepool.

16,042. Was Hartlepool the third you mentioned ?—It was.

16,043. You think that the same facilities afforded at the Tyne and the Wear should be given at Hartlepool ?—I think so. Hartlepool is a place of very considerable trade ; it is a very improving place, and the ironstone which is opening out in Cleveland will tend further to improve it. I think that ships coming to make these harbours should be assured that there is a shelter for them in case of storm.

16,044. Cast your eye upon the diagram of the north-east coast of England hanging on the opposite wall ; do you see a deep embayment ?—Yes.

16,045. And the Tees Bay forms the deepest part of the whole coast ?—It does.

16,046. Do you think that a reason for placing a refuge harbour in such a position ?—I think, keeping in view the saving of life and property, I should put it in the centre, as it were, of the great trade. Tees Bay is at one extremity. That is one reason why I think that Hendon Bay, or somewhere there, being, as it were, in the centre of the great coal traffic, would be more advisable than Tees Bay.

16,047. Just so ; but are not the vessels carrying coal spread along the coast from the Tyne to Flamborough Head ?—They are.

16,048. Is not Tees Bay almost in the centre of that district ?—It is. I do not know whether you mean that with reference to a harbour of refuge, or to the improvement of the Tees port.

16,049. I am speaking of it as a harbour of refuge. You are a dock director ?—I am.

16,050. The south dock contains, I think, 32 acres?—32 acres.

16,051. Do I understand you to say that as an engineering work it has been highly successful ?—Highly successful.

16,052. As successful as any similar work on any other part of the coast of England ?—It has.

16,053. I think the dockgates and drawbridge are both moved by hydraulic pressure ?—By hydraulic pressure.

16,054. And it has the latest engineering facilities ?—The most recent improvements have been adopted, especially in sluicing. The sluices, I think, are extremely efficient. The sluices, being lifted by hydraulic power, are lifted all at once and with very great rapidity, so as to give full effect to the sluicing.

16,055. And it maintains an outlet deep enough for a vessel of 21 feet draught to pass out without difficulty ?—I think that some of the American vessels have drawn more water than that.

16,056. I think that you said you were the owner of some screw colliers ?—Owner and part owner.

16,057. Are screw colliers on the increase or otherwise ?—Well, I think they are not very much on the increase at present.

16,058. So far as your experience goes, are they likely to increase or not ?—I know from experience that they have been extremely useful in carrying coals ; but they require a good deal of management. You must have complete arrangements at both ends to ensure quick passages. Unless they can make their passages very quickly they are not profitable, and consequently they are not generally profitable to persons who are only owners of screw colliers.

16,059. Might extra facilities be given at Sunderland or in the Thames ?—It depends more upon the coal owners, who themselves can give those facilities. That is the case with me, and that probably is the reason why my screw colliers have been more profitable than is generally the case. They cannot be made profitable without the co-operation of the coal owners, and of course they will drive as hard a bargain with the proprietors as they possibly can.

16,060. If screw colliers did increase in number, it would probably tend considerably to lessen the number of wrecks on the coast ?—Well, there certainly would be fewer vessels, and screw colliers might get off the coast when a sailing ship could not ; but all ships trading between London and these ports keep as near the coast as possible, and make their voyages as quick as possible. Screw colliers caught in a gale would require shelter as well as others. Probably there would be a smaller number of ships, because one screw collier does the work of three or four other vessels.

16,061. Are the pilots of the port of Sunderland efficient, and sufficient in number ?—That is not much in my department. I leave such matters to fitting agents, whom we have here ; but I have heard no complaints about the pilots.

16,062. It came before us in evidence yesterday, that the efficiency of the pilots is very much diminished by their not being able to get out in their steam tug at all times of the tide ?—There is no doubt that it is very desirable that they should be able to do so.

16,063. Is there not at all times sufficient depth of water at the south outlet ?—There is a greater depth there than anywhere else.

16,064. Might not a berth be assigned to the steam tug in the tidal basin, so that she might go out at all times of the tide ?—They could be locked out very well.

16,065. No ; without that. Could not the tug float in the south entrance ?—It might. It is a question of arrangement and cost.

16,066. I presume they would have to pay dock dues for that privilege ?—No ; I think the dock directors would deal very liberally in that respect. The lifeboat and some of the cobles have berths in the south entrance without payment.

16,067. It was said by a pilot that they were ready to pay dues, and had paid them, but still the steam tug was obliged to go out, and they could not put pilots on board vessels in bad weather ?—I never heard of an application being made to the directors for that purpose, and I think that if an application were made they would listen to anything which would tend to the saving of life.

16,068. Perhaps you will have it inquired into ?—I will do so.

16,069. (*Capt. Sulivan.*) I suppose, Mr. Wood, that in advocating the improvement of these piers you are taking it for granted that the money laid out will be sure to have the desired effect ?—Certainly.

16,070. Should it not have that effect, a large sum of money, which might make a refuge harbour somewhere else, will have been thrown away ?—I think that the parties concerned, the Government giving money towards the improvement of harbours, and the local authorities risking another sum, would, before they entered upon the works, be very well satisfied that they would answer. There is no mystery in the present day about what will answer and what will not. It is a question of calm and serious consideration.

16,071. Do you know any instance of a tidal river with piers outside remaining a deep-water harbour, or preserving a deep entrance, in consequence of the im-

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provement which has been made in it?—I think that the improvements of which I am cognizant have always held their ground; that is, if a certain amount of improvement has been projected, I think that, speaking generally, it has always been realised. I have known of no failures.

16,072. Should you, with our present knowledge of these matters, consider a harbour constructed to improve the entrance of a tidal river a certain work, or should you regard it in a great measure in the light of an experiment?—I think it is beyond an experiment. I think it is more certain than an experiment, because in the present state of our information we ought to have before us all the elements to enable us to judge whether it would be successful or not. There may be some difference of opinion, but the elements are easily obtained, and I do not think there is much risk in carrying out such a work.

16,073. Do you know any cases in which such works have been constructed at the entrance of tidal rivers which give sufficient data and sufficient experience to make any works of the kind a certainty rather than an experiment?—I think that the works which have been carried out in the Wear are sufficient to enable engineers to judge whether or not further works would have the desired effect. There have been great improvements since I first knew the Wear; and I think that these improvements have been attended with the success which was anticipated when they were projected.

16,074. Do you recollect the piers being lengthened?—Yes.

16,075. Prior to that, what depth of water was there usually on the bar at low water?—I cannot very well say what was the depth, but I know that a great many years ago the largest vessel that could get out of the Wear held only from ten to twelve keels of coals. The river has been successively improved until there is now something like three or four feet of water at low water.

16,076. Then you consider obtaining three or four feet at low water a great result, for what has been done on the Wear?—Oh, certainly, two or three feet of water makes a great deal of difference. There has been a great deal done in the interior of the river in the way of deepening it. I think it is altogether a question of cost.

16,077. But suppose that in the course of 20, 30, or 40 years these works should so far prove a failure that the bars now inside the harbour are again formed at the entrance, will not all the money spent upon them have been entirely thrown away?—No, I think not; I cannot think that money expended in the way in which it is proposed to expend it here would be inefficient. I think that the whole matter rests upon a question of cost, and for several years I have not the least doubt that it would be successful. Whether or not it might ultimately fail is a question. One cannot say, but, so far as my judgment goes, I think it would not be money thrown away, nor do I think it would be an experiment. As I say, the elements are known, and I do not think at this time of day we ought to be unable to judge whether the works would be successful.

16,078. Then are you taking it for granted that works at the mouth of a tidal river can in the present day be determined as to their results by engineers with as much certainty as they can if carried out in bays or other places where harbours of refuge might be made?—No doubt there is more difficulty in deciding what is necessary to be done in a tidal river than in still water; but I think that in the present day engineers could be found who could reduce it almost to a certainty what would be the result of such works.

16,079. You said that the Sunderland docks cost more than was estimated?—They did.

16,080. Can you state roughly the estimate and the cost?—I have not the documents before me.

16,081. But roughly, how much more did they cost than the estimate?—I do not really know; it has been a series of estimates and a series of extensions. The original plan was not to have a south entrance at all; the original plan was only for an entrance from the river; then the south entrance was projected, and then another dock; so that there has been a succession of improvements, and I could hardly state how much of the excess was to be attached to one and how much to another.

16,082. From your experience, do you believe it is generally the case that in large works, such as railroads, docks, or harbours, the result has been that the original estimate has fallen considerably short, generally very far short, of what the actual cost has proved to be?—Taking it generally, I think not. I think that recently the ultimate cost has more nearly approached the estimate than it did formerly. People have more experience and are better able to judge what will be the cost. At the same time I cannot conceal, nor is it necessary that I should do so, that sea works are the most difficult to estimate correctly; but still it is a matter of estimate; it is a matter of a few thousand pounds here or there. I take it that there could be no great difficulty in estimating what these works would cost. For instance, the carrying out of the north pier of the docks is a part of what will be required, and there would be no difficulty in an engineer, having that experience before him, estimating what similar piers would cost carried out at the mouth of the river.

16,083. (*Mr. Coode.*) You seem to think that the engineering operations of the present day are pretty certainly attended with success; will you tell me if the sluicing operations here have been perfectly successful?—So far as they have been required, I think they have.

16,084. Are they still adopted here?—The sluices are still there. We have not had much occasion to use them. There has not been much accumulation of sand; what has accumulated has come from the dock. The total depth excavated was 12 feet, but the clay of the coffer dams has not all been taken up yet. So far as our experience of the sluicing goes, I think it has been extremely successful. A current of water has been produced which would certainly carry away any sand or silt, but of course it cannot remove the clay; and when gentlemen state that the sluicing has not been successful, I take it that they mean with reference to the clay, not with reference to the sand.

16,085. Is dredging now resorted to?—It has been, to clear away the clay; but there is another matter with reference to the sluicing which has not been carried into operation yet. The difficulty of sluicing is that there is not a sufficient margin between the height of the water in the dock and the depth which is required for vessels to give a sufficiently large quantity of sluicing water. When the improvements projected are partly carried out it would be easy to have deeper water in the southern dock, so that we could put the large vessels into that dock when the sluicing power was in operation, and so render it more effectual. At present we have not more than two feet or two feet and a half that we can employ for sluicing. That is one of our great difficulties.

16,086. Do you know whether the most dangerous gales here are those which back round from the south-east to north-east?—I have heard from nautical men that that is often the case; I do not know from my own experience.

16,087. You have heard from nautical men that the gales which do back round are the most dangerous?—I heard so, from one of the pilots. It is not usually the case. When the wind is in that quarter it generally goes westward about.

16,088. But when it goes round by north-east it is generally more dangerous?—It is.

16,089. Would not ships bound south lying along the coast from Flamborough Head be liable to be driven back by that change of wind?—If the change takes place before they get into the ports, I think they would; but I take it they might get the Humber. The wind would be east before it was north-east, and

then I take it they would run to the Humber or other places.

16,090. With the wind east, could vessels weather Flamborough Head ?—With the wind, first south-east, then east, and then north-east, I think they might.

16,091. The effect would be to cause them to be exposed to the gale for a long time ?—It would.

Mr. James Riddell examined.

16,092. (*Chairman.*) You are resident engineer to the Sunderland Dock Company ?—I am.

16,093. You have been present during the statement of Mr. Wood, the chairman ?—I have.

16,094. Will you now make any further statement relative to the dock company which may appear to you desirable, with special reference to the object of their inquiry, that is, the establishment of harbours of refuge ?—I was instructed to sketch a plan. This plan for a harbour of refuge in Hendon Bay, which has been put in by Mr. Wood, is, with some slight alterations, similar to one projected by Mr. Murray two years ago. It consists of a northern breakwater 500 yards long and an outer breakwater 3,900 yards, or thereabouts, in length. Mr. Wood suggested to me that the northern pier and the inside southern breakwater would greatly increase the safety of vessels going into the south entrance of the dock. That is the smaller plan for the works at the south outlet of the dock which has also been put in by Mr. Wood.

16,095. I will first take the larger plan for a great harbour of refuge in Hendon Bay. Have you any detailed estimates and plans to lay before the Commissioners ?—I have no particularly detailed plans, but I can show you a section, and state generally what will be the cost of the work. [*The witness put in a section, and then continued.*] The dock company have a large quarry adjoining the southern end of the dock, whence they took a large quantity of materials for that dock. The cost of stone from that quarry, put upon waggons and ready for deposit, is 1*s.* 4*d.* per ton, or 2*s.* per cubic yard. That is the total cost, including the royalty and every thing which is paid for the stone. The rubble deposit shown in the section would amount to 354 cubic yards per yard forward, which would cost 70*l.* 8*s.* I allow for staging 6*d.* per cubic yard, amounting to 8*l.* 17*s.*, which, together with other items, would bring up the cost to 170*l.* 1*s.* per yard forward, and consequently make the total cost of the 3,900 yards 66,319*l.* 10*s.* The northern breakwater 500 lineal yards, taking that at——

16,096. Will you give the total result, instead of reading the items, and then hand in the statement from which you are reading ?—The total result is 804,672*l.*, without the inner south breakwater, which would not be required if the large one were made.

16,097. What would be the total result, with an upright wall ?—About 1,200,000*l.*, and I should prefer that to the other plan.

16,098. Now, coming back to the two inner breakwaters, and viewing them independently of the large outer breakwater, I see that the area between the points marked A. and B. on the chart is entirely open to winds from east-north-east to east-south-east ; but is not the area enclosed at the entrance of the dock entirely open from north-east to south-east ?—Pretty nearly it is.

16,099. The heaviest and most dangerous gales on this part of the coast are from north-east to south-east, are they not ?—Yes.

16,100. Then this area of about eighty acres, which you propose to enclose, would be of no use at all for refuge purposes in the most dangerous gales which blow on the coast ?—It would be of great assistance in getting ships into dock in ordinary gales. It would protect us from south and north gales.

16,101. These piers would be very advantageous for getting ships into the dock ?—They would enable steamers to take them in more easily.

16,102. But the area enclosed would be of no use whatever for refuge purposes in the most dangerous gales which blow on the coast ?—Not particularly for that. In ordinary kind of gales we could get ships more easily taken in tow by steam-boats.

16,103. (*Mr. Coode.*) The estimate of 804,000*l.* which you have put in refers, I believe, to the outer breakwater only ?—To the outer breakwater and the north breakwater ; not to the south breakwater.

16,104. Of what material is the outer breakwater to be formed ?—Of limestone.

16,105. From whence do you propose to procure it? —From our quarry ; we have a quarry just close.

16,106. How far is that from the south pier ?—It will be about a mile from the present entrance ; but the timber work on the plan runs close into the quarry.

16,107. Will you state how far it is from the south breakwater ?—It is close at the end of it.

16,108. How far from the north breakwater ?—It will be upwards of a mile.

16,109. I think you stated the cost at 1*s.* 4*d.* per ton upon the waggons ?—That is what it costs the company.

16,110. What have you allowed for leading to the north pier, and depositing ?—2*s.* 4*d.* over all.

16,111. Do you propose to construct the outer breakwater by means of staging ?—We propose to do it with craft.

16,112. How much per ton have you allowed for conveying the stone from the quarry to the site of the work ?—I have allowed 2*s.* 4*d.* upon the whole.

16,113. 2*s.* 4*d.* for leading and depositing ?—For leading and depositing.

16,114. Irrespective of the cost of getting the stone ?—Irrespective of getting the stone.

16,115. Would the larger stones I see marked upon the section, six feet by four feet and four feet six inches, be procured from the same quarry ?—They have stones there of ten tons weight.

16,116. Then you apprehend no difficulty in getting a sufficient quantity of that size ?—I think I should not have any difficulty upon such a large quantity of rubble as I should want. I should have to select the blocks.

16,117. I do not quite understand that answer ?—I should have a large quantity of smaller ones to select the large ones from. I should select the pitching stones from the best of the stones.

16,118. I assume they would be selected; but do you apprehend any difficulty in procuring a sufficient quantity of large blocks ?—I should think not.

16,119. Have you had any experience in constructing isolated breakwaters of this kind ?—I have not, so far out to sea as this, but I have had a good deal of experience in taking stones out, in craft.

16,120. Into what depth of water ?—Only 10 or 11 feet.

16,121. At low water ?—At low water.

16,122. In situations at all exposed like this ?—Not so much exposed.

16,123. Then how many months in the year do you think you could work at this outer breakwater ? —It would depend upon the seasons. One would differ from another. Perhaps eight months; but as I got the breakwater formed I should then find shelter.

16,124. Would you find shelter for the craft which were taking the materials from the shore to the site of the breakwater ; would they not be exposed in attempting to reach the site of the works ?—As soon as I got part of the breakwater down it would shelter me.

16,125. It would, perhaps, shelter you from easterly gales; but would not the craft be exposed to gales from the south-east ?—In that case they would go to the dock entrance.

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16,126. And the works would necessarily be stopped ?—Yes.

16,127. Have you made any allowance for loss on account of the plant lying idle for part of the year ?—I consider that it would not be so very much idle.

16,128. I think I understood you to say that you could only calculate upon working during eight months ?—Only the craft would be idle. I should still go on quarrying stones and preparing materials.

16,129. But still the conveyance of stone to the work must necessarily be suspended ?—Yes.

16,130. Have you made any allowance for that ?—Of course. I consider that the 2*s.* 4*d.* would cover all those things.

16,131. Would cover all such contingencies ?—Would cover them all, as I have added 10 per cent.

16,132. Where would you propose to ship these stones ?—I should ship them close to the quarry, bringing part by railroad. A railroad starting from the quarry at present goes to the south outlet. On the northern breakwater I might deposit the stones from gearing.

16,133. I see that the slope which you have drawn from the work seaward is, down to a depth of about nine feet below low water, three to one, and below that one to one. Do you believe those slopes would be sufficient for such a purpose ?—I think they would.

16,134. Do you give that answer from previous experience ?—I do.

16,135. Was that experience derived on this coast ?—We form our works, and generally find them stand there.

16,136. What is the greatest depth of water in which you have formed works ?—About seven feet at low water. I consider that the deeper the water the better the stones lie.

16,137. Do you apprehend you would have any very heavy sea here ?—The sea would come upon the slope down to a greater depth than eight or nine feet ; that is the reason I should prefer the upright wall.

16,138. Have you any section of the upright wall ?—I have not.

16,139. Will you furnish one to the Commissioners at your leisure ?—I will.

Mr. Ralph Hudson examined.

Mr. Ralph Hudson.

16,140. (*Chairman.*) Are you resident in Sunderland ?—Yes.

16,141. In what capacity are you connected with the port ?—I am a shipowner and shipbroker.

16,142. For how many years have you been connected with the port in those capacities ?—I was born and have always lived here.

16,143. You are acquainted with the objects of this inquiry ?—I am.

16,144. Have you been present yesterday and to-day ?—Part of both days.

16,145. State any opinion which you have to offer as to the advantage or necessity of a harbour of refuge for this district, and also whether you think that the construction of a single harbour, or the improvement of the three ports of the Tyne, the Tees, and the Wear, would do more to save life and property ?—I wish in my evidence to remark upon two or three points. The first is with reference to the harbours themselves; the second, with reference to the dues to be imposed on ships for them ; and thirdly, I am in a position to give the Commissioners any information they may require with reference to the primage dues, if they wish it, and also with reference to the pilotage service. With reference to harbours of refuge, so far as I am able to form an opinion, I am decidedly in favour of the improvement of several harbours, and I generally concur in the opinions which have been already expressed. Upon that point I do not know that I need say anything more, because I think you have already had sufficient evidence upon it.

(*Chairman.*) Certainly not, if you generally concur with previous witnesses.

(*Witness.*) I think the question of tolls has not been touched upon. The shipowners, as a body, and I, as an individual, are decidedly opposed to any passing toll. I may, first, broadly give the objections that I hold. That is——

The witness was here interrupted by a consultation among the Commissioners, at the conclusion of which the Chairman said,

You will not proceed with the evidence you were going to give us with respect to passing tolls. It will always be competent to the Commissioners at a future period, if they think proper to do so, to call upon you to give that evidence.

(*Witness.*) I do not know that the other matters to which I referred will come any nearer the objects of the Commission than that, and therefore I need not make any observations upon them. I apprehend that the primage and dues paid to the Trinity House of Newcastle are not more connected with it ; but they have incidentally arisen, and I was prepared to give information upon them, if any question was asked.

16,146. Will you now proceed to state to the Commissioners what the primage dues are ?—They are a charge imposed under a very ancient charter in favour of the Trinity Brethren of Newcastle, upon ports, including Whitby and Blyth. The rates are 2*d.* and 2½*d.* per ton for timber, and in proportion for other goods. They are not very regular. The revenue derived from them is never spent on any of the ports from which it is paid. The amount derivable from primage dues, and payable to the Trinity House, from this port alone, I compute to be about 750*l.* a year. I have a return for 1850 which gives about 450*l.*, but since that time it has materially increased, as trade has. They have another due on ships, which averages about 1*s.* 2*d.* per ship, and that produces, I think, 600*l.* a year, making a total of 1,300*l.* a year paid from this place. There is another anchorage toll, I think, which was spoken of to-day, amounting to somewhere about 600*l.* a year, which belongs to the lessee of the Bishop of Durham,—I believe the Earl of Durham is the present lessee,—for which no services whatever are rendered. That is about 600*l.* a year.

16,147. The primage dues are a very ancient duty? I think they are. There were two trials respecting them. I was a witness for both plaintiff and defendant. On these occasions I paid considerable attention to the evidence, and the charters, I think, were granted by the Charleses or Jameses. They have been collected under those charters ever since. They were given in consideration of some "love and affection" which the king bore to the grantees for their endeavours to support some poor brethren.

16,148. Therefore in point of fact it springs from that vested right, which cannot be interfered with without compensation ?—Well, that is in the wisdom of Parliament.

16,149. Which can only be interfered with by the wisdom of Parliament ?—All that I say about them is, that the places by which they are paid have derived no benefit from them.

16,150. With reference to the pilotage service of the port, there was a question raised which you must have noticed. Have you anything to observe to the Commissioners on that point ?—I am a sub-commissioner. Some 10 or 15 years ago, I think, in consequence of a series of representations, a number of sub-commissioners were appointed to manage the pilotage service at this port under the Trinity House of Newcastle. Some three or four years ago, in consequence of some differences of opinion among them, they resigned in a body. Our pilotage service got into very great disorder. There was no person apparently to come forward; and I was solicited, some 12 months afterwards, to be one, to endeavour to carry on the pilotage service as long as it was under their control. I agreed to do so, but in accepting the appointment stated to the deputation which came

over, that in taking the office I merely took it administratively; that is, to carry out the law as it stood; but that I should not be in any way fettered as to my opinion or endeavours to abrogate that present system. And of course I feel myself quite in a position to state what my opinions are; that I think we can decidedly better it. It would be only justice to the port that the shipowners here, or the town generally, should have the control of the pilots.

16,151. (*Mr. Lindsay.*) You say you pay 1,300*l.* every year to Newcastle, and 600*l.* to the Bishop of Durham, for which you have no return?—For which we have no return that I am aware of in any shape or way.

16,152. Are there any other dues to which the inhabitants of Sunderland, including the shipowners, are subjected, and for which they get really no return?—I cannot say there are.

16,153. Nothing in the shape of passing tolls to any harbour in the south?—Passing tolls? Yes; there are a great many of those.

16,154. For which you get no benefit?—For which, in my opinion, we get no benefit.

16,155. What are those tolls, and the nature of them?—From the nature of the imposition I conceive they have been intended to be imposed on merchandise, but it unfortunately happens that the shipowner has to pay.

16,156. They fall on the shipowner?—Virtually.

16,157. What amount is paid out of Sunderland?—I am not prepared to say. I think plenty of duty.

16,158. Cannot you give somewhere about the sum?—I should not like to say, within a few thousands, because I have not the figures.

16,159. Can you speak as to what you pay for harbours on this coast?—I can speak as to the rates of some of them, but not as to the correct amount.

16,160. You do not know the amount which falls on Sunderland?—I should think, altogether, it is between 3,000*l.* and 4,000*l.* a year; but I am merely speaking from impression.

16,161. With regard to the pilotage, are the pilots here under the management of a local board, or are they under the management of the Trinity House of Newcastle?—Under the management of a local board here.

16,162. Have the shipowners, and others interested in the place, any voice in the nomination and selection of pilots?—None whatever.

16,163. Something was said yesterday about Sunderland being a creek of Newcastle. What do you mean by the word creek?—I think it is obtained from those charters of which I have spoken, where Sunderland is denominated a creek of the port of the Tyne. That is in a charter of James I., I think.

16,164. But you have every privilege and every facility with regard to customs which Newcastle possesses?—Precisely so. It is merely with reference to pilotage, and with reference to these dues.

16,165. It merely applies to the tribute of 1,300*l.* a year paid to Newcastle, and to the election of pilots?—And to the election of pilots.

16,166. The election of the sub-commissioners who appoint the pilots?—The nomination of the sub-commissioners who appoint the pilots?

16,167. (*Capt. Sulivan.*) You said this money was paid to Newcastle for the support of old brethren. Do you mean by that, seamen, or masters of the merchant service?—So far as I can understand, old seamen; a certain number of pensioners; but I am not prepared to speak positively. These matters are not much published, and not much known.

16,168. Is a fair proportion of these appointments given to the seamen of this port, in proportion to the sum you pay?—I think the recipients of the pensions must be brethren of the Trinity House. I do not know of any seamen receiving them.

16,169. Not as pensions to old seamen?—No. I think they are elected; but I am rather in the dark about it.

16,170. You cannot say that any seamen or old men among the masters and seamen of this port derive any benefit from these pensions?—I am not aware of any in any place.

16,171. Could you state more explicitly what that 600*l.* a year is paid for to the Bishop of Durham, and how it is paid?—It is levied on vessels through the medium of the Custom House.

16,172. On each vessel?—1*s.* 2*d.*, I think, on each vessel.

16,173. The same as you pay for tolls to Newcastle?—No. The toll to Newcastle commences at 11*d.* and rises to 1*s.* 5*d.*, according to the size; the average is about 1*s.* 2*d.*

16,174. Then the other is about the same amount?—For the average, about the same amount. I am speaking in the rough. I have not the figures before me.

16,175. How are your pilots paid?—Very indifferently.

16,176. But how? By a scale?—By a scale.

16,177. According to the depth of the vessel?—According to depth. 1*s.* 3*d.* a foot in summer, and 1*s* 6*d.* in winter.

16,178. Do they get all, or is any paid to the pilot board of Newcastle?—6*d.* on each ship is presumed to be deducted from the pilot, and paid to the Trinity House of Newcastle.

16,179. Does any portion go to keep up the sub-commissioners of pilots here?—It is intended to go in keeping up the pilot ruler here, but I believe it is never paid, there are so many defaulters among the pilots who have not paid it.

16,180. Is it paid to keep up the sub-commissioners?—No; a pilot ruler; a pilot master. They call him a pilot ruler here.

16,181. The amount, you say, has never been received?—A great many of the pilots are defaulters. They receive the money themselves, and never pay the contribution which their licence specifies they should pay.

16,182. Have you any power over the pilots?—Suspending them.

16,183. To see that they pay this?—There is a power in the Mercantile Marine Act to call upon them to give up their licences, and some men, under some late proceedings, gave them up a few days ago.

16,184. Is it the case that men were suspended here because they took a lead in trying to get a different system of pilotage?—Certainly not.

16,185. The pilot Hendon, who spoke yesterday, states that he was suspended, for going to the Board of Trade?—The Trinity House and the commissioners say he was suspended for not paying the 6*d.* which he agreed to pay. In other words, he was called upon to give up his licence.

16,186. Was he not suspended soon after he had taken some lead in applying to the Board of Trade?—Not that I am aware of. I believe they were called up before the Trinity House on account of it, but what took place I do not know.

16,187. (*Mr. Lindsay.*) I want your opinion on the main question. You said you thought that the improvement of the existing harbours—and when I say the existing harbours you know those to which I refer—that the improvement of the existing harbours would, in your opinion, do more to save life and property than the construction of any one great harbour on any site between Flamborough Head and the Tyne?—I think so.

16,188. You have great experience as a shipowner?—I was going to give a reason; that the majority of ships which these harbours of refuge would be erected for on this coast are of a small description and of a light draft of water, and I think by improving the present harbours, so as to admit them, presuming that it is possible to carry out the views which have been set forth by Mr. Stevenson and others, I think a larger amount of property would be saved than by any harbour of refuge.

16,189. Presuming, then, that the harbours were

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so improved, do you think it would be necessary, looking to the objects in view, to construct a harbour further south, somewhere in the neighbourhood and to the north of Bridlington ?—Referring to the wreck chart, I see the majority of ships are lost immediately off the north parts ; comparatively few are lost to the south. The larger proportion of them, so far as I can make out, are light ships. The laden ships are generally lost in attempting to go up to London, and in running for their different ports of destination, and no harbour of refuge would save them.

16,190. Then, if the existing harbours were improved, is it your opinion that the Government would not be warranted in spending half a million to a million of the public funds, after they had improved the existing harbours, in constructing a harbour of refuge somewhere in the neighbourhood of Filey ? Is that your opinion ?—I have not the money under my control ; but I do not think the advantage to be received would compensate for the amount.

16,191. That is what I mean. You do not think the advantage to be gained would compensate for so large an expenditure of public money ?—I went into it with reference to the wreck chart, and saw that the number of ships which are in a position to be saved are not nearly so many as people are apt to suppose, on this coast.

(*Chairman.*) Before you go, it may be necessary to state, as we stopped you on that point, that if the question of passing dues should again come under our consideration, or should a different decision on the subject be come to in consequence of all the Commissioners being present, then I shall feel it my duty to bring under their consideration, whether, as a matter of courtesy to you, you also may not be permitted to express your opinion.

(*Witness.*) I think it is very important, with reference to the shipowners. Strange views might be brought out.

Mr. Charles Alcock examined.

Mr. Charles Alcock.

16,192. (*Chairman.*) You are chairman of the Shipowners' Society ?—I am.

16,193. How long have you been connected with the society in that capacity ?—About two or three years. I have belonged to the Shipowners' Society for many years, and have been chairman about three years.

16,194. Are you resident in Sunderland ?—I am.

16,195. Give your opinion as to the advantage or necessity of a harbour of refuge for this district of the coast, or whether it will be better to improve the three ports of the Tyne, the Tees, and the Wear, for the purpose of saving life ?—I will. I have paid considerable attention to the subject from having been 15 years at sea, and have taken a good deal of interest in it so far back as 20 years ago. I am entirely of opinion that if the present harbours could be improved they should be so ; but I have some doubt as to how far they can be rendered accessible to ships of all burdens at all times of the tide. We all unanimously agree that they should be improved as much as possible. That is the first question. To the next question, I answer that I am in favour of having one or two or three general harbours of refuge, but I am not in favour of expending any very large sum of money. Certainly, where the saving of life and property is certain, I would not be niggardly with the Government funds, especially when they expend so much in the English Channel and on both sides of the Irish Channel. They have expended a very large sum of money in those places ; and I think our member justly stated, when he put the question, that he would not vote for supplies for different improvements in the channel without some inquiry. I think that was Mr. Hudson's remark before the House of Commons ; and I entirely agree with him, because we have such an immense traffic here that we are entitled to something. If there are large ports to be made in the channel, I think we ought to have some consideration from the Government. Since I gave evidence (I think in August last) before the Select Committee of the House of Commons, I have paid still more attention to the matter, and I think, with all due deference to everything which has been stated, that if one general harbour of refuge is to be placed at any point between Flamborough Head and the Farn Islands, Hendon Bay is the proper site. We have had at least half a dozen meetings here upon the subject, and I have attended them, both as chairman of the shipowners' society and as non-chairman. The first took place before the Committee was appointed, last year, in March 1857, when Mr. Murray laid his plan before a very large meeting of shipowners. It was fully discussed, and they were unanimously of opinion that Hendon Bay was the proper site for a harbour of refuge. We very much approved of Mr. Murray's plan ; but of course, not being engineers, we did not altogether decide upon it. We thought perhaps it might be good, but that some alterations might be made in it. That is the same plan as Mr. Riddell's, except that Mr. Riddell has carried the piers to a larger extent at the north ; he has carried the pier at least a third of a mile round towards the shore. I do not exactly approve of Mr. Riddell's plan. I do not approve of that portion of the breakwater which extends to the north-west from Hendon. I do not approve of the inside southern breakwater. The northern smaller breakwater I very much approve of, because the absence of such a breakwater is the only thing which in my opinion stops the outlet of the southern dock from being made an inlet. It would perfectly shelter the southern outlet for refuge purposes from the north-east. The only question would be, in an engineering point of view, whether the sand would at all go up inside the southern breakwater. I have been at least 36 years about the water here and on the shore, and I am convinced that the sand all sets south, so much so that the groins all fill up on the north side, and they are nearly perfectly free on the south side. I was chairman of the meeting to which I have referred when we were unanimously of opinion that this was the best site. We had Mr. Murray discussing the matter three hours ; his estimate of the cost was 800,000*l*. I afterwards saw him, and begged him to go into further calculations, to see that his estimate was correct. I afterwards saw him, in London, and he told me he was quite sure that the cost would be under a million. Of course that would be subject to revision. I presume that if it did cost a million of money, if Government spends a million or five millions at Dover, it should not be a consideration altogether of money. I think we should be rather above that. I quite agree that every care should be taken of the public funds, but I do not think that one should have all and another none. I mean that the northern ports should be without any Government money, and that southern ports should have it all. I may perhaps be allowed to state, that at the desire of one of the members of the Select Committee of the House of Commons, who stated that he should like to have an opinion as regards Redcar, I went and made a long examination of Redcar, and my opinion, when I wrote to this gentleman, was that it would be an excellent harbour of refuge for local purposes. The rocks which go south are of some importance ; but I do not agree with Mr. Calver, that they are so bad as he made out. I went at great length into the matter, with one or two pilots. We sounded, and there was some capital ground inside the roads ; inside the rocks upon which the breakwater is proposed to be built. A good deal has been said as regards Filey ; but in the Tees bight another thing struck me, because I paid attention to it, and gave considerable time to it. I think there was another plan, which was for running a breakwater from the south side of the Tees ; a rubble wall to shelter an anchorage in the Tees, which could be made a capital local harbour of refuge. The estimate of the Tees conservancy commission for that work was 50,000*l*. That is my

opinion of the Tees bight and of Redcar. I am also of opinion that, if it could be done at a small cost,—I believe Mr. Coode proposed a plan which would cost 300,000*l.*,—the erection of a harbour of refuge at Filey would be of advantage to ships caught there. I should certainly approve of three harbours of refuge; that is, if we could not improve the present harbours sufficiently to give accommodation for refuge purposes. That is my opinion with reference to that part of the matter.

16,196. I think I understand you to say that primarily you would consider it best to improve the three ports?—If we could do so.

16,197. And, secondarily, that a harbour of refuge in the neighbourhood of Flamborough Head,—to the north of Flamborough Head,—would be advantageous for laden ships?—It would be advantageous; I certainly think that. Our ports here being the centre of traffic, and especially Sunderland, a harbour of refuge at Hendon Bay should have the first consideration, unless the Government intend to go on with all at once. There is great necessity, I acknowledge, for a harbour of refuge, not only for the sake of the great number of ships that are lost, but also for those which are knocking about for three or four days with a heavy gale from the south-east, and despairing of being saved. Therefore I see the requirement and necessity of a harbour of refuge down towards Flamborough Head.

16,198. Is it the case that occasionally loaded colliers founder at sea?—Of course when a ship is overpowered she founders at sea. For instance, Mr. Wilson was talking about 34 years ago. I happened to be off here at the time as a boy, and eight or ten vessels went down with all hands. The cries of the drowning men were awful, and have been stamped upon my memory ever since. One was called the *Mackarel*, and eight or ten all went down in the same gale.

16,199. Have you any idea where they went down?—Between here and the Farn Islands.

16,200. Therefore laden colliers which could reach a harbour of refuge at Filey Bay might very probably be saved from foundering?—Of course, if a ship sprung a leak it would be very likely to save her. We have had numerous instances of ships being lost from foundering. From here to Yarmouth Roads the coast is without any refuge at all.

16,201. Have you been at sea for any time yourself?—Fifteen years.

16,202. In what capacity?—Eight years a captain, and seven as a seaman.

16,203. In the coal trade?—Chiefly in the coal trade.

16,204. Did you notice the description which was given of the number of vessels which were sometimes at anchor in Yarmouth Roads?—I did.

16,205. Is that confirmed by your experience?—Upon my word I do not know. I think I have seen 700 or 800 sail; but I did not count them.

16,206. If we had a harbour of refuge at Filey Bay, what do you consider the number of ships which it should be calculated to hold in order to render it useful?—From 200 to 300. I think Mr. Coode's plan is to afford accommodation for 300 or 400 ships. I approve of that plan, having been in Filey Bay several times, and think it is a very likely plan to succeed in saving life and property on that part of the coast.

16,207. Do you know Bridlington Bay?—Well.

16,208. Which side of the head do you prefer for the harbour of refuge?—Certainly the north.

16,209. Is Bridlington Bay good at present as a refuge from north-east winds?—It is an excellent refuge from the north-east.

16,210. In your opinion, then, it would be a pity to spoil it by making it a harbour of refuge, as a former witness said?—I was rather astonished at an observation of that kind, because my impression is, it would be the same as at Hartlepool, which, according to the experience of captains who have much knowledge of it, is growing up. One says that where 40 years ago he found seven fathoms he now finds only seven feet, which is a mighty difference; and another one states that he found five fathoms 40 years ago where he now only finds three. I believe these gentlemen will give evidence here.

16,211. Are you of opinion that Bridlington Bay is subject to the same disadvantage?—I cannot say; but I know the Smithic Sand was liable to shifting a good deal formerly, and it may be so now.

16,212. (*Mr. Lindsay.*) Say it was found out that Hartlepool Bay was not silting up nor likely to silt up, and presuming that Hartlepool Bay afforded in an engineering point of view equal facilities for the construction of a harbour of refuge as Filey Bay, and supposing that the cost was the same, that the area of three fathoms and upwards which could be obtained was the same for that cost, and supposing that it rested between one or other of those points for the construction of a harbour of refuge, and looking to the saving of life, the saving of property, and facilities of commerce for ships trading along this coast, which site would you prefer?—I would prefer Filey, provided Redcar was made into one; if a small auxiliary harbour were made at Redcar.

16,213. Presuming no other harbour made at all, say that nothing else was to be done, but that it was decided that the public money should be expended on one or other of these sites, and presuming that Hartlepool offered the same facilities as Filey; which site would you prefer?—I would take Filey.

16,214. You still take Filey?—Yes.

16,215. The previous witness stated that Sunderland paid 1,300*l.* per annum to Newcastle, and 600*l.* per annum to the Bishop of Durham, for which it receives no return. Is that the case?—I believe that is so, this year; but I have reason to think that in ordinary years it is 1,500*l.* This year we have had only 3 cargoes where we generally have 12. I do not think it is much more than two thirds this year; so that in my opinion it is much more considerable than 1300*l.* Some years ago,—seven or eight,—I got the sum calculated, and it amounted to nearly 1,500*l.*; and before the Royal commissioners who were down on the Shipping Dues Bill they refused, if I recollect right, to give the amount of dues. At any rate what they did give was a perfect farce. They gave 200*l.* or 300*l.* as the annual revenue. As regards the Bishop of Durham, I think the amount of the dues was 800*l.* per annum at that time

16,216. Whatever the sum is, whether it is in the one case 1,300*l.* or 1,500*l.*, and in the other 600*l.* or 800*l.*, do you receive any return? Is Mr. Hudson correct in stating that nothing is received in return for these payments?—I cannot say "nothing," but next to nothing.

16,217. What is the return, then?—I believe our infirmary gets 10*l.* a year. I happen to be on the committee, and I think they get 10*l.* a year.

16,218. Nothing else?—Nothing, to my knowledge. When I was before the committee on the Tees Conservancy Bill, Mr. Stevenson put it to me, whether there was not some old pilot getting 5*l.*, but I could not find him, and so I presume it is not so.

16,219. To your own knowledge, there is nothing but the 10*l.* to the infirmary and the 5*l.* which you heard was paid to an old pilot?—That is it.

16,220. Are there any other ports or persons to which or to whom the people of Sunderland are called upon to pay annually any sort of dues for which they receive no return?—Yes. I presume your question includes the passing tolls.

16,221. Yes?—We pay passing tolls, in the first place, to Tynemouth Low Light; next, to Whitby, Bridlington, Ramsgate, and Dover.

16,222. About how much is paid by Sunderland annually to these different places?—Somewhere about 1,500*l.* a year. I am not exactly conversant with the sum. I have the Tyne account, and there is paid somewhere about 4,000*l.* some odd hundreds.

16,223. What advantage is derived in return for the 4,000*l.* which is now paid?—We derive

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no advantage, because, as a practical shipowner, I give my captains special orders not to go into, Ramsgate under any circumstances. Bridlington is very much blocked up. Whitby it is no use talking about. So we pay all these charges, and have nothing in return.

16,224. Why do you give your shipmasters orders not to go into those harbours?—For this reason, that we have had several ships get more harm by going in than they would receive by stopping out in the open sea. We have had several ships run into Ramsgate. I think I had three or four, which have taken the ground, and got considerable damage. I had one about two years ago; she was running into the entrance from the cross tide; the tide running across the mouth of Ramsgate Harbour, she struck the pier, and was very much damaged.

16,225. Is it the case that not one of those parties, or a very small proportion of those, who are made to pay the 4,000*l.* per annum to these ports, ever derive any benefit; not benefit to you as an individual, but are you aware that any of the parties who pay derive any benefit?—I am not speaking as an individual. I am speaking as an individual only as regards my own ships. I have been at a great many meetings here, and have taken a great interest in the subject. I went with Mr. Fenwick and a large deputation of about 30 gentlemen to Mr. Henley on the passing tolls. He promised to take it into consideration, and give us an answer as to what course the Government thought of taking.

16,226. I do not wish to go into the general question; I wish merely to ask, from your position as a shipowner and the chairman of the Shipowners' Society, if those who pay this passing tribute derive any benefit from the 4,000*l.* a year they have to pay?—None whatever.

16,227. We have the particulars. It is not necessary to go into the general question. I wish merely to ask, is it a fact, as regards this port, that for the 1,400*l.* or thereabouts paid to Newcastle, the 600*l.* to the Bishop of Durham, and the 4,000*l.* paid for passing tolls, in all 6,000*l.*, no benefit is derived?—Next to none.

16,228. If that 6,000*l.* a year were capitalized, at the present rate of interest, three per cent., would it not give a sum of 200,000*l.*?—180,000*l.*, I think.

16,229. If they were relieved from the payment of this 6,000*l.* per annum, for which they derive no benefit, would it be the case that they would have a sum of 200,000*l.*, and thus be provided to that extent with the means of constructing the piers which have been proposed for the improvement of their own harbours, and thus do much towards the saving of life and property?—I included the dues paid at Newcastle in the passing tolls, and said the Tyne and us paid 4,000*l.* a year for the passing tolls.

16,230. How much do you pay?—I think it is 1,300*l.* a year.

16,231. To Bridlington, Whitby, and other ports?—Yes. You will see it by the report of the Royal Commissioners.

16,232. You pay, then, 1,300*l.* to those ports, 1,300*l.* to Newcastle, and 600*l.* to the Bishop of Durham; 3,200*l.* or thereabouts in all?—Yes.

16,233. Which, if capitalized, would give 100,000*l.* or thereabouts?—Thereabouts.

16,234. That 100,000*l.* would, if you were not subject to these dues, for which you receive no benefit at all, be at the disposal of the people of Sunderland for the improvement of their harbour so as to save life and property?—Quite right.

16,235. That is your opinion?—That is my opinion.

16,236. (*Capt. Washington.*) Are you well acquainted with the pilotage of the port?—I am.

16,237. Will you be so good as to state anything which you have to submit to the Commissioners on the subject?—The pilotage is in a very unsatisfactory state. Our pilots are so dissatisfied with Newcastle that they are always complaining. My impression is that the men are so much pressed that they act rather hastily; sometimes, by being led to think that they are so obstinately dealt with by the Trinity House, they are put out of the way. For instance, two men, one of whom gave evidence yesterday, came to me as chairman of the shipowners' society, before we went to London. I recommended him to get our members to assist him, and get a representation to the Board of Trade. The great grievance is the taking of the sixpence. Supposing the pilot get 5*s.* for the piloting of a ship, then he pays 6*d.* out of it, just 10 per cent. on the poor man's earnings. Then there are two classes of pilots here; the harbour pilots and the sea-going pilots. The sea-going pilots complain that those who have no licences have the same privilege as those who hold them. Therefore there is a general scene of dissatisfaction among the pilots. Of course our pilots are very respectable men, but they have not that encouragement to go on with their work the same as the pilots on the Tyne have, who are better regulated, by being under the Trinity Board. They are better managed than they are here, where they are left to the sub-commission, which sometimes takes a great deal of notice of them, and sometimes none at all. The sub-commissioners recommend to the commissioners on the Tyne, and there is sometimes a difference of opinion.

16,238. Can you suggest a remedy?—Nothing but having a pilot board here.

16,239. Is the account we have heard of the pilot steam tug being brought out of the tidal basin at the south outlet a matter within your knowledge?—It is only so by a pilot telling me.

16,240. No complaint came to you?—No complaint came to me.

16,241. Do you consider there would be any difficulty in getting it remedied?—None at all. I think the dock directors would remedy it. The difficulty, I presume, is about opening the dock gates. I do not suppose the steamboat would lie in the channel outside the lock.

16,242. The pilot stated that it would?—I think the pilots are wrong. I think it is the outer basin of which the gates are shut. I think so; but the pilot is here. I am fully convinced that it is this basin. There are two gates; the outer gate is often, in a half gale of wind, kept shut. Of course when the outer gate is open, in fine weather, they could go out and in at any time. I do not speak from personal knowledge of the thing; but I think that is the difficulty, about our going out in bad weather, because the gates here are so large. I explained before a Committee of the House of Commons that I thought they were large enough to take a frigate. When I came home I found they were exactly the dimensions I gave, somewhere about 200 feet long and 60 broad.

16,243. (*Capt. Sulivan.*) Explain how the pilot boats and steamers are paid. Who pays them?—They have to take their own cobles or the steamer.

16,244. Paying for them out of their receipts?—Yes.

16,245. If they are cruising off Flamborough Head, who provides the vessel for the cruising?—They cruise in their own cobles. These are fine vessels; very light and easy to manage.

16,246. They get no vessels provided by the Trinity House of Newcastle?—No; the Trinity House completely neglects them.

16,247. If they were placed under a board here, could they be provided with everything necessary, and could the expenses of the establishment, which would be required for their superintendence, be paid out of the pilotage receipts?—I should think that the receipts would be much increased.

16,248. I suppose you mean that the receipts would be increased by their having better means of reaching vessels at sea?—Yes; and by giving the men more encouragement.

16,249. Do you think that would all be provided, or would it still have to come out of their receipts?—That would be a question. With the men more

organized, and more on the look-out, I, as a shipowner, would rather pay them better. I think the men are under paid. I think they are not well paid, especially in any large class vessels.

16,250. Did you understand the pilot to mean that it was the steamers which they were not allowed to keep in the south dock ?—I understood the steamer.

16,251. Because I understood it was a boat ?—The pilot cobles lie in the outer entrance. They will lie safely, because they draw only from a foot to nine inches of water. They are of a very small draught of water. The steamer is quite a different thing, and will draw about four feet.

16,252. Referring to Ramsgate and other tolls, is it the case that vessels which cannot possibly enter these harbours, even when in danger, and at high water, have still to pay the toll ?—They have always to pay the toll.

16,253. Although the harbours will not receive them ?—Though the harbours will not receive them.

16,254. Yet they have to pay ?—Yes.

16,255. Is there not some alteration in these dues; are they not to be done away with, or has not some change taken place rather recently respecting Ramsgate ?—I believe it was understood that the Admiralty agreed to take off the charges on ships passing Dover; but with regard to Ramsgate, Bridlington, and Whitby nothing has been done.

16,256. (*Chairman.*) Nothing has been done ?—Nothing has been done.

16,257. (*Mr. Coode.*) You said you had been knocked about upon the coast for two or three days, in despair of being saved. Where was it ?—Off Flamborough Head.

16,258. Did you sail in a coal laden vessel ?—I was in a coal-laden vessel nine-tenths of the year.

16,259. Bound to the southward or northward ?—To the south.

16,260. Then for two or three days you were prevented from getting to the south, and were in considerable danger ?—For three or four days.

16,261. Could you have reached a harbour if there had been one in Filey Bay ?—We were reaching into Filey Bay nearly the whole time; I think half a dozen or a dozen times.

Mr. GEORGE SPARKE examined.

16,262. (*Chairman.*) You are resident in Sunderland ?—I am.

16,263. A shipowner ?—I am.

16,264. Have you been a seafaring man ?—I have been at sea, and connected with the sea, all my life.

16,265. Did you command a vessel for any time ?—For 22 years.

16,266. In what trade ?—In the Baltic, coasting, and Archangel trades.

16,267. How many voyages have you made to the Baltic ?—Generally two in the year; but I think I have been more than 20 voyages.

16,268. Have you been present in the course of this inquiry ?—I have.

16,269. Then you are aware that there is a question between Wick and Peterhead, as to which would be most advantageous as a harbour of refuge for ships in the Baltic trade coming home late in the year. If you have any opinion to offer, give it to the Commissioners ?—Peterhead is the nearest point; but you have the Moray Firth open. About Wick I cannot say much; I do not know much of it. I have no personal knowledge of Wick.

16,270. You have no personal knowledge, and therefore you decline giving an opinion on the subject ?—I decline to give an opinion on Wick.

16,271. How far north have you ever made the land in coming home from the Baltic ?—Generally by the Farn Islands; sometimes St. Abb's Head; sometimes the May Light, or the Firth of Forth; seldom to the northward of the Bell Rock.

16,272. Do you think a harbour of refuge in this district would be of great advantage ?—I think a general harbour of refuge would be very serviceable, for the saving of life and property, on this coast, between Flamborough Head and the Farn Islands. Ships are frequently caught in very heavy weather, and have great difficulties to contend with upon this coast, which is a very dangerous coast.

16,273. Where would you put such a harbour ?—The Commissioners will decide upon that point; there has been a great deal of evidence given. For my own part, it is natural to place it close to your own door, and I give my opinion for Hendon Bay. I have seen a good deal of what has taken place. I live very near to the southern part of the bay, and I have seen some disastrous shipwrecks take place in it; one particularly, in the early part of January 1837. There was one vessel came in, and coming through the broken water I think she must have canted her ballast. She came in upon her broadside, and ran quite up against the banks. We on shore all thought that every soul on board had perished; but, to our great astonishment, the men came up the banks. The gale was on a Sunday. The next day, on a Monday, there was a steamer off here. She had been off here two or three days. This steamer came within the White Stone and within Hendon Rock, and took the southern entrance, being the only ship taking the southern entrance in a gale of wind. She came in very light without receiving damage. Steamers are very awkward ships to take in a narrow channel.

16,274. Then would you prefer one large harbour at Hendon Bay to the improvement of the three ports of the Tyne, the Tees, and the Wear ?—I quite agree with the evidence given, that the three harbours should be improved, as well as the general harbour constructed; but I think that the general harbour would be a great national benefit.

16,275. Supposing that both cannot be done, which of the two plans would you prefer ?—The improvement of the harbours.

16,276. (*Mr. Lindsay.*) Did you hear the question I put to Mr. Alcock, as to his opinion, supposing the matter rested between Filey Bay and Hartlepool ? What is your opinion upon that point ?—I should prefer Filey Bay. In Filey Bay there is an inlet, but no outlet in an easterly wind, and you would be obliged to turn out. If you had a harbour upon the line of coast you could either go to the northward or to the southward. You could get out of a harbour in Hendon Bay, and if the wind was east and by north you could go to the southward; but if you get deep in Tees Bay, with the wind east-north-east, and want to go to the southward, you cannot get clear of Whitby.

16,277. All points considered, to which should you give the preference ?—If one were made in Filey Bay it would be a great benefit to the loaded ships, which are frequently caught by the wind from south-south-west to south-west.

16,278. All things considered, which site would you prefer, if it rested between these two ?—Hendon Bay.

16,279. Say it rested between Filey Bay and Hartlepool, to which site should you then give the preference ?—Filey Bay.

(*Witness.*) I should like to make some statement about the pilots.

(*Chairman.*) Make it.

(*Witness.*) The pilots are here exposed in these gales of wind, in these small boats, which endanger their lives very much. Men are frequently lost in these boats. Two or three have been lost, I believe, within a very short period. The dues go to the Trinity House of Newcastle; and it would be much better if the 6*d.* a ship, which is collected by that corporation, went to constitute a fund for providing cutters or steamers for these people to go out in. They would then be more secure of their lives. At present, they are far too much exposed in their small boats or cobles. The cobles are very small things to

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drift about in the very hard gales in which they are frequently caught.

16,280. (*Chairman.*) Have any cases occurred in which they have been blown off the coast altogether, and never heard of?—Yes. It is a great shame that these men are not better provided for; and if the ruling of the pilot board was conducted at this port I believe the pilots would be better managed, and better contented.

16,281. Would it be in your power to furnish the Commissioners with a return for any number of years showing the number of pilots lost?—I dare say it could be got.

16,282. Will you, at your convenience, send it to the secretary?—Mr. Brown, the secretary of the shipowners' society, will do it.

16,283. (*Capt. Washington.*) Have any pilots been lost recently?—I believe about three weeks ago two were lost, and never heard of.

16,284. Blown off the shore?—Blown off the shore.

16,285. (*Capt. Sulivan.*) Do the pilots get anything, in the shape of pension, from the Trinity House in return for the 6*d.* they pay?—None.

16,286. No provision for them when worn out?—No provision. The 6*d.* was intended to be so, but they do not get anything of it. I happen to be one of the sub-commissioners who resigned their offices as sub-commissioners when the pilot master was appointed here, and when the 6*d.* a ship was levied on the pilots. All the 21 gentlemen who constituted the board resigned.

16,287. Could you tell me, roughly, about how many ships enter and leave the port which take in pilots in the course of a year?—I cannot speak for that.

16,288. Can you get it?—Yes, I can.

16,289. The colliers, I suppose, rarely take pilots?—Most of them do.

16,290. Do men accustomed to the port take pilots?—Yes; they very generally take pilots. I should say there are very few instances in which ships come in without pilots.

Mr. James Anderson examined.

Mr. J. Anderson.

16,291. (*Chairman.*) You are a shipowner?—Yes.

16,292. How long have you been connected with the port in that capacity?—About 18 years.

16,293. Prior to that did you follow the sea?—Yes; I was captain of a ship.

16,294. How many years?—About 23 years.

16,295. In what trade chiefly?—I was in the Baltic, but was principally, however, in the coasting trade. I was a good deal in the Baltic and in the North American.

16,296. How many voyages have you made from the Baltic?—I cannot exactly say; between 20 and 30.

16,297. And how many north-about?—A few times; not many.

16,298. You never went north-about from the Baltic?—Not from the Baltic, but to and from America.

16,299. Have you ever made the voyage to Archangel?—Yes.

16,300. How many times?—Once.

16,301. You are aware of the question as to a harbour of refuge on the coast of Scotland between the Firth of Forth and the Pentland Firth, and that two sites, Wick and Peterhead, have been mentioned for this harbour. Give your opinion which would be the most eligible?—I think I should prefer Wick. I know it, and have been in Sinclair Bay; I think I should prefer it.

16,302. Will you state your reasons?—I think I can. Peterhead is situated on a promontory. If a ship clears it with a wind from north-east she can then make the firth if bound south. If the wind is from the south-east, clearing Peterhead, she can run to the Moray Firth. The Caithness coast, on the other hand, is a dead lee shore, and ships running to the Pentland Firth will find themselves often embayed, and Wick, if a safe place as a harbour of refuge, would be very advantageous to them. There is also a large number of fishermen always about there, and looking upon their lives as valuable as those of others. I think that a harbour in this situation would be valuable to the fishermen, as well as to a great number of small vessels which trade to Wick. I was in the Orkneys not long ago when a large vessel with 13 or 14 hands came on shore, and all the crew were drowned. I apprehend that if there had been a harbour of refuge at Wick she might have made a bolder course with the other side of the firth, and probably have saved herself.

16,303. Would a harbour of refuge at Wick be of much use to the Baltic trade?—Very little, except to ships bound north about, going to the west side of the island, because I never made the land, that I recollect, to the northward of Tynemouth.

16,304. As a general rule, you do not think that a harbour of refuge on the north coast of Scotland is much needed for the Baltic trade to and from the east coast of England?—That far north, it would, according to my opinion, be useless.

16,305. Should you describe the coast of Scotland from the Firth of Forth to the Pentland Firth as being the district in which this harbour of refuge would be placed?—My own idea is that a harbour of refuge would not be called for on account of the Baltic ships; they do occasionally get to the north, but not frequently; and I think my experience is rather that ships are now of a very superior class and character to what they were, and we can make passages much better than I ever recollect making before. I never recollect making the land to the north of Tynemouth. I have had some bad passages from the Baltic, but I have always had a decent sort of a ship to make them in.

16,306. Therefore for the Baltic trade from the east coast of England a harbour of refuge is not wanted in that district?—I think not, for the Baltic trade. For the general trade it may be very useful. I believe in the neighbourhood of Wick it would be.

16,307. For the Baltic trade, going north-about, you are of opinion that a harbour of refuge would be very useful?—The same would apply to the Baltic ships there as to the general trade. They would make the land somewhere about the opening of the firth. There is another idea: Ships coming from America through the Pentland Firth when they come in from the sea with large deck loads, and not quite so manageable as in general, come through the Pentland Firth, make a way half way across the Moray Firth towards Peterhead. If southerly gales come on they are in a very awkward position. A harbour at Wick would be very advantageous for such a ship or ships to bear up to. It is always desirable to have a harbour of refuge to leeward, and southerly winds prevail very much on that coast, and a great deal of damage is done.

16,308. With reference to this district, what is your opinion?—I have been here, and heard the whole evidence. My opinion is that it is most desirable that we should improve the three harbours to which reference has been made. I have been associated with this place for a long time, was born in it, and have known it from childhood, have been about the water, and have been cognizant of a great amount of damage continually done in the harbours. An immense amount of money is paid by insurance societies solely for damage done on and about the piers. It is most desirable that the harbours should be improved to the greatest possible extent. But the question with regard to the harbours is more a question of property than of life. It is only occasionally that we hear of a loss of life in connexion with ships which

are stranded on or about our harbour; only occasionally.

16,309. But are there cases in which loaded ships founder at sea?—Yes, many.

16,310. Do you think that these cases would not be provided for by a harbour to be established at Flamborough Head?—I think not, generally.

16,311. Supposing it was decided to put a harbour at Flamborough Head, on which side would you place it?—It is of no use on the south side, which has a shelter for light vessels from the north wind, and is naturally protected by the Smithic Sand. I show little favour to a harbour in Filey Bay either, for one reason; I take it for granted that the worst weather is when the winds are south-south-east coming round to east, continuing to blow very hard for a few days in that direction, and then frequently going to north-east. In constructing a harbour to shelter loaded vessels from south-east gales I think it would be unwise to erect it at a very windward point where ships could not get. The further it is to leeward the better, bearing in mind that the distance from Flamborough Head to the Tees or Sunderland is not very great; and then it is much easier for a ship to run back 10 miles than for another to beat to windward a quarter of a mile in the gales of wind from which you want to protect ships.

16,312. How does the question apply to fleets of ships which leave these ports with a fair wind, and get a certain part of the voyage, and then are met by the wind coming upon them from the south? How do you view that?—It depends upon the position in which they are taken. One ship would leave Sunderland, and be caught above Hartlepool; another might get further; another further; another might get to the south of the head, and calculate upon soon getting into the Humber. I have seen a considerable number of ships in the neighbourhood of Flamborough Head, and a considerable number lying a long way to the north at the same time.

16,313. As a general rule, do not the ships leave with a slant of wind?—Very generally; but I have seen them go out with southward winds and bad weather. We are not very nice about putting ships to sea here.

16,314. When they come out with a slant of wind, how far does it take them?—They may not get far, reaching out and reaching in, but always making the same place. I think I have reasons which are good in my judgment for saying that if any general harbour of refuge were made I would have it somewhere on the Durham coast. The principal reason I have already given, that it is on the lee side of the bay, taking the whole of that coast, and that it is very easy to run a few miles to leeward. My experience on this coast is that it comes on to blow from the southward; you put the ship under shortened sail; you often have to lay-to during the night, and when day breaks next morning you find you have drifted in sight of the Durham coast.

16,315. Which is the easier coast to make, Durham or Yorkshire?—As to that, we that are acquainted with them find no difficulty. I think there are few better coasts to make than the Yorkshire coast; it is so undulated and lofty, it is not difficult to make. The only difficulty is that it comes over foggy in bad weather, so that it is not so easy then to make as the Durham coast.

16,316. In foggy weather, if you found yourself off the coast, with the wind on the shore, which would you prefer, Durham or Yorkshire, for the saving of life and property?—I know no place along the shore that I would sooner go to save my life than to Hendon Bay. I have known it since I was a child, have known many ships on shore, and never knew any one lose his life. It is naturally sheltered by the rocks laid outside. I heard it yesterday called a rocky shore, but I do not know that it is. I think it is a sandy beech. From being a boy I have ever heard the maxim, that if ever we were caught on this coast we should run for Hendon Mill, and that maxim has been generally acted upon.

16,317. Taking the coast from the Tees to the Tyne, and south to the head, taking the coast generally, on which part of it would there be the best chance of saving life and property, if taken with a gale of wind dead on shore?—The whole of the Yorkshire coast is what we call rock-bound. Going on shore is inevitable death. The ships go to pieces. There are only one or two places, like the neighbourhood of Filey Brigg and a little south of Scarborough, where there is a beach; only one or two isolated places where there is any prospect of saving life at all.

16,318. I presume if a ship finds herself on the Yorkshire coast with apparently a heavy gale blowing on shore she immediately stretches north to the Durham coast?—That would depend entirely upon her position and the state of the wind.

16,319. Giving you the wind dead on shore,—a gale of wind blowing dead on shore upon the Yorkshire coast,—what would be the most prudent course to pursue?—With a loaded ship and the wind at east, I would give her a chance of going south; but with a light ship I should go north. With the wind at east the ship will lie north-north-east. She might not go to Sunderland, but I should expect her to do so. If the weather got any worse the ships would all get to the Durham coast. With light ships it is generally so, because we have very few ships that go ashore on the Yorkshire coast. I have known instances, but those have been ships caught hugging the land too much aboard. Generally speaking, in coming down with south-east winds, if the wind is at all inclined to get westerly a captain hauls the ship out from the head, and invariably finds a good offing, and is in a position to bear for any point which he thinks most advisable. With regard to laden ships, it has struck me, as I heard the evidence concerning this harbour, that though I do not wish to say a word against the improvement of a harbour, I should be strongly of opinion that it does not meet our requirements. We have coal ships drawing 15 or 16 feet of water, and taking the most favourable view which I can of the contemplated improvements, I should not like to see one of those ships, if she were mine, come into the harbour, because I should calculate on having the cargo to discharge to put her into dock, and to expend 500*l.* or 600*l.* The chance probably is that she would strike in coming in. Hence I think for laden ships we require something more than can be fairly calculated upon, from all I have heard as to the plans we have before us, for the improvement of the Wear. I doubt, too, whether the improvement of the Tyne will give a result according to the calculations. I do not think we should be able to take advantage of that, or even look at the Tyne or the Tees. I do not think these are places for a ship drawing 15 or 16 feet of water to take in a gale of wind. I think a harbour of refuge is required for the safety of those vessels, and more especially for the safety of the lives of their crews, for there is no doubt that the seamen who are drowned are generally drowned in laden ships, which I believe mainly founder at sea from this fact. Seamen and masters who wish to take care of the property intrusted to them get away from the land, as there is no use coming to it, because there is no harbour to go to. I agree with what Mr. Alcock said about ordering captains not to go near certain places. If ships go to Hartlepool they only go to be lost. Owing to ships so keeping out they keep to sea, and if their companies are bad, or the ship should spring a leak, which frequently happens, they lose ships and lives. This year I had a vessel in the Firth of Forth driven back a considerable distance from the south. There were 250 sail in the firth all driven from off the Yorkshire coast. Many received a great deal of damage on their passage to the north, and many others were greatly damaged in the firth. Several lost their anchors. One of mine lost her anchor, and had to pay for salvage, and to run the ship further up the firth into a place of safety. Some provision, I think, is wanted for such emergencies as these. I am afraid, myself, that the contemplated improvements in the

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harbours will not meet the case of those vessels which draw 15 or 16 feet of water. Indeed I am satisfied that they cannot make a channel wide enough for the ships to steer. The ships will yaw, and they will go on to shallow ground, injure themselves, and have to be repaired at considerable cost. This, in my opinion, with the lives of men at present drowned in laden ships, demands from the Government the provision of an efficient harbour of refuge for the safety of those employed upon this coast.

16,320. Therefore your opinion is that the improvement of the three harbours would not meet the exigency, and that the single harbour should be somewhere down in this vicinity?—Yes. In considering the question slightly, there seems a great many thousand vessels, 40,000, 60,000, or 100,000, sailing out of port from the Wear and northwards, making altogether a very large number of ships, and I have an impression that it is simple reason and good judgment to make the harbour of refuge in the vicinity of these ships, and not to put it at Flamborough Head, their arrival off which is problematical, but rather where we know they are, at Shields or the mouth of the Wear and Tees. If they get a little to the southward, and the wind is from the north and east, so that they may carry double-reefed topsails or close-reefed sails, they may go to the southward. We want ships to make voyages, and captains with nerve and experience, and a good ship will always aim at doing that; but there are many cases in which a harbour of refuge is an absolute necessity. Tremendous storms take place in which the best ships, with the best canvass, must fail; and I think such a harbour should be made in this neighbourhood, in which great trade is carried on.

16,321. (*Capt. Sulivan.*) Perhaps you are aware that besides choosing the best place for a harbour to be made, it is necessary that some natural formation of the coast should assist, in order to overcome the expense and certain engineering difficulties?—I assume it is; but I am not an engineer.

16,322. Supposing it was found that only two places give those engineering facilities, and that they were Hartlepool and Filey, which should you prefer for laden vessels bound south?—Hartlepool, because a ship could run back 12 miles easier than she could 100 yards to windward.

16,323. Do you know Hartlepool?—Yes.

16,324. Are you satisfied there is no reduction in the depth of Hartlepool Bay?—I am satisfied there is a reduction.

16,325. Would you consider that a great drawback against making a harbour of refuge?—Certainly. I should wish to remark, before I go, that I am very strongly of opinion that Hendon Bay is one of the most preferable places for a harbour that I know of, having regard to the question of natural formation and facilities for the making of a harbour. Taking the whole coast, I think it is very favourable. Although it may not be considered so naturally, I think it might be made so artificially. I would not favour making a harbour of refuge in the curve of a narrow contracted bay. About Filey, with the wind in the north-east, if you wanted to proceed south and you could not get out of Filey Bay, you would be pressed by the breakwater, and have no room to turn out; the sea rolls in dreadfully. I have been riding in Filey Bay when the wind has come round to north of west, and the ship has been rolling. You could not get the ship well out when you wanted to proceed south with the wind east-north-east. The same may be said of the Tees. Now look at Hendon. It is right in the cod of the bight. The harbour could not be made on a better coast, nor with a better port for leaving, than is presented there, and that is what we want. We only want to stay until we can safely proceed, and make a voyage. The further you are to windward with the wind east-north-east the better you go out. I have run to London in 40 hours, and sometimes in less time, and so I do not think much of the whole distance, and a few miles difference in the position of the harbour might not be so much a matter of consideration as choosing the points which would be most favourable for the reception of the ships which would require it. The Durham coast is the most favourable for the loaded ships.

16,326. (*Chairman.*) You consider facility of access and departure the most important points?—Yes.

16,327. (*Capt. Sulivan.*) How do the east-south-east and south-east winds generally draw round?—I have found the wind will blow from south-south and by east, and south-south-west, range down there a long time, and when the wind gets to the east of south-east, east-south-east, it generally blows round then to east; with this it will draw to the east of north, which is always the worst of all.

16,328. Does it blow hard when it is east-north-east?—Generally.

16,329. You would not want to sail with a gale from east-north-east?—I think we should.

16,330. You would not want to sail in a gale?—We want to sail as soon as we possibly can.

16,331. Does the wind more generally go to west and north-west than the other way?—It does. If any place on the Durham coast were selected, directly the wind got off we should most assuredly go away, however hard it might blow. It is part of my experience that we have not such very hard gales of wind from east and east-north-east as we had when I was a boy.

Mr. JAMES SHEPHERD examined.

Mr. J. Shepherd.

16,332. (*Chairman.*) How long have you followed the sea?—From 1830.

16,333. How long have you commanded ships?—I never commanded a ship.

16,334. In what capacity have you served, then?—Generally as mate, and before the mast.

16,335. How many years have you been a mate?—About ten years.

16,336. Have you been present during the course of this inquiry?—Yes.

16,337. Give your opinion as to the best point for a harbour of refuge on this coast, if there was to be only a single one, or say whether you think it would be better that the improvement of the three ports should be carried out?—I beg leave, first, to say, that I was chairman of a meeting of seamen of this port, which was held a short time ago, on the subject of harbours of refuge. I am president of a society of seamen, and the opinion among them is, that the improvement of the existing harbours would be highly beneficial to the seafaring population and the shipping interest generally. They consider that the three harbours improved so as to admit ships under all circumstances would be much better than one general harbour placed anywhere. They consider that one general harbour, wherever it is placed, will not meet the requirements of this busy part of the country. I know, from my own experience, that many ships sail out of these coal-lading ports, sometimes under peculiar circumstances; the wind may be from the south. It generally so happens that the spring tides of these northern ports answer from about three in the afternoon to six. Therefore in the afternoon it so occurs in the winter time that it is soon dark after three. If the wind is southerly the ships stretch off away with the tide. Very often I have known a gale come on in the course of the night, and in the morning the ship has very often been lost, and most of the ships are put to the greatest extremity as regards carrying sail. Now, under these circumstances, I think that a harbour of refuge, or the improvement of the existing harbours, would be highly beneficial to shipping and to the saving of life, more especially as regards the laden ships. In my experience, a great deal of life is lost in laden ships; and if I refer to the wreck chart, I find that the greater

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part of the wrecks are caused about the neighbourhood of Sunderland. I find that the greater part of the wrecks and of the damage, and the greatest loss of life, occurs in the neighbourhood of Sunderland, and between Sunderland and Shields. I have a little statement with me respecting the loss of life :—In 1833 about 52 ships came on shore, and foundered between Flamborough Head and Sunderland. There were very many lives lost in that gale. In 1840 there was a very heavy gale of wind ; a great many ships came on shore, and lives were lost. In 1849 another gale occurred off this coast, and a great many lives and ships were lost. I think, when I compare these circumstances with the wreck chart, and the account given in it, together with my own experience at sea, I infer that the improvement of the existing harbours, so as to admit all ships under ordinary circumstances, would be highly necessary, and highly beneficial to seamen generally, and to the saving of their lives. In 1849 a ship called the *Cyrus* came on shore, behind the north pier of this harbour, and the greater part of the crew were lost. I think if there had been a harbour made available under ordinary circumstances the ship would have got in, and the crew and property would have been saved. In 1853 a very heavy gale occurred on this coast from east-south-east and south-east, when several ships foundered in the Tees Bay, and several lives were lost. There was a gale in 1853 or 1854, when a great many ships had to run back to Leith Roads, and several of the crews and parts of crews were washed overboard. I think if there had been a harbour of refuge, or if the existing harbours had been improved, these casualties would have been avoided ; and the like will be prevented for the future if these works are carried out. Therefore I think, that, considering those things, it is highly necessary that the government of this country should improve the existing harbours, or make one general harbour, so that it should be available under all the circumstances. I am instructed by the seamen to say, that those are their opinions ; and I will read a resolution which was adopted at the meeting I referred to, and which was moved by James Smith, seconded by Richard Kelly. It is to the following effect :—" That " the meeting is of opinion that a single harbour of " refuge on any part of the north-east coast would " not give sufficient protection to life and property. " The meeting is of opinion, that if the existing " harbours were improved, and made available at all " times of tide, and under all circumstances, they " would be more advantageous to the shipping fre- " quenting this part of the coast than a single " harbour of refuge at the entrance south of the " coal-loading ports, or in any other part of the " coast." There was another meeting of shipowners, masters, and seamen, interested in the welfare of the port, of which Mr. Thomas Robson was chairman, and they passed a similar resolution. They came to the conclusion that it would be necessary to give evidence before the Commissioners, and appointed me to do so, in order to show the necessity, if possible, of improving the existing harbours, and making them available under ordinary circumstances, or of establishing one general harbour of refuge. I may say from what I have experienced at sea, and what I know, and from the many lives which have been lost, that it is highly necessary that the Government of this country should do something for the welfare of the seamen who are so much exposed on this part of the coast. According to the wreck chart, numbers of ships have been wrecked and numbers have foundered within the last few years. I know by my own experience, and by my own observation, that very many precious lives have been lost on this coast from the want of a harbour of refuge, or the improvement of the present harbours. In the year 1856 or 1857 a gale came on from the eastward ; a great many ships ran for the harbours, and in Hartlepool Bay two or three light ships foundered. Off Tees Bay several went ashore. One in particular capsized her ballast two or three times, and was lost with all her crew, except one or two. Another ship, as I was informed by some of the crew, capsized her ballast three times, and with great difficulty got into Hartlepool. In that same gale several ships foundered. From all these things, it must be quite evident to this Commission that there is a necessity for some harbour of refuge, or for the improvement of the existing harbours, to be carried out as speedily as possible. The sailors of this port, numbering about 3,000, have desired me to urge the necessity of the question, and to move the Government to improve the existing harbours, or to make one general harbour of refuge in the most convenient place along this busy part of the coast.

16,338. When was the first meeting held ?—I do not exactly know the day.

16,339. About what time ?—About a month since.

16,340. How many were present ?—About 200.

16,341. How many at the second meeting ?—About 180.

16,342. On what authority do you state that the 200 and 180 seamen represented the opinions of 3,000 ?—We form a society of seamen called the Seamen's Benevolent Society or Seamen's Union. I am the president of that society. We consider that when 200 men are assembled for any purpose which is calculated to advance the interest of that society it is a fair representation of the men. It is not possible for us to get all the men together, or one half, at any given time; therefore we set it down as a rule that if 200 men are assembled, and agree upon any one subject which affects the interest of the seamen of this port, it is conclusive evidence of the opinions of the whole body.

16,343. Then, although the men who were present were not specially deputed to express the opinions of their brother seamen on these points, you are still prepared to state, that in your belief the resolutions they came to fairly represent the opinions of the majority of seamen here ?—Yes. You will find that several seamen spoke at the meeting.

16,344. Of course you must be aware that a statement such as you have made cannot possess the authority which a memorial signed by all the seamen would carry with it; and if you think proper at any future period to send a memorial containing these sentiments, signed by those seamen of the port who choose to sign it, that will undoubtedly be a much more authentic evidence of their opinions ?—Yes.

16,345. We have received so much evidence about harbours of refuge, and received it so much in detail, that I merely ask you whether you generally concur in the opinion that the improvement of the three ports is the thing which should be done first ?—Decidedly so.

16,346. Supposing anything further is to be done, it is your opinion that a large harbour of refuge would be useful ?—Yes.

16,347. Supposing such a large harbour of refuge has to be constructed, where would you put it ?—I have gone into the question, so far as my abilities will allow me, and have made inquiries. I have read as much as I could get hold of on harbours of refuge, the improvement of harbours, and such like. I have been at the trouble of going twice to explore Hendon Bay, and have taken soundings in the present harbour twice, for the purpose of giving an opinion. I have explored Hendon Bay, and from what I have seen from the soundings, and from the quality of the bottom, and the position of the rocks—Hendon Rock—the Whitestone—from the soundings, and the quality of the ground generally, I find that it is a very suitable place for a harbour of refuge.

16,348. Then you would prefer Hendon Bay ?—I do, for many reasons. I believe it is a very good place as regards the quality of the ground. There are very good anchorage grounds in it. Hendon Rock and Whitestone Rock are, according to my idea, very good places for building the foundations, and the ground is generally very free for anchorage. In the chart which the Commissioners have before them

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there is shown the scar or rock leading out a long way, and Mr. Calver's chart shows rock a little further to the northward even. In some places the soundings I took corresponded very much with Mr. Calver's, but they differed a little as regards the quality of the ground. The depths are something similar, but they differ as to quality of ground.

16,349. Supposing we are to have the three harbours improved, would you place the additional harbour close to one of those to be improved, in preference to putting it on a part of the coast where there is no harbour at all ?—A harbour of refuge is, in my estimation, necessary in the most central point of the coal-laden ports, and I do not know any place more central than Hendon Bay.

16,350. (*Mr. Lindsay.*) I think the seamen have been very fortunate in obtaining a member of their body to state their case so feelingly and so well as you have done, and I have only one question to put to you. If the three harbours, the Tyne, the Wear, and the Tees, were made harbours of refuge, that is, harbours which the vessels usually going along the coast could take at all times of the tide in gales of wind, do you think there would be any further necessity for a harbour of refuge between Filey Bay and the Farn Islands ?—If the harbours can be improved so as to admit ships under ordinary circumstances, I would not go quite as far as the resolution, which says the harbours shall be available under all circumstances. It is a question very likely with some whether they can be improved to be available under all circumstances, and to all sorts of ships; but if the harbours are made available under ordinary circumstances, more especially to admit loaded ships at the first of quarter flood, I think that would meet my views, and meet the necessity of the case. It is the loaded ships to which I look most, because the lives are lost principally from them.

16,351. Say it rested between the improvement of the three harbours to the extent you name, or the having one great harbour at Hendon Bay, which would the sailors prefer ?—The sailors prefer the improvement of the three harbours.

16,352. Say that the Government resolved to do neither,—neither to improve the existing harbours, nor to make a harbour of refuge at Hendon Bay,—but should decide that one harbour should be made either at Filey Bay or Hartlepool, which of them would do most to save life ?—The north side of Hartlepool Bay. I have an impression that Redcar, improved and made a harbour of refuge, would be a very convenient place for ships.

16,353. You would prefer Redcar to Filey or Hartlepool Bay ?—To any place, except Hendon.

16,354. Say it rested between Filey and Hartlepool alone ; which would you prefer ?—I should prefer Hartlepool, then.

16,355. (*Capt. Sulivan.*) Do you know whether the water in the north bay of Hartlepool is decreasing ?—I do.

16,356. Is it a subject generally spoken of among your class of seamen ? Do they ever remark on any of these harbours filling up ?—We, as a class of men, are very anxious about harbours of refuge. Two years ago we moved in the question, and there has been much talk about it lately, especially since the issue of the Royal Commission. At our meetings here, and the men generally hold weekly meetings, we generally have some social conversation on whatever is to their interest, and the harbour of refuge has been a topic of great interest among this most suffering class of people. That has been a question raised on several occasions. I have conversed with several men, and they have generally expressed an opinion that Hartlepool Bay has grown up very materially. I happen to know, from my own experience, that it has grown up. I remember that about 20 years ago I was riding off Seaham Harbour with a gale from the north-east, broke my cable, and went into Hartlepool ; we drove for some time, and the ballast shifted ; we got the ballast righted, and tried to get into Seaham ; found it difficult to get in there, but got into Hartlepool, and brought up somewhere near the Stones buoy. We rode very well there, in about six fathoms water. I find there is not now that depth of water where the Stones buoy is.

16,357. How long is that ago ?—About 20 years.

16,358. Six fathoms at low water ?—I cannot say whether at low-water. I think it would be flood-tide when we went in. The general practice is to get a cast of the lead before letting go the anchor. We were in about six fathoms at that time.

16,359. You are satisfied there is less water now than there was then ?—I am quite satisfied that the sand has very materially grown up. I remember riding there on another occasion, close inside the masonry work. The sand has materially grown up there.

16,360. Then how do you think it would be safe, under any circumstances, to build piers and make a harbour of refuge in Hartlepool Bay ? How could you preserve the harbour with a proper depth if it is gradually silting up ?—That perhaps belongs to engineering. I cannot tell how to keep it clear, but it is quite evident that it is silting up.

16,361. I do not ask you how you would keep it clear, but would you think it desirable to build a harbour where there is such a possibility of its getting shallower ?—I do not think it so desirable ; but the question was put to me, which should I choose, that or Filey Bay ?

16,362. Supposing Filey Bay is not likely to silt up, and Hartlepool is, which then would you choose ? —Filey, of course. I would choose the nearest place to the coal-loading ports ; that is my object. I believe the coal-loading ports pour out such a large mass of shipping, more especially in the summer time, that a harbour of refuge close to the most central place is very necessary. It is almost impossible to see the loss of life continue without doing something for its preservation.

16,363. But if it should be proved that Hartlepool is not so silting up, and that a harbour could be made there with safety, being so deep in the bay, you would decidedly prefer it to a place to the southward ?—I would, with the exception of Redcar.

Mr. William Hodge examined.

Mr. W. Hodge.

16,364. (*Chairman.*) How long have you followed the sea ?—28 years.

16,365. In what capacity ?—Partly before the mast, and as mate.

16,366. How long have you been mate ?—I have not exceeded two or three years in the coasting trade.

16,367. Have you been present to-day and yesterday ?—Yes.

16,368. And have heard the evidence of the witness who has preceded you ?—Yes.

16,369. Do you generally concur in his opinions ? —I do.

16,370. Is there any point that you would like especially to mention ?—I think not. I fully concur with all his remarks.

16,371. I distinctly understand that you are of opinion that the improvement of the three ports would be preferable to making any large harbour, wherever it might be ?—Just so, provided they make them available.

16,372. Provided they can be made available. Do you mean for loaded ships at all times of the tide ?—Yes.

16,373. For loaded ships at all times of the tide ? —Yes.

16,374. That would involve from 16 to 18 feet of water ?—I think the majority of vessels draw from 15 to 16 feet of water.

16,375. Supposing we are to have one single harbour of refuge, in addition to the improvement of these three ports, where would you put it ?—Hendon Bay.

16,376. Would you still put it in Hendon Bay if the Wear was improved, in preference to putting it on a part of the coast where there is no port at all ?—Yes.

16,377. (*Capt. Sulivan.*) You heard the last witness speak about Hartlepool silting up. Do you know whether it is shallower than it was ?—Not of my own knowledge. I never entered the port of West Hartlepool. I have heard different men express the opinion, and I have heard the pilots say that it is silting up gradually, both the old harbour and the bay to the southward of the new harbour.

16,378. I mean the bay leading to the two harbours and bounded by the Heugh ?—Just so. No doubt it is silting up. I have every reason to believe it. No later than yesterday and to-day I have heard different parties expressing the opinion that it has silted up most materially, from seven fathoms some few years back to five now.

16,379. In how many years back do you think they say it has decreased those two fathoms ?—They did not mention a term of years.

16,380. (*Chairman.*) What is the general tonnage of colliers ?—From 250 to 300 tons.

16,381. How many hands do they carry ?—They vary ; some carry six or seven, others eight or nine. There is no fixed number ; some carry more than others.

16,382. After knocking about two or three days in bad weather, with a laden ship, are they generally pretty well done, and have they generally had enough of it ?—I should say so.

16,383. Do the ships from being placed on the ground frequently strain and leak in heavy weather ?—There are exceptions ; some of them do.

16,384. So that besides the ordinary work of the ship, they have a little extra work in pumping occasionally ?—Occasionally ; there are exceptions. Some go very well ; according to which way the ship is affected by the nature of the weather and the deepness of the vessel.

16,385. Light ships, after rounding the head, hug the land, do they not ?—It all depends on the position of the wind. If the wind is south or south of west they steer a direct course ; if it is west-south-west they keep near the land, for fear of losing it.

16,386. When it is blowing a gale of wind along shore and the weather is thick, as a general rule, how far can you see the land ?—Do you mean the Yorkshire coast ?

16,387. No ; along here ?—The land in Hartlepool Bay is very well ; as you come to the northward it begins to decrease. The highest part is Black Hall Monuments.

16,388. In thick weather, blowing hard on shore, at what distance can you make out the land ?—It will depend on the nature and amount of the thickness. The weather is sometimes so exceedingly thick you must be very close in before you can see the land.

16,389. What distance with snow and sleet ?—You will not be able to sight the land ; you must depend on the lead for guiding you. The principal part of the masters would resort to that to guide them, and would calculate their position by the soundings.

16,390. If a ship missed her port in weather of that description, blowing hard on shore, what chance is there for a light ship ? If running for the Wear she missed her port, two or three miles to the north or south, and gets close in land, what chance has she when she has to haul the wind, having it dead on shore ?—It will depend ——

16,391. Having the wind from the east-south-east or east-north-east dead on shore ?—She must do the best she can. If she is embayed between the Wear and the Tees she must keep off the land.

16,392. What chance has she of getting off the land ?—A very poor chance of getting off the land if the weather is that severe. She must endeavour to keep off as long as she can until it clears up. If it does not clear up in many cases they go on shore.

16,393. Do many loaded ships founder at sea ?—No doubt numbers have. Many have never been accounted for.

16,394. If you are obliged to take in your close-reefed topsails, and to heave the ship to, and drag, under what sail do you do it ?—Put her under a trysail and fore-topmast staysail.

16,395. In such weather does the sea break on board loaded ships much ?—It chiefly depends on the abilities of the ship, with reference to her sea qualities, and whether she falls off much.

16,396. Generally, what weather do they make ?—It depends on the position of the ship. The sea may be so foul as to break on board the best of ships. A ship falling off, a foul sea may get on board the best, and do damage, if laying close to the wind.

16,397. If any ship falls into the trough of the sea she runs the chance of getting a sea aboard, particularly, I suppose, these heavy laden colliers, which are not, I am told, more than 18 inches above the water. I want to have your opinion as to whether, when these ships are hove to, under such circumstances, they generally get a good deal of sea on board ?—Decidedly so.

16,398. Tell me how these loaded ships scud ?—Dead before the wind.

16,399. Yes, dead before the wind ; but generally are they vessels that scud pretty well ?—Provided they steer well ; but it all depends on the steerage.

16,400. Do they steer well ?—Many very indifferently.

16,401. Then I presume they do not scud well ?—Not as respects steerage. You must recollect there are many fine vessels in this trade.

16,402. I am asking generally. When these vessels scud, how many points do they fall either way ?—As far as two and three, and four sometimes, either way. That depends a great deal on the man at the helm being careful. Even a bad steering ship will not yaw to the same extent if the man is careful ; but some, with all your watchfulness, you cannot steer at all.

16,403. After three or four days hard work in weather like that we have been speaking of, it is perhaps difficult to be careful ?—Yes, it is.

Mr. JAMES SMITH examined.

16,404. (*Chairman.*) How long have you followed the sea ?—33 years.

16,405. In what capacity ?—For the last 15 years as master.

16,406. Always in the coal trade ?—Generally. A few voyages up the Baltic.

16,407. You know the object of our inquiry; do you generally concur with the two previous witnesses ?—I do.

16,408. Is there any point they have omitted to name which you would like to state ?—I do not know that there is anything particular. I would just wish to state that I have had to take all the three harbours in gales of wind. I went from this harbour in a ship drawing 15 feet of water, got winds down from the south, and got up to Rowcliffe. The wind came down at south, varied to south-east and east-south-east, and came on very suddenly. Being caught suddenly, and knowing the ship was not very good, but was a very old ship, and sometimes made water when the weather sea was bad, I ran for Hartlepool, when the sea grew very bad, and got in. The ship came to the ground three times before I got into the place, but did not receive any serious injury. She made a little more water than usual ; but if I had been an hour and a half later in taking that bar she would have fallen on the bar, and likely have gone to pieces, and it would have been a question whether our lives would have been saved or no. On another occasion I went out from here, got

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up the length of Whitby, wind heavy, blowing strong from the west. We got into Whitby Roads, let go the anchor, and rode there part of one day and part of the night. At night the anchor parted, came off, and we drove out into the sea with about 55 fathoms of chain at the bows, and the anchor stock and shank. The following day at six o'clock the wind was westward, and we went to the south. On that occasion I ran for Shields, not with the same ship, but in a ship of the same size and draft of water. I ran for Shields, but after I got inside I said I would never attempt to take Shields again, for in going over Shields bar the bar seemed to be such a length, and there was such a length of broken water, that at times the ship was completely buried. It happened to be a ship that was built by Johnson of this port, the *Morning Star*. She behaved very well amongst the broken water. She touched the ground once, and her head paid off to the northward, but if she had touched again she would have gone on the Black Middens, and we should have been drowned. She did not, however; she recovered herself, and we got in. I have never been shipwrecked, but have had some near escapes. I have only been once on the ground during that time. That was in Yarmouth Roads, on the Newcome Sand. I have frequently come on to this coast. Much has been said about a place for light ships. That is a second consideration with me. A loaded ship is the one which wants a place of safety. When I leave London or Portsmouth, or any other port, with a light ship, my mind is at perfect ease as regards the saving the lives of those I have committed to my care; but when I am on board a loaded ship, and perfectly know, on leaving this port, that should I be caught in a gale there is no place to which I can go with a ship drawing 15 feet, such as I generally have, I have always been unusually uncomfortable in my mind, and could not sleep easily until I got the Humber under my lee. Then I seemed to get my mind at rest, knowing that there was a perfectly safe place, where, if caught in a gale of wind, I could bear up. I have my opinion, and am prepared to give that opinion, not influenced by any other person.

16,409. I understand you are distinctly of opinion that the first thing to be done is to improve these three ports, and enable loaded ships, drawing 16 feet, to run into them, if we can, at any time of tide?—Yes.

16,410. Supposing anything further done, that we were to have a single harbour, where would you place it? Where would be the best place for loaded ships?—I have been brought up in this town at about the east end of the town, and have seen most of the ships that come on shore. When at home I have seen a great number come ashore, and a number of men's lives lost. For years together we used to heave the ballast at sea from the ships previous to coming into the harbour. It would be always my object, when coming here with a light ship, when I had to heave ballast out at sea, if possible, generally to bring up in a place which the pilots call the Smooth, and for this reason; when we came up with a gale of wind, and could not carry canvas with the ballast, this place named the Smooth was a very safe place for the ship to go ashore. In fact I have seen ships go ashore in this Smooth, and of all the ships I have seen go ashore I have never seen a man drowned in Hendon Bay. I always thought that the safest place that I could see along the Durham coast. I am of opinion that if I was at sea with a loaded ship, and compelled by stress of weather to run for the shore, I should take my chance in Hendon Bay. I think that is a very suitable site, and the best site I can see for a harbour of refuge.

16,411. But bear in mind that were we first to improve the Wear, and make it available for ships drawing 16 feet of water; would you put a harbour of refuge close to an improved port, in preference to putting it on another part of the coast?—Yes.

16,412. (*Mr. Lindsay.*) What is the average size of the colliers; the registered tonnage?—I believe that from 150 up to 320 is about the average.

16,413. Taking a collier of 250 tons, what crew does one carry on the average?—Generally eight hands, two of them boys.

16,414. That is to say———?—Master and mate, three able seamen, and two boys.

16,415. That makes only seven?—There would be four able seamen.

16,416. One boy does the cooking and such things?—No; one man generally goes as cook.

16,417. He is shipped as seaman and cook?—Yes.

16,418. When you require to shorten sail every one must be on deck?—Every one.

16,419. What depth would you be from the main deck to the water's edge?—Ships vary. There are some go out with better than two feet side, some two and a half, and some less, according to size.

16,420. What is about the average?—About two feet.

16,421. For a ship of 250 tons?—Yes.

16,422. Do they go to that depth, winter and summer?—They never make any difference; they are always loaded one way.

16,423. (*Chairman.*) You have heard the question which I asked the previous witness about heaving-to and scudding; do you agree with him in his answers?—Ships vary in scudding.

16,424. I am talking generally; we cannot talk of particular ships?—Some ships steer well; others steer very badly.

16,425. Of course when a ship steers badly it is very dangerous to scud in a gale of wind?—When I have seen ships scud I have generally hove to. There is a difference between ships lying to. Some will lie over close to the wind, and others will fall off. I went out with a brig, the *Elizabeth Jane*, and fell in with a heavy gale of wind, about five years ago. We were driven off the land on to Gravel Bank, lost our canvass, two sets of sails, having nothing else but jibs and staysails, and had to set the fore and aft sails. It was about Christmas 1846. After waiting for a tide we got to Shields with a steamer. If the brig had laid to, like some I have been in, she would not have lost her canvass. When the maintopmast gave way we got a foretopmast staysail into the main rigging; then she fell off, and fetched a sea aboard. It swept the deck, taking away two men, the galley coppers, and all the bulwark, first by our falling off into the trough of the sea; she gave one reel to windward, the sea fell right on her deck, and we thought she would have gone down.

16,426. Does that style of thing happen often?—Yes, very often, in a gale of wind, among laden ships.

16,427. I think you have told us, that although there may not be much loss of life, still people in your ships run very great risk?—Yes, they must do it.

16,428. Many a man who has, like yourself, followed the sea in those ships for many years, although he has not been wrecked, has been near it very often?—Yes.

16,429. Therefore you think that that forms a fair ground for doing something for them?—Yes.

Mr. Thomas Robson examined.

Mr. T. Robson.

16,430. (*Chairman.*) How long have you followed the sea?—About twenty-five years.

16,431. In what capacity have you principally been at sea?—Previous to the last three years, about fourteen years master of a ship.

16,432. You have been present yesterday and to-day?—I have.

16,433. Will you give me your opinion on the subject of this inquiry?—I will. The subject is one of great importance; one in which I take a great

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Mr. T. Robson.

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deal of interest, being a subject which has occupied my attention for some years. I have studied it, and have listened to many statements which have been laid before me on that question, and, at the same time, with the feeling that I should very anxiously embrace a harbour of refuge. I have heard the statements as regards the importance of the present principal harbours on this coast, and my opinion, as concerning that coast, runs thus :—It is my firm conviction that you may improve them for local purposes, but as to improving them to such an extent as to make a harbour of refuge of any one of the three principal ports on this coast it is my firm conviction that you cannot attain that object. One reason I have is this : In winter time, when losses and wrecks take place on this coast, and the weather is very similar to that which we have outside to-night [*it was raining very fast*], there are very heavy freshets in the rivers. Independent of the ebb tide that runs out of the rivers, there is a freshet added to it. I have seen in the port to which I belong a freshet running at the rate, I think I may safely assert, of seven knots between Sunderland piers. I had a mind to prove it about sixteen years ago. I was mate of a light ship. We came down to the bar with a gale of wind from the south-east and the east. As soon as we entered towards the back of the bar, the black ball went up, which showed that we had not enough water to proceed over the bar ; we instantly took the notice given, and heaved the ship's head out to sea. The captain consulted me. I said, " I am pretty well acquainted with Shields " bar, and I have no doubt she will sail over that, " because if we get round the point we can let go " the anchor in smoother water." He said, " Well, " Thomas, if you think so, we will risk Shields bar." As a specimen of what might be done in improving these harbours of refuge, as soon as we reached Shields bar the sight was enough to frighten us from trying that. Many of the gentlemen present may recollect the circumstances, when Farren's *Ocean* and other ships were lost on the Black Middens. They were landed on the Black Middens, solely on account of the strength of the freshets and the ebb tide. Admitting that these improvements perfectly succeed in providing sufficient water to admit the ships at dead low tide, a vessel would have a double defence ; but it is my conviction that you can never obtain sufficient water at any of the three ports to admit a ship of twelve feet draught at low water.

16,434. Therefore you are decidedly of opinion that we must have one harbour of refuge, independent of the improvements which are to take place at the three ports ?—That is my firm opinion.

16,435. Where there will be no river and no freshets ?—No freshets and no tides to contend with.

16,436. Of course this strong freshet makes a very bad sea ?—It does.

16,437. Have you seen the plan of Mr. Stevenson, for throwing out piers in front of these harbours ?—I have.

16,438. Supposing that was done, do you think you could run in there with safety, notwithstanding the freshet out of the river ?—The freshet would still be as strong as between the present piers ; equally as strong.

16,439. Therefore you think the freshet would continue to be as great an objection to any plan of that kind as it is at present ?—I would say that the proposed plan would improve the entrance of the harbour for local purposes. I have seen the plan, and I find the sea coming in to the large space proposed to be inclosed, and it must increase the height of the sea at the present piers. That I will admit, but then I believe I am that far acquainted with the bar and the bottom of the bar as to be able to say that there are not more than three or four feet of loose ground upon the rock. From one side of Sunderland south pier to the north pier there is a rocky bottom. It would improve the harbour, and make it safer to take in a gale of wind.

16,440. You approve of the improvement of the harbour for local purposes ?—I do.

16,441. But you consider it will be quite inadequate as a harbour of refuge ?—My own opinion goes that far.

16,442. If we have a large harbour of refuge, where is the best place to put it ?—I have stated, that having very closely examined the place which I have heard mentioned to-day, Hendon Bay, and living close to it, I have frequently observed there in a heavy sea, and have wondered how it was that the sea broke so lightly in Hendon Bay, compared with what it did on other parts of the coast. Many statements which have been made I can corroborate. I never saw a ship go ashore in Hendon Bay but that the men were taken out of it. For a harbour of refuge I should say that it ought to be a central place. Many places have been mentioned, Filey Bay, Redcar, Hartlepool, and Hendon Bay ; and, according to my experience as a mariner, Hendon Bay is the most proper place for a harbour of refuge. I can give my reasons on different points, if it is required.

16,443. (*Capt. Sulivan.*) If it was decided that a harbour of refuge should be either at Hartlepool or Filey Bay, and you wanted it for laden vessels bound south, which would be the best and safest place ?—I should prefer Hartlepool, in one respect, to Filey.

16,444. Do you know that Hartlepool is silting up ? —I cannot solve that question ; but from general information I am led to suppose that it is.

16,445. (*Chairman.*) You have heard the question I have asked about heaving to and scudding. Do you agree generally in what the previous witnesses have said ?—Yes ; I know that by experience.

16,446. You agree that frequently when ships are obliged to heave to very serious accidents occur on board ?—Frequently ; particularly in scudding, if the sea runs on the quarter, or with a leading gale. I know that by experience, having been clean swept, and that too in a good ship, considering it was a collier.

16,447. It frequently happens that you are obliged to run with the wind on your quarter ?—Yes. There is something to be allowed for in colliers. We sometimes run unreasonable risks, and the reason is that we are paid by the voyage. Every man is paid by the voyage as well as the captain, and therefore we are sometimes more persevering than ships in the foreign trade are. On that account we never want to go to a harbour of refuge or the Humber, so long as we can make progress. But if we cannot make progress, or have to wait for a tide, we should be as glad of a harbour of refuge as the foreign-going vessels.

16,448. (*Chairman.*) I may remark, that it is perhaps the risks you run which make you the sailors you are.

Captain HURD, R.N., examined.

Captain Hurd, R.N.

16,449. (*Chairman.*) You are inspecting commander of the coastguard in this district ?—I am.

16,450. For what period have you held that appointment ?—Five years.

16,451. I believe you have been present both yesterday and to-day ?—I have.

16,452. It is very late in the evening, but we shall be very desirous to have your opinion well considered on the subject. Would you do us the favour to prepare and forward to the secretary in London any remarks you may wish to make on the evidence you have heard ?—I will.

Mr. ROBERT BROWN examined.

Mr. Robert Brown.

16,453. (*Chairman.*) Are you the chairman of the Shipowners' Society ?—I am.

16,454. How long have you been connected with that society ?—About 15 years.

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Mr. Robert Brown.

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Chairman.

16,455. The Commissioners have heard all that they wish to know on primage and pilotage; but if there are any remarks you may like to make on these two questions, bringing points under their notice which have hitherto escaped them, they will be glad to hear what you have to say?—I have been requested to make some statement with respect to the basis on which the Trinity House rest their claims, and which it is thought it will be desirable to convey to the Commissioners, inasmuch as in our opinion it forms a strong equitable ground for the conclusion that in dealing with the question as between the Trinity House on the one hand and the promoters of harbours of refuge on the other Parliament would be prepared to appropriate the revenue for refuge purposes. The title of the Trinity House rests upon two bases. One part rests on one basis, a parliamentary basis; another part rests on a prescriptive basis. You have heard from the evidence of Mr. Hudson that there are two classes of dues payable, one of which is only the Trinity dues. These rest upon the parliamentary basis, and are collected by virtue of an Act of Parliament, 41 Geo. 3. c. 86. By that Act of Parliament the Trinity House of Newcastle are empowered to levy dues upon Newcastle, and upon all those places which are designated its creeks, Sunderland being one of them; and about 700*l.* is collected from Sunderland under that Act, and is appropriated exclusively to keeping up the Low Lights in Shields harbour. Sunderland does not derive one tittle of advantage from that 700*l.*; it is appropriated exclusively to keeping up the Low Lights upon the Tyne. As that rests altogether upon a parliamentary title, we presume that Parliament will be able to deal with it. As they made the grant they can take it away, and appropriate it in any way they may think proper. Then, as to the primage dues, 700*l.* is collected in Sunderland from them. They rest upon a prescriptive right, which has been two or three times the subject of litigation, once at the instance of the Newcastle shipowners, and another time at the instance of the Sunderland shipowners. We were advised that if we could only fix upon the origin of the title we should have good grounds for disputing the claims. We entered upon a course of litigation in the hope that we might succeed in doing so. Their last charter is a charter of James II., but that was preceded by a few other charters, tracing them back to a primary charter in the time of Henry VIII. Now the way in which they stated the case was, that Sunderland had paid the dues, which they proved by that document, and by living evidence for the last 50 or 100 years, and there rested the case. We produced the charter of Henry VIII. If we could have shown that that was the origin of the grant, our case would then have been that it had an illegal origin, inasmuch as the Crown had no power to make grants without the authority of Parliament. In that view of the case we were supported by decisions come to in the case of Scarborough, to which, perhaps, the Commissioners will let me refer. It was, however, mentioned in the charter of Henry VIII. as being an ancient due. I mention this with the view of fixing upon the minds of the Commissioners the idea, that although the title of the Trinity House is a legal title, which will perhaps give them the right of possession against all litigants, yet it is but technically legal, because we could have defeated it if we could only have traced it historically back to its true origin, which no doubt was that it was granted in remote antiquity to and was collected probably and in the first instance as a voluntary contribution by the ecclesiastical houses which lined this coast from Holy Island on the north to Whitby on the south, a series of monasteries which were erected under the same auspices, and there is no doubt that it originated with these ecclesiastical houses, and was a contribution for the protection and support of mariners, and for saving them from wreck, or at all events supporting their wives and families when they were shipwrecked. This, however, was too great a distance for us to trace it back to by legal evidence. It appearing upon the face of the charter given in the time of Henry VIII. that it was then an ancient due, we failed at law, although we still think that equitably the Trinity House are but trustees for the benefit of the seamen, on whose behalf these dues were no doubt originally granted. Sunderland, you see, like all the ports south of the Tyne, becomes a creek of Newcastle, in consequence of its having from a very early period been dependent upon that town when there was only one custom-house located at Newcastle. Long before that, however, in the time of Elizabeth, papers prove that it was designated a creek, and it has continued to be called by that name ever since. In the case of Scarborough, where the shipowners of the north had paid a passing toll for 200 years, we disputed it on grounds similar to those on which we dispute the claim of the Trinity House of Newcastle, and we succeeded, because, although they proved the fact that we had paid the due continuously for 200 years, yet we were able to put our fingers upon an early grant made in the time of Charles II., confirmed by a subsequent order in council, and the court at once pronounced that to be an illegal origin, the crown having no power to make such a grant, and it being made in the time of the Stuarts, when they were in the habit of seeking to lay hold of everything they could for the purpose of contributing to the revenue of the crown. Having no parliamentary origin, although it had subsisted for 200 years, we succeeded in destroying that passing toll. I may mention also, in reference both to this subject and generally to that of passing tolls, that we are at present unable to make any return or to form any correct idea of the aggregate amount which is contributed to the passing tolls of Whitby, Bridlington, Ramsgate, and Dover, for these reasons; that within the last two or three years, since all the parliamentary returns were made, we have contested the validity of the claims both of Dover and Ramsgate; and although in both instances they have been levied under parliamentary grants for 50 years and upwards, we succeeded at all events in abolishing them, with the exception of one voyage in the year. They had been in the habit, both at Ramsgate and at Dover, of levying the due upon the coasting vessels every time a ship passed; but in point of fact they had no legal right to collect it for more than the first voyage of the year. As no parliamentary returns have been made since the dues were thus reduced, we are unable to make any accurate return of what is collected at present. I mention these things to show the basis on which we rest the firm conviction that, notwithstanding these dues may appear to have assumed a sort of legal origin by their having been passed over and paid when shipowners were perhaps more affluent, and received perhaps better profits than they do at present, yet, whenever these dues have been tested in similar instances, they have been proved rotten; and we have a firm conviction that the Trinity House due, if it could only be probed to the bottom, and if we were not prevented by the facts of history failing us, would prove equally rotten, and that upon equitable grounds we have a strong basis on which to appeal to the justice of Parliament.

16,456. (*Mr. Lindsay.*) If you have any other facts to state, bearing upon the case, will you send them in the shape of a memorial to the secretary?—Yes.

16,457. You appear as the secretary of the Shipowners' Society?—And on the part of the seamen.

16,458. Are you fully satisfied, on the part of the shipowners of this place and the seamen, that, so far as the main question is concerned, respecting harbours of refuge, you have brought out the whole facts of the case, so far as regards Sunderland?—I am quite satisfied it is so. There have been numerous meetings of shipowners and of seamen, and the greatest publicity has been given to these proceedings.

16,459. (*Chairman.*) Are you perfectly satisfied that our coming here has been as publicly known as was desirable?—Perfectly satisfied. The mayor gave ample notice to all persons that were interested; ample notice. Everybody that had any business here knew several days beforehand.

(*Chairman.*) Are there any other parties present who are interested in this inquiry, who wish to tender their evidence to us?

No answer.

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Mr. Robert Brown.

16 Oct. 1858.

Sittings at Sunderland closed.

HARTLEPOOL.

Monday, 18th October 1858.

PRESENT:

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Mr. RALPH WARD JACKSON examined.

HARTLEPOOL.

Mr. R. W. Jackson.

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16,460. (*Chairman.*) Are you prepared to make a statement relative to the subject of our inquiry, as respects this port?—I am.

16,461. You reside in Hartlepool?—Near West Hartlepool.

16,462. Are you connected in any capacity with the harbour and port of Hartlepool?—I am one of the Port and Harbour Commissioners, representing a public trust created in the year 1813.

16,463. Are you a shipowner as well?—I am also a shipowner in the port of Hartlepool.

16,464. Will you now proceed to make any statement which you may wish to make to the Commissioners with reference to the advantage or necessity of a harbour of refuge on this part of the coast, observing that it is the wish of the Commissioners that you should abstain as far as possible from any evidence which is already before us in an official shape in the published evidence of the Committee of the House of Commons in the years 1857 and 1858?—Before presenting to the Commissioners the statistics of the port, I should be glad to make a few observations with reference to the evidence I am about to offer. And I am desirous of doing that because I wish it to be particularly observed by the Commissioners that we at Hartlepool abstain altogether from casting any reflections upon the trade of any other place. We think it is quite sufficient to expose the statistics of the trade of Hartlepool, and shall be careful to avoid any disparagement of our neighbours. I have, therefore, the honour to present to this Commission the result of official returns of ships, with their registered tonnage, entered and cleared with cargoes, coals, and merchandise, foreign and coastwise, exclusive of all ships in ballast, from the under-mentioned ports, namely, Newcastle-upon-Tyne, Shields, separate, Sunderland and Seaham, conjointly as well as separate, Hartlepool, separate, the port of Stockton with Middlesborough and Stockton, separate; and this return, which I will hand in, is a faithful extract from the Board of Trade Returns for the years 1855, 1856, and 1857, together with the tonnage of coal actually shipped, and merchandise exported, with its declared value to Her Majesty's Customs. It does not include the imports of merchandise, because there are no means of ascertaining that; but I may state here that it is extremely large, and it is increasing in a considerable proportion, in a proportion I had no conception of 12 months ago. It will appear by this return that the statements made in other places—I cannot help saying unfairly—are untrue. Instead of the port of Hartlepool decreasing, it is very decidedly increasing, not only as regards trade generally, but especially as regards its merchandise. And if I were to consider the question of refuge for ships as regarding locality, it would not be unfair to include the whole port of Stockton in Tees Bay, Hartlepool Bay being a part of that large estuary. And therefore, if for the purpose of refuge we include the whole trade of the Tees, then there is (not a decrease, which was stated on the Tyne, but) an increase as respects the merchandise. I may at once state that it exceeds, for Hartlepool alone, nearly the whole of the north-east ports put together. The trade in merchandise in Hartlepool, exports I speak of only, commenced only about 1853, in which year the merchandise was 15,987*l.*; in 1854, 252,653*l.*; in 1855, 782,739*l.*; in 1856, 1,537,764*l.*; in 1857, which we all know was a most depressed year, its exports in merchandise amounted to 1,767,160*l.*; and in the nine months of the present year ending September it is 1,595,324*l.* Now at Newcastle in 1857 it was 1,388,075*l.*, Hartlepool was 1,767,160*l.*, Shields 24,892*l.*, which, added to Newcastle, does not anything like reach that of Hartlepool, and Sunderland was 83,832*l.*, Seaham 875*l.*, Middlesborough 618,686*l.*, much more than even Sunderland, and Stockton was 33,794*l.* The value of merchandise also in Hartlepool last year exported, exclusive of coal, was nearly the value of the whole of the coal exported from the Tyne.

16,465. (*Mr. Lindsay.*) As you have given the increase of merchandise year by year, will you also give the increase of shipping for the same years, year by year?—Yes; in 1855 the number of ships in the port of Hartlepool was 9,839. Will it be convenient to the Commissioners that I should read this?

16,466. (*Chairman.*) Yes?—In Hartlepool in 1855, 9839; registered tonnage, 1,387,567; the quantity of coals shipped for that year was 1,613,442; the merchandise in that year, 782,739.

16,467. (*Mr. Lindsay.*) You have given us the merchandise already?—In 1856 the number of ships was 10,406; the registered tonnage, 1,497,081; the coals shipped 1,657,976 tons, being an increase over 1855. But as the number of ships in 1857 was 10,275, it will, therefore, be seen that there are 131 fewer ships.

16,468. Then by this return there appears to be a decrease in the registered tonnage between 1856 and 1857, of how much?—There is a decrease in the number of ships of 131, and in the tonnage there is a diminution of 69,525, distributed over 131 ships, while the coal increase is something like 20,000 tons. So much for the return of all the ships and trade of the place. I am not now in a situation to give the exact trade in the old harbour, the books of which belong to a private company. I

HARTLEPOOL.

Mr. R. W. Jackson.

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could not ask them to give me the exact trade of their port, but this is taken from *Browne's Export List*, which is an authorized publication by Her Majesty's Letters Patent, and emanating from the Customs at Newcastle. I have a return from the list for the month of September last, in which the quantity of coal shipped for that month, as well of the value of the merchandise, are given, and which at West Hartlepool was 259,049*l.*; compared with 1857, this is an increase of 42,434*l.* At Newcastle the total exports in the same months were 92,876*l.* against 102,477*l.* There was a decrease of 9,601*l.*

16,469. (*Chairman.*) Will you give that in evidence ?—I will ; that is, for the month of September, and I have all the rest, if required. Then, in order that I might show that which is particularly within my own knowledge, namely, the ships, and coal shipped at West Hartlepool,—I have no means of acertaining—I have no right, in fact, to ask the trade of another port which belongs to a private company—I have prepared a return for West Hartlepool, which shows that the statement in another place that there was a decrease is certainly wrong. West Hartlepool is the very youngest port in the kingdom, and I think it is right just to state that there is a decided increase of upwards of 100 ships entering West Hartlepool in the present year, up to September, over the preceding nine months of last year, and that in respect of coal there is also an increase of upwards of 40,000 tons at the present time. I am responsible for these returns, because they have been taken from the books themselves, which are open to examination at any time. I may state that the prospects of Hartlepool are very considerable, and much enhanced by the discovery of a very fine bed of ironstone within a stone's throw of the place. The Cleveland Hills, which are rising to the south of the Tees, abound in ironstone, and have only been brought into development during the last eight years. There is embraced in these hills 200 square miles of ironstone—the authority which I quote is Professor Phillips ; and there is a quantity of ironstone in that neighbourhood equal to the consumption of four times the entire coalfield of Durham and Northumberland. The coalfield of Durham and Northumberland, Durham particularly, closely approaches the port of Hartlepool. It commences within six miles. There is no other part, except Newcastle and Sunderland, where the coal approaches anything like that. As we get further south, into the Yorkshire district, we cannot find any port at Filey or Hull, or any other place nearer to the coal fields than 70 miles. Here we have it within six miles, with the finest coal of all descriptions for household, steam, manufacturing, or coking purposes, and of every quality that may be required for domestic or manufacturing purposes. We consider that this district really and truly is in its infancy. I am now approaching the question immediately before you of a harbour of refuge ; and upon this subject I probably had best refer you to a chart which is upon the wall, which we call the Hartlepool Wreck Chart. This (*handing in a chart*) is a coloured lithograph chart which was prepared when Mr. Rendel laid out for this port, at the instance of the Port Commissioners, a harbour of refuge ; and it is presented here, not for the purpose of advocating the line of piers that are there shown, but we did not think it right in presenting it before you to take out anything which existed upon it when placed in evidence before the Select Committee of the House of Commons on Harbours of Refuge. Therefore, passing altogether, as if it did not exist, the line of piers laid down there, I draw the attention of the Commissioners to the faithful position, as near as can be laid down, of all the wrecks that have occurred in Hartlepool Bay, and that could be easily stuck in that map, during the period of 1846, 1847, to 1857 ; in addition, however, to which, there are about eight vessels which have since been introduced. The ships altogether, during 12 years, number 239, and we know their names and all about them. Out of these there were 92 lives lost in this bay.

16,470. (*Mr. Lindsay.*) Including what time ?—Part of 1846 and 1847 and up to the end of 1857 ; many more lives would have been lost if it had not been for the energetic use of the life-boats. There are in this port, between this and Seaton nine life-boats ; at Redcar there are two, making altogether 11 life-boats within the bay.

16,471. (*Chairman.*) The Tees Bay ?—In the Tees Bay I do not know whether there are any to the south of Redcar, but at all events, between Redcar and Hartlepool, there are 11 life-boats ; and alluding to the youngest life-boat that has been placed here at West Hartlepool, we have saved about 200 lives in our own life-boat in this bay during a period of eight or nine years. It will be found, therefore, by the list that I will hand in with this wreck chart, that there were 239 vessels in the above period wrecked, and 92 lives lost. The tonnage of vessels stranded was 22,586 ; totally wrecked, 928 ; total tonnage, 33,514. The number of lives lost annually being on the average 8·3 ; but in 1857, within the bay of Hartlepool, there were 44 lives lost.

16,472. (*Mr. Lindsay.*) Were those lost from ships, or were they casualties in the bay in boats ?—In ships wrecked, marked on the wreck chart.

16,473. Forty-four lives lost from ships wrecked in the bay ?—Yes, and they are marked upon this chart, and every year has its specific colour to denote it. This has no reference whatever to the losses that have occurred on the Yorkshire coast or in the Tees mouth. These which I allude to just go to Seaton and not on the Yorkshire coast.

16,474. Do I understand you to say that between the Long Scar Rocks and Hartlepool, in this bight or bay, there were 44 lives lost in 1857 ?—Yes, and they do not go to the northward of the Heugh. It is merely within the limits of the Port Commissioners.

16,475. But the port of Hartlepool extends to the northward of it ?—It does.

16,476. How far ? — To Blackhalls, about six miles. But this chart does not take in the six miles.

16,477. Then, within the range of the coast, how many miles were these 44 lives lost in ?—Just three miles ; and these ships you see marked upon the site where the west harbour is, were wrecked before the piers within which they lay were built. But you will observe upon this chart there are no vessels marked within the inner harbour at Hartlepool. Were we to record all the damage that occurs to ships taking these tidal harbours in great crowds, the multiplication would be very great indeed. The wrecks shown are simply on the outside the piers. I will now give in these returns.

16,478. (*Capt. Vetch.*) How many lives were saved by means of the life-boats ?—I do not know. Applicable to the question of refuge, I may give now what has occurred since our sitting. I allude to the ships that have been put in windbound yesterday into West Hartlepool, nearly the whole of which are ships bound for places north of Hartlepool. There were 14 ships ; of these, four were bound to Newcastle, four were bound north of Newcastle, five were bound to Seaham, and one was bound to Stockton. These came in yesterday with a strong breeze.

16,479. (*Chairman.*) Can you put in the force and direction of the wind ?—I will put it in to-morrow. The wind was north-east, about north-north-east.

16,480. Will you give me the force of wind, as well as the direction ?—I will send to the lighthouse which the Port Commissioners have, for the record there.

16,481. Have you anything further to add to your statement ?—I have more statements to put in, which I think will bear more particularly upon refuge. One from the Custom House, which is an account of the number of vessels that put in for refuge, not being vessels which had previously loaded at Hartlepool or West Hartlepool, distinguishing those whose destinations were north of the port from those which were bound south of Hartlepool, from the 1st of January 1852 to the 15th of October 1858. During

that period 2,999 ships arrived in Hartlepool bound for other ports, of which there were 1,347 bound for ports north, and 1,171 bound for ports south of Hartlepool, loaded. Vessels arriving windbound, and not intending to load at Hartlepool, but afterwards loading, were 48. And of vessels whose destinations were for ports north of Hartlepool, the greater number were from Seaham, Sunderland, and the Tyne. That is what is entered in the Custom House as windbound ships. They keep a return of everything that comes in and goes out, except in ballast. Applicable also to the refuge question, I put in from the authority of parties who have made out these returns, namely, the public notaries, returns of all vessels that they have noted casualties, after arriving in this port, from the year 1839 to 1858, from Mr. Belk, notary public; it contains all the causes, where the vessels were, and the causes of their entering. There is a similar return from 1848 to 1858 from Mr. Anthony Dobing, public notary at Hartlepool. The same from Mr. William Todd, from February 1856 to September 1858. A similar return of Mr. Peter Barker, also notary public, from 1845 to 1854; he is now dead. Also from Mr. Edward Turnbull, from the year 1845 to September 1858. In each case there is appended an extract from the depositions of captains giving the grounds for their taking refuge in Hartlepool.

16,482. Does that conclude your statement?—I am going to present what may refer you more immediately to the Bay of Hartlepool. I shall be very glad to put it upon higher grounds than that of mere local advantage, though it would perhaps be perfectly justifiable on my part to state that, while other ports are very properly desiring to have their entrances improved, Hartlepool would, even upon the lower ground, seek to have its port also improved, as being one of great importance to the district, and certainly the third on the north-east coast. The only means the Port Commissioners can devise, in a commercial point of view, for the improvement of the port, would be the throwing out a breakwater at the entrance to or off the bay; but I would rather put the question upon the higher grounds of its importance on the north-east coast in saving life and property, and the return I have put in I think sufficiently justifies me in stating that Hartlepool is the place which the Port Commissioners believe to be the best. I have individually believed it for a long series of years, having deeply reflected upon the question, and having some knowledge of the coast. I have therefore devised what appears to me to be the mode by which Hartlepool Bay will be best protected as a sheltered anchorage, answering all the purposes of refuge, and at the same time carrying out the object which the Commissioners have in view. Now in this suggestion I make of a sheltered anchorage without a close harbour, there are two designs upon the chart I hand in—one is to nine fathoms and the other is to seven fathoms; and the areas in the nine fathoms are these:—Nine fathoms at low-water spring tides gives sheltered anchorage for 1,650 acres; five fathoms low-water spring tides 1,072 acres; three fathoms at low water 488 acres; and one fathom at low water 124 acres. In the design shown by the line upon the chart commencing with seven fathoms there will be a sheltered anchorage of 1,452 acres; five fathoms at low water 1,000 acres; three fathoms 488 acres, and one fathom 124 acres. There may be other designs to provide the sheltered anchorage, according to the ingenuity of persons who give attention to the subject, and there are, no doubt, gentlemen upon this coast who have given considerable attention to it. However, without adopting for this purpose, and at this moment, any of the suggestions of other persons, I put in a design of my own for a breakwater, as suggested upon this chart; and I am prepared also with a very carefully considered estimate, sent by a contractor who will be glad to execute the work at the sum. This is the design (*design produced*), which we call No. 1, the estimate for which I shall be prepared to give in. This is design (*design produced*) No. 2. The models of these designs are at the end of the room. The estimate for the nine-fathom design, with a rubble base, masonry top, is838,156*l.* per statute mile. The material to be found is about two miles from West Hartlepool; and as a material, so far as I know, it is fully equal to Holyhead stone. If plan No. 2 were adopted, which is all of rubble, for the breakwater, it would be 962,544*l.* per statute mile. I give the exact number of tons per lineal yard in each, and the cost per ton for rubble and masonry; the cost per lineal yard; the tons per statute mile, and the cost per statute mile, so that it may be worked out in the minutest detail. In the case of No. 1 design, which is for rubble, and part masonry, in the nine-fathom design the total cost would be 2,130,630*l.*, and for No. 2 design, nine fathom, 2,446,830*l.* For design No. 1, in seven fathoms, the total cost would be 1,604,175*l.*, and for design No. 2, in seven fathoms, 1,758,387*l.* There is a very much larger quantity of material in design No. 2. A gentleman will be prepared to enter into a contract for this work; and he states that in the course of three years he will be prepared to deposit rubble which will in reality give a large amount of shelter. It will not be as complete as when finished, but it will be a partially sheltered anchorage for vessels, inasmuch as it will reach within 10 feet of low-water mark spring tides. If this rubble was deposited outside the Heugh there would be no ground-swell after that, and to complete the work five years would be required. I have also to present a list of wrecks that we have ascertained occurred in one gale from the east-south-east and east-north-east on the 3rd and 4th January 1857, between Flamborough Head and Newbiggen, a distance of 90 miles. I have divided that district into three classes, each about 30 miles;—the Filey district, the Hartlepool, which may be called the Tees district, and the northern ports, or the Tyne district. The Filey district lies between Flamborough Head and Whitby, in which there were 13 wrecks in that gale; in the Hartlepool or Tees district, between Whitby and Blackhalls, 39; and in the northern ports or Tyne district, between Blackhalls and Newbiggen, 15 in number.

16,483. In one gale?—Yes, it goes by the name of the 4th of January gale. It was included in that gale, when the large number of lives in 1857 was embraced; of course it will be observed, that in consequence of the very large traffic that is now flowing through and into the port of Hartlepool, the merchandise requires very much more valuable ships than those that are required for coal, and in that view also we consider that it is highly necessary that this site should be accommodated, and a harbour of refuge provided in which vessels could at all times obtain shelter. In illustration of this I may mention, that while the average registered tons of vessels I have given you as entered in 1856 was about 144 tons register—in 1857 I explained there is about 131 less, the average is 162½, and in both the docks of Old and West Hartlepool there are very large ships coming in, ships of 400, 500, and 600 tons—we, at West Hartlepool, have had ships in of 2,200 tons, 1,400, 700 tons, and so on. I myself went out with a ship of 2,200 tons not long ago. She was a New York steamer 300 feet long, and in one quarter of an hour from her leaving the dock quay she was in the German Ocean.

16,484. Can you name the draught of water?—I can get it from the harbour-master. The piers are, as you see, increasing the depth of water. The water into Old Hartlepool is, I believe, the same as it has been for some time. The depth into West Hartlepool has increased very greatly indeed from nothing on what was called the bar to between five and six feet now at low-water spring tides. I may state, that there is no bar, that every ship passing over the locks, till at West Hartlepool, can go safely to sea. Within the month a large ship from Cronstadt, an American, 1,350 tons register, came in with 1,500 tons of timber the day before quarter-day, drawing upwards of 19 feet of water. I do not enumerate others, because

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where one ship can go a thousand can. This leads me to remark, that the depth of water is decidedly on the increase. There is now abreast of West Hartlepool Harbour nothing but clay. The low-water line gave considerably higher up in the shore, showing generally the deepening of the bay. The beaching ground is extremely good, and I have several times seen vessels in hard gales when they have not been able to fetch up, so as to gain the harbour, square yards and run for the beach, thus exhibiting that there is a safe beach for vessels to run upon, although it is not a comfortable place to be in at any time; and yet I have seen many ships, for the purpose of saving life, square their yards and run for the beach. On the south of the west to the harbour at the Long Scar Rocks the sea has got higher up at high water than it did before. This does not make it the less necessary for a harbour of refuge, to prevent ships going upon such a place to beach. There is a capability in these two ports of receiving within their own docks and their own tidal harbours from 900 to 1,000 ships. We may boast also in Hartlepool, as our neighbours in the north do, of having steam tugs amply sufficient for the locality. It will be observed, that it is not so necessary to have many steam tugs where the range of towage is not more than a mile or a mile and a half, as contradistinguished from a long river. I may mention the incident of a ship of my own, called the *Ward Jackson*, which was bound from Hamburgh in the year 1855. At the same time in Hamburgh was a large steamer from Hull, called the *Burlington*, and both captains found their way across the sea, wholly and solely by the lead in a fog. In the case of my ship the captain brought her into Hartlepool Bay safely; he took his soundings perfectly regularly all along the Yorkshire coast, which, as you will hear from the nautical witnesses, are perfectly regular and ascertainable. My captain brought the ship perfectly safe in a dense fog to Hartlepool Bay. But in the case of the *Burlington*, the fine steamer, she was wrecked, totally wrecked, at Flamborough Head.

16,485. Does that finish your statement; do I understand you to say, with reference to this chart showing the wrecks, that it has been put in evidence anywhere before a Committee of the House of Commons?—It was in the room before the Select Committee of the House of Commons when taking the evidence as to a harbour of refuge. It was not in the whole time.

16,486. It is not published?—It is not.

16,487. Do you think it will be possible to let us have a tracing of that?—Yes, certainly.

16,488. You will have all the ships you allude to put in colours, an exact copy of that?—Yes. I must just mention to you that this chart assisted the Act of Parliament that was passed in the year 1855 for authorizing the conversion of the bay of Hartlepool into a harbour of refuge; and the Act specifies that any work there contracted shall not be a close work unless the Admiralty sanction it. The Act has 73 clauses, and is called the "Hartlepool Pier and Port Act of the 16th July 1855." After a very full inquiry by Parliament, the expediency of the conversion of the bay, at as early a period as may be practicable, into a harbour of refuge, was recognized, the Act being "for the improvement, maintenance, and regulation of the port of Hartlepool, for the construction of a harbour of refuge there, and for other purposes." The graving docks at West Hartlepool are the largest and most convenient of any in the north of England, so much so that vessels come from London direct to West Hartlepool for repairs, and vessels also come direct from Antwerp to be fitted out. The large vessel I spoke of as 300 feet long came direct from Antwerp, went back to Antwerp, and was sent from Antwerp to New York. She was called the *Constitution*.

16,489. In a former part of your statement, you handed in returns by a contractor of what he would be willing to make these breakwaters for. Is that contractor present?—He is.

16,490. And if we wish to know the price, we shall be able to do so at a later period?—Certainly.

16,491. What do you consider the boundaries of the Tees Bay, and what of Hartlepool Bay?—For the purpose of refuge, I call Hartlepool Bay inclusive of Tees Bay, and it is so distinguished in the Admiralty published chart; the limits are, I think, from Redcar on the one side to Hartlepool Point on the other. The limits of Hartlepool Bay we have considered coming out to about five fathoms. The limits of the port and jurisdiction of the Port Commissioners is two miles seaward parallel with the shore, for about seven or eight miles of coast from Seaton to the south to a place called Blackhalls on the north. This corresponds also with the Customs Port.

16,492. What are the distances from low-water mark at each end of the proposed breakwater?—It will be intermediate between the six and seven, and a little more than a mile and a half.

16,493. And the same at the outer, I imagine?—A little more than one mile and three quarters.

16,494. (*Mr. Lindsay.*) I think you said, in reply to Admiral Hope, that you were a port commissioner?—I am.

16,495. Have you any other interest in this place?—Yes; I am chairman of the West Hartlepool Harbour and Railway Company, which constructed works and commenced the town in which we are now sitting.

16,496. And you have an interest as a stockholder in both these undertakings?—There is no private interest in the port commission.

16,497. You say there are docks?—The West Hartlepool Docks.

16,498. Yes; and you have an interest and capital in the docks?—Yes, considerable.

16,499. I understood you to state that some evidence which was given before us at another place in regard to the decrease from Hartlepool was incorrect; was it so?—The decrease in the bay of Hartlepool?

16,500. No, the decrease in the trade of Hartlepool; was it incorrect?—Perfectly incorrect.

16,501. Looking at these returns which you have read to us to-day, and handed in, I find that while the ships and registered tonnage of the other northern ports has increased in that time, Hartlepool has decreased by 131 ships and 69,525 tons. Is that correct?—That is correct in those two particulars.

16,502. Then, so far as these two particulars are concerned, the witness in his evidence did not make an incorrect statement?—He would not make it in that respect, but he generalised it, as I heard it, very much; and it was impossible to do otherwise than call it generally incorrect.

16,503. So far as the comparative increase and decrease is concerned, of ships and their tonnage, he was quite correct?—No, he was not in this respect, —that in one case he added the Tees, and in another place he did not add the Tees.

16,504. But so far as regards the increase of ships and tonnage at any one of the other coal ports, they show an increase, and Hartlepool shows a decrease, between 1856 and 1857. Is that the fact, or is it not the fact?—It is the fact in that particular year, but not over the period that the gentleman stated.

16,505. Well, so far as regards last year, you admit the fact is correct as he stated it?—I do not remember his figures. If he said it decreased, he is right, but I do not admit the quantity of his comparison.

16,506. What increased accommodation have you made for ships at the port of Hartlepool between 1855 and the end of 1857; and has there been any increase of dock accommodation?—There has been no increase of dock accommodation at Old Hartlepool; there has been at West Hartlepool, but it is scarcely complete.

16,507. During these periods, has dock accommodation for ships increased?—The dock accommodation has been increased, but not made available yet.

16,508. It is not open to shipping?—It was open for shipping, but it was not completed. At this instant, near the large merchandise dock here, there is a large warehouse being erected.

16,509. But just answer my question. Had you the dock accommodation here in 1857, where ships can load, which you had not in 1855?—Not for loading coal, simply merchandise. There has been no additional accommodation provided during that period.

16,510. But there has been additional accommodation for the shipping of merchandise?—There has.

16,511. To what area?—A dock of 10 acres, a timber dock, with timber yards behind, and another graving dock.

16,512. What is the area of water? Is it 12 acres increase?—It will be about 12 acres or more.

16,513. How do you account for it, that while you have an increase of dock accommodation to that extent, the shipping frequenting Hartlepool between 1856 and 1857 has decreased so very materially?—I account for it in this way, that several collieries have been temporarily diminishing their exports at West Hartlepool, in preparation for a very large extent of trade which will be developed in the course of another year; and that there has not been the quantity of coal which could have been shipped. Two or three collieries are sinking to lower seams, and, consequently, have not been able to ship the usual quantity during the progress of their works.

16,514. Are any parties, to any extent, who were working in 1855 and not in 1857, any of those that ship at Old Hartlepool?—I do not know anything about Old Hartlepool.

16,515. West Hartlepool? Has there been an actual diminution in the coals worked during the process of sinking to the lower seams? Many thousand acres will be available in the course of 12 or 18 months which have never been opened yet or brought out of the bowels of the earth, and the coal owners have been spending large sums of money, and they have not shipped so much coal; but a line of railway has been made to new collieries; within six months they will be opened. It is the best coal that goes to London—the Tees Wallsend.

16,516. Do I understand you to say that there is a large field of coal undeveloped?—Yes.

16,517. Is it to the south of Hartlepool?—The west and south-west.

16,518. Will the port of shipment of that undeveloped field be Hartlepool?—It must be West Hartlepool.

16,519. Now tell me something as to the main point, the saving of life; I think you referred to the fearful gale of January 1857?—Yes.

16,520. And you handed in a list of wrecks which had taken place from Flamborough Head to—which point north did you say?—First from Flamborough Head to Whitby.

16,521. I want to ask you some questions upon that, because a return has been sent to me, and I believe to the other Commissioners, for it comes in a printed form; and in this return the coast is also divided in somewhat a similar manner which you have divided it here, and this return which I hold in my hand gives results very different to those in the return you handed in. It states, that in that gale there were 27 total wrecks between Flamborough Head and Whitby. Your return makes it out that there are 13 wrecks?—Yes.

16,522. Now it gives the names of the ships and the spot where they were lost, and how they were lost; and how do you account for it, that while one gives 13, the other return gives more than double. I will allow you to look at it, perhaps you will be able to tell me. Look at it and compare it with your own?—Well, I detect a fallacy in the very first ship. The first ship, called the *Radcliffe*, of Whitby; it states that she was bound from Hartlepool for London, loaded, and was wrecked at Filey, and the crew saved. I think I was wrong in saying that was a fallacy, for she was wrecked at Filey, but it says, "left Hartlepool on the "second. The captains of these vessels reported "themselves to be caught in the gale off Flamborough Head "in company with a large fleet of vessels, many of "which were lost off Hartlepool and other ports;" and it also states that other vessels were caught off Flamborough Head by the gale. Now, I happen to know that among the list of witnesses I have got, I have got the captains of one or two of these vessels, which are stated to have been wrecked there, and who are prepared to come before the Commissioners and deny it.

16,523. Then, do I understand you to say, because our object here is to arrive at correct information and truth, that it is not correct that 27 ships were lost between Flamborough Head and Whitby in the gale of 4th January?—I do not intend to say it is not correct, but I have not been able to ascertain, by examination of the deposition, that they were.

16,524. Do I understand you to say, you will produce captains who will prove to us that the ships named in this return, nine of which appear to have been wrecked, with all hands; do you mean to say that you will produce captains to prove to us that they were not lost between these places?—No; I apprehend no captain can tell that. A man who was in the gale would have quite enough to look after himself. I cannot say that my captain will say what proportion of vessels were lost there, but these are the only proportions we could ascertain. I beg to make this remark, that it had been said that all the ships that had been put into what is called the Filey district had been caught off Flamborough Head, and could not reach a harbour to the north of Whitby, and yet in the other list, vessels that are acknowledged to have been wrecked to the north of Whitby, and others that were also caught north of Hartlepool, were also caught off Flamborough Head in the same gale, showing that which is represented as being inconsistent. That of the vessels which were wrecked between Whitby and Flamborough Head, 27 are represented as having been unable to reach a harbour north of Whitby, and yet there were 28 that in the same gale did happen to pass Whitby Point, and were wrecked north of it.

16,525. Now then, Mr. Jackson, are you prepared to state that that return which you have handed in to us, contains an account of all vessels which during that dreadful gale were lost on the shore between Flamborough Head and Whitby?—I cannot say all, because some might founder and never be heard of.

16,526. I say in the account?—That is all I can find.

16,527. Then if there had been a harbour of refuge at Hartlepool such as you propose here, where such ships as these could have found safe shelter during that gale, would that harbour of refuge have saved any of those ships?—Humanly speaking, you may say all, except those that foundered, and what the conditions were one is not in a position to tell or speculate upon.

16,528. Do you mean me to get it down in evidence that if there had been a harbour of refuge in Hartlepool Bay, these ships which were wrecked between Flamborough Head and Whitby during that gale would have been saved, humanly speaking?—I do.

16,529. Wrecked on the coast?—Wrecked on the coast between Flamborough Head. The gale commenced on the 3d of January from south-south-east, and veered round to east-north-east. Of course, if seaworthy and able to reach Hartlepool Bay, and it is admitted in that list that there were 28 did reach it, of the other 27 that were wrecked, alluded to in that list as being wrecked between Whitby and Filey Bay,—and they were in a condition to run past Whitby in some way, as 28 did clearly,—they must have been saved.

16,530. But might it not arise from those which reached Hartlepool being further to the windward than those which were unfortunately wrecked between Flamborough Head and Whitby, and could not weather Whitby Point?—Not in a south or south-east gale, it is a fair wind.

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16,531. But the gale ranged, you say, from east-north-east to east-south-east ?—South-south-east ; it lasted two days.

16,532. If ships were caught between Flamborough Head and Whitby when the gale veered round to the east-north-east, could they have weathered away at Whitby ?—I don't think there were any ships between Flamborough Head and Whitby on the second day of the gale. I would rather you asked some seamen. I only took the depositions of all the parties here who say the wind caught them all about Flamborough Head east-south-east.

16,533. Have you measured the breadth of your proposed breakwater ?—I have.

16,534. What is the length per statute mile ?—4,744 yards.

16,535. How many miles is that?—Two and a half.

16,536. Then the whole breakwater will cost a little more than 2,000,000*l.* ?—Yes.

16,537. What area of sheltered water will you have at the four fathoms and upwards within the limits of the proposed breakwater ?—I will have to calculate that upon the chart.

16,538. What area of three fathoms and upwards will you have ?—1,526 acres.

16,539. What area at four fathoms and upwards ?—There will be fully 1,400 acres.

16,540. You say the depth of water in the bay and the approach to it was very decided on the increase ?—I did not mean to say it was deepening outside of five fathoms.

16,541. Do you mean to say that within the line of the four fathoms the depth of water is decidedly on the increase ?—Decidedly.

16,542. Do you mean the whole area of the bay between the Long Scar Rock and the Heugh Head ?—I take the whole area.

16,543. How do you arrive at that ?—The haven master has made very careful surveys, and he annually reported them to the Commissioners.

16,544. The depth has been decidedly on the increase during what length of time ?—During the last 12 years. For the last 12 years there has been a decided deepening in the mean depth of the whole, and not a shallowing. The approaches at low water have gone higher in the bay, exhibiting clay where I never saw clay before, and I have known the bay intimately for many years.

16,545. I have asked you these questions because by a Parliamentary paper before me, Drawing No. 7, Report to the Admiralty under the 11th and 12th Victoria, c. 129, 1850, I find that the three-fathom line of soundings in 1846 is about 800 feet further to the eastward than what it was in 1838, showing that, if that chart is correct, instead of the bay being very decidedly deepening, it is very decidedly shallowing ?—I don't know upon what authority that chart is prepared.

16,546. Do you know whether that is correct or not ?—I really can't pretend to say. In the centre of the three-fathom line I see there is an extension eastward. As a Commissioner I have understood that between 1838 and 1846 there were and are variations of the three-fathom line in one particular part, but from 1846 to the present period whatever may have been the cause of that little increase to the eastward it does not exist in any altered shape except by a decrease over the whole mean area of the bay. Previous to that period there had been works going on in connection with the dock, and which excluded a large portion of water up to that period from the bay.

16,547. Take a date nearer than 1846. This same chart shews that, between 1846 and 1849, the three-fathom line has gone eastwards about 200 feet ?—Well, so far as my own knowledge is concerned, which arises chiefly from the reports of our officers, that is incorrect.

16,548. Will you be able to explain to the Commissioners the cause of this very great discrepancy, for either this chart must be wrong, or the soundings on which you have given your evidence must be wrong, the one or the other ?—Certainly.

16,549. Will you be able to explain to the Commissioners that point ?—Mr. Mossman will be able to explain his surveys precisely. Those who have known this bay five years ago can see what they never saw before, namely, bare clay and large boulder stones that had hitherto been covered.

16,550. What draught of water was the ship of 2,200 tons ?—Seventeen feet.

16,551. Consequently that ship of 2,000 tons did not draw a great deal more than one of our largest colliers ?—She was a very large ship, and was the mail packet between Antwerp and New York. I take the 2,000 tons from Mr. Pile's return, but whether it is register or burthen I can't tell.

16,552. (*Capt. Washington*). Do you know anything of the lithographic plan that has been put into your hand, or who is the authority for it ?—I don't know who the authority, is except that it was appended to the report of Mr. Cockburn Curtis, who held a preliminary inquiry at Hartlepool, I think, in 1849.

16,553. Did Mr. Cockburn Curtis sound the bay ?—I don't know.

16,554. I see the state of the bay is laid down in 1852 by Mr. Francis Giles. Do you know anything about a survey of that date ?—I do not ; it is amongst the records of the Port and Haven Commissioners.

16,555. Do you know if there is anything in that report or plan which shows the same datum line was used in comparison between the two water lines ?—No.

16,556. You talked of water having been kept out of the bay ?—Out of the slake.

16,557. Do you allude to sluicing ?—No ; during the execution of the works a coffer dam was put across the old harbour.

16,558. Was the whole volume of tidal water which filled and emptied the slake twice a day excluded for a certain period from its return on the bay ?—Yes, for three or four years.

16,559. Are you of opinion that that would be quite sufficient cause to account for any shoaling at a particular part of the bay ?—I think it would certainly have some effect. I also think some effect would be felt when certain displacements of the rock at the Heugh occurred, perhaps thoughtlessly, and caused some washing away of the headland.

16,560. What displacement do you allude to ?—The displacing of the foreshore rocks, taken away by permission of the Duke of Cleveland, who claims the foreshore. They took the stones to build the docks at Old Hartlepool, and let in the sea upon the headland, causing some falling down of the cliff, and it is possible that a portion of that might fall into the bay. The displacement of the rocks terminated, the slake opened, and nature allowed to resume her operations ; there has not been for 12 years any sort of difference between the depths. The mean depth of the whole bay is the same as it was previous to 1846.

16,561. Were any sluicing operations carried on in any part of the time ?—None.

16,562. Between 1838 and 1846 did any sluicing operations go on ?—I don't remember.

16,563. Have sluicing operations gone on since 1846 ?—Yes.

16,564. Do they go on at present ?—Yes.

16,565. Are you aware whether any large amount of silt is driven into the bay by its operations ?—I do not know.

16,566. Is the plan you have produced for a harbour of refuge or sheltered anchorage designed by yourself ?—It is.

16,567. Are you professionally an engineer ?—No.

16,568. Then you would not tie yourself to this plan if an engineer proposed another design, by which a sufficiently sheltered area could be obtained at a

much less cost?—Oh no! If they could produce the same results at a less cost I should be too happy.

16,569. Is there in the possession of the Port and Haven Commissioners any other design?—Not that I am aware of. The Port Commissioners did apply to Parliament to enclose the harbour shown upon the wreck chart on the wall, and the design was deposited according to the usual form of Parliament, and that harbour was authorized, subject, of course, to any alteration.

16,570. By whom was that design made?—By the late Mr. Rendel.

16,571. Did he give any estimate?—Yes.

16,572. What is the amount?—800,000*l.*, and 30,000*l.* for the protection of the headland.

16,573. Then it appears that the late Mr. Rendel, who there is no doubt was as good a harbour engineer as this country ever produced, was satisfied that he could construct a breakwater to shelter sufficient area in Hartlepool Bay for 800,000*l.*, while your estimate is 2,000,000*l.*?—Yes, if all rubble work. No doubt, if we connect with the shore the piers, we could do the same way as they do at Holyhead and Portland; clearly then the estimates would be very materially reduced, but these are detached breakwaters.

16,574. Will you state the width of entrance at the north?—About 1,000 feet.

16,575. Do you consider such a width necessary?—I don't. I would diminish it to about the same as Kingstown Harbour, 880 feet.

16,576. It has been repeatedly stated to the Commissioners, by engineers and others, that 600 feet entrance was ample for any harbour of refuge, and that indeed ships in gales of wind took Sunderland piers, which are only 370 feet wide. Have you any reason to doubt that?—I don't like 600 feet out in five, six, or seven fathoms. 1,500 feet at the centre opening is wide. I thought it better to put it at an increased width, because it would be easier to decrease than increase.

16,577. Are you aware that in the pier run out from Portland there is an opening 400 feet wide, that that is bridged over, and that the stone is carried by railway over it and deposited beyond?—I am quite aware of it.

16,578. Is there any reason why the same process should not be followed at Hartlepool?—It is not the same locality. The opening at Portland, I apprehend, is nearer the shore than the approach to either of these breakwaters.

16,579. Have you ever before to-day seen this paper (*the same referred to by Mr. Lindsay*) which professes to be, so far as its titles goes, facts relating to the inquiry as to the best position for a harbour of refuge on the north-east coast of England?—I have.

16,580. Is the document authenticated?—I am not aware that it is.

16,581. Can you guess where it is likely to have sprung from?—It has a very strong feeling towards Filey.

16,582. It states that petitions were presented to Parliament from Hartlepool and the river Tees containing about 700 signatures in favour of a harbour of refuge at Filey. Can you tell us how these 700 signatures were obtained?—I have not the slightest idea. I can easily imagine that petitioners are got pretty freely from ordinary seamen, and also it may be from masters of ships, to whom it may be represented, that they are going to make a harbour of refuge at any place, and who would say "Oh, very well, then I will sign it." Had I thought of presenting a memorial to this Royal Commission in favour of a harbour at Hartlepool it would have been signed by every man who frequents this port; and I believe there is not a master or seaman in any ship in both these sets of docks that would not volunteer to come and sign it, and come and give evidence.

16,583. And do vessels in the docks come from different parts of the world?—All parts.

16,584. You think 6,300 signatures, including fishermen, could be obtained to a petition in favour of a harbour of refuge in Hartlepool Bay?—Yes, far more than that.

16,585. In this rather singular document it refers to a gale of wind and gives us all the particulars, except the all important one, the direction of the wind, do you happen to know how the wind was?—South-south-east; it blew within two points of a hurricane.

16,586. I see that in No. 2 return, opposite the wreck of the *Union*, it is stated that "this ship, I pre-"sume, left Yarmouth Roads on the 3d, in company "with 70 or 80 others, the wind southing and increas-"ing as they ran down. About 9 p.m. hove to for "the night, Flamborough Head west-south-west nine "miles. There is no doubt 12 out of the vessels "lost that day would have been saved by a har-"bour at Filey." Is there any reason why these vessels, with the wind at south-south-east, should not have run to a refuge harbour in Hartlepool Bay?—None. This extraordinary paper states that 27 of the vessels caught off Flamborough Head were wrecked between Flamborough Head and Whitby because they could not fetch a harbour to the north, while the 28 that are reported to have been lost between Whitby and Hartlepool to the north were caught in the same gale and about the same place, and yet they did fetch to the north; therefore this strikes me as a most extraordinary analysis of any gale of wind.

16,587. After that statement, I think we may dismiss this printed paper as utterly valueless. You said 241 vessels were wrecked in 12 years, was it in Tees Bay or Hartlepool Bay?—In Hartlepool Bay, and a few straggling ones just abreast of Seaton and about half a dozen to the north of the head.

16,588. Can you add those which have taken place at Redcar and the Heugh?—I should say about 40.

16,589. What was the average of the crews of the 241 vessels wrecked?—I should think about seven.

16,590. Then you believe the lives of about 1,700 seamen were risked, and that out of these 92 were lost?—92 were lost, but many were saved by the life-boats.

16,591. And of the whole number the life-boats appear to have saved 200 on the coast in eight years?—The West Hartlepool life-boat has saved 200.

16,592. Are there other life-boats in Hartlepool Bay?—Yes, four in Hartlepool, and West Hartlepool has provided a second.

16,593. Can you procure for the Commissioners the number of lives that have been saved by other life-boats in the same period?—I have no doubt I can.

16,594. And in 1857 as many as 44 lives were lost?—Yes.

16,595. Do you know any part of the coast of the United Kingdom where there was a greater loss of life in the same period?—No.

16,596. Is it notorious that along the north-east coast of England, Tees Bay is the chief site of the wrecks?—It is.

16,597. Taking the coast from Flamborough Head to the Farn Islands, is it not the deepest part of the bight of that bay?—It is; no vessels could even get off on either tack when once embayed between Robin Hood's Bay and North Sunderland. I hear that constantly and frequently.

16,598. Are you of opinion that a harbour of refuge should be placed where it is most likely to catch embayed vessels?—I think it is.

16,599. Should it be placed nearly in the centre of the district that these vessels frequent?—That, I have no doubt, would be the most convenient place.

16,600. Does Tees Bay occupy exactly that site?—It does.

16,601. Do you know any part of the coast of the United Kingdom on which 11 life-boats are stationed in as small an extent of coast as here?—I believe not. The fact of the existence of these life-boats in this very deep bight is strong indication where most wrecks occur and where there is the greatest necessity for means for the preservation of life and property.

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Mr. R. W. Jackson.

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Capt. Washington.

16,602. A life-boat and all her paraphernalia cost some money ?—Yes.

16,603. Is it likely a life-boat would be established if there was not an absolute necessity for it ?—Certainly not. I should say Old Hartlepool, which is also extremely energetic in its endeavours to save life, has, during the period I stated, also saved 200.

16,604. From what places does the trade of Hartlepool in merchandise chiefly come ?—From the great manufacturing districts of England, and all parts ; the imports are quite as large, they are very large especially in timber, which trade is thus progressing in a most extraordinary extent, and is likely to be still further developed. I have already provided five acres of bond yard, and only the other day I was asked by influential houses in the trade if I would provide three times that quantity within the next 12 months, and larger ponds as well as timber yards.

16,605. Can you account for the great increase in the traffic of Hartlepool ; is it the facilities offered by the port ?—It is, merchants find it to their advantage ; there is a difference of the rates between Hull and Hartlepool for the freight of large ships. Timber ships alone this year have a difference of 22 per cent. saving at Hartlepool as compared with Hull, from the simple circumstance of the conveniences that have been provided for shipping, the facility of getting to sea, the absence of all river navigation, and a return cargo at all times at command. I consider Hartlepool, therefore, budding forth to immense results. Only this year large ships have ascertained what has been provided. I have heard from several captains of large ships that they had no idea there was such a place on the east coast, and we shall feel it in the course of another year. Ships are not like railway trains. A shipping place takes a little time to develope.

16,606. Are the graving docks at Hartlepool so superior to the graving docks of which all the world has heard at Antwerp ?—I suppose so ; the *Constitution* was an instance in point of one coming here.

16,607. What is the length of the graving docks ?—One is 320 feet and the other 350. Ships at this very moment are coming down to them from London.

16,608. You have not stated the floating area at Old Hartlepool docks ?—About 60 acres ; at West Hartlepool there is dock and harbour accommodation of 78 acres, and the length of dock quays at West Hartlepool is upwards of two miles. Behind the timber yards we have five acres only just started with, and we have available immediately joining that, and very likely to make use of it, 17 more, making 22. Our warehouse accommodation at West Hartlepool covers two acres, and contains an area of 317,720 square feet, or upwards of seven acres. At West Hartlepool we can ship a million and a half tons a year ; at Old Hartlepool they can ship a similar quantity.

16,609. Are there all sorts of appliances for repairing vessels at Hartlepool, and all that vessels taking refuge are likely to require ?—Yes ; at Old Hartlepool there are several ship yards, patent shipways, gridirons, and all appliances that are required ; and at West Hartlepool it is the same. Works are almost in hand for a patent slipway and gridirons, and we have contemplated two more patent slipways.

16,610. What space, for how many vessels, do you consider would be required, looking to the traffic of the coast, if a harbour of refuge were made at Hartlepool ?—For 500 to 700 sail at a time. They will be constantly moving in and out with the entrances north-east and south ; and with such a large area as I am contemplating, with light vessels we might go up to 1,000 ; besides there are docks that will hold a thousand.

16,611. Could you not at high water take the greater part of the vessels from the bay into four docks ?—Yes ; but the refuge ships would displace the loading ships, which we should not exactly like.

16,612. Suppose you put 500 into the docks, would not that afford very great relief to the bay ?—It would.

16,613. Could steam tugs take hold of vessels immediately they came within the piers and take them to their moorings ?—Oh dear, yes ! 106 have gone to sea laden from West Hartlepool with just five tug boats, and if there were 10 they would do an immense quantity of business. The steamers would have about a mile and a half to go to the entrance ; but there is a wonderful difference between that and the entrance to the Tyne, and up to Shields Harbour. There you are in a narrow place in a tidal stream, but at Hartlepool it would be perfectly open anchorage, and ships would scarcely want steam in Hartlepool.

16,614. But without disparaging the claims of the Tyne from its enormous traffic, would there be equal facilities at Hartlepool ?—Oh dear, yes ! I think the Tyne is very deserving of the attention of the Government to carry out their works, and Sunderland also, but the capabilities of this bay are so great that the requirements of steam power would be much less than in rivers.

16,615. (*Capt. Sulivan.*) You are aware of the improvements which are going on in the Tyne, by which they profess to get 15 feet water ?—I am.

16,616. And if it succeeds, will that be a valuable harbour of refuge for all the light ships, and most of the loaded ships belonging to the north coast collier district ?—Yes, at suitable times of tide. It would be a harbour of refuge at flood tide.

16,617. Do you consider it important that the northern coal ports should have a harbour somewhere south, where loaded vessels could run to if caught after leaving in a gale of wind ?—Unquestionably ; as an instance, take the number of vessels which came in here yesterday morning.

16,618. For the same reason, do you not think that, for the Hartlepool collier trade, a port somewhere south of Hartlepool would be equally valuable to the Hartlepool trade ?—Not in the same breeze.

16,619. If a port south of the Tyne is more favourable for vessels leaving and being caught after leaving their harbour, for the Tyne trade, then the vessels leaving Hartlepool would find a port to the south equally favourable for the same reason ; would they not ?—No, that is assuming they all got up to that point.

16,620. Well, assume that Tyne vessels got 40 miles to Hartlepool, Hartlepool would not be made available to them ?—Except in a north-east wind.

16,621. If Hartlepool vessels got an equal distance, then a port equally far to the south would be equally valuable to them ?—Not in an easterly gale ; if you allude to the same circumstances and the same gale, that cannot be.

16,622. If the Tyne vessels have got 40 miles to the south of their port, may we infer that Hartlepool vessels will have got 40 miles south of their port in the same wind ?—Yes.

16,623. And if Hartlepool forms a valuable port of refuge to Tyne ships, would not a harbour south of Hartlepool form an equally valuable harbour of refuge for Hartlepool ships ?—Provided they got to it ; but 40 miles would only bring them up to a little beyond Whitby.

16,624. You state that this paper is valueless because it is not on any authority ; can you tell me, so far as value is concerned, why we should lay any more stress on what you have compiled than those that have been laid on the table ?—There is no more value, of course, to the document I put in than to any other document, provided it is equally correct.

16,625. Do you mean to state that you can prove by those witnesses that are going to be examined that any one of those vessels said to have been lost in the Filey district, were not lost there ? I think I understand you to say that ?—No ; I am going to prove by a witness who was in the gale, and who was caught between Flamborough Head and Whitby, that he could not have fetched a harbour at Filey, but could have fetched one at Hartlepool ; that the vessels caught between Flamborough Head and Whitby could not have fetched north of Whitby.

16,626. That is the point I was going to bring you to. You state that these vessels lost south of Whitby could have reached Hartlepool as well as those that did reach, and because the gale was south-east ?—Certainly.

16,627. Now do you believe that any sailor in command of a ship would allow his vessel to be wrecked between Hartlepool and Whitby in an east-south-east gale, when he could either have kept off the land on the starboard tack, or could have run back to Hartlepool, or into the Firth of Forth ?—It is quite impossible for me to say what a captain would do.

16,628. I ask whether it is probable that any man would have allowed his vessel to be driven into that small bight, if we may so distinguish it, between Whitby and Flamborough Head, when he could have weathered or drawn off the land or run down to the Firth of Forth. Would he not have been a madman to have done so ?—He would, if there had been a harbour at the bottom of the bight.

16,629. I say, as it was ?—We have no harbour of refuge now ; they know it is hit or miss when they come.

16,630. Could not a man have kept off shore on the starboard tack, or run back to the Forth, as long as the gale was south-east ?—I don't say they run in between Filey and Whitby when the gale was south-east ; I said many of them had stood out to sea, and the gale caught them from east-north-east.

16,631. Is it not more likely that all these vessels lost between Filey and Whitby were lost when the wind had shifted to the eastward, so that being leeward they could not weather Whitby, or get off the land on the south tack ?—I think they would be able to weather Whitby.

16,632. Do you think any man who could have weathered Whitby with a sandy bay at Hartlepool on their lee bow would have allowed his ship to be driven on to that rocky coast ?—No ; but in a gale of wind, when there is no harbour of refuge, and when you are knocked about on all sides, I won't profess to say, neither would any man profess to say, what he could do, or what the circumstances of the gale would compel him to do, or where he would choose to come ashore ; but it is the want of a positive position to which he knows he can run at all times without contending with the gale that causes the accidents.

16,633. We have it in evidence in other ports that when ships are caught on this coast, and cannot get off the land, they try to get to the best beach to run their vessels on, and so save their lives. Do you believe that out of these 27 vessels that were wrecked on that rocky shore one man would not have tried to weather the Head and get back to the best beach at Tees Bay or elsewhere, if he could possibly have done so?—It would be a choice of evils necessarily in a gale of wind, such as we had on that occasion. No man whether light or laden could determine which was the best to go to.

16,634. You said that as one half of the vessels fetched back to Hartlepool those others might have done so had they chosen, or words to that effect ?—The paper states so.

16,635. Is it not very possible that in the number of colliers off Flamborough Head, when the wind draws round to the point you have named, while all the weather-most vessels would weather Whitby, and get back to Hartlepool, all the leeward-most must fail to weather Whitby, and so be wrecked there ; and would not this account for different ships going ashore there, and others at Hartlepool ?—No, you see the gale was so long at south-south-east. The report of that gale says they were all caught off Flamborough Head, both the 27 and the 28, on the same day ; therefore if the 28 got down why could not the 27 ?

16,636. Then do you mean that with an east-south-east gale these 27 vessels ran down on that rocky coast, and were wrecked when they could have got off ?—I believe they did not run down in the east-south-east gale, but stood off, and were caught, and then it was a question which was the best.

16,637. If they had stood off, and were far enough to windward to have fetched Hartlepool, would they not have done it rather than have been wrecked ?—Hartlepool would not have saved them.

16,638. Would not Hartlepool, as a rule, with its life boat and beach, save a vast number more men from vessels wrecked there than would have been saved from an equal number of vessels that were wrecked on the shore about Flamborough Head ?—I think so.

16,639. Then would not a collier master, desirous of saving the lives of his crew, do everything he could to fetch Hartlepool or the Tees Bay and beach, rather than be lost ?—I do not believe any master of a ship off Filey Bay, or off Whitby, makes up his mind to run for a beach. If he comes to Hartlepool he makes the best of his way into the harbour if the water will receive him, and if it won't he knows there is the beach ; but no man at 50 or 60 miles from Hartlepool makes up his mind to run his ship ashore unless he has lost his anchors.

16,640. Do you suppose that any sane man off Whitby, or that coast, knowing there is a beach and all those life-boats, would allow himself to be wrecked on that rocky coast if he could by any possible means have weathered Whitby and come back to Hartlepool ?—He would not certainly. He would have contended for Hartlepool if there had been a harbour for him, because he would then have had some point to look to for the saving of his ship, but not having a harbour of refuge, he is tossed about by every wind, and getting worse and worse every time he makes a tack.

16,641. You say there is a channel now five feet deeper than it was outside the West Hartlepool Dock ?—Into the West Harbour.

16,642. Has that channel ever been dredged ?—There is nothing but clay, and we have been dredging it by the ordinary dredging process, and it is maintaining itself.

16,643. Then the channel that you speak of, where the water is deepened at the two-feet mark in the entrance to the west dock, has been in a great measure formed by dredging, and not by any natural movement of the tide ? Not only that, all the sand is dispersed from abreast of the west harbour, and all the clay bare there ?—The lock sills in the west docks are about 5½ to 6 feet below low-water ordinary spring tides.

16,644. Can you be kind enough to say whether you attribute the silting up of the bay to the back water being stopped by the coffer dam about three years ago ?—I don't attribute it altogeher; I say it is a circumstance occurring during a period of years when that operation was performing.

16,645. What years ?—It was in 1832, 1833, 1834, and 1835, I believe.

16,646. Can you account for that ?—It is in a report of Mr. Calver that the depth of from 26 to 28 feet water in the anchorage ground had decreased from two to three feet.

16,647. That was before any of the stoppage of the back water occurred ?—I know nothing about that.

16,648. That from 1838 to 1846 over two-thirds of the bay nearly half a million cubic yards of deposit has been formed ?—I don't think Mr. Calver says that. It is quoted by Mr. Calver from a Report of Mr. Cockburn Curtis.

16,649. Report of Mr. Calver to the same effect, I think ?—No ; I have paid a great deal of attention to it.

16,650. As everybody is bound to do to anything Mr. Calver writes, but the argument in the whole of that document is against a close harbour; I don't wish to go into that question, but just to give the dates to see whether the silt was going on when the back water was stopped ?—Nobody has attempted to say at what particular time the alteration of the three fathoms line had occurred.

16,651. But I was struck by one remark you made. You said the low-water line was going inward, to show that the bay generally was deepening. I see it is stated in the report that that shallowness in the

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bay was on both occasions accompanied by a slight deepening of the inner shore of the bay, so that this low-water deepening went on at the same time that the centre of the bay was shoaling up, the greatest amount of the shoaling being unfortunately in the central part of the bay in the anchorage ground on which so much as two or three feet depth had been lost ?

16,652. Have you any means of showing that this silting up during these periods did not take place, or do you dispute the facts stated in this Report ?—I am bound to dispute the facts from all the information that the port can have ; from all the information of the captains who were in the habit of bringing up in the bay.

16,653. That is from 1826 to 1846, I only gave you those two periods ?—Well, I've no means of saying whether it is right.

16,654. From 1846 to 1849 the inspector remarks ; can you tell me who the inspector was?—Mr. Cockburn Curtis.

16,655. He says that the "shoaling has taken place "across the whole width of the bay at its entrance "or mouth, and the whole of the anchorage the "ground has deteriorated, the greatest loss of depth "more than three feet has, unfortunately, taken place "in the northern portion of the Bay, inside the shelter "of the Heugh ;" will you give any documents or evidence to disprove that assertion which agrees with the chart on the three-fathom land ?—I should be very happy if I could give you any information from 1826 to 1838.

16,656. But this loss I mentioned is from 1846 to 1849 ?—Then our haven-master who has made periodical surveys reports to us, and will be able to state that it is not correct.

16,657. Mr. Curtis again states, "This proves not "only there is the presence of foreign matter, but "that it has a disposition to fill the deeper portion "of the bay "?—I am satisfied from my own knowledge, that the whole of the southern portion of the bay is very decidedly deepened.

16,658. Mr. Cockburn Curtis further says, "The "sea sand with other matter is being continually "dredged out at the tidal basin at West Hartlepool ;" is that correct ?—It is not ; it is a new work, and we have been dredging and taking it out into 20 feet.

16,659. Mr. Curtis continues: he says, "Sand drifts are apparently at the tidal basin of Hartlepool;" is it correct that it has been continually dredged out ?—It is not correct.

16,660. Again, it is said, that sand in large quantities is lodged in space between the two harbours, the accumulation keeping pace with the extension of the West Harbour works ; is that the case ?—At high-water mark in the very recess there is an accumulation of sand which is between high and low water mark, but it is not an available part of the bay in any way whatever, it is a fine beaching ground, and nothing else.

16,661. And that deposit of three feet of matter, the greater part sea-silt, is being removed by dredging out of the Victoria Dock, a work only formed 14 years ago, is that correct ?—It cannot be from the Victoria Dock. I have seen that stuff ; it is as black as coal.

16,662. "Three feet of silt has come in at the Victoria Basin, and has to be dredged out ;" is that correct ?—It is not the correct way to put it ; in all these coal ships there is a very considerable amount not shipped, and it is the case in West Hartlepool.

16,663. I am quite right in what I first stated, that this is Mr. Calver's report, and these are quotations from Mr. Curtis ?—I know what Mr. Calver has alluded to with regard to taking it out of the Victoria Dock.

16,664. He only says, "Hartlepool Bay will silt up "were it inclosed, as is proposed, by the pier ? "—I "think that is very likely.

16,665. He also says, "The risk which must attend "its inclosure goes against the attempt to make a harbour of refuge there." I ask you now, whether any works outside the bay, such as you propose, would not in great measure tend to cause additional silting ; may that not to some extent increase the tendency to silt up by confining the water more into the bay, and so tend rather to increase the shoaling up of the bay ?—Mr. Calver does not say there is any shoaling of the bay now.

16,666. He goes up to 1849, and stated shoaling, and states that since 1849 the haven-master told him that it is not increasing, but what I am anxious to get out is, if you can show us that natural causes of the silting up for the previous 20 years have not been in operation since 1849, and are not likely to be in action again, because this is a very material point connected with a harbour of refuge at Hartlepool ?—I think Mr. Calver himself states, that matters in the bay are somewhat stationary. He brings it up 1849. Our haven-master will show there was no increase between 1846 and 1849.

16,667. And, therefore, Mr. Calver and the haven-master are directly at issue, are they ?—Well, they are at issue ; but Mr. Calver does not say to what extent.

16,668. He goes on to say, as an instance of the way in which the silt is held in the water or likely to be deposited, that the Victoria Dock has silted up to the extent mentioned, though the sea water has been admitted to it for only a portion of time, and also that the deepest portion of the bay has shoaled considerably. I can only repeat, that, with regard to the Victoria Dock stuff, I have no doubt in the world it is the same as is found in all docks, more or less. This being a coal port, a considerable quantity of coal is lost in the process of shipment ; and we have at West Hartlepool, though only 10 years old, had to take out the stuff that is so deposited. That which is taken out at West Hartlepool is as black as coal. There is some portion of sand in gales of wind; the sea has in suspension a quantity of sand, and if it were carried into a corner, it would not get out, but would be deposited, and that is the case in every harbour ; but when you come to a sheltered anchorage, I don't propose to bring anything to rest, while there must be something at rest in a dock.

16,669. Taking the inner portion of the bay, which is said to have been silting up in these 20 years, I cannot learn that any works have been going on materially to affect the silting up, or in any way account for that otherwise than by natural causes. Can you say that the construction of these breakwaters will not in this inner bay increase the tendency to deposit, by making the water stiller than it is at present ?—No ; the currents that will be made by these three openings will be of a very different character to waves lashing into the bay unobstructed. Sand does not come into this bay any more than it does into any other part of the coast. There will not be that lashing of the waves into the bay of Hartlepool as in the Tees Bay, Filey Bay, and every other place between high and low water mark. There is no appreciable deposit of sand in Hartlepool Bay. Speaking of a particular spot there may be in all bays a little higher sand than at another, or a shoaling ; but that is not the character of the bay, because as a bay it is not shoaling. At a particular part of the bay, between 1826 and 1828, and between 1838 and 1846, I don't profess to deny that there has been a slight alteration of the three-fathom line. Take it outside, and there is no alteration really and truly of the available anchorage of the bay or outlet. But nobody pretends to speak to a few inches.

16,670. Mr. Calver says the deposit has extended over two-thirds of the bay to the extent of nearly half a million of cubic yards. That is very different from a slight silting up in some places ?—I take Mr. Cockburn Curtis's chart, and I find what I said is corroborated, that it is just about the three-fathom line at the centre, but at the two horns the line remains the same.

16,671. You stated, as one reason why Hartlepool was so easy to make, that one ship found her way by the soundings, and the other was wrecked off Flamborough Head. Suppose an equally careful captain had been in the ship lost off Flamborough Head, the soundings would have brought him in here just as easily as the ship that was saved. Don't you think she was lost by neglect of her soundings?—I should think not.

16,672. You gave us 1,650 acres as the whole area of the three and four fathom line, and you gave us 488 acres as the five fathom line?—I thank you for giving me the opportunity of correcting that four fathoms; taking it as near as you can at a mean between five and three will be about 870 acres.

16,673. I suppose you removed these piers to the increased distance from the shore to endeavour by a stronger current, a larger space, and less interruption from an in-shore current to reduce the probability of any silting up?—Yes.

16,674. If any reduction of the space were made by removing the piers closer in might it not increase the tendency to silt up?—I don't admit the tendency to silt up. If there had been a tendency to silt up in Hartlepool Bay we would have been silted up long ago. Things are remaining much in the same state as they were this time twelve years at all events; but from my own knowledge, and soundings, there is a deepening of a considerable portion of the bay.

16,675. Will not a certain portion of the sediment from these docks find its way into the harbour in the same way that a tidal river brings a certain amount of sediment?—Most unquestionably no; for the simple reason that when the dock gates are closed nothing comes out.

16,676. Where does the sluicing bring the water from?—From the large area of the slake, 168 acres.

16,677. What is the object of the sluicing?—Keeping open the channel, and having an effect on the bar.

16,678. Of deepening the entrance at their docks, and removing some of the bar that prevents vessels approaching so readily to their dock?—Yes.

16,679. Then this sluicing, if it has the desired effect, deposits the sand it removes into the bay?—It deposits no more than it brought in. It is the same thing backwards and forwards. There is no additional quantity, and can be no more, and the same deposit in these very docks takes place in all the rivers to some extent, but there is no detritus.

16,680. Do you believe that in the bay near to the outgate of the Tees any sand is brought up by the water on the beach?—There is the same tendency to sand falling on the beach in Hartlepool Bay that there is in Filey Bay, or any other bay, because the sand on this coast from Yarmouth Roads right away down the bay as far as St. Abb's Head is moving, but there is no sand coming from Tees mouth into Hartlepool Bay.

16,681. (*Capt. Vetch.*) Will you explain to the Commissioners the reason why you prefer this breakwater to a close harbour?—Because I wish to keep nature as near as possible in her present state, and because the line of the breakwater I have suggested is properly in the line of the currents both of the flood and the ebb tide, and will take the currents therefore end on both ways.

16,682. Will you state your objection to a close harbour?—Because upon this coast from Yarmouth Roads to the Farn Islands, sand comes down in gales of wind, particularly in southerly gales, and it is brought down and held in suspension by the water, wherever, therefore, that water is,—and there is no more in the water abreast at Whitby than there is brought off the Tees—wherever that muddy water settles, it must deposit.

16,683. What is the depth of the proposed harbour at the entrance?—One is nine fathoms and the other seven.

16,684. Then you have a clear opinion that at nine fathoms of water the sediment of the sand at the bottom of the sea is moved by the waves and current?—Certainly not, it is the sand that is in commotion, and brought up in a heavy sea, and the water being charged with sand, it is conveyed by the tide, not by the waves alone, into all the recesses wherever the tide comes. Of course if it comes into a dock, as it does in the Tyne and elsewhere, it will deposit.

16,685. Then you consider that with eight or nine fathoms water an aperture open to the sea, the sand and silt would come into that harbour?—No, there would be no sand or silt falling into Hartlepool Bay at that depth.

16,686. Then you could not object to a close harbour on that account?—I have no objection to a close harbour on that account. If you take the close harbour to the same depth, because the same law would apply; but I may mention that when you have got charged water into a small space where there is a run of tide, the chances are there will be a deposit at high water, and generally where it is in a state of rest. In West Hartlepool there was a deposit which might have been seen about a year ago, accumulating in the corners and in the bights, but there is not an inch of silt, and it cannot be while the harbour is one perpetual series of currents.

16,687. That is, in a gale of wind at nine fathoms of water there is sand and silt kept in suspension?—Yes, anybody may see that on the coast. It is so in Yarmouth Roads, and all over; but if this small harbour of West Hartlepool, containing 44 acres, does not silt up one inch, from operations that I have been lately performing, between high and low-water mark, how, in the name of fortune, is a harbour of 1,000 acres, when there is a perpetual revolution of the currents through that harbour into the deep sea, to silt up?

16,688. Would you tell me what the material is with which you propose to construct your breakwater?—The large rubble stone, the different stones of different specimens which are lying behind you.

16,689. Where do they come from?—Some from about two miles of West Hartlepool, some from the coast of Northumberland, Bambrough Castle.

16,690. What are the particular nature and quality of these stones?—Whinstone, and fine hard heavy limestone.

16,691. How do you propose to convey them from the stone quarries to your depth in the sea?—There are different processes. Some come by the sea, and some must be transported in barges, and by gangway.

16,692. But if it cannot by gangway?—Then by barges. But the contractor has made his own calculations, and thinks three years would be sufficient for him to deposit it if he had sufficient money. He is an efficient and experienced contractor, and I have no doubt he would find the means of depositing that stuff if he got the money.

16,693. What stone do you propose to apply to the superstructure?—Fine hard freestone.

16,694. From where?—From the immediate neighbourhood.

16,695. What neighbourhood?—Some 20 or 25 miles off. I am getting a good deal of stone from Bramley Fall now.

16,696. Will not the carriage be very expensive?—We know what it is, we are in the habit of paying for it every month.

16,697. And your contractor has taken it into consideration?—He has; and he tells me, and will tell you, he considers those prices liberal.

16,698. You stated 44 lives were lost in one year?—Yes.

16,699. And 200 were saved by the West Hartlepool boat. In what period was that?—10 years.

16,700. That would be at the rate of 20 lives per annum?—Yes.

16,701. Will you state whether or not these 200 lives saved by the boats, and the numbers that were actually lost, should not be added together to show

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the danger of the bay ?—No doubt ; and I have promised to obtain by to-morrow as near an account as I can of the saving of lives by the other boats in addition to those I have given you, and taken out of ships that have come into the bay.

16,702. Is it not the fact that Tees Bay extends from the harbour of Hartlepool to Redcar ?—Yes.

16,703. And that it includes in fact Hartlepool ?—It does.

16,704. Hartlepool Bay then is a portion of Tees Bay ?—Yes.

16,705. Would a harbour of refuge at Hartlepool not be a great advantage to Tees Bay ?—Unquestionably.

16,706. (*Chairman.*) Do you think the set of the Tees in the direction of Hartlepool causes any deposit of sand near the Long Scar ?—I think not.

16,707. Has there been any dredging of sand near the entrance of West Hartlepool during the present year ; and has such dredging been intended to produce increased depth of water ?—The dredging from West Hartlepool this year has been principally of clay. We have now made a complete uniform depth from the dock sill to where the land works out with the bottom of the bay, so that any vessel passing out of West Hartlepool Docks goes to sea safely.

16,708. Can you speak as to the effect of south-east gales on both harbours as respects silting up ?—There is no silting up in the harbours. We have had many gales from the south-east on this coast, and they produce muddy or sandy water the whole way down to the Farn Islands a certain distance outside ; but I have watched many and many a time the ebb tide out of the Tees, taking a course something like east-north-east.

16,709. (*Sir F. Smith.*) You said inside there is positively no silting ?—There is none at all.

16,710. No deposit has taken place in connection with the harbour to show that there is a loss of water? —Certainly not. But a very decided deepening, and it is going on every day. I do not know when it is to stop.

16,711. Is it by a natural process or not ?—By a natural process.

16,712. Are you prepared to affirm that along the coast there is no increase of deposit ?—There is no increase of deposit that I can detect at any part of this coast. The most prominent sand that I know of is the Herd Sand at the mouth of the Tyne. That has been uniform for a number of years. Probably the pilots at the mouth of the Tyne might say that in a heavy south-east gale there would be an accumulation of six inches, but it would go again north-easterly.

16,713.. If there was a deposit, would a portion be in the bight of the bay ?—No doubt.

16,714. Therefore, there might be some accumulation at projecting points ?—Not immediately at projecting point, there might be just inside, on either side of it.

16,715. In ordinary groins put up along the coast, you find deposits of sand on one side or the other ?—Yes, there would be that.

16,716. That does not apply to your case ?—Not to the deep sea.

16,717. At what depth of water, according to your experiments, is sand raised by the action of the wave? —I cannot possibly tell you that, but we have seen in south-east gales on this coast sand in the water at a long distance out, but where this has been disturbed I cannot say. We do find that south-east gales bring a charged water, and we find that north-east gales take it away again. North-east gales clear generally any little accumulation that may be collected down upon those different points, but it would be unfair to assume at Hartlepool Bay any more than at any other place. As near as can be, during a period of 12 years, there has been an increase of depth throughout the bay generally. In one particular part of it, on the north side I think, it is a little higher from the sand, but most unquestionably on the south side of it is not so. I had an opinion that the pier, which the Port Commissioner built about three years ago, had a tendency to cause a little accumulation behind it.

16,718. On the west side of the pier ?—Yes, but if we are to compare great things with small, and to be so minute as to take over inch by inch all a great bay like this, both high and low water mark, and take the little accumulation that may be made by artificial work, and then say the bay is shoaled, is perfectly a wrong principle, for I can find in every place in the United Kingdom variations arising from particular circumstances, but on the whole nature brings herself to her own arrangement, though you may destroy that by artificial works. I should not like to enclose the bay and to prevent those ordinary currents and movements, which, I think, help in the main to keep the bay open, and must keep it open.

16,719. You say you see no reason why Hartlepool should be the place where we assume there is a deposit ?—Certainly.

16,720. Is there any reason for assuming that Hartlepool Bay is placed where there should be no deposit ?—Yes ; I could mention that a vessel came only a month ago direct from Cronstadt was never in the place before, and drawing 19 feet 3. She came into the bay the day before quarter-day. I sent out a couple of steam-boats, and she came in to the West Harbour drawing 19 feet 3 perfectly clear. Speaking therefore practically, I don't think you can find any fault with the bay of Hartlepool, if a ship like that will come in, on quarter-day, one of the tide harbours.

16,721. Do you admit that there will be any difficulty in getting to Hartlepool if a harbour of refuge should be constructed ?—None whatever ; the entrance may be considerably too wide, but I don't object to the entrance ; and I am quite sure that the admission of 1,500 feet of sea into a space of 1,600 acres will not be felt ; it will be quite inappreciable. 1,500 feet of sea would be of no great importance whatever. It would separate immediately on both sides, and fall over the Long Scar ; therefore I am quite sure that any small boat in any gale of wind could go off. If money be an object, it could be reduced.

16,722. Are these red lines projected by you or by an engineer ?—They are my own design, but I have left the details to an engineer of considerable experience, and a contractor.

16,723. And have you well studied the direction for these breakwaters for a length of time ?—Yes, for years. I never thoroughly made up my wind, whether it was desirable to put a breakwater on the Long Scar or not. I considered that when the bay was covered by means of these breakwaters, and would then be a question whether you would run an inner pier upon the Long Scar or not. I think in some circumstances it would be desirable, but in the present state of the bay it is not.

16,724. Then your vessel would be shut out from every wind, and the Heugh would be made perfect smooth water ?—Yes, and it would be a great improvement to the Tees, it would direct the flood tide and ebb.

16,725. Do you not think that the real object required might be attained at considerably less expense by making your breakwater proceed from the north side of the Heugh ?—I never would close a breakwater to the north.

16,726. But if there be no tendency to silt, why not ?—Because the bay for 10 hours is in a complete rotatory state, and I don't want to destroy that. There can be no natural deposit if you keep up the rotatory motion.

16,727. What produces that rotatory motion ?—The flood tide comes into the bay, and of course finds its way immediately round the head, as water will always do,—for the first two hours, therefore, works into the bay ; it then being filled, infringes upon the Long Scar Rock ; then there is the slake behind, and the tendency of the slake water is to draw everything round, and that rotatory motion continues from the

first two hours of flood to low water; the currents are very mild, but still they are there.

16,728. So that if sand were in suspension instead of being deposited it must come into the bay, go round and out again ?—It does.

16,729. If it comes into the bay and goes out of the bay by the Heugh, would it not become still at the mouth of the Heugh, and deposit there ?—You are supposing that sand is rolled along the bottom of the shore.

16,730. I am speaking of the sand in the water ?—The water is charged for a hundred miles north and south, but that deposit never falls. In the whole arrangement of this coast nobody finds any material alteration. We sometimes have in the Tees a deposit of sand ; it gets reduced ; nature finds it convenient, I suppose, to have to deepen the bar on the Tees, according to the prevailing winds ; the same takes place in the Tyne, they lose two and three feet of water and begin again.

16,731. Has any section been taken of Seaton sand, to shew whether there has been any accumulation of sand there ?—I am not aware the decrease of sand is very perceptible off the Long Scar at a place called the House.

16,732. Has it ever occurred to you to have instead of two detached breakwaters one continuous breakwater parallel to the shore ?—That is one way, but I don't recommend it, because in that case you really only get one entrance, and that is from the northward.

16,733. Your present plan will not give an entrance to the south ?—It does not, and it is not wanted. It gives an exit.

16,734. I asked if you had three entrances, and you said yes ; you mean three openings ?—Yes.

16,735. Do you think a harbour of refuge is really called for to save life and property on this coast ?—Oh ! it is a harrowing scene here sometimes, when you see a large fleet of ships knocking about, and the steamboats unable to get out to help them.

16,736. Do you know the number of lives lost in the bay ?—90 and upwards in the bay of Hartlepool.

16,737. Do you know whether these lives were lost by collisions or wrecks ?—None by collisions.

16,738. You have no doubt these vessels would have been saved if there had been a harbour of refuge ?—I have seen vessels founder actually within the line of the breakwater I have suggested.

16,739. I dare say you must feel that the greatest defect about your project is its costly nature ?—I feel no difficulty about that, because I have prepared it with a very comprehensive view, but upon a principle which can be adapted to a reduced character, it could be begun with, and we need not wait before it is all done to get shelter, as in Redcar or any other place. But in this place every yard of underground work would be a protection pro tanto to this bay. If you can form a low breakwater here there would be no heavy sea falling into it. From the very first stone that is put in there would be the gradual improvement of a bay which has already been designated a harbour of safe capability.

16,740. Does that apply to this particular plan of yours ?—Yes ; if you try to make a breakwater on a rock you have not this advantage.

16,741. Will you explain why ?—Nature has provided the very finest breakwater at the Long Scar.

16,742. Is Filey Bay adapted for a harbour of refuge ?—It is a very fine bay, and I don't say some improvement might not be made which would be advantageous to the mariner as a good resting place. At present it is a half-tide rock, and you could only improve it by building on the top of it ; but at Hartlepool you want the ground swell kept out, and there is already a good shelter under the head, and there is a fine harbour and dock for ships to enter if the steamer can get hold of them. If there were thrown out a rubble stone breakwater in nine, eight, seven, six, or five fathoms steamboats would be able to go out and save ships when they cannot now go out.

16,743. Why should you not build the breakwater on a half-tide rock ?—You may ; only you have not got the shelter you have got here of 800 or 900 acres.

16,744. I presume you are of opinion that if you could have more than one harbour of refuge along this coast, it would be very desirable ?—I have no objection to two.

16,745. In fact if the Tyne could be improved, your project carried out, and Filey Bay improved, would not that be desirable for the mariner ?—It would ; but I cannot hear the word harbour of refuge applied to the Tyne or any navigable river, because it cannot be approached on an ebb.

16,746. But if improved it would be a great advantage to the mariner ?—No doubt ; and it is deserving of improvement.

16,747. Do you think the site of Filey Bay is good from its geographical condition ?—It is suitable for a purpose, but not for the dangers this deep bight of the coast has. I have thought much about the description of work available in Filey Bay, and should not be at all sorry to see it accomplished, but if the harbour of refuge were formed on the rocks, I am bound to state that is the wrong place. We don't want protection in Filey Bay in a north-east gale, or any wind at all which will enable a seaman to get round the head. A breakwater to the south-east of the village of Filey might enable vessels to bring up and wait the tide, instead of harassing the crew by dodging about.

16,748. I presume that you have heard that at Flamborough Head there are often very large fleets collected ?—Yes.

16,749. Do you imagine that if such a fleet of vessels is obliged to bear up and come to the northward, any single harbour such as that you propose would be sufficient to hold them ?—Oh, quite ; if there is to be only one harbour, I should recommend as large a space at Hartlepool of sheltered anchorage as the money will produce.

16,750. Are you in a position to afford any local fund towards any Government grant ?—Yes ; but not sufficient. I negotiated some time ago with the Government and the Exchequer Works Loan Commissioners, with a view to a grant of money for something to be done here. The negotiation was in fact taking place at the very time when the Select Committee on Harbours of Refuge was appointed, and in consequence of that it was suggested to me that I had better suspend the application and wait the result of that Committee.

16,751. (*Mr. Lindsay.*) Do you think an opinion is of any value when opposed to fact ?—No ; I think an ounce of fact worth a pound of argument.

16,752. You stated that, in your opinion, a return which had been handed to me, and which stated that 27 ships during the gale of 4th January were lost between Flamborough Head and Whitby, and that nine of those vessels were lost with all the crews on board, was utterly worthless ?—I did not say that.

16,753. You stated "yes," did you not, to one of the Commissioners who expressed that opinion ?

(*Capt. Washington.*) My question was as to a comparison only between two places.

16,754. (*Mr. Lindsay.*) Then you did not state that the return was utterly worthless ?—I did not ; I think it is valuable for the reason I have given, viz., that it shows a great inconsistency as between the 27 vessels wrecked between Flamborough and Whitby, and the 28 between Whitby and Hartlepool, for that very return, in terms, states that all the vessels were caught in the same gale on the same day, and in the same place ; I say that if 28 vessels could get to the north the 27 could also.

16,755. Will you be able to prove by any witness that 27 ships were not lost on the coast during the gale of the 4th January between Flamborough Head and Whitby ?—I cannot.

16,756. Will you be able to bring forward any witness who can state that any of these ships were

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not lost between the places named on that morning?—I cannot answer that question without asking the witnesses.

16,757. Will you endeavour to show that this return is not correct even to the extent that any one of these 27 ships was not lost between the places named?—I will; there are two persons who were in the gale, who were wrecked, they will be able to tell you.

16,758. In your return, you state that there were only 13 ships lost in that one gale between Flamborough Head and Whitby; this return states there were 27; it gives the names of the ships, and therefore I for one am bound to believe this return is correct, unless it can be shown to me that these ships or some of them were not lost within the limits named?—The return which I have put in, and which gives 13, is not intended to imply that there were not more, but simply that I have not been able to obtain more. As regards Hartlepool or the Tees district, where there are 28 returned, I've ascertained from indisputable authority that there were 28.

16,759. You are not prepared to show there were not more than 13 lost between Flamborough Head and Whitby?—Yes.

16,760. Are you prepared in the same way to show there were not more lost or not fewer lost between Whitby and places further north?—No; but I will give credit to that statement. I would much rather not deny it. I don't know it, but I would much rather assume the correctness of the 27 ships, as is stated in that return to have been lost between Flamborough Head and Whitby.

16,761. That is, you will admit its accuracy?—I will, because I don't know to the contrary.

16,762. Then so far as regards the return which you have handed in, unless it shows the whole of the ships lost south of Whitby, your return becomes utterly valueless as a comparative return; is not that the case?—I have not put it in as a comparative return.

16,763. For what object did you put it in?—For the purpose of ascertaining the distances between which the wrecks occurred in that gale and the whole wrecks.

16,764. But if that return does not show the whole wrecks, what is the value of it?—I say it does as far as I can ascertain it; there are no means of ascertaining the whole.

16,765. Do you intend to lodge your return as containing the truth, and the whole truth?—It contains the truth as far as I know, but it might contain more. I mean to say there will be more that I have not been able to include; but I have not done it, I pledge my honour, to diminish any other person's return, but to give a faithful return of that gale.

16,766. We are dealing with facts?—These are facts.

16,767. But does it contain the whole facts, as far as any one has the means of knowing?—It contains the whole truth that I have been able to ascertain, but it is not for me to say if a person is able to produce 27 instead of 13 that I should deny it.

16,768. Then you searched for the whole truth?—Yes.

16,769. From Whitby to the north?—Yes.

16,770. And you searched for the whole truth from Whitby to Flamborough Head?—These are given, and I have the documents which are my authority.

16,771. Am I to understand that your return contains all the wrecks which were known to take place on the 4th of January between Whitby and Flamborough?—Yes, so far as I have been able to ascertain, but other persons may be able to gain information which I have not, and if so, I give them credit; I don't say there were not 27, but we see there are 39 in the one and 28 in the other. I gave in the return, showing 39 and 15 at the northern ports, and the other paper only gives 28.

16,772. Would you desire to withdraw this return to reconsider it, or do you wish to lodge it as it is?—I lodged the return in the best manner that I have been able to obtain it. I don't say, and no man living can say, whether it contains the whole wrecks that occurred in that unfortunate gale; but it does contain those which have been ascertained within Hartlepool or Tees district, and the Northern ports or Tyne district, where it has been stated in this very return that north of Whitby and then down to the Tyne, and including the Tyne, there are only 28, I produce 54, that is the truth.

16,773. I offer no opinion on the returns, I only wish to be satisfied which is correct?—I can only tell you I have not brought this return for the purpose of contrasting the one with the other.

16,774. But you lodge a return which you desire the Commissioners to understand is a correct return, and you lodge it for their guidance?—But I had not said, and will not say, it contains the whole of what may have occurred; because I have had better means of ascertaining from Whitby to the north, which contains 54, those people who have compiled this other return have given 24. I give them credit for having better information with regard to the Filey district between Flamborough Head and Whitby than they have had between Whitby and the north. I give them 20 for that, and let them give me credit for stating that instead of 28 there were 54. I don't wish to disparage the return. I don't know who prepared it, or anything about it.

16,775. (*Capt. Washington.*) Did you, or did you not, understand the question put to you by myself with respect to these returns that, as a comparison to determine the position of the site for a harbour of refuge on the north-east coast of England, that document was valueless?—Yes, I think I gave my reasons for the statement that it was upon this simple circumstance of 27 vessels having been said to be wrecked in the same gale, when these vessels could not have made Hartlepool.

16,776. (*Capt. Sulivan.*) Taking this as valueless as a comparative return, I presume you mean to say, because the comparative number of ships was stated incorrectly?—It is in one respect, it does not give the quantity as a whole.

16,777. Particularly, I may tell you that we shall have numbers of all the wrecks on this coast by the time we return to London; if, when we get back, it is proved by the comparison of these accounts of the wrecks that his is more correct than yours, will it not be proved that yours is the more worthless and valueless of the two?—Most unquestionably.

16,778. Then at present it is a doubtful point whether this is worthless and valueless, or whether yours may not be the more worthless and valueless for comparison?—Yes, as a return of vessels; but really and truly my observations were directed to the argument that was derived from this return. I don't care at all in making this remark whether my return as regards the quantities, or the return which you hold in your hand is correct. I simply say, that in rejecting this of mine as valueless, and containing too many in the one respect and too few in the other, I then returned to the allegation that I made that it is worthless, as stating that Filey Bay would be a better place than Hartlepool for a harbour of refuge; that is all I meant.

16,779. If the return should prove true and the comparison true, or if yours should prove true and the comparison true, would that not on one side or the other be proving, so far as these returns can go, the importance of one district over the other?—No; per se I don't think that would be a fair way of contrasting it; it must be the men who were on board those vessels who should determine what places they would make best.

16,780. Really, I suppose that all those men,—which you will not allow,—did their best to keep off the coast, and were only wrecked from absolute necessity. May not both parties have included the wrecks on the Whitby beach, and each party have taken those wrecks at Whitby as in his own district?—

I said so before, distinctly. I did not make use of the word Whitby, but I said it might be that we have included in the Hartlepool district some that the gentleman who compiled this return had included in the Whitby district.

16,781. Then, therefore, you might have done yourself injustice by saying in the district?—Precisely; it was meant for that. Instead of 39 in the Hartlepool district, it should be reduced only; you will observe that in the northern part it does not include the Tyne; now I did include the Tyne, and I have stated in the Tyne, though it does not include the 15 which I have ascertained between Black Hall and the Tyne. Assuming 28 to be correct, and that I am incorrect by taking the 11 from the Filey district and giving it to this, I have not included the Seaham, Sunderland, or Tyne wrecks.

16,782. I think you have said the ships wrecked in Hartlepool Bay were most of them laden ships from that batch of ships off Flamborough Head?—I got it out of the returns.

16,783. Exactly. Then, could all those ships, as well as those in the Filey district, have gone into a harbour of refuge at the Filey district?—I think not, with the south-south-east gale in which they were all caught.

16,784. You said that the breakwater would direct the tide more fairly towards the entrance of the harbour?—I think it will.

16,785. If so, must it not be diverting a portion of the tide that would otherwise go into the bay?—Certainly not, because it is after the sea has passed beyond Hartlepool Bay where the south breakwater commences.

16,786. I am speaking of the eastward breakwater, which will deflect the tide towards the Tees mouth?—No, the southward.

16,787. It runs, however, at right angles in the direction of the Tees?—Oh dear, no; it runs nearly end on with it.

16,788. This long breakwater to the north; may that not divert a large portion of the flood tide that now enters round the Heugh in the Hartlepool Bay?—No; if you have an opening of 1,000 feet, you know, in Hartlepool, it will not be felt. Hartlepool Bay is not a river, it is an open bay.

16,789. You made some remark about the work that had been made about the sand collecting at the north corner of the bay?—Yes.

16,790. And at the same time you made the allusion to the trifling alteration of the depth when other parts of the bay had deepened; do you consider a statement that two or three feet over the greater portion of the bay, the greater accumulation having taken place in the southern portion of the bay, which you thought was keeping clear, is a trifling matter?—I don't believe it.

16,791. But suppose it to be true?—I would call it trifling if it remained stationary. I could understand that 12 years ago there was three feet less in the whole of this bay, but from 1846 to the present time there was no alteration, as I have explained to you, in that bay. Then I say the trifling alteration of three feet before is inappreciable to the existing state of things and to the depth of water that now exists, and to its capacity for a sheltered anchorage.

16,792. I understood you to apply the remark the "trifling alterations" to those which had been referred to as having occurred before the year 1846?—No, there were no trifling alterations then.

16,793. Then the alterations you allude to, of two or three feet over the greatest part of the anchorage ground from the centre of the bay, you don't mean to call trifling if they really took place?—I don't call them trifling if they existed at the time, but if nature there consolidated the bay and made her own what she has, then I say that the alteration before 1846, coupled with the unaltering from 1846 to 1858, is not a matter of importance, because it shews that the bay is not filling, and that the regular tendency is not to fill, but the tendency is to maintain its present position.

16,794. One more question. Do you know any cause in action in these two periods, of 10 years each nearly, when the bay was stated to have been silting up different from what has occurred in the last 10 years to account for it?—Yes. I mentioned that there were circumstances which don't exist now.

16,795. I thought you only mentioned one period of three years, because I heard no other?—Yes; it might have occurred during that period.

16,796. I beg your pardon; I gave you two periods?—Then I mean to say there is no alteration.

16,797. That would make six feet?—Yes, then there is no such thing. I cannot go back to 1826, but if the bay shoaled between 1826 and 1838 in any particular part three feet, and if between 1838 and 1846 it shoaled two feet more in another part, and if it is stationary from 1846 to the present time, then I mean to say that nature has done that which we ought not to complain of. But I do state this most distinctly, that from 1846 to the present there are not the same circumstances in operation, and there has been a very natural increase; therefore I am bound to say, though in the whole parts of the bay certain little localities may have accumulated, a point of sand is not to be taken in a great space of 1,000 acres as any disparagement to its position; and I say it is a misnomer to call it a shoaling of the bay.

16,798. Do you consider those who have the responsibility of recommending a place for a harbour of refuge at a great outlay to the public, should consider it of the first importance to ascertain that, so far as ordinary circumstances will go, there will be the least possibility of silting up?—Oh, most certainly; there can be no question of the importance of that.

Mr. W. Ogilvie Mossman examined.

16,799. (*Chairman.*) You are haven-master to the Port and Harbour Commissioners of Hartlepool?—I am.

16,800. How long have you held your present appointment?—Upwards of 12 years.

16,801. And previously how were you occupied?—In Her Majesty's surveying department under the Admiralty, under the command of Captains Slater and Otter for 16 years.

16,802. You are aware of the objects of the present inquiry?—I am.

16,803. Will you now give to the Commissioners your opinion as to the necessity of a harbour of refuge on this coast?—The necessity arises in consequence of the very great traffic that is daily traversing backwards and forwards about the coast, and to the very great number of wrecks, and loss of life, that takes place annually between Flamborough Head and the Farn Island, and to obviate the very great and distressing casualties, of which I have witnessed a good many. I think a harbour of refuge at the most convenient place upon the coast would be a means of diminishing a great deal of the casualties that do take place. If I am to give any opinion as to where the harbour of refuge should be, if there is only one, I think in the centre, at the most convenient place, in the bottom of the bay, that is within the line of embayment; that is the place where a harbour would be most beneficial.

16,804. You are aware, from the evidence which we have already taken, that there is a question as to the silting up of this bay; what is your opinion on that subject?—Well, since 1846, I find, from my own observations, that there is decidedly an increase of from 3 to 5 inches, taking the average depth of the

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whole bay. I do not mean to say that it is that, if you go into all the little intricacies of each contour line; but, after going carefully through my plans—of which I have one for every year except one—I find nothing in the bay from which any gentleman should say the bay is inclined to silt up. I have taken levels over the shore, commencing at the Long Scar Rock and coming round the shore, northward to the Old Harbour; I find that, on taking the first survey as a base, including the water and also the shore, there is upwards of half a million cubic yards of moveable matter that I have lost since 1846.

16,805. (*Sir F. Smith.*) If I understand your last observation, it is to the effect that you have found half a million cubic yards of water in that time?—No, not half a million cubic yards of water in that time.

16,806. Then, what is the value of your observation, if you have not got water where you have lost sand?—We shall have it at high water, but I am referring to low water.

16,807. Are you prepared to stake your professional reputation that there is no silting up in this bay?—Yes, I am. None since 1846.

16,808. Your knowledge goes back to 1846?—It might be said to go back for 40 years.

16,809. Then why don't you go back to an early period?—Because I have nothing to prove what I may say.

16,810. You have no reason to doubt that the state of things in 1846 existed in 1836?—I have no idea. It might be, but I did not make a survey in 1836.

16,811. Why there should have been any change for the 12 years previous to your survey the general circumstances of the case are the same, are they not?—Yes, excepting the opening of another harbour in the bay.

16,812. The circumstances are such that they would not deter you, as a man responsible for the advice you give, in recommending that the bay be made a harbour of refuge?—Decidedly not; in fact, I would not be afraid to stake my life in favour of its being made so.

16,813. As an old sailor, may I ask you upon a general principle whether you would prefer to have, all other things being equal as regards holding ground and general site, would you prefer to have harbours of refuge in the bights of bays or on promontories?—In bights of bays decidedly; ships can get to leeward when they cannot get to windward; and if you place a vessel in a gale of wind off a promontory, and she has what a sailor calls "a loose leg," she can go either way, but if you place her in a bay she must go zigzag, back and forward, and she is always going to leeward.

16,814. Suppose you draw a line from Flamborough Head to the Tyne, and that at the Tyne a good harbour of refuge can be made, and also at Flamborough Head, and another at Hartlepool Bay, if the vessels were behind that line, would you recommend a vessel preferring going into a harbour at the bight of the bay or on the promontory?—I would take the harbour that I could most conveniently reach.

16,815. Suppose both were equally convenient?—I would take the nearest.

16,816. Even if it happened to be on the promontory?—No doubt.

16,817. Suppose they were both equally near, would you take the promontory or the bight of the bay?—It would depend upon circumstances as to the part of the coast I would have to make afterwards.

16,818. But supposing all those circumstances equal, I want your decided opinion whether you would prefer the harbour in the bight of a bay or on a promontory?—Decidedly in the bight of the bay, because if a man is stationed anywhere where he can fetch for a headland, and the land flies, as you go, north or south, if he can fetch one way he can fetch the other; but if he is situated between two promontories, between the Farn Islands and Flamborough Head, he cannot get off. If I was making for a promontory an accident might take place as I was steering for it, and I might not be able to reach it.

16,819. Presuming that you did miss the harbour on the promontory, you would still have the bight of the bay to run to if you had a harbour there?—Certainly. If I started for the bight of the bay in the first instance I should always be able to go to leeward when I could not go to windward.

16,820. If the Commissioners have heard anywhere that a harbour of refuge is not wanted on this coast for the safety of life and property, you would be disposed to attach no importance to such opinion?—None whatever; a harbour of refuge is decidedly required for the saving of life and property.

16,821. If the Commissioners have been told that vessels are not well manned and well found, and that a good vessel and skilful master will keep the sea rather than go into a harbour at all, would you think that a sound opinion?—I think if a man told me he would keep the sea rather than go into the harbour, I should be inclined not to believe him.

16,822. Is it not the fact that vessels are better manned and are better officered generally in the mercantile marine than formerly?—I believe so.

16,823. And the vessels are better found generally?—I do not know for that; I see some in a very wretched state.

16,824. Are you disposed to ascribe any of the dreadful casualties which occur to vessels being indifferently found?—I have no doubt they are.

16,825. Do casualties occur more to vessels laden or not laden?—I believe, of the wrecks we have had in the vicinity of Hartlepool, the light vessels are the greatest number wrecked.

16,826. And under what circumstances generally have these light ships been wrecked?—I don't remember that there were more total wrecks of light ships than of laden ships; but a light ship is much more ready to be got off the shore than a laden one.

16,827. Are there facilities for vessels beaching themselves north or south of your harbour?—There are—to some considerable extent. I have known vessels when they could not fetch either of the harbours, square their yards, and run upon the beach.

16,828. Have many of the accidents that have occurred on your coast arisen from collisions?—Not many in the vicinity of Hartlepool.

16,829. Do you think that collisions are more likely to occur if you had only one harbour of refuge than if you had two or three?—There might be collisions, but I think when vessels are running for the same harbour of refuge they would all be running one way. I always apprehend that collisions take place when they are going in opposite ways.

16,830. Suppose a case of 700 vessels being at Flamborough Head coming northward, they would be all going in the same direction?—Yes, but they would not be close enough to come into collision; they are vessels running in one way.

16,831. Do you observe on the chart that there is a small number of wrecks and a greater number of collisions?—I don't know that that has attracted my attention.

16,832. It is a very important fact that. Do you know the north coast of Scotland?—Very well.

16,833. Do you know Peterhead?—I do.

16,834. May I ask your opinion of Peterhead as a harbour of refuge?—It would make a very good small harbour, but I don't think a harbour of refuge is required at that place. It is a place where you can get either one way or the other if you fall in with a gale of wind off Buchan Ness, or even right off Peterhead itself. If you cannot get the Firth of Forth you can at least get into the Moray Firth.

16,835. In fact, there would be no occasion whatever for a vessel being obliged to go into Peterhead?—She might be obliged.

16,836. If disabled, and the wind from the eastward she would go into Cromarty?—She would if she was any distance from land.

16,837. For vessels going north about, would Wick harbour be useful?—Decidedly. Some years ago I

recommended that that bay should be inclosed as a harbour of refuge for the convenience of vessels trading from the Baltic, and the ports on the east coast of England, round to the west coast, and to America, because many times a vessel coming across cannot study the tide. He is anxious to make the land, and is obliged to wait, sometimes in very heavy gales of wind, before he dare take the Firth ; it is one of the most dangerous places we have.

16,838. If that will take him to Wick it will take him through the Forth ?—It will ; but there is a danger in taking the Firth when there is a sea on.

16,839. With an adverse tide, of course ?—Yes, I have seen everything washed from off the decks.

16,840. Do you know Redcar ?—I do.

16,841. Do you think Redcar possesses any facilities for forming a harbour of refuge ?—Well, there is a small space in what is called " the harbour." It is a very small sandy space between the ridges ; the chief part is rock.

16,842. You think the space is not sufficient ?—Oh dear, no !

16,843. What holding ground is there at Redcar ? —In the space alluded to there is good holding ground, but I never knew a vessel of any size to be riding there. The holding ground is amongst the best on the coast.

16,844. Suppose economy of construction would result from making a harbour of certain dimensions here, and a small harbour at Redcar, would that, in your opinion, be a good arrangement ?—I think not ; they are too near each other.

16,845. That is, you are rather disposed to think it is dangerous to have more than one harbour of refuge close together ?—Oh dear, no ! but a seaman might confound himself between the two, and so work his ship ashore. If you give him a long distance to run he will think about it much more sharply.

16,846. We have been told elsewhere that there is a feeling sometimes amongst seamen to run even for a worse port, if it be their own port. Do you think that likely to prevail to any extent ?—No doubt a man is always anxious to reach his own home ; but if ships are bound either north or south of their own port, and the sea is in that state that there is danger in entering any harbour except the one purposely provided for them, they would go into it on the way home, and stop till a more convenient time to approach their own harbour.

16,847. As there is a harbour here, and a thriving town, do you think that if there was not any harbour or any establishment, or any town that Hartlepool would be the best position to form a harbour for the saving of life and property ?—I believe, if the harbours of Hartlepool had not been in existence there would not have been any opposition to the making a harbour of refuge here.

16,848. Do you think it is a feeling of rivalry that leads to the opposition, and that the question of expense has nothing to do with it ?—I do think so. To make a general harbour of refuge it should not be a money question ; there is a great deal of prejudice against Hartlepool, in consequence of rivalry in commercial matters.

16,849. I think no humane man can doubt the desirability of having the place which would save life and property, and therefore I assume that to be the general feeling of mankind ; and I am sure you can only ascribe it to a question of finance the not having a harbour of refuge here or elsewhere ?—I do not think the authorities at any port on this coast are capable of making a sufficient harbour of refuge with borrowed money only.

16,850. Do you attach any value to Bridlington Bay as a place of refuge ?—In northerly and north-east winds I do, but it is so shoal there is only $4\frac{1}{2}$ fathoms within the Smithic. I don't think a harbour of refuge could be made there.

16,851. What do you think of Filey ?—A very nice little harbour might be made there ; but if one harbour only is to be made Filey is not in the position where it can be made useful.

16,852. I am not talking of one harbour only, but of the means of saving life ; and if one harbour cannot do it perhaps the country will feel it right to make more than one ?—If we are to talk about the coast being properly supplied with harbours of refuge I should make three between Flamborough Head and the Farn Islands, one in the centre and one near each of the extreme ends, say at Filey Bay to the south, and Druridge Bay to the north. In Alnmouth Bay two rivers come out ; and that is the reason why I would not recommend it, although I once did so before.

16,853. Does the existence of a river coming out render it unfit for a harbour of refuge ?—It does.

16,854. Do you know Blyth ?—Perfectly.

16,855. Do you think it can be improved in such a manner as even in the smallest degree tend to save life ?—I don't know the state Blyth Harbour is in at present. It is some years since I have been there.

16,856. Are you aware a scheme has been proposed for the formation of a large harbour of refuge at Sunderland ?—I have heard of it.

16,857. Will you favour the Commissioners with your opinion as to the suitability of Hartlepool Bay over Sunderland Bay ?—I have heard they propose to make a harbour of refuge at a place they have recently called Hendon Bay—in the Smooth, inside the White Stone Rocks ; but there is such a large quantity of rocky bottom that I cannot see where they will give accommodation.

16,858. Do you think, if the money were to be expended in such a large harbour as you propose to make, would the circumstance of the better holding ground in Hartlepool Bay induce you to give it the preference ?—It would. Although I am resident in Hartlepool I hope the Commissioners will not think I speak partially on that account.

16,859. Suppose two and a half millions of money were to be spent, would you recommend both Sunderland and Hartlepool ?—No. They are too near each other.

16,860. You don't apprehend that there would be any silting up in this bay ?—Not in the least.

16,861. Are you aware that the breakwaters are not proposed to be attached to the shore ?—I have heard it said so, but I have not seen the plan Mr. Jackson has explained to you.

16,862. (*Mr. Lindsay.*) Speaking to you as a sailor, when a ship is sailing along the coast, does she shape her course so as to keep outside of the headlands ?—It depends upon circumstances.

16,863. If she is off the Farn Islands, coming from Leith to London ?—I think she would try to make Flamborough Head before she went to the southward.

16,864. He would shape his course outside of Flamborough Head ?—Decidedly, if the wind was favourable ; if the wind was from the starboard-hand, he would rather draw a little inshore. In his course, from Leith to London, he would very likely steer for the salient points, if the wind was inclined off the land.

16,865. If you were in a Leith smack off the Farn Islands, bound for London, would you shape your course to go outside Flamborough Head ?—If I was aware the wind would allow me to reach that distance, I would.

16,866. Under any circumstances, would you ?—I should very likely sight Souter Point first, and then Flamborough Head.

16,867. Under ordinary circumstances, sailing along the coast, would you not shape your course so as to keep off the headlands ?—I would certainly shape my course to keep clear of them.

16,868. Say the wind was chopping round upon the land, with the headlands under your lee ?—It would depend entirely upon my position.

16,869. If you shape a course so as to keep outside the headlands, and the wind was to chop round upon the land, would the headland be under your lee ?—

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It would if the vessel could fetch it on either tack. If not, I would say it was to windward.

16,870. If a headland was under your lee, would you reach it more easily than you would the bight of a bay ?—I might not in some cases.

16,871. If both the bay and the headland were under your lee, would you fetch the headland quite as easy and in less time than you would fetch the bay ?—I don't know that. If I were to do that, the headland would prove to be nearest to me, because I have always understood that all vessels except one that I was in would go faster when the wind was free.

16,872. But shaping your course outside the headland, would not the headland be nearer to you than the bay ?—If I had progressed to bring the headland to a certain bearing, it would.

16,873. As a general rule, sailing along the coast, the headlands would be nearer to you than the bays when you are passing them. Then, if a ship is disabled or in distress, would she or would she not have less distance to run for the headlands than for the bays ?—If you are talking about a disabled ship bearing for a point, I care not whether it be a headland or a bay, but the small variation of one or two points of the compass in the direction of the wind would cause him to make a choice of the one or the other.

16,874. But a ship in distress or disabled, obliged to seek refuge, would have less distance to run for a headland than a bay ?—He might run into one when he could not into the other.

16,875. But I am presuming them both under your lee ?—Then I would take the nearest place.

16,876. Because you would have the least distance to run, and the least danger and risk ?—Certainly.

16,877. Whether do you think that the expenditure of two millions of money at Hartlepool, to construct such a harbour as Mr. Jackson has shadowed forth, would do more to save life and property at this particular place than it would do if those two millions were devoted to construct a harbour at Filey ; a harbour somewhere in Tees Bay ; a harbour somewhere about Sunderland, and a harbour somewhere about the Tyne ;—harbours such as vessels frequenting the coast could enter at all times of the tide ?—I don't think two millions of money would go farther than improve one a little more than to make it sufficient for what is required to give refuge to the trade.

16,878. But should it be found that the expenditure of two millions would do what I have named, whether would you spend it in that way, or at this particular place, with the view of saving life and property ?—What is the depth of water we must come to ?

16,879. Take 20 feet at low water if you like ?—Then I say it could not be done with the money.

16,880. But presuming it could be ?—Well, then I think there would be too many harbours of refuge.

16,881. But say the Government should arrive at a different conclusion ?—Well, it is a very particular question.

16,882. It is a particular question, I know that ?—I think it would require a great deal of consideration before I could properly answer it. What would be the use of having harbours of this sort so close together on this coast, or any other coast, I don't know. From the gradual increase of the shipping on the north-east coast, I am aware that if a first-class harbour of refuge is not now made through the representation of the present Commissioners, one will ultimately have to be made, and should a small one (in the meantime) be constructed upon the site most suitable for the large one, the result would be ruinous.

16,883. If there were so many harbours, would you consider it necessary that each should have space for refuge for ships besides those engaged in the trade ?—I do not ; because if you improve these harbours beyond what is called a simple tide harbour, you must go to this extent : you would encourage destruction of life and ships rather than the safety of life and property. Just say that there is a foot more water at a port, and you will find a dozen ships more there to-day than yesterday.

16,884. Assuming that these harbours were made so that vessels could take them in an easterly gale and at all times of the tide, would that tend more to save life and property than the construction of one great harbour ?—It might do to have more than one harbour, but there might be risk to a certain extent ; a man passing between two harbours might lose his life by not determining in time which to take.

16,885. Then you consider it would tend more to save life and property ?—I would construct one good harbour before I would improve the others : and I am very anxious to see one good harbour made on this coast, if any assistance is to be rendered by Government to any extent, but at the same time keeping the present harbours within certain limits.

16,886. Is it your opinion that one good harbour would do more to save life and property than making all these harbours accessible at all times of the tide ?—I decidedly say that two millions spent upon one harbour would do more to save life and property than if those other harbours were improved ; and one reason is, I don't think any of those harbours can be improved beyond a certain extent ; or then you would do an injury ; as those connected with rivers could only be used in bad weather with safety during the flood tide, or there would be a danger of losing life and property. Because, if you contract the tide it makes the sea on the ebb break heavier by increasing the current.

16,887. (*Capt. Washington.*) You stated that for 12 years you have been haven-master at Hartlepool ?—I have.

16,888. Prior to that how had you been employed ?—In the Surveying Department of the Government for 16 years, under Captains Slater and Otter.

16,889. Were both those officers employed surveying the north-east coast of England ?—They were.

16,890. Did they survey Hartlepool Bay ?—Captain Slater did ; I assisted him. That was in 1838.

16,891. Do you know whether his soundings were reduced to a certain datum ?—They were.

16,892. Were the soundings you have referred to reduced to the same datum at low water ?—To the same datum.

16,893. Was the principal part of your survey service in soundings ?—Not the principal part.

16,894. Were the principal part of the soundings done by you ?—Yes.

16,895. Was the Admiralty chart of Hartlepool Bay done by you ?—It was.

16,896. You have had 26 years' experience with the lead and line ?—Not exactly with the lead altogether.

16,897. Were the soundings you referred to soundings made by yourself or superintended by yourself ?—They were superintended and registered by myself.

16,898. Then you can speak bonâ fide and correctly to the soundings you have named ?—Decidedly.

16,899. Do you remember any soundings being taken at Hartlepool in 1836 by the late Francis Giles ?—I do not know anything about them.

16,900. Is there any records in the Hartlepool Commissioners' Office with reference to that document ?—Not that I am aware of. I have heard of Mr. Giles, and that he made the survey of the bay, but I have not seen it nor his datum. I should be very glad if I did, because I should be able to compare the total result of my observations for the last 12 years, about which there is so much difference. I wish I could find his datum.

16,901. Do you attach value to a sounding unless you know what datum it was reduced to ?—I would not give that for it.

16,902. Then any comparison as to the decrease of water, on a comparison made with Giles' survey and another, you would not place any dependence on ?—I would not, his datum being wanting.

16,903. Do you remember a gentleman named Mr. Cockburn Curtis coming to Hartlepool and

making an examination of the bay 10 years ago ?—I do.

16,904. Did he take any soundings ?—He did, but not to any extent. He took a section of soundings, I think from the Commissioners' harbour to a place just to the southward of the entrance of the west harbour. He would have taken more soundings if the weather had permitted.

16,905. Was there some one watching the tide gauge while he was taking them ?—Yes.

16,906. Were the soundings reduced to the same datum as the others ?—Yes.

16,907. Since the survey was made by Captain Slater in 1838, what other surveys have been made ?—I think Mr. Calver made a survey in 1846.

16,908. Did you compare that survey of 1846 with Captain Slater's of 1838 ?—I did not.

16,909. Did any one ?—I compared my own that I made with Captain Slater's.

16,910. You made a survey in 1846 ?—Yes, previous to Mr. Calver making his, and I compared it afterwards with the survey I made in 1838.

16,911. Our real object is to get at the truth of the soundings ?—I will be most happy to give any information of what belongs to the bay.

16,912. So I should say from my long experience of your character. Did you find any great difference between the soundings in 1846 and those of Captain Slater ?—I did. About the three-fathoms line I found a difference in one spot of three feet.

16,913. Was it a decrease of depth ?—It was in a particular spot of the bay, as if at the bottom of a pit.

16,914. Will you state where it was ?—(*Witness indicated on the plan.*)

16,915. Then on this Admiralty plan of Hartlepool Bay, numbered 1628, you have drawn a line showing where you believe the three-fathoms line to have been in 1846 ?—That portion of the three-fathoms line that projects to the westward with a curvilinear form does not appear the same from my soundings taken in the bay in 1846. The three-fathoms line became more of a natural curve across the bay, but had progressed somewhat seaward in the adjustment of the contour lines.

16,916. This line you have drawn only makes a difference of 12 inches of water ?—I think exactly in that place it appears to be two and half or three feet shoaler since 1846. I have an annual survey from 1846 inclusive, except 1857, when my duties called me away from the bay.

16,917. Will you state any change that resulted from your survey ?—I know of no material change. The physical workings of this bay show an inclination to deepening instead of shallowing. That is the result of my observation of the physical operations of the bay.

16,918. You have heard the statements read to-day from Mr. Cockburn Curtis's report ?—I have.

16,919. Do you know what foundation there is for the statement that there is a decrease of water in the bay ?—I believe this statement was founded in some measure from the contour lines on my own plan. I should have no hesitation in drawing a tracing of it, and you would then be able to see in the zigzag course of these contour lines what a large matter some parties are inclined to make out of a small one.

16,920. I think the occasion of Mr. Curtis's coming down was to report on the design proposed by Mr. Rendel, was it not ?—No, I think it was an extension of the west harbour.

16,921. Who did report on Mr. Rendel's design ?—Mr. Rendel himself.

16,922. Did not Mr. Calver report upon it ?—Yes, he did.

16,923. Was he not in consultation with you, and had access to your charts ?—I believe he had them all at Sunderland.

16,924. Had he all the plans he required ?—He had.

16,925. Do you know what the main object of Mr. Calver's report was ?—I do not ; but there were many observations in it which I did not agree with.

16,926. Mr. Rendel's design was for a close harbour ?—It was.

16,927. If I remember right, Mr. Calver's object was to show that a close harbour would not be a safe design for Hartlepool Bay ?—I believe it was.

16,928. It is true, I suppose, that he would make the utmost of every slight deposit of sand by which to support his own argument ?—There is no doubt about it.

16,929. Have you anything further to state about the soundings in the bay ?—Nothing, except that I trust what I have said will be taken as a fact so far as I have been capable of making observations ; and that it shows that since 1846 the tendency of the bay generally has been to deepen and not to shoal. I have taken soundings over a certain portion of the bay, and I have connected the surveys with levels taken over all the shores where the substance is moveable, and I find that between high and low-water mark there is about half a million cubic yards of substance that I do not know where it has gone to from under my feet since 1846. That is within the limits of the bay, and as Sir Frederick Smith says, if we lose land we must gain water, we must have that quantity of water greater than there was in 1846.

16,930. Does any sluicing go on at present at Hartlepool Old Harbour ?—Yes, they have been sluicing pretty often lately.

16,931. What is the object of the sluicing ?—To deepen the bar ; or, I might add, to keep it in adjustment.

16,932. There is a bar across Hartlepool Old Harbour ?—Yes, there is what we call a bar.

16,933. We have heard something about the quantity of deposit in the Victoria Dock. Do you know anything about the nature of it ?—I do.

16,934. Do you believe it to be sea sand ?—I do not. I distinctly state it is coal dust chiefly, and the substance that is blown from the quays with the wind. It is like a piece of glue in the first instance, and if you allow it to harden and cut it, it will be as black as your hat. No sand goes in there. There may be a little.

16,935. I think you stated distinctly your opinion that Hartlepool Bay is the best site for a harbour of refuge on the north-east coast of England ?—Decidedly. Its position with respect to the configuration of the coast will tell any man the same, if he has a mind to speak impartially with respect to what we want to save, life and property.

16,936. We have heard it stated several times along the coast, that even if a harbour of refuge were made, ships bound to the Wear and the Tyne would not take it, but would go on and try to get into their own ports at all risks ?—They may have said so, but if you will make this bay a harbour of refuge and clap a gale of wind against their vessels, you will soon see where they will be.

16,936*a*. We have heard it stated to-day that in eight years 2,999 vessels took refuge in Hartlepool Bay in its present *ex post* state ?—There has an immense number of vessels come here for refuge and got cargoes on their way. When I have discussed the matter with any sailor, he has told me he would sooner go to Hartlepool than any other place on the coast, because he would always save his life, if not his ship, and if he had to put his ship ashore he could get her off without material loss.

16,937. Suppose a breakwater to be constructed by the most able engineer in this kingdom so as to form a sheltered roadstead for Hartlepool Bay, do you think there would be any risk of this filling up ?—None whatever ; but I would rather a close harbour were made ; because, in the first instance, there is a danger of ships entering the north entrance, and also the south entrance. If ships went round the pier heads in a gale of wind, most certainly you would see many of them go ashore.

16,938. Is there anything to prevent a vessel with

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a fair wind taking an entrance with 800 feet ?—No ; but I should be inclined to give a refuge harbour on this coast about 1,000 feet.

16,939. Have you any design for a sheltered roadstead in Hartlepool Bay ?—I have for a close harbour.

16,940. What is the width of the entrance ?—1,000 feet.

16,941. What would be the difficulty in taking such an entrance ?—It is not that I am alluding to, but its being too close in towards the shore.

16,942. Why do you object to an entrance close to the shore ?—Because if there is a ship on the lee shore she would very likely get a sea on the weather bow and be knocked all to pieces, whereas if she were to go in an entrance in the centre there would be no danger, as she would go before the sea.

16,943. Could a vessel take the centre entrance with the worst wind on this coast ?—Yes ; in any weather.

16,944. Do you think Hartlepool Bay should be made a harbour of refuge ?—I do.

16,945. You object to the design that has been laid before the Commissioners ?—I object to an open harbour, and prefer a close one.

16,946. Would you prefer Mr. Rendel's design ?—I would ; but it does not go far enough to seaward ; and I may explain a matter in reference to that design which no other person knows except myself. Mr. Rendel and I discussed the cost of those works in London, and he said, if he was going to draw up a design of a harbour to be made by public money, he would go to seven or eight fathoms with his piers ; but for want of funds he could not go beyond five fathoms with the entrance.

16,947. You do not approve of that design you state ?—I do not, under those circumstances. That it does not occupy area enough within the enclosure, and it does not go into deep enough water.

16,948. You do not think there would be any danger of its throwing the sand into the harbour there ?—No ; at a certain distance seaward of the entrance the bottom is of smooth rock. I have a scheme which I have given myself a great deal of trouble about, although I did not think it would come before the Commissioners. It will show you where the rocky bottom commences outside the bay. I do not put it in as evidence.

16,949. This is very similar to Mr. Rendel's ?—It is. It may almost be said to be a modification of it ; but it occupies a greater area, and goes into a greater depth of water.

16,950. And you think there should be no north entrance ?—I would neither make a north nor a south entrance into this harbour, but construct it with a centre entrance only, and I would connect the piers with the shores on both sides, and keep all tides or currents out except simply what were required to supply the interior with the tidal waters during the flood. Then everything would come to an adjustment, as there would be no opposition to the physical workings within the enclosures.

16,951. Then you do not attach much importance to the rotatory motion of the tide ?—So far as rotatory tides go I do not. But I believe the currents at this moment in the bay do carry substances to sea, otherwise I could not lose such a quantity of sand from under my feet as I have stated ; but if what may be termed detached breakwaters are raised to protect the bay, I do not know what the result would be consequent from altering the direction of the tides, and giving some fresh course to the scouring powers.

16,952. The close harbour you propose must fill and empty every tide ?—Yes.

16,953. Are you acquainted with voyages made from the Tyne, Tees, and Wear ?—Yes ; in former years I was in the coal trade.

16,954. Do you happen to have any diagram showing the position of vessels that have been out six hours and caught in a gale ?—(*Plan produced.*) This is the line of coast extending from Flamborough Head to the Farn Islands.

16,955. I see some vessels marked as sailing out of particular ports ?—There are eight,—one from the Tees, one from Hartlepool, one from Seaham, one from Sunderland, one from Shields, one from Seaton, one from Warkworth, all the coal ports on this coast.

16,956. How came they in this exact position ?—I put them in from my knowledge of the trade, and the winds on the coast.

16,957. How long do you suppose them to have been out of their ports ?—Six hours. I have put them at that position which I have frequently seen vessels in, with north-west and westerly winds, after running to the southward for six hours, which is about 36 miles from the port they have left ; and this brings them to abreast of that part of the coast known to seamen as the Yorkshire high land, or what I call the south horns of the great recess within which so many valuable lives are annually lost and numerous wrecks take place. It frequently happens that these vessels having arrived at the above position with the wind from the land, it dies away, but shortly afterwards a breeze springs up from the south-east ; they tack and stand off, the wind increasing with showers gradually veers more to the eastward, and ultimately blows a perfect storm, from about east or east by north to east-north-east. The vessels so situated are now under low canvas. Some are disabled, and the whole fleet by stress of weather have drifted several miles to leeward ; they cannot clear the land on either tack, and ultimately, first on one tack, then on the other, they drift into the heart of the great recess, where they find Hartlepool Bay directly under their lee. Talking about so many ships reaching one point at the same time, I never knew it in my life. For instance, if a fleet of ships leaves the Tyne, vessels of small draught would leave, very likely, about half flood, and the latter part of the fleet would leave about half ebb. They are then leaving the harbour during the tide about six hours, which distributes them for many miles along the coast, and how can they reach one point at one and the same time ? I have heard a great deal about ships dodging in Filey Bay, and about seeing a great many vessels collected there, but it has always been in south-west winds ; and very likely, when standing off on the first of the flood, if you do not keep a sharp look out, you will have a light collier coming down and knocking your bows in. That is the way I believe collisions take place so frequently off Flamborough Head. I never saw more than 50 or 60 in the bay at once.

16,958. No doubt a good many vessels collect about Flamborough Head. Do you believe the statement we have heard to be greatly exaggerated ?—I do. I never saw a fleet of 700 ships off Flamborough Head or even in Filey Bay.

16,959. If Filey Bay could be made a good shipping place, it would be a great advantage ?—It would ; but it is not the place for a harbour of refuge. I have seen Mr. Coode's plan. It is all right enough, but I do not like it, in consequence of its being what I call a one-sided harbour. I would rather he had made his entrance in the middle, and divided his south pier, and brought a portion of it off from the shore.

16,960. Have you ever been in the Baltic trade ?—I have.

16,961. For some years ?—Oh yes.

16,962. What is the land that ships bound from Hamburgh usually make ?—In the back end of the season, they will steer for what they call the Yorkshire highland, that is the Cleveland Hills.

16,963. Is it very well known among all sailors as the Yorkshire highland ?—Oh yes.

16,964. But in a south-west wind, are they not often driven down to the coast of Scotland ?—Frequently ; I have known ships driven down there repeatedly, and get into both the Orkneys and the Shetland Islands. If the wind is from the southward and westwards, they would endeavour to sight Buchan Ness, because Buchan Ness is well known, and a prominent place to make.

16,965. Then, if there was a stopping place for those vessels at Peterhead, it would be a great convenience ?

—It would, at Wick or Peterhead. But I would make it at Wick, and I would make a secondary one at Peterhead, but I think the one would be wanted ten times for the others once.

16,966. For what vessels, particularly, would a refuge at Wick be wanted ?—For those vessels going through the firth, and it would be an act of charity to make it, in consequence of the loss of life and property in the fishing trade.

16,967. Were you not surveying for Wick Bay ?—Yes.

16,968. Would there be any fear of that bay silting up ?—Not the slightest. There is not a particle of sand about it, except what you may carry away in a wheelbarrow in a day.

16,969. If you made a harbour of refuge, would you enclose the whole bay ?—I would.

16,970. But seeing the Pentland Firth is open in the worst winds that blow, and that there are certain harbours in the Orkneys, would you still think it necessary to put a harbour of refuge at Wick ?—Yes ; because in the heaviest winds on that coast, taking the Firth is so dangerous. There is such a sea breaking in it, and I know from actual measurement that the tide there runs at 11 knots an hour ; when surveying with Capt. Slater, I found it run from 9 to 11 knots.

16,971. And do sailors generally think the navigation of the Pentland Firth extremely dangerous ?—They do.

16,972. Do you happen to have seen in the *Times*, within the last 10 days, that a vessel in the Pentland Firth had had her decks washed, and 10 of her men washed overboard ?—I have not seen it, but I should never dispute it. I came through once with all hands driven to the mastheads to save life ; our vessel went through like a water duck.

16,973. Would sailors, if they could avoid such a piece of navigation, trust themselves in it ?—I think not, if there was a better place to go to.

16,974. Are timber ships coming home from North America in the fall of the year ever caught in the Moray Firth, and driven back ?—Frequently, when they might go into Wick. A ship will be coming down sometimes from the westward with a fine breeze, just as little wind as you could wish to go with pleasantly, and directly she comes to the eastward of the land she meets a gale of wind. If she goes back into the Pentland Firth it is ten to one but that she gets her decks swept, and she has to go at all risks to the north ; until the tide will suit her she dare not go into the Orkneys. Under these circumstances, if a harbour of refuge was made at Wick, a ship could go into or come out of the firth without danger.

16,975. I am bound to say that from the reports of Captain Otter, and the other officers with whom you have served, they have all said that a more faithful servant to the public they had never had under their orders than yourself ?—I can only wish to return my thanks to Captain Otter and his officers for their compliment. It is about all the remuneration, except the regular pay, I have received from the Government for the long time I served them in that service. I hope it will pass through your hands into Captain Otter's, under these circumstances.

16,976. (*Capt. Sulivan.*) I hope it has led to your getting a good berth here ?—I don't complain of it.

16,977. Do you know that last year 1,060 vessels took refuge in Scrabster Roads, immediately to the west of the Pentland Firth. Would you think that a pretty convincing proof that a large number of vessels would equally use a harbour of refuge if made to the eastward ?—Decidedly, because two harbours so situated directly balance each other.

16,978. With reference to Peterhead, do you believe any ship could be caught in a gale of wind, under the ordinary circumstances, and could not get from the land on one tack or the other ?—If she could not get into the Moray Firth she could go up the Firth of Forth.

16,979. Then do you think ships are in such danger off that north-east point of Scotland as to justify the outlay of public money for a harbour of refuge in a place in that neighbourhood ?—Decidedly not.

16,980. Do you consider a harbour of refuge at Hartlepool, 40 or 50 miles south of the coal ports, has a great advantage, that vessels having shortly left their ports, and being caught by foul and dangerous gales, have it under their lee ?—Yes.

16,981. Would it not be the case that if Hartlepool ships advanced an equal distance to the south they would find an equal benefit if they had a harbour as far to the south of Hartlepool as Hartlepool is south of the Tyne ?—Of course, if they get so far south.

16,982. You have placed these ships very closely to the land ?—I have placed them according to the distance I know they pass the land.

16,983. Do you mean that vessels have a choice of shaping their course leaving the Tyne would be as close in as these are placed ?—The Tyne vessels are upon a course that they would pass within a mile of Flamborough Head.

16,984. We have been told that ships to avoid this bay always get more offing than a straight line, so as to go down for Flamborough Head rather more to seaward ?—They do.

16,985. Then they would not be so close to the land as you have drawn them ?—Not with the wind from the east.

16,986. Do ships going along with the wind from the land find it draw to the southward when they are off Flamborough Head more than any other place ?—In leaving the Staples and shaping a course for the Dudgeon light vessel or Flamborough Head the difference is very little. Immediately you get in the vicinity of the Yorkshire land you find the wind incline more ahead of you. That is where the adverse winds take place, both when the vessel is bound north and also when she is bound south ; you will find that vessels will come down here from the southward light, and as soon as they commence to round Whitby Point the wind comes out of the bay from the north-west ; this is when it has been rain with the wind from the southward.

16,987. You have heard the remark made that in the gale in January 1857, which caused such destruction of property, a larger number of vessels were wrecked in this division of the coast than in the Filey division. With your knowledge of the route vessels take, and as a seaman, do you believe that if these vessels were all, as we have been told, caught off the Flamborough Head, and that a certain portion of them weathered Whitby and fetched into Hartlepool, that any one of the captains who lost his vessel between Flamborough Head and Whitby would not have weathered Whitby, and sailed off the land and endeavoured to get to Hartlepool, if he possibly could ?—Yes ; when he came to find himself in danger. But, I believe, if these vessels were lost there, it was because there was no harbour of refuge in the Bay of Hartlepool.

16,988. But is it so at present ? For the saving of life and property is not the Tees Bay altogether more a harbour of refuge than a ledge of rocks, and are there not more facilities for saving the crew of a stranded vessel than in any part of that iron-bound Yorkshire coast ?—Yes.

16,989. Then if you were situated as any of these men were, in command of a ship, and you knew the weather and all the circumstances off Whitby land, would you endeavour to run your vessel on shore in the Tees Bay, if you could fetch it, or would you have allowed your vessel to go on shore between Whitby and Flamborough Head ?—In the Tees Bay, decidedly.

16,990. Then do you believe that all these men lost off Flamborough Head were so far to the southward that they could not weather the Whitby land ?—Yes ; or they would not have been lost. And I believe the cause of these vessels being lost, after I understood there were some other vessels in company with them that had run to the northward and been saved, was that they had tried to hang out too long and could not get to Hartlepool.

16,991. Fourteen vessels in one case, and 27 in

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another, were colliers loaded, and supposing they were off Flamborough Head when caught, had there been a harbour of refuge in Filey Bay, could the greater number of those vessels have got into Filey Bay ?—I do not know that they could.

16,992. Would those vessels that had gone off the land with a south-east wind when the wind drew to eastward have been able to fetch Hartlepool ?—Yes.

16,993. Might not the ship that fetched Hartlepool have been more to windward than those vessels which could not weather Whitby?—I do not know.

16,994. Those that were wrecked at Hartlepool Bay were those that went further off the land and were more to windward ?—No, I think not.

16,995. I want you to give me the general question as to the loss of vessels which did not get into Hartlepool ; might not they have been in that portion of that batch of vessels that were further to windward when the wind came round to the eastward, and so were not able to fetch Hartlepool ?—I do not know that.

16,996. If the wind veered to the eastward would not the most easterly ship and the furthest from the land have been most to windward, and therefore most likely to fetch Hartlepool ?—Yes ; if they were determined to do so.

16,997. Then all the vessels between Whitby and Flamborough Head could have got into a harbour at Filey ?—If they had immediately taken it when they first met with the wind from the southward and eastward they might, but I do not think they would have gained it afterwards.

16,998. Is it the very great object in laden vessels to prevent running back if possible, and holding their own if they can ?—Yes, decidedly.

16,999. Then if the gale did begin to the south-south-east and freshened very rapidly into a gale, and drew round to the eastward,—if the vessels rounded Flamborough Head when they found the gale coming on, and knowing that there was a harbour in Filey,—if they had borne up could they have got into Filey ?—I believe they would not immediately have gone into it. They would have endeavoured to keep the sea until they saw what the weather was going to be.

17,000. If you were off Flamborough Head under the circumstances, in command of a vessel, a collier, and there was a harbour in Hartlepool or Filey, which would you go to ?—I would go to the first that I could go to with safety.

17,001. At Filey Bay or Hartlepool ?—I would take the harbour most advantageous to my prosecuting my voyage.

17,002. So far as I see by the chart, the course from Filey Bay to Flamborough Head and the course from Hartlepool, is very similar ?—The land is very similar, but you have the advantage of a weatherly position at Hartlepool.

17,003. If you had your choice, and was bound south, would you rather go into Hartlepool Bay than Filey Bay to be in a position to sail for London again ?—Yes.

17,004. By the Government returns we find that the number of laden colliers lost to one of light are as 5 to 1. The loss of life is double in laden colliers compared to the loss in light. Have you any reason to doubt that ?—I believe that on this coast we have more light ships ashore than laden ones.

17,005. Do you think a great many more lives are lost in laden colliers that are wrecked than in light ? —There is a greater chance of a laden ship's crew, if she gets the ground, being lost, than a light one's, because a light ship will in all cases go nearer to the shore than a laden one.

17,006. Many laden also founder before they can reach a port, do they not ?—They do sometimes, but more readily when they get disabled.

17,007. Suppose this return to be correct, and that four or five to one were laden, would you then consider that a harbour of refuge should be especially made with regard to laden colliers or light ?—Decidedly I should prefer making it for the benefit of the laden ships.

17,008. With reference to what you said of the important coal ports, do you believe from what you know of the tidal harbours and bars of these rivers, that any outlay of money should be made for a harbour of refuge, closing the mouth of one of these rivers within it, with a certainty that in years to come it would remain available as a harbour of refuge, and that there would be no fear of its ever silting up ? — I should not recommend the entrance of a tidal river to be enclosed as a harbour of refuge.

17,009. Suppose that 15 feet will be obtained at the entrance of the Tyne at all times of tide, would that become then a very available harbour of refuge, more especially for light vessels running to the northward ?—Oh dear, no ! it would not be what I call an available harbour for light vessels, because I do not see where they are to lay them ; below the Low Lights there is no accommodation.

17,010. I am speaking of entering and running up this 15 feet channel ?—I am not at all certain at this moment but that if they make 15 feet into the Tyne they will cause a lot of wrecks at the mouth of it, unless they can go to this extent—that a ship can go in and float all over the outer portion of the harbour, because ships would run to it, expecting there was more water at it than they would find.

17,011. But would it not be an available harbour of refuge if there were 15 feet at low water ?—It would be a convenience.

17,012. It would save many from wreck in that neighbourhood, would it not ?—I do not say but what it would.

17,013. And therefore would become an auxiliary harbour of refuge on the north end of this district ?—The worst thing in the Tyne being a harbour of refuge is that you cannot turn a ship round in it.

17,014. But compare 15 feet at low water with its present depth, and say whether, the improvement being permanent, it would not make a comparatively useful harbour of refuge for light colliers ? —Certainly, if it could be made permanent it would be valuable, and therefore would be an available auxiliary harbour of refuge.

17,015. If, on the other hand, they fail in getting that depth of water, would you consider that a proof that any Government grant spent for the purpose would be thrown away ?—Decidedly.

17,016. Would the same remark apply to Sunderland as another tidal harbour ?—I think the same remark would apply to any place that had a tidal river to contend with.

17,017. You said something about prejudice at other ports, I suppose you allude to ports that trade— the coal trade competing with those ports ?—I did.

17,018. You cannot apply any remark of that kind to a place in an open bay with no trade, like Filey ?— No, any remark I make about Filey, or any other place, I make as I think.

17,019. I am certain of that ?—I have no interest in any matter whatever but the benefit of the public.

17,020. That I firmly believe, I assure you. With reference to the collisions, do you believe that a large proportion of collisions are caused by the number of steamers that pass this place meeting numbers of sailing vessels, by vessels meeting each other off these places even in moderate weather, and therefore that collisions do not so much apply to a harbour of refuge ? —I am not aware how the collisions altogether take place. I believe many collisions might be avoided if a better look out were kept on board the steamers. I have had to do with steamers, and other vessels, and I was never afraid of running any ship down, but I have been afraid of being run down. There is an excuse for sailing vessels getting into collision, but none for a steamer.

17,021. Do you think collisions apply much to the question of a harbour of refuge ?—I think not so much as general trade. Collisions are not caused by vessels trying to reach one harbour or another.

17,022. (*Mr. Coode.*) You said you did not approve of an open breakwater at Hartlepool, because you did

not know what the result would be; will you tell us what you allude to as that result ?—I did not mention the result.

17,023. In speaking of the comparative advantages of the two plans, I understood you to say that you did not approve of an open breakwater, because you did not know what the result would be ?—I should not say I did not, but I do not remember saying it. I said I did not know how it would affect the tides. There are many different tides in this bay. If the detached piers were constructed, I do not know how it would affect the tide. It would take about three times as much area to hold a ship in an open harbour as it would to hold one in a close harbour, in consequence of the tides and the different motions a ship would be affected by. In a close harbour everything is adjusted, and all vessels in it ride one way, therefore you could always calculate upon half a cable holding a vessel, where you must give her very likely the whole of it in an open harbour where the tides are running and heavy gales blowing.

(*Chairman.*) Your examination will be resumed the first thing next morning. The Commission is adjourned till 10 o'clock to-morrow morning.

Tuesday, 19th October 1858.

PRESENT :

Admiral Hope (Chairman).

Sir F. Smith.
Mr. Lindsay.
Captain Washington.
Captain Sulivan.
Captain Vetch.
Mr. Coode.
Mr. Evans (Secretary).

Mr. Ralph Ward Jackson re-examined.

(*Mr. Jackson.*) I was going to intrude myself upon you for one moment, I have one or two more charts I ought to have given in yesterday. I have them in the room, and will either give them in now or at another period.

(*Chairman.*) Certainly.

(*Mr. Jackson continued.*) That is the map which has been very carefully prepared, and was the subject of very considerable discussion in both Houses of Parliament during the present year, and it shows the entire coalfield connected with the limestone of the counties of Durham, part of Northumberland, and the ironstone of Cleveland, giving, in fact, a coast line from North Shields to Runswick Bay, with the great mineral wealth that is on that coast line. The coalfield has been laid down by an eminent authority in the north of England, Mr. Nicholas Wood, and is accredited by Professor Phillips, as being correct. The ironstone field mentioned yesterday as containing 200 square miles is laid down by Mr. John Bell, of Newcastle, a man thoroughly acquainted with the geology of this country, and is also accredited by Professor Phillips. I put these in as showing the great mineral wealth of two most useful productions of the earth, coal and iron, immediately on the coast line for which we are now considering a harbour of refuge. I was also asked to report the number of lives that have been saved by Hartlepool boats, as well as those I mentioned by West Hartlepool boats. I find from the pilot-master, who generally is in command of the Hartlepool life boats, that from the year 1846 up to the present time, including the lives saved from the wrecks shown on the Hartlepool chart, the lives saved at Hartlepool were 337 ; West Hartlepool 220, making a total of lives saved by the two Hartlepool boats, of 557 since 1846, besides 90 odd that had unfortunately perished, as I stated yesterday. (*The witness put in the Maps and this Return.*) I may also mention, that after the meeting yesterday I communicated with the contractor, whom I had mentioned as having given an estimate for the proposed sheltered anchorage or breakwater, that I submitted to the Commissioners yesterday, and he has revised his estimate, and I have revised my plan by reductions from it. I take the liberty therefore of placing before the Commissioners a work precisely similar in point of character, but reduced in area and very materially in cost, in consequence of its near approach to the shore, and the ability of the contractor in that case to execute the work by staging instead of, as he had previously contemplated, by the sea, making so much difference as to come within one million sterling for a work of 1,286 acres, making it 989,520*l.* instead of 1,604,175*l.*, which was the estimate for the seven-fathom anchorage that I proposed. Of course if you go to nine it is increased, but I have brought it down to seven, with the breakwater approaching the shore, and with greater facilities to get off the land. I have coloured this design blue, and have a tabular statement of the area, which I will now read shortly. The area of seven fathoms to low-water mark, spring tides, 1,286 acres ; the area in five fathoms and upwards, 210 ; the area in four fathoms and upwards, 493 ; in three fathoms and upwards, 815 ; in one fathom and upwards, 1,170. The estimate is signed by Mr. William Hutchinson, who has executed works under my own direction, contracts of upwards of a million of money, and I have always found he has been pretty correct in his estimates, in fact, I never have had five minutes trouble with any work for which he has estimated ; and he states the statute mile to be 621,984*l.* ; the length of both breakwaters is 2,800 yards, and the total amount (the prices exceeding in fact those which I know are paid at Holyhead) is 989,520*l.*

17,024. (*Mr. Lindsay.*) What is the total length of the breakwaters ?—2,800 yards.

17,025. Do you include the piers running out from the Heugh ?—Yes, I should tell you there is a pier there which would be suitable. It is not exactly in the construction, but it is in the piers. It is a small spur pier run out entirely from the land.

17,026. The breakwaters will be about 2,800 yards, without the piers ?—Yes.

17,027. Will you state the length of the piers ?—It is about 500 yards, but it is immediately between high and low water mark.

17,028. Then there is a breakwater of 2,800, and a small pier of 500 yards ?—Yes, there is a substitute for that, but there is another pier which has been made, and the material from that would go into the other.

17,029. This pier (*that in the design*) you would take down and remove ?—Exactly. There would be a little addition, but the contractor has put liberal prices in order to include the whole.

17,030. (*Capt. Washington.*) Then you withdraw your plans of yesterday ?

17,030 *a.* (*Chairman.*) Have you any statement to make with reference to this new plan before the Commissioners proceed to examine you on it ?—No.

17,031. (*Sir F. Smith.*) What is the total area you propose to include in the new plan ?—1,286 acres is the low-water area.

17,032. What do you propose to include by the other plan ?—Nine fathoms.

17,033. Am I to understand that the blue plan breakwater and the red breakwater are in the same

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sounding ?—A portion of the seven-line breakwater is brought nearer land and a little shortened.

17,034. What is the dimension in the actual length of the whole project—the lineal dimension I want to know ?—The seven-fathom design.

17,035. The outer or inner ?—The outer one is 4,474 yards.

17,036. Including the pier fetched out to land ?—No, because in the other case that is a separate work, and a portion of the other work would be obstructed. I have not included it in the length, but it is included in the price.

17,037. It would be convenient for the Commissioners, if you would give the total lineal length of the works you project ?—The spur pier for the nine-fathom design is 400 yards. May I ask, do you wish to have the breakwater separate or the aggregate ?

17,038. Aggregate?—It is as I stated yesterday, and is part in the 4,474, it is 4,500.

17,039. That is the large scheme, now the next scheme ?—3,650.

17,040. And the blue scheme ?—2,800.

17,041. Your larger schemes were the result of very long consideration, were they not ?—They were, and this other scheme itself has been laid down to the other extent. Really since you commenced your labours I may observe, that there was a general desire to make an efficient, a large, and comprehensive harbour. I had no means whatever of judging what would be sufficient for such a purpose, and I therefore, out of my own head, suggest this as a comprehensive measure.

17,042. Naturally looking to the expense, you at that time considered it would not be more than sufficient for the purpose ?—Oh, I don't know what money the Government were prepared to advance ; I never looked to the money.

17,043. Without referring to the Government grant, my question is not directed in that sense at all. I say, I presume you considered the question of what in your opinion would be requisite, having of course a view to the expense ; but if you had not a view to the expense, you would have had a still more gigantic scheme ?—I looked at the measure knowing that it would be an expensive one ; but really with a view to give a very large protection for anchorage on this coast, suitable, I don't hesitate to say, for Her Majesty's navy as well as mercantile marine.

17,044. Had you no project matured when you appeared before the Select Committee of the House of Commons ?—No ; except I spoke of one which is upon the wall, that was the only thing then considered by the Port Commissioners, and they have themselves, as a body, not considered anything else.

17,045. I suppose the Commissioners are to understand that you consider the plan you proposed yesterday is more than sufficient for the purposes of trade and the navy ?—Well, I won't say for the navy, because they might go to a very large extent, but for mercantile protection I think it is too large. I don't think it is necessary. It would be very good to have such a thing as this, but I don't think it absolutely necessary, and I would be satisfied with less.

17,046. When has that conviction come over your mind ?—As to what ?

17,047. As to the money that is sufficient for your large total ; you say you think it is more than sufficient ?—I only formed my conviction the very moment you asked me the question. If you ask me my suggestion for a mercantile marine, then I answer, that the nine-fathom line is not, I think, necessary. But if you ask me, at the same time, to include the navy then I think it is necessary.

17,048. Of course you will understand the duty of this Commission in recommending any site for a harbour of refuge is to see that it is sufficient for the purpose. The difference of the two plans—that of yesterday and that of to-day—is so considerable, it is necessary that we should have your reasoning and arguments to show that the present plan would be sufficient ?—Then I unhesitatingly state that it arose entirely from the examination yesterday of myself and Mr. Mossman. I observed that the great question was, how little can be done in point of construction, and how much can be effected consistent with that grant for protection, and several questions were asked me, I think, as to 600 feet for an entrance. I felt quite sure that 600 feet would do entering, but it won't do very much further out. And it was asked by several honourable Commissioners, how many ships did I think it would be requisite to shelter, and how much each of the harbours would hold, and then leave as many for a sheltered anchorage. And I remember making the remark, from a question by an honourable Commissioner, whether if there were 1,000 they could not all be held in the present docks, that I should be sorry to see them there. It would destroy trade, because there must be trade going on as well as shelter to wind-bound ships ; and it was simply and solely with that view that I had called the contractors together to ascertain what, if the plans were reduced and brought under, the work could be constructed for.

17,049. I hope you are not bringing before us a project solely to meet a question of expense ?—Oh, no !

17,050. But a project which, if carried out, would be sufficient for the purpose. In the largest plan of the three what amount of accommodation do you propose to give ?—In the nine-fathom, 1,650 acres ; in the present plan, 1,286 ; and consequently, though I press the same design, I feel persuaded that it is a correct principle to act upon. I don't say that professed engineers might not suggest some little alteration. But I think the principle is right for an open roadstead or sheltered anchorage.

17,051. Then I presume the Commissioners must understand your first projects are the maximum harbour you require ?—I think so.

17,052. And that the blue is the minimum ?—It is difficult to answer a minimum. You see, suppose we were to construct the blue, and then by the progress of the commerce of this country, which no human mind can grasp, we find it insufficient, my saying it is sufficient to-day would certainly prove to be an incorrect opinion.

17,053. But what position would you put the country, the Commissioners, and the House of Commons in, if you commenced the construction of this harbour of refuge, and then turned round and said "It is true you have voted a million of money for the blue harbour, but I have changed my mind, and it is not sufficient ?"—If it was not the mercantile marine, I am satisfied with the blue plan.

17,054. Then the Commissioners are not to expect, in going minutely into the estimate for this project, if they find it comes to considerably more than you have calculated upon, that you would then reduce the plan a second time ?—If you tell me that you are only going to spend a certain sum of money, then of course you must be content, and you bring the harbour to the money. But if you ask me what is beneficial to trade, the money question does not enter into the consideration of the amount for a great efficient harbour. If it was a man who has had any means to apply it he would take the money, and if you confine the grant by Parliament to a sum of money then you limit of course the work to the money.

17,055. I don't expect that will be the course of action of this Commission, or of the House of Commons ; but if the House of Commons sanction the public funds being applied to the purposes of a harbour of refuge, they would be very unwise if they sanctioned any grant whatever that did not effect the object required. Therefore, I apprehend that the first step is to ascertain what is the minimum project that you can lay before us ; and then it is for us to ascertain what that will cost, and for the House of Commons to determine whether they will grant the bill. We cannot recommend a project if it should be insufficient for the purpose ?—Then I may consider myself responsible for what I am going to state. As one of the Commissioners I supported the application to Parlia-

ment, and Parliament granted that application for the conversion of the bay of Hartlepool into a harbour of refuge, of the dimensions shown upon the chart upon the wall. The prices paid for constructing those piers I do not discuss at this moment, it is irrelevant ; but the Admiralty, when we were at Parliament, required to have control in the construction of these piers, and any person there at the present moment can form an opinion what course ought to be adopted. Parliament had sanctioned that work, subject, of course, to the construction of the works as the Admiralty may be advised. That is the minimum that Mr. Rendel and the Commissioners who employed him thought was required for that bay. But Mr. Mossman stated to you yesterday very truly, and I confirm it, that Mr. Rendel was hemmed in by money ; and had the Commissioners given him any encouragement, and given him 200,000*l.* or 300,000*l.* more, he would have gone to seven fathoms instead of stopping at five. That is the precise position in which we, as public trustees, are. We are fortunately conservators of a bay which is capable of very considerable protection. Give us the money, and we will take it out to five, six, seven, or any other depth. But Mr. Rendel said that it was within the scope of the Pier and Port Commissioners, in conjunction with some Government aid, to construct works which would give an area as shown on these piers ; and I follow Mr. Rendel in his wish, and go for the seven fathom if we possibly can.

17,056. I want a distinct answer whether is this your minimum project ?—Do you mean the minimum according to my ideas of the requirement ?

17,057. Yes ?—No ; I think enclosing a less portion, namely, the five-fathom, would be of immense advantage to this coast.

17,058. I wish to know whether, according to your present view, that would be your minimum plan ?—My minimum plan would be the five-fathom ; but my preferable plan would be the blue plan, if I could not get the nine.

17,059. Then if you find, on going more minutely into the estimate than you have been enabled to do during the night, the amount was not what you thought could reasonably be expected from this bay, you would still be disposed to give in a small plan coming to five fathoms ?—I would. It is in fact making a harbour to the money.

17,060. But still making a harbour which is still sufficient for the purpose of saving life on this coast ?—Then I don't hesitate to say that for saving life and property in connection with ships, the minimum would be the plan of Mr. Rendel. If the enclosure was to be reduced to five fathom, of course the expenditure would be proportionably reduced from that which I have given in this morning, namely, 900,000*l.*

17,061. Are the piers on which the estimate has been reduced the same as those that you calculated in the larger amount ?—They are materially reduced from the simple circumstance that you are closer to the shore, and would be able to execute the whole work by staging.

17,062. But so far as regards that portion of the work which is nearest the shore ; would that work be done at the same price as the other project would be ?—It would be materially lessened.

17,063. I do not precisely see why the shore end should not be made at the same cost as in the other instance ?—A contractor, I apprehend, in laying for a whole work would have to regulate his gearing and plan on one distinct principle.

17,064. Do you think, as a general principle, that larger work is done at less proportionate cost ?—Not if you are farther out at sea ; but I am talking of the same depth of water and the same distance from the shore.

17,065. I should think the cost would be, if not the same, at least less in a larger length ; because the same plant and the same establishment would carry out the progress of the larger work ?—I am not a contractor, though I have had a great many works under my superintendence and suggestion, and I can give you no evidence of that nature.

17,066. In the course of the night you have had before you a new project and a new estimate, and you come to us this morning established with a statement made to you by your contractor, who has never failed you in any previous instance ; and therefore I presume that, as a man of business, when your contractor shows you the diminished cost, you ask him what has enabled him to do so ?—I do ; but I feel perfectly satisfied that the contractor has given more liberal prices for that description of work than those which are paid at Holyhead.

17,067. I beg you to understand that I am not cross-questioning you with a view of leading you to contradictions, but really for the sake of obtaining information ; and I think you are quite capable of giving it, because you have had before you the contractor, whose statement you have sifted ?—He has made a statement that rubble work will be put up at a higher price. The masonry, which is the most expensive work, he keeps exactly the same as in the larger plan.

17,068. At what distance does he propose to get the rubble ?—Within two miles of the place.

17,069. Where is that ?—A little north-west, as inland.

17,070. You don't contemplate getting any portion of the materials from the rocks along the shore ?—No ; not an inch, I hope, will ever be taken away.

17,071. You had better leave them alone ?—Oh dear, yes.

17,072. I think it would be a convenience to the Commissioners if you will put upon the plan what is the red project, and what the blue ?—It can be done in a quarter of an hour.

17,073. I see that the length of the horns of your breakwater are very much smaller in the blue than in the red, and are differently directed ?—Slightly.

17,074. I see also that there is a breakwater which comes from the south side of the headland ?—From the east side.

17,075. Whereas in the red it projects to the sea north of the Heugh, while the other comes from the under side of it. May I ask why you have changed the position of that, perhaps, very important element in your project ?—For the express reason of my having shortened the north-east breakwater. On this coast a north-east breakwater, you will see, overlaps and entirely excludes any sea from the north. It did open to the north-east, when there could be no sea coming materially out of this bay. It lies to the north of Hartlepool Heugh ; it is perfectly straighter. I have not yet made up my mind as to the necessity of it. When you enclose the entrance to the north-east breakwater, it might be a little deflected on shore, and in that case would not be necessary at all.

17,076. Then I am to understand you desire us to consider this as a substitute plan ?—Alternative, if you please.

17,077. (*Mr. Lindsay.*) I think I understood you to say that the plan you now submit will contain an area of 815 acres at three fathoms and upwards at low-water spring tides ?—That is my calculation.

17,078. The shelter for ships will be from easterly gales within the proposed breakwaters. Will the usual class of vessels, the laden colliers trading along this coast, find safe anchorage at three fathoms in your opinion ?—Not laden.

17,079. The average size ?—The average size draws 14 feet ; drawing 14 feet and 18 feet, you know, would not do at low water.

17,080. Then you think they would require three and a half or four fathoms ?—Four fathoms.

17,081. Then the area is reduced to 493 acres of four fathoms ?—I would rather not speak as to ships ; I have not had experience of riding in heavy weather in deep-laden colliers.

17,082. I asked the question because I know you have turned your attention very much to it, but if

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you would rather I put the question to nautical witnesses I will?—I have not ridden out in a collier in a gale of wind.

17,083. What area at four fathoms and upwards did Mr. Rendel's plan give?—He does not put it in that form. He says a harbour, to be adequate for the wants of the vast trade, should be in size equal to the accommodation at one time of not less than 300 or 400 vessels of all sizes, varying in draught from 18 to 20 feet.

17,084. He goes to the point that you go between the Heugh and the rock called the Long Scar. I wish Mr. Mossman would measure on Rendel's plan, and be particular to answer the question of area. Mr. Rendel's plan gives the area at three fathoms. What was Mr. Rendel's estimate?—800,000*l.*, and 35,000*l.* for the protection of the Headlands.

17,085. In all 835,000*l.*?—Yes.

17,086. Then his piers appear to have been carried out in much shoaler water than you propose. The entrance was just at five fathoms, and of course you will see there that they receded very quickly. They do not cover much at five?—Scarcely any.

17,087. What was the difference in the length of the proposed piers between Mr. Rendel's and yours?—Mine are breakwaters, and his are piers.

17,088. When you include your piers the length is 12,300 feet. What was the length of Mr. Rendel's?—The plan he proposed was to alter the work that the Commissioners had already executed, commencing from the head, and going down upon the rocks. That was executed by the Port Commissioners,—the curves appear in a different direction, and extend 2,600 feet.

17,089. What is the length of the pier from the Long Scar?—The South Pier from its head runs south by west for 2,200 feet in from 25 to 22 feet water, leaving an opening of 1,100 feet between the two heads.

17,090. In all about 16,500 feet?—I dare say you are right.

17,091. I want to know the length of the pier which Mr. Rendel was to construct from the end of the Longscar Rocks?—5,930 yards. There is some little discrepancy between Mr. Rendel's and mine; I think he has measured it at low-water mark.

17,092. Well, as I am anxious to have it correctly down, I would like you or Mr. Mossman to answer me the question as to the area of water, after you have measured it. You got an Act of Parliament I believe two years ago, to carry out Mr. Rendel's plan?—Yes.

17,093. Why was that not carried out; was it want of funds prevented you?—We have carried out a part.

17,094. Why did you stop short?—That very great evil, the want of money.

17,095. What means did you adopt to raise the money?—We applied to the Public Works Loan Commissioners, and having laid our application before them, they submitted to me their usual questions, which are very numerous, and require a great many particulars. They require them also to be sworn to before a magistrate. These I returned, and from time to time communicated both personally and by letter—chiefly personally—with the Commissioners, with the view to raising the portion of the money, corresponding to the belief of the Port Commissioners that they would have funds to pay a reasonable rate of interest upon, and on the ground that as the work proceeded refuge would be gained, and consequently a revenue. But in the middle of that communication, the Select Committee on Harbours of Refuge was appointed by the Government, and then I received the intimation that all communications must be suspended with the Commissioners until the result of this Commission was known.

17,096. Then it was not on account of not being able to offer security in the shape of revenue present or even prospective?—I have had no answer that the security we offered was insufficient, although I cannot say our funds are sufficient for 800,000*l.* or a million of money from the Loan Commissioners.

17,097. But when you went to Parliament to ask leave to construct a harbour, you knew you would require about 850,000*l.*, and must have had an idea as to the mode and means of security you would have to give in the shape of revenue or otherwise for raising the necessary amount of capital?—This is a public trust. It is in pretty much the same position as a company going to apply to Parliament for funds to construct, as it were, a private undertaking. The Port Commission was specially incorporated for the purpose of improving the harbour, and I will read the preamble of the original Bill, which is very significant of our trust. This Act was passed on the 15th of April 1815: "Whereas the pier situated in and near the town and "at the entrance of the port of Hartlepool, in the "county of Durham, is in a state of considerable "decay, and in imminent danger of total destruction, "whereby the houses and other buildings in the "town will be much endangered; and whereas the "repairing, enlarging, and maintaining the said pier "and entrance of the said port will afford security "to the town of Hartlepool, and will be of great "security to the coasting trade of this kingdom"——

17,098. That is not so much my point. Before you applied to Parliament for a bill to construct a harbour of refuge, empowering you to borrow money for the construction of that harbour, you must have had in view some means or other of raising that money. How did you propose to raise it?—As it has been since 1813, by a small toll upon all ships that entered within what was then called the Port of Hartlepool, and by the Act which authorized the harbour of refuge these limits for the purpose of toll were brought within the area of the proposed harbour.

17,099. Then was it because the revenue, present and prospective, was not considered sufficient by capitalists, or by the Exchequer Loan Commissioners, that you ceased going on with your works, or was it because the Committee was appointed in regard to harbours of refuge, and therefore you considered it prudent and desirable to delay these works until you had had the proceedings of that Committee; which was it?—It was both.

17,100. First of all, you could not raise the money, your revenue was not considered sufficient?—Quite so.

17,101. Did you make extra exertions to raise it?—I have made no exertions since the Exchequer Commissioners intimated they could give no answer.

17,102. You and the other gentlemen connected with you, being shrewd men of business, would you have seriously contemplated the construction of a harbour of refuge in this bay, if you had had the most distant idea of its being silted up?—Most undoubtedly not.

17,103. The question of silting up was a question you, as prudent men, inquired into, I presume, before you applied to Parliament for a bill?—Most unquestionably, and it is right I should say I supported the application to Parliament founded upon Mr. Rendel's plan, and he came, upon more matured reflection and actual experience, which is perhaps the best test of the necessity of harbour works of this character, to the conviction that it is not desirable to enclose the bay, but to leave openings.

17,104. You say the whole of the Pier and Port Commissioners were unanimous in regard to the necessity of constructing a harbour of refuge?—Oh dear, yes!

17,105. But were they unanimous whether it should be an enclosed harbour or an open harbour?—I do not think that was ever decided. Mr. Rendel prepared a plan, which was under the consideration of and was sanctioned by Sir James Graham, then First Lord of the Admiralty, and they reported that we had only to apply to Parliament for the necessary powers, hoping at the same time to get the necessary funds for the purpose.

17,106. You were of a different opinion from the rest of the Commissioners as to the mode of con-

structing the harbour, as to whether it should be open or closed ?—Yes, it has never been openly discussed, except by a little conversation together.

17,107. You were of course aware that it would materially tend to increase the trade of West Hartlepool and Old Hartlepool if the bay was formed into a harbour of refuge ?—No doubt it would improve it. I maintain that it would improve any neighbouring port as well.

17,108. Then it was a question of business. Was that the object with which you went to Parliament ?—Certainly not ; because the great majority of the Commissioners were not West Hartlepool people.

17,109. But I included the trade of Old Hartlepool as well. Was it with the object of improving the trade of both places that you went to Parliament for the Bill ?—No.

17,110. Was it on the ground of humanity, then, that you as private individuals applied to Parliament to save life and property along the coast ?—We are not private individuals in this port.

17,111. Was your object then in applying for this Bill, to benefit the trade of the district within these limits, or was it to save life and property along the coast, or was it both ?—You may say both. If there had been no private harbour here there would have been no Commission applying to Parliament, and begging to extend it out of their own private pockets. We are located here with large possessions, but we hold responsible positions as Port Commissioners.

17,112. In fact you consider, as Port and Pier Commissioners, that it was your duty to protect the entrance of these harbours, so that ships could enter them without endangering lives and property ?—Most unquestionably ; the Commission existed for many years before any harbours were in this bay. They had funds which might be put down at nil.

17,113. And, with that object in view, you got a Bill through Parliament, and attempted to raise the necessary funds for the construction of piers ?—Yes ; in accordance with our original trust, that of the improvement of the port and securing the coasting trade, which is our preamble in the original charter.

17,114. (*Capt. Sulivan.*) If Mr. Rendel's plan were carried out, supposing engineers considered that was the best plan, do you think that plan would give not only a valuable protection for those ports and trade, but also a valuable harbour of refuge for all the collier class of vessels that might be embayed within that embayment ?—Do I understand you to ask me the same thing as Sir F. Smith did ? I think it sufficient.

17,115. I did not say sufficient ; I said did you consider it would become a valuable harbour of refuge for all the coasting trade of these ports that would be likely at at any time to be embayed within that line ?—I think it would be a very valuable harbour of refuge.

17,116. As Mr. Rendel appears to have had some question as to the silting up, do you not think he designed these piers at the shore with the idea of guarding against silting up, because I see by his report that he goes into that question of silting a good deal ?—I cannot of course consider what induced Mr. Rendel to lay out this enclosed harbour ; no doubt he, as as everybody else must know, that enclosing a place almost entirely, with the exception of one entrance, must make it of course nearly a dock.

17,117. Supposing the sand to be approaching the bay, either by the tide or by a tide at the Tees assisting a south-east gale, would not the continuance of a pier to the south, guard against any continuance of that contingency ?—The south pier would guard against any contingency from the Tees, or what is passing through the bay.

17,118. Conjoined with the effect of a south-east gale in throwing the sand along the shore ?—Yes.

17,119. Then, if they were constructed, would it not reduce the amount of sand going into the bay, and what was held in suspension by the water coming in by the tide ?—It would if it came that way.

17,120. I am supposing these piers cut off all chances of sand travelling along the shore, and so getting into the bay. The sand that came in then I presume would be what came in by suspension in the water ?—Yes ; and I should tell you that the only part which will prevent sand coming in is the shore end of the Long Scar Rock.

17,121. That is what I am alluding to ; I exclude that portion of the port that is outside the Long Scar. No sand goes through that ; according to your supposition that the sand is driven from the south into Hartlepool Bay, it does not go over the rock. And supposing any sand in Hartlepool Bay to be brought in by the action of the sea, whether from the north or from the south, would the piers stop it, or reduce the chances of silting up to the minimum of the quantity brought in by the tide from the flood and held in suspension ?—Certainly.

17,122. Will you be kind enough to say what duties you are allowed to levy under the Act in vessels coming in, supposing the harbour of refuge to be completed ?—By the Act of the 16th July 1855, after a sum of money amounting to 250,000*l.* has been expended, then the maximum duty comes into operation. There is a similar scale up to 100,000*l.*, or when the maximum is expended. Then, any vessels entering within the limits of the harbour, and also entering any private dock, loading or unloading a cargo, 1½*d.* per ton. For every vessel entering the harbour of refuge, or either entering to use or not entering to use, any shipping place, and not loading or unloading with cargo, if such vessel be in ballast or have any cargo, 3*d.* per ton. If such vessel be laden, 6*d.* per ton burthen ; it is called burthen, but it means register.

17,123. Then do I understand that a vessel using both harbour and dock will only pay 1½*d.*, but loaded vessels coming in for refuge will pay 6*d.* a ton ?—Vessels coming in for refuge have to pay dues as well.

17,124. At 6*d.* per ton, vessels would have the free use of the docks if they required ?—Yes ; and any vessels coming in and discharging here, or loading, have the advantage of the docks, and must pay the Company also.

17,125. Vessels entering only for refuge, and even not using the docks, pay four times as much for harbour dues as vessels coming for the trade of the dort ?—Yes ; it will be found that they pay nearly the same as vessels that enter laden from other ports ; and, according to this, vessels that have the double advantage of a harbour of refuge, making for the port in a gale of wind, have all the convenience of the docks, and pay more than a collier passing the coast coming in for a refuge harbour alone. After so large an expenditure of money, I think it was made out, referring to the evidence already given, that the average between 3*d.* and 6*d.* was 4½*d.*, and that was considered upon a ship of 400 tons would not be a heavy toll.

17,126. Have you any calculation of the dues from the permanent trade of the port, besides the refuge, which would be obtained if a harbour of refuge was made. You are levying a toll upon your present 10,000 vessels, the amount of tonnage last year. What revenue would be received from a harbour of refuge, suppose the arrivals were to the same extent ?—In the blue book there is my calculations on that subject, in great detail. I think I could not improve upon these figures I gave in to the Select Committee of the House of Commons.

17,127. Can you give me any idea even what proportion you considered in your estimate of the trade of the port would bear to the refuge. Taking a much larger number of vessels trading to the port than would come for refuge probably, can you tell me about what proportion there would be paid by the two classes by the 3*d.* and 6*d.* for refuge, and 1½*d.* for the port ?—I might be able, by referring to the papers which give me that calculation, but if I mistake not I put it altogether so many ships, knowing how many ships sailed from the Tyne, the

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Wear, Seaham, Blyth, Warkworth, and the Tees and Hartlepool.

17,128. Had you only then taken a proportion of these as likely to require refuge?—Yes, I put it at twice in the year, one year with the other, to use a harbour of refuge, and my reflection teaches me that I was within the mark when I said they would require a harbour of refuge, I forget whether it was twice or three times a year.

17,129. Will you refer to the document and let the reporter get it down?—Yes; it is in the appendix to the Report of the Select Committee on Harbours of Refuge, 1857.

17,130. Have you separated then the dues due to the trade of the port from the dues due to refuge?—I do not remember that it did.

17,131. Will you give them in in separate items to our secretary?—I will endeavour to do so.

17,132. Did you calculate for twice in the year?—Three times I think.

17,133. Was that founded on the idea that this would be the only harbour of refuge on this coast, or supposing that there would be a harbour of refuge here and one at Flamborough Head for any collier that might require it. Would that materially reduce your estimate of vessels taking refuge here?—No; I will assume some protection at Filey Bay and it would not very materially reduce it. I am quite persuaded that many ships would be advantaged from having a resting place at Filey Bay, and I do not think it would materially diminish my estimate of the dues at Hartlepool.

17,134. What it did reduce would be principally laden vessels more than the light; would it not, therefore, reduce your higher payment for a harbour of refuge of 6*d.* more than the payment of 3*d.*?—I would not say so, and for this reason, that here only on Sunday we had an instance of fourteen windbound ships coming into Hartlepool; the whole of them light.

17,135. That exactly confirms what I was saying. I say that having a second harbour near Flamborough Head would reduce the loaded ships coming in here more than the light, so that the light vessels would be more likely, having come past Flamborough Head in a south-east gale, to want a refuge nearer their own port, and the laden vessels would be more likely to have got down to Flamborough Head and so to avail themselves of that harbour of refuge?—If I remember right I estimated two-thirds light and one-third loaded.

17,136. (*Capt. Vetch.*) The plan you submitted yesterday was a project for the improving and forming a harbour of refuge at Hartlepool?—It was.

17,137. And you have now submitted to-day another project?—I reduce the one on the same principle.

17,138. I suppose you have not wished the Commissioners to pledge themselves to the adoption of either of these?—Oh dear, no!

17,139. But should be able to consider this with any other project that may be presented?—Most certainly, I only hope they will carry out one or the other.

17,140. (*Mr. Coode.*) A question was asked you just now as to the length of these piers as proposed by Mr. Rendel, and some discrepancy appeared to exist. Will you refer to page 3 of the Parliamentary Paper 110 for the year 1855, and you will see the north pier is to be composed of two cants; the first 637 yards, the second 730 yards. The south pier is also of two cants; the first 2,120, and the second 723. Will you be good enough to add these together?—4,210.

17,141. Now, will you refer to page 7 of the same document, and you will see that Mr. Rendel describes the piers as 1,700 yards and 1,300 yards respectively outside the low-water line?—Yes, he does.

17,142. Making in all 3,200 yards outside the low-water line?—Yes.

17,143. If you will refer to that red chart on the wall you will see that the proportion of 3,200 and 4,210 will bear the same relation to each other as the portion outside the low water bears to the portion inside the low-water. That is, that the two portions outside low-water line would be just about double the portion inside the low-water line, showing that the portion inside the low-water line is one third of the whole?—I do not quite understand you. It appears to me that if you take the line direct from the Long Scar to Hartlepool Point, you will spoil it.

17,144. I am speaking of Mr. Rendel's design as laid down in this chart. Assuming that to be 4,210 yards in all, the two portions outside the low water will be about two-thirds of the whole will they not?—Then you call that low water along the Scar Rock, which would give ——

17,145.. Yes; which would give the discrepancy. Mr. Rendel must have been speaking of the portion only outside the low water, and the Admiralty are speaking of the whole length at high water?—It is very probable that is the case.

17,146. If so, that clears up what appears to be a discrepancy?—It is very possible.

17,147. Have you any authentic copy of that design as laid down by Mr. Rendel?—Oh yes, several.

17,148. Will you undertake to supply the Commissioners with a reduced copy on a scale with which the secretary will furnish you?—Certainly. I may mention that with reference to the cost of Mr. Rendel's design, his design was upright wall throughout. Masonry had nothing to do with rubble or that sort of work.

17,149. (*Capt. Sulivan.*) Was not Mr. Rendel's plan constructed in this way in consequence of the want of large quantities of material close at hand, combined with the idea of making blocks of concrete on the spot to build it?—I do not know. I remember his asking me where he could get large ashlar stones, and I directed him to the Yorkshire Hills, and the hills lying to the extreme west, the same sort of stone as I have adopted in the West Hartlepool works.

17,150. Is it your opinion, and that of the contractors you have consulted, that notwithstanding the distance from the stone you can construct a heavy pier and breakwater at a cheaper rate per yard than the breakwater of Mr. Rendel?—At the time Mr. Rendel made his estimate, we did not know that the stone laid to the west so close to us.

17,151. Then you feel confident you can construct a breakwater, such as has been described, at a lower rate than Mr. Rendel's design?—Most unquestionably. I am exceedingly glad to find that we have so valuable a stone in this neighbourhood. I had no idea of it myself until very recently.

17,152. (*Mr. Coode.*) What is the nature of the stone you have recently discovered?—Hard limestone.

17,153. How is it described among the specimens, that we may identifyit?—Limestone hard; about 13 cubic feet to the ton.

Mr. James Johnson examined.

Mr. J. Johnson.

17,154. (*Chairman.*) You wish to put in extracts from a journal kept by you relative to vessels taking refuge in the year 1847?—Yes.

17,155. Hand it in to our secretary.—(*Document put in.*)

Mr. E. K. Calver, R.N., examined.

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17,156. (*Chairman.*) You have been engaged for a long period in the survey of this coast?—I have.

17,157. And therefore, as a matter of course, you are perfectly well acquainted with it?—I am.

17,158. (*Mr. Lindsay.*) Have you seen this plan of 1849 of Hartlepool Bay?—I have.

17,159. Do you, from your own knowledge of the coast, think that this plan represents correctly the

soundings at the period of making it ?—It appears to do so.

17,160. Do you notice that the three-fathoms line has been extended very considerably outwards ?—It has.

17,161. Between the different dates marked upon the plans ?—It has somewhere about 900 feet to seaward in one part, I think, in the course of 12 years.

17,162. And at the point of the greatest extension the breadth is about 800 feet ?—Its depth has gone to seaward to that extent (*indicates on plan*).

17,163. Does that show, in your opinion, that between these particular dates there has been a silting up in the bay ?—It shows a silting up.

17,164. Can you account for that silting ?—The facts bearing upon the silting or otherwise of Hartlepool Bay I had to determine for myself in the year 1846, and from the facts then gathered by myself, I have no doubt this plan is correct ; I find there was a silting up. The facts I refer to are given by myself in 1844 in a letter, a copy of which I have in this MS. book. Perhaps I had better depend upon my own facts.

17,165. Has it been published ?—It has not, that I am aware of.

17,166. Then the Commissioners will be very desirous to hear it. To whom was the letter addressed ? —To Captain Washington, Captain of Her Majesty's ship *Blazer*, in which ship I was as Captain Washington's assistant. It was as follows :—

" In August 1846 Her Majesty's ship *Blazer*, commanded by Captain Washington, arrived at Hartlepool with a view to determine any change which might have taken place in the bay since the Admiralty survey in 1838. I was Captain Washington's assistant and received due direction from him for that purpose. I accordingly entered upon the labour of re-examining the bay. I identified Captain Slater's datum, to which his survey was referred, and referred my own observation to the same. After taking the results, I entered them upon some illustrative plans, which, with the letter, I forwarded to Captain Washington, who was then absent on duty :

" ' Sir,—A re-examination of the bay of Hartlepool being now completed, I beg to transmit for your information the accompanying documents in illustration of the changes which have taken place in its depth since the Admiralty survey of 1838 ; and it will be necessary that I mention the circumstances under which this survey has been performed. The re-examination extends over a period of nine days, beginning from the 23d July. At first the wind was from the south-west, causing a slight surface liffer ; latterly it was light and variable with the bay perfectly smooth, so that an opportunity of a suitable character, for comparison with the former survey, has been most favourable. All the sections across the bay run in 1838 have again been sounded at a time of low water, and no precaution has been neglected for insuring a faithful result. The old sounding at zero was identified without difficulty from a former transfer of level at the quay wall at the dock office by Mr. Mossman, and another by myself from the old pier lighthouse, and they agreed within two inches. Such being the circumstances under which the work was undertaken, the result may be stated briefly as follows :—The bay has silted up over two thirds of its extent a deposit varying from $\frac{1}{4}$ to $2\frac{1}{2}$ feet, the great alterations being in the centre and outer portions of the roadstead. On the other hand, the inner portion of the bay skirting the bar near the port, and from the centre to the low bar, as well as a patch outside the bar, has deepened to a like degree and has laid bare large tracts of clay ; and there is little doubt that the sand removed from this quarter has left to swell the amount deposited in other places. The bay was also divided into 14 portions, and specimens of the clay taken in each case ; it appears to be without any variation in quality, what is known among surveyors as muddy sand, in other words the finest of sand mixed with a sufficient quantity of earthy matter to give it tenacity. The exact amount of decrease in depth, as well as its limit, are clearly shown on the plan No. 2, accompanying this report ; but it will be seen, on reference to the document, that no comparison is instituted within four feet of the contour line opposite the old harbour from the sea, though undoubtedly the bar and the channel are improved within the influence of the sluicing, and variations in form and depth may be expected at times if the operation of sluicing is repeated ; the bay before the contour line and above occupying nearly the same position in both places, while the channel within them has improved in breadth and depth.' "

17,167. What is the date of that letter ?—August 1846.

17,168. Then by that letter there appears to be no doubt in your mind that before 1846 silting was taking place in the bay ?—It was.

17,169. Are you able to speak as to the fact whether it has continued from that day up to the present time, or up to 1856 ?—I do not know of my own knowledge, only through the medium of the haven-master.

17,170. Then I must state to you that the haven-master, in his evidence yesterday, said that after the period you referred to, when the bay had been silting up, no silting has taken place ; but that, on the contrary, if anything the depth has increased a few inches. From your great experience I want to ascertain from you, if, in your opinion, that silting having once commenced, and having gone on for 12 or 20 years, it was likely to stop at the year 1846, and not got on from 1846 to 1856 ? Can you give any reason for that, if it is the fact that the bay has not silted up, or should you be disposed to doubt the fact ?—I should be quite ready to receive the fact if stated by Mr. Mossman, from my faith in his accuracy.

17,171. Then can you account for it ?—To my mind it would not be any extraordinary circumstance ; the bay is silting up at one period and not at another.

17,172. Do you know any instance where bays go on for certain times silting up and then suddenly stop ?—An increase of soil and then a subsequent decrease is nothing unknown in nature ; but as a matter of memory I cannot give you an instance at the present moment, but I am quite sure that it is a common occurrence.

17,173. It is a common occurrence for sand to go on gathering in a particular part for 12 years, and then suddenly to stop ?—There is a distinct reason why it should cease. I can quite fancy a basin like Hartlepool Bay filling up from whatever cause, and then ceasing, because in time the material from the increase of depth would be brought within the suspending power of the wave, and there will be a depth when the tendency to deposit will be enlarged by the power of the wave to suspend. What that depth will be, of course I cannot say.

17,174. Then do you think that the silting which took place up to 1846 was caused by the sand coming from the ocean, or by any sediment coming out of the slake, or by the destruction to some extent of the headland called the Heugh ?—In connection with that I will state to you the opinion I appended to the report at the time. After detailing these facts I proceed :—

" So far as to the result. The cause of an alteration so seriously affecting the well-being of a rising port, is a matter much more difficult of solution. The fishermen appear to attribute it to the practice of sluicing from the slake by the present Commissioners ; but a comparison of the statements made by them before the Commissioners would seem to take materially from the value of their opinion. For many reasons I do not think an unprejudiced person will look to the sluice for the cause ; but even supposing it to be the cause, the accumulation in the bay must either have come from the channel, the tide harbour, the surface of the slake, or of the streams passing through it, as neither the channel nor the tide harbour have altered in any

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material degree since 1838 ; the slake has also worked up frequently for an inch during the past three years, as is clearly proved by numerous levels taken by Mr. Robinson, the resident engineer. And the field drains, which alone empty themselves into the slake, cannot be supposed to be charged with matter similar to that deposited in the bay. Upon mature deliberation, I consider the increase of depth to be owing to three causes :—1st. As before observed, to the scourage of the inner part of the bay. 2dly, to the practice observed by light vessels bound to Seaham, Sunderland, and Shields heaving their ballast while crossing the Tees Bay, the lighter particles of which find their way to the shore abreast. And lastly, to the close neighbourhood of the Tees mouth. That river has been considerably deepened of late years ; and it is but natural to suppose that part of the soil removed has been laid on shore at either side of the entrance."

So far as to opinion.

17,175. But these causes still exist. Colliers, I presume, still heave their ballast at sea when bound north, and the Tees still exists, and the sluicing still takes place ; the harbour also is still in the position in which it was?—Yes.

17,176. Then if these causes still exist, why should the silting go on up to 1846, and suddenly cease at that particular date, and no silting take place between 1846 and the present time, but on the contrary an increase of depth ?—From the reasons I have already stated, that the effects and causes I have specified might he neutralized by another cause, the decrease of depth itself might he a counteravailing cause of no further decrease.

17,177. That is your only reason ?—That is my distinct reason that if such a thing be caused that the silt, as stated, has ceased to accumulate in Hartlepool Bay, then I should be prepared to account for it in that way.

17,178. That is the only way in which you can account for it, knowing as you do that the causes which existed up to 1846 still exist ?—I should account for it in that way.

17,179. That way and no other ?—Yes.

17,180. If, after turning it more over in your own mind, you should discover any other reason for it, perhaps you will address a letter to the secretary of the Commission on the subject ?—I shall be happy to do so.

17,181. I have been reading over, as in duty bound, the evidence which was taken before the Seclet Committee of the House of Commons, and I have been reading perhaps with more than usual care, the evidence which you gave there. At page 118 of the Report of Evidence taken in 1857, and at Question 1,947, you were asked by the Chairman as follows :—" You have no " hesitation in stating as your opinion that a harbour " of refuge is urgently required on that part of " the coast " (referring to Hartlepool). Your reply is " Urgently required," and then you add, " I may " mention that in January last (that was in January " 1857), we had a gale of wind from the east, and I " think as respects that gale, I think I stated in the " Report how many lives were lost, partly from my " own observation, and if on that occasion a harbour " of refuge of sufficient space and judiciously pro- " jected had been in existence at Hartlepool, I have " no hesitation in saying that the whole of these lives " would have been saved," and you answer, " Yes, " certainly." Now I want to ask you, Mr. Calver, what property and what lives do you refer to ? Did you refer to the ships which were lost between Whitby Point and the Black hall Rock four miles north of Hartlepool, or did you refer to the ships which were lost between Flamborough Head and Whitby during that gale ?—My reply would have reference to any vessel embayed and in distress on that occasion, and within the north-east of the bight.

17,182. What do you mean by the north-east of the bight ?—I should define the north-east of the bight as bounded by North Sunderland Point on the northward, and the north cheek of Robin Hood's Bay to the southward.

17,183. Then your answer is that, in your opinion, if there had been a harbour of refuge at Hartlepool such as you have in view, all the property and all the lives which were lost between Robin Hood's Bay and North Sunderland Point would have been saved ?—That is my opinion.

17,184. By the return that has been handed in to you, there appears to have been a considerable loss of life at Whitby ; do I understand you to say, that if a harbour of refuge had been constructed in the Tees Bay at Hartlepool, these ships would have been saved, and the lives on board ?—That is my opinion.

17,185. With the gale at south-south-east these ships had no need to be driven on shore at Whitby ?—No.

17,186. Nor with a gale at south-east ?—No.

17,187. Therefore it would have been when the gale came round to about east or east-north-east, that the ships went on shore ?—Probably.

17,188. Then they were lost, no doubt, because they could not weather away the land at Whitby ?—Probably.

17,189. If they could not, how could a harbour of refuge at Hartlepool have saved them ?—The circumstances would be altogether different if a harbour of refuge had existed. Without a harbour of refuge a person would linger opposite the coast, and hope against hope that the gale would take off, whereas, if a harbour of refuge existed, there would be a motive for altering his plans. If he saw a gale commence, knowing that there was a harbour at Hartlepool, and that the gale might increase, he would immediately run to the north so as to put the harbour under his lee.

17,190. If that is your answer, would it not apply to those ships lost during the gale between Robin Hood's Bay and Flamborough Head ?—It would apply to any vessel placed within the limits of the north-east bight.

17,191. A harbour of refuge then would have saved these ships between Robin Hood's Bay and Flamborough Head ?—It would.

17,192. Then, the same reason which led to the destruction of the ships at Whitby, would equally apply to the destruction of those ships between Robin Hood's Bay and Flamborough Head ?—It would ; because they could not weather away the coast ; but I am not aware of the circumstances.

17,193. If they could not weather away the coast at Whitby, tell me why it should not be the case along the range between Robin Hood's Bay and Flamborough Head ?—The cause of the loss would be the same in the two cases, because they could not weather the head.

17,194. Then, if the reason you have given does not apply to ships which were lost between Flamborough Head and Robin Hood's Bay, I am at a loss to know how it can apply to those ships which could not weather away the land at Whitby ?—They wanted the inducement to make them stretch to the windward, which there would have been had there been a harbour of refuge here.

17,195. Can you account for it, why those ships lingered on that iron-bound coast, instead of making for the Durham coast, where there was a better chance of saving their lives ?—It might have been the want of any precaution.

17,196. If a harbour of refuge was made, do you think it would knock precaution into the heads of masters of ships, if it is not there by nature ; because, if it was the want of precaution which led to the destruction of these ships, and the fearful loss of life, then I am afraid it would be a waste of money to construct a harbour of refuge in the hope of saving them ?—I put it in a different light.

17,197. Tell me how you look upon it ?—If you had a particular harbour of refuge at Hartlepool, a person who is navigating a ship upon the coast would not be in the uncertainty there is now, and would take ad-

vantage of it if necessary. There would be no reason for his lingering and pressing upon the coast until it ended in his ultimate loss.

17,198. Then you think, if there had been a harbour at Hartlepool, these ships would have passed to the north, instead of keeping to the south, in case the wind chopped round to the east-north-east ?—That is my opinion.

17,199. (*Capt. Washington.*) Do you remember the circumstances under which the survey of Hartlepool was made in the year 1846, for I don't ? I do not know the circumstances which led to it ?—I remember you were absent on duty at the time.

17,200. I think at that time I was on the Tidal Harbours Commission ?—I think it was so.

17,201. Your report will be in existence at the Admiralty, of course ?—It will.

17,202–3. (*Capt. Sulivan.*) I suppose they will have a copy of this plan you refer to in 1846 ?—It was forwarded to Captain Washington.

(*Capt. Washington.*) It must be at the Admiralty.

17,204. (*Capt. Sulivan.*) In the report to the Admiralty, you said that a continuation of silting up has gone on from 1846 to 1849, and that the shoaling has taken place across nearly the width of the bay at its entrance or mouth ; while the anchorage ground has thus deteriorated the greatest loss of depth has unfortunately taken place in the northern portion of the bay ?—That is in the same report from which I have been quoting.

17,205. Taking Mr. Mossman's details, you were satisfied there has been no silting up since 1846 ?—I have stated that I am satisfied, that is the fact.

17,206. But in your report you give three more years silting up ?—I observe the paragraph.

17,207. It does not quite agree with your evidence of not silting up since 1846 ?—From my own knowledge.

17,208. Will you state who the inspector is that you refer to as remarking that the shoaling has taken place ?—That was Mr. Cockburn Curtis.

17,209. Now, with reference to what you said about silting up, and why it might have ceased, do you think that another reason might be, that through some unusual clearing out of the Tees during the period of silting up or some series of winter gales acting with an ebb tide, some shoaling might have occurred prior to 1846, but might not have gone on since that time ?—I think it a very likely reason.

17,210. And would it also be the case that some unusual amount of sea in the bay might have added to the silting up, where you describe it, by removing the sand from the inner portion of the bay, where you say it was rather deepened, and swept the clay clear; would that add to the silting up ?—Not if you refer to the dry banks of the river. I should refer it to the waves.

17,211. Referring to this plan of Mr. Rendel, and supposing that any portion of that silting up came from the south-east waves combined with any fall from the Tees, bringing the silt into the bay, would not a breakwater, constructed at the shore, tend to guard against a silting up along the shore from the south ?—It would prevent any material being rolled along the beach by the action of the sea, but it would not prevent the accumulation arising from charged water.

17,212. But it would prevent any tendency to drift along the shore by the action of the south-east wave, acting in combination with an ebb tide, charged with sediment from the Tees ?—It would.

17,213. Then, suppose that any tendency of sand to accumulate around the north head to be stopped by the north breakwater, would it reduce the tendency to silt up to what the tidal water at the entrance of the harbour brought in in suspension ?—It would, up to certain period, when the accumulation at the back of the artificial works had increased to such an extent as to admit of the drift partly getting into the harbour.

17,214. Do you think, from what you know of the tendency of the waves, and the action of the tide along the shore to carry silt along the Long Scar Rocks and round the Long Scar Head, that there would be any fear of these long piers silting up, so as to make it at all dangerous near the mouth of the harbour ?—No ; not by the finer matter held in suspension, but of the coarser sand I should expect a considerable accumulation.

17,215. Suppose there has been no tendency to silt up for the last ten years, do you suppose any amount of sand is travelling towards that bay from the north to the south that, in any moderate period of time, would accumulate and fill up the back of the piers ?—You can only determine the quantity by the artificial works themselves. I have seen cases where you could not, from common observation, detect any moving material, but when the works were put out then I have seen a very large accumulation in a very short time, whereas if you had not had the artificial works you would not have believed such an amount could have been supplied.

17,216. I see there is no silt on the outside of the breakwater that has been built ?—I should expect it.

17,217. What little is in the inside is apparently brought in by the south waves ?—I should not expect it.

17,218. Then from your experience of this would you suppose that along the northern breakwater on the north side, it would have much tendency to silt up at the back ?—I think it would outside low-water edge, not on the rocks, because no materials will lie on rocks.

17,219. Do you suppose that the amount of sand or silt brought in in suspension by the tidal water materially reduces the depth in a material period of time ?—I should fear accumulations resulting from the direct effects of these works going on. Knowing as I do, the highly charged state of the water on this coast, I should apprehend it would accumulate within such a harbour very rapidly.

17,220. I understand you to say that the slake has only silted up a fractional part of an inch in a long period ?—It has.

17,221. Then the water in that will generally be as much charged with silt as the water in the still harbour ?—It will.

17,222. Would that lead you to suppose that the amount of silt from the still water only would not be greater over the bay than it would in the slake, except looking to the difference in the depth ?—What is the fact in one case is most necessarily the fact in the other. I find that, in the one case an agent is provided to prevent an accumulation, in the other no such agency exists.

17,223. Will you mention the agent, if you please ?—The agent which preserves the slake is a small diminutive lipper, which is generated in gales of wind over the surface of the slake, and in all expanses like the slake. Every little lipper suspends its portion of material ; the consequence is, that over centuries you will find nilets of that sort preserved very nearly in a mean state, without sensible increase or decrease, and no such agent would exist in the case of an enclosed outer harbour.

17,224. Will the water in the western docks, generally speaking, be charged with sediment much in the same way as water in the bay ?—In the western docks I should expect an accumulation in the channel harbour, and no accumulation upon the slopes.

17,225. I allude to the actual basin inside where we are told there has been no tendency to deposit any silt ?—I should consider it a singular exception.

17,226. Can you give us your reason for thinking that the silt deposited in the Victoria Basin was sea silt ? Can you give us the precise facts by which you arrive at the conclusion that it was sea silt and not coal dust ?—I cannot as a matter of memory, but I perfectly remember making certain inquiries to satisfy myself as to the source from whence it was derived. It was suggested to me that it might be partly due to the blown material from the coast, and the refuse of the ships. I remember duly considering it, and I

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arrived at the inevitable conclusion, that the greater part of it was matter resulting from the open water, sea-water pen.

17,227. You say in your report, sand and silt. Did you have specimens of it examined, to see whether it is sand or not?—I think, now you mention it, I did. I got some materials, and compared it with that in the bay.

17,228. Then you are still of opinion, that the water of this bay, whether in the dock or in the bay, deposits a certain amount of sediment answering to what you describe?—That is my opinion.

17,229. I ask you whether, by leaving an opening in the breakwater to the beach above the Long Scar Rocks, that would not leave the bay open to the risk of silting from the Tees, and the action of the set of the sea bringing the sand or silt into the bay in the way supposed it might have been done during the silting up of ten years previously?—Not to that extent.

17,230. But to a similar extent?—Possibly to a small extent.

17,231. If the water coming in from the south, and with the sea and ebb tide, did bring matter in, would not its unobstructed escape to the northwards round the Heugh be very much retarded, and would it not have more tendency to deposit that matter in the bay than it had in an open bay?—It would.

17,232. Would you consider that, on the whole, the argument is in favour of a south breakwater?—No.

17,233. With reference to the question of wrecks on that south part of the coast, you said if there was a harbour at Hartlepool any prudent man would take care in a gale of wind, and sea drawing to the southward, to find himself in such a position to have the harbour that he might come into it for protection. I think that was your remark?—It was.

17,234. Provided on the other tack he could not weather the head and get into a harbour?—I think so.

17,235. Now would you believe, under the present circumstances, knowing what you do of the additional chances of saving live in Hartlepool, compared to any part of that rock-bound coast, that any prudent man would not endeavour either to keep the Humber under his lee bow on the one tack, or, if the weather allowed him, Hartlepool Bay under his lee bow on the short tack before he will allow himself to be driven in on that rock-bound coast?—I think there are certain circumstances which would induce him to adopt a different course; there is the uncertainty of the time of his arrival at Hartlepool to the time of tide, and various other things, and his entrance into a port would not be so certain.

17,236. I am not speaking of his entrance into a port, but merely of the additional chances of his saving the lives of himself and his crew that he would have on Hartlepool beach or the Tees beach, to what he would have on any other portion of that rock coast. Would you, yourself in charge of men's lives in that position, for one moment risk being caught on that shore, and having to take any of those little beaches about there, if you could get Hartlepool under your lee, and use it as the means of saving life if not of saving the vessel?—I cannot, without knowing the case, understand how vessels with the wind first south-south-east and south-east, and then east, linger upon this coast, and are finally lost. I cannot understand it. I can only say they could not effect it with common precaution.

17,237. May it have been that vessels hung off the Head with the south and south-south-east gale too long, hoping still that it might draw to the eastward, could not weather the Head on the one side, and could not fetch Hartlepool, and so were driven on the rocky shore?—That is possible.

17,238. Suppose the greater portion of laden vessels along the coast were caught off Flamborough Head, would those vessels, had there been a harbour of refuge existing both at Filey and Hartlepool, have borne up for Filey if they could fetch it, or would they prefer passing Filey and coming back to Hartlepool?—They would have taken Filey if they could have reached it distinctly.

17,239. While for any vessel to the leeward of the bay that could not have fetched Filey, Hartlepool would form a second harbour of refuge?—It would. You made use of the term caught; I cannot understand on the occasion referred to, with the wind south-south-east and south-east, a vessel caught there.

17,240. Taking it for granted masters of these colliers are some of the best seamen in the world, the whole of their lives have been spent in this work, and that they have seen the same thing over and over again, and would be fully aware of the precaution necessary to the saving of their lives, do you believe that if they had not been caught in the common acceptation of the term, they would have been wrecked along that iron-bound shore?—Then I must make my former reply, that without a harbour of refuge there are circumstances which would make men hang on to the last moment about Flamborough Head, but had a harbour of refuge existed, the circumstances would have been altogether different. Those men who lingered about the Head, and were lost between the Heugh and Whitby would not have acted with the commonest prudence had they not drawn to the northward, knowing that they had this harbour under their lee, which they could enter at any moment.

17,241. Supposing there had been a harbour at Filey at that time, would the vessels caught off Flamborough Head been likely to have taken it at once, being so near and without losing the ground, or would they have run back to Hartlepool had one existed there?—They would have taken Filey.

17,242. But suppose there was only one, not one at each place, would it have been an additional advantage for them to take a harbour of refuge quickly, it being at Filey, and so far advanced on the voyage, than if it had been at Hartlepool?—That, again, involves the question of preference whether they would be soon at Hartlepool or Filey.

17,243. No, I am speaking of those vessels at Flamborough Head having a harbour so close without running back; would they be more likely to take it early without risking their vessel than they would if taking it earlier involved running back 40 miles?—I think that a harbour of refuge would produce this effect, but men would timely take shelter in them and not hang out.

17,244. Would the fact of a harbour being nearer them, and so much more on the advance towards their voyage, make them take it sooner?—Yes.

17,245. For light vessels in such a gale as that, and rounding Flamborough Head, bound for their coast and hoping to reach their coast, would a harbour in Hartlepool have been more valuable than one at Filey?—It would be more valuable as being much further on their course towards home.

17,246. (*Capt. Vetch.*) Does it not happen that during several years the wind and gales prevail more in one direction than another, and produce the effect of deepening the bed of the sea in some places and shoaling in another, and that in another period of years the wind and gales prevail more in the opposite direction, the effect of which is to restore the bed of the sea to its normal condition?—Yes.

17,247. If so, might not such cause satisfactorily account for the different state of the bed of Hartlepool Bay as observed in 1846, and at a later period?—It would.

17,248. Supposing a regular trade proceeded from the Tyne, the Wear, Hartlepool, or the Tees, to southward in somewhat a pretty regular manner as they would in the aggregate, and a gale came on from the south-east that prevented him from proceeding beyond Flamborough Head, whether, in your opinion, would Hartlepool, if a harbour of refuge was made there, or Filey, if a harbour of refuge was made there, be the means of saving a greater number of vessels seeking shelter, supposing the storm to be uniform from the Tyne to Flamborough Head?—Hartlepool;

because I should assume the greatest portion of the vessels would be to the leeward of Filey.

17,249. (*Chairman.*) During your surveys where have you been engaged, I mean generally as to the districts on the coast ?—From the Shetland Island to the Thames principally.

17,250. I do not intend to examine you at any length now, in fact hardly at all, as we shall have the advantage of your evidence at a later period in London, but I will ask you if you are well acquainted with the Tyne, the Wear, and the Tees ?—I am.

17,251. Will you describe the effect of the freshes which come down, in the first place, in the river Tyne ; I mean with a spring ebb, which makes very often a bad sea in the harbour's mouth with a gale blowing along shore ?—It makes a very hollow and dangerous sea.

17,252. And the freshes add to the danger of the sea, but in what degree ?—It adds materially in degree, for it makes the sea hollow—a bursting heavy bad sea.

17,253. And therefore increases the danger of entering a harbour under those circumstances very considerably ?—It does.

17,254. Now as respects the Wear, which I understand to be a river far shorter, and therefore I presume the fresh is not so heavy, how is it affected by freshes ?—It is affected in a similar way, only the river is much smaller, and it has not so great a force as that of the Tyne.

17,255. The Tees—are the freshes in the Tees as serious in their effect as those on the Tyne ?—The sea produced by the freshes in either case would be much the same.

17,256. Is the Tees fresh as bad a subject to deal with as the Tyne fresh ?—As bad ; there is more danger, if I remember rightly, in the Tees than in the Tyne.

17,257. (*Sir F. Smith.*) I had the advantage of hearing your evidence in 1857. In the House of Commons you were asked what was there in this part of the coast which you considered most essential for refuge and the best place for it ; your answer was Hartlepool Bay. Have you any reason to doubt that was a sound conclusion ?—I have no reason to doubt it.

17,258. Your were also asked, with reference to the construction of a breakwater, and in question 1,894 that the Chairman put to you, he said, "Having no communication with the shore on either side?" to which your answer is, "Having no communication with the "shore." Do you still hold to that opinion ?—I do.

17,259. You are aware that Mr. Rendel's plan was to be connected with the shore ?—It was.

17,260. Had you any conversation with Mr. Rendel on that subject ?—I had not.

17,261. I should have imagined, from your great experience here, that Mr. Rendel would have consulted you. A question was put to you, "Still would "you have a strong current running through the harbour ?" and your answer is, "Yes, and it would not "interfere with the current in the smallest way." Do you still hold to that opinion ?—I do.

17,262. The next question that was put to you was, "Do you think that an advantage?" to which the answer is, "It is imperatively necessary." With that opinion you would be strongly opposed to any connection with the shore in any breakwater for the protection of that roadstead ?—I am.

17,263. Question 1,900 is, "In order to insure the "suspension of material in the water a current of that "kind is rather an advantage or otherwise?" and your answer is "Yes ; observing in gales of wind that we "have the sea charged even to the depth of 12 fathoms "on the eastern coast of England, it is quite clear "that to form there a harbour of refuge would be a "very dangerous experiment." Do you still hold to that opinion ?—I still hold to that opinion.

17,264. I ask that question because it is important to know if you have arrived at any change of opinion from the evidence you have heard or read ?—You are asking this question with reference to this bay in particular ?

17,265. Question 2,116, "The great mass of sand "has not shifted so as to effect a general unity of a "place for shelter ?—It has not."

17,266. Question 2,117, "With reference to Har- "tlepool bay, do you know the nature of the bottom "there?" The answer to it is, "It is very thick stiff "clay, with a deposition of sand upon the surface." "Is that deposition of sand of any depth upon the "clay ?" Your answer is, "Several feet at least, "because within the last few years the basin, and "also a part of Hartlepool Bay, has been filled up "several feet by sand." Now answer to a question put by one of my colleagues. You only got up to 1846. Now that was in 1857, eleven years afterwards, yet you say, "within the last few years," do you mean since 1846, or antecedent to 1846 ?—That remark will be limited to 1849, when I had communication on the subject.

17,267. You call that the last few years then ?—Well, it is rather a loose term.

17,268. I wish you to have an opportunity of explaining that, because it seems a little contradictory. You have explained it to me quite satisfactorily. You say there are great facilities for procuring, near Hartlepool, the necessary facilities for a breakwater. Do you give that upon your own knowledge of the facts, or from hearsay ?—Not from my own knowledge, but upon statements I have heard.

17,269. You also stated to the Select Committee of the House of Commons that, excepting for local purposes, a harbour is not expedient at Sunderland ; I suppose from that, you consider Sunderland an unfavourable position for a harbour of refuge ?—As to the position, I should consider it inferior to Hartlepool.

17,270. You say that it is not expedient except for local purposes ?—Yes.

17,271. You are still of that opinion ?—I still am of that opinion.

17,272. Then you gave an opinion that Redcar is a bad site for a harbour of refuge. Do you still hold to that opinion ?—I still hold to that opinion.

17,273. I think at some other part of your evidence you state the probability was that the deposit upon the southern point of this bay came from the neighbourhood of the Tees ?—Yes.

17,274. (*Capt. Sulivan.*) From your knowledge of the tidal rivers on this coast, do you believe any outlay could be made by Government that would be likely to insure the depth necessary within the piers built by that outlay ?—No.

17,275. (*Mr. Coode.*) You stated in reply to the Chairman, that in time of freshes there would be heavy bursting seas at the mouth of the Tyne, the same at the Tees, the same at the Wear, but in a less degree. Do you give that answer from your general knowledge of such matters, or from actual observation and experience on this coast ?—From my own actual experience.

17,276. In which of these three cases ?—In each of these three cases.

Mr. William O. Mossman re-examined.

17,277. (*Chairman.*) Do you know of any vessels loaded out in the bay that have taken part of their cargoes in in the docks ?—I think I remember something about one vessel, and if the captain had stopped in the harbour there would have been plenty of water ; but he would not be persuaded, and would rather go to sea and take in some keels of coals. If these cases were occurring, I should have to look strictly after them, to see that they did not throw the coals overboard instead of putting them into the vessels.

17,278. In what part of the district were you employed under Captains Slater and Otter ?—From the Tees to Stornoway, in the Island of Lewes, Hebrides.

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17,279. Then you are well acquainted with the Pentland Firth ?—I think so.

17,280. When you had to take refuge in the rigging were you making the passage from the westward or from the eastward ?—From the westward to the eastward.

17,281. When you ran into the firth, was the weather bad, or did the weather surprise you in the Forth ?—Immediately we got to abreast of St. John Point, or rather what they call the Old Men of May, it fell calm, and we fell into the weight of the tide. The vessel became unnavigable, and the sea broke into her. There was a heavy swell setting in, and it caused us to be in much danger. We hardly had time to take to the rigging, and were obliged to go up aloft and sit looking at everything going away, till we finally drifted out into the open sea outside the Skerry Islands and Duncansby Head clear of the tide.

17,282. When the sea was breaking over your vessel, was she battened down ?—Yes, all but the companion hatch, and it was locked, but a great deal of water went down there.

17,283. As I understand, the tide in the Pentland Firth runs sometimes in the springs at nine or even ten knots an hour. Is that within your experience ?—Yes.

17,284. It has also been given in evidence that the tides run six hours either way ?—Yes.

17,285. The tide runs fair through the centre draught, and the eddy does not extend to any great distance from the shore ; does that accord with your experience ?—There is a certain channel, which may be called the fairway through the firth, but it is difficult to keep a vessel in it except with a fair and commanding wind. If you approach the firth with a foul wind, you can scarcely prevent getting into the eddies in working through.

17,286. What is the breadth of the firth there ?—If we take the main coast, I think about seven miles, but there are several islands.

17,287. What is the breadth of the fairway where the tide runs clear of the eddies ?—Perhaps a couple of miles.

17,288. You limit the extent of the fairway to about two miles in the centre of the firth ?—Yes, as far as I can remember.

17,289. At what distance from the entrance to the firth does the effect of the weather tide extend in a heavy gale of wind in making the sea unfair ?—I should think seven or eight miles.

17,290. To what extent would the sea be more dangerous there than in the open North Sea ?—I should think about three to one.

17,291. In making the sea a more hollow, tumbling sea, and dangerous for a vessel to scud or heave to in ?—Quite so.

17,292. Then at what distance from the entrance to the firth would you be disposed to say that the effect of the tides as respects the sea commences ?—Where we attribute any danger would be about 12 or 15 miles clear of the firth.

17,293. Therefore, at a distance of 15 miles from the entrance of the firth, a vessel would heave to with as much safety as respects the nature of the sea as she would out in the open sea ?—Yes, but I should doubt she would drift into it.

17,294. Are you well acquainted with the coasting trade on this coast ?—I am.

17,295. In those which carry the most dangerous cargo, being loaded with the deadest weight, is it safer with the wind blowing hard to heave to or to scud ?—In some cases it would be more dangerous to scud than to heave to. Some vessels would heave to, but others better adapted to it would scud.

17,296. But take the generality of those vessels, what would be the safest thing for them to do, to scud or to heave to ?—To heave to, decidedly, in many instances.

17,297. (*Mr. Lindsay.*) Have you measured the area which would be obtained under Mr. Rendel's plan of four fathoms ?—Three fathoms and upwards, 307 acres ; four fathoms and upwards, 79 acres.

17,298. Speaking to you as an old sailor, what area in acres would be required for 100 ships of the usual description trading on this coast to ride at anchor ?—If it was a close harbour with one entrance, I should give them about an acre each, or a little more.

17,299. Then with an open harbour, what acreage would you give them ?—I would multiply it by three. I should think it would take about three acres to each.

17,300. Then I understand your answer to be that with a close harbour 100 ships might be moored safely at anchor in an area of 100 acres or little more ; while with an open harbour, such as that proposed by Mr. Jackson, it would require an area of 300 acres to moor in safety the same number of ships ?—I should certainly think so.

17,301. Would you consider three fathoms sufficiently deep water for a vessel drawing 14 feet to moor in, provided it was sheltered as Mr. Rendel shows ?—No ; I should give it a foot more if it was in a close harbour.

17,302. Then this plan of Mr. Rendel's being a close harbour, would not contain a great number of the usual class of vessels frequenting this coast, because there is only of four fathoms and upwards, 79 ; and 330 between three and four ?—It would not contain the quantity of vessels that would resort to a harbour of refuge on this coast. It is too small.

17,303. You think then if Mr. Rendel's plan was carried out it could not be looked upon as a national harbour for this coast, but that it would be a good auxiliary harbour ?—It would be a good auxiliary harbour.

17,304. In your opinion, considering the draught of water that would be inclosed, you think it would not be looked upon in the light of a great harbour suitable for the large amount of trade which is passing along the coast ?—I think it does not go seaward enough ; it should go out into deeper water. If any thing was to be done with this harbour, I should certainly advise that it go to at least seven fathoms at low water.

17,305. Then Mr. Rendel's plan would not answer, in your opinion, the wants of this coast ?—It is too small, if it is to be the harbour of refuge.

17,306. Then, looking at the plan which Mr. Jackson has got, and considering that you would have an open harbour, and would require three times the area in an open harbour to afford safe shelterage to ships that ride at anchor to that which you would require in a close harbour, would you think the plan of Mr. Jackson sufficient as a harbour of refuge for the whole trade of this coast ?—I am not aware there will be the quantity of protection in that harbour that there will be in the other, taking the whole area. It is very open.

17,307. You think that even Mr. Rendel's plan would give more protection, for the reasons you have given, than the extended plan which has been lodged by Mr. Jackson ?—I am not saying that more vessels of heavy draught of water would ride in that area. I am speaking of shelter. I think there will be almost as much of what I now call shelter as in Mr. Jackson's, Mr. Jackson's piers are so very open. The piers extending so far round the bay, and the sea flowing round these piers, particularly at the south end, would cause an immense disturbance where shelter ought to be found under their lee.

17,308. You said that in your opinion you did not think there had been any silting up since 1846, but that, on the contrary, the depth had increased a few inches ?—Going into the total sum I find that the depth as an average over the bay has increased.

17,309. Do you think some part of it has shallowed and some part deepened ?—There are items in such a case as this that never should be taken into account. You cannot split hairs when you come to deal with some millions of cubic feet of water in a bay like this.

17,310. As hairs have been split on this point I am anxious to have the question settled one way or the

other beyond doubt. Can you lay down upon the plan of 1846 not merely the soundings taken in 1846, but also the soundings taken this year, 1858, and lodge it?—Oh, decidedly.

17,311. So that we may see where it has deepened and where it has silted up?—Yes. There are two returns of the prevailing winds on this coast, which were ascertained at the lighthouse, and I omitted to hand them in last night, and there is also a table and return of the different wrecks that have taken place about the coast within the limits of the port of Hartlepool, signifying those stranded and wrecked, laden and light. This (*produced*) is a table showing the number of storms, the force of the gales, the division of the compass in which each has occurred, during the years 1854, 1855, 1856, and 1857.

17,312. (*Capt. Sulivan.*) You have heard, I think, what Mr. Calver said with reference to this southern breakwater. As you have given an opinion in favour of a close harbour, I wish to ask you whether you think one advantage of this southern breakwater would be the cutting off a tendency to drift sand in south-east gales from the mouth of the Tees towards the harbour, and so close the entrance inside and outside the Long Scar Rock?—It will prevent anything from entering there.

17,313. From what you say of the sand in the bay, generally, are you of opinion that the sand generally comes from that direction rather than the north?—I never since I knew anything about Hartlepool had any doubt about the bay silting up from the north, for it was always from the south that I had any doubt. I have never yet, although I have heard repeated assertions made that the bay of Hartlepool was silting up by matter from the Tees, and such as that. I never could find with my own observation that was the case, although I say at this moment, that if you raise detached piers off this bay you will cause an inclination of the water to get into a sort of converging current, where none at present exists, between the pier and the land, and you might cause a scour. Therefore that substance would get into the bay, and it could not get out again.

17,314. Do you doubt that, supposing the harbour to have retained its depth for the last 10 years, at the bays between the two docks the sand is increasing in some places by gales from the sea?—Oh yes; there is the beach in the north-west part of the bay; between the two harbours, for instance: that is the only place where the substances have risen higher than it was when I came to Hartlepool. But still the low-water line, I may explain, is nearly the same, with the exception of a small portion on the north-east side of the west harbour.

17,315. Is it not likely that what has increased there has been brought in from the south?—It is taken from one beach and laid upon the other. Every season I took a level over the beach; I have divided that into 10 or 11 sections to the north, as far as the West Harbour. Between the West Harbour and the other harbour there are four or five sections that come at right angles over the shore, and terminate at low-water mark; and also in the other harbour there are 20 or 30 sections. I took these levels in conjunction with the surveys that I made below low water, and I connected them together, and when I came to compare both the results I found that if the sand goes from here it very likely lodges there, or I lose it altogether, and on the two quantities being put together I find there are lost since 1846 upwards of half a million of cubic yards of substance, which I know has gone to sea somewhere or other, or to where I cannot get hold of it.

17,316. As you do not suppose the bay, since 1846, has had a tendency to silt up, if foreign matter has been brought into the bay previously, may the tide or current from the Tees have caused it?—I believe it must have come from the high-water banks, caused by the storms that prevailed between 1838 and 1846, and by the currents in the bay not being strong enough to carry it out to sea. It had been too voluminous for their weak powers to deal with. There is another reason that I might here explain, and which is, that during a certain period between the years just mentioned the tidal waters were entirely excluded from the slake, and when this is done the currents in the bay are very much weakened. I may also mention that at no period from the opening of the old harbour until I became resident at the port were the tidal waters admitted higher than what is called the neap tide high-water line; thus excluding at an average spring tide a quantity of water equal to about 860,000 cubic yards, which otherwise would have very materially augmented the currents by passing through the bay. I mentioned the circumstance to Mr. Harrison, who is the engineer of the Dock Company, and he ordered the gates in the sluice dam to be opened; after this the full flow of the tide was daily admitted, and since that period the depth in the bay, instead of showing any diminution, has gradually increased; I may say, although the difference is not very great, yet it shows an increase in the average over the whole.

17,317. With reference to what you said about the entrance to your breakwater, there is an angle at each buoy, is there not?—There is.

17,318. Supposing, instead of that one entrance you had an entrance at each of those angles, a vessel from the north-east might run into the north one, while vessels from the south might run into the south one, and vessels leaving the harbour might with a fair wind take the one or the other. That would be more convenient, would it not, for the entering and leaving of these vessels?—It would be a convenience during fine weather.

17,319. But with reference to any deposit in the harbour, should you fear that two openings would run more risk than one; having a large opening, facing as it does the north parapet, and the one overlapping the other, and acting as a funnel to catch any sediment that might come along through the breakwater from the south?—I should have a great idea that a harbour there, under any construction, if there are two entrances given to it, except it may be through a pier parallel to the land, and the two entrances to go direct out to sea, it would be injurious. It would be injurious to the navigation, by the entrances you propose being too near the shore. If you could confine the vessels to pass in fine weather only, it might be a convenience, but in gales from the sea it would cause wrecks upon the shore, and also prove injurious to the bay, because you make the harbour so very open and exposed you give less shelter, and do many other things which I cannot describe at this moment.

17,320. I am not speaking of closing in or of opening, but of the breakwater outside and angle where the buoys are; would not that be quite far enough from the shore to ensure any vessel going in in safety?—Not in bad weather. It is too near the shore.

17,321. If the gale was north-east, would a wave not go into the large opening at the angle, as well as if the gale was from the south-east?—No; the inclination of a wave in its progress towards the shore, immediately it comes in contact with less water than it has been previously running in, is to form itself into that line which is parallel or nearly so to the shore on which it falls. Therefore, with the wind at north-east, the wave would probably be going through direct to the north-west, notwithstanding its previous course being from the north-east.

17,322. Supposing that at that entrance a vessel was coming in from the north-east, would she have to haul right round the pier head on the starboard tack across the sea in the very worst place to get into the harbour?—So far as the wind is concerned she would have, but the sea would be going right after her.

17,323. But in hauling up, she would bring the sea upon her beam?—Yes; if you make a harbour with two entrances it is called an open harbour, where a close harbour would have but one entrance.

17,324. I understand you to apply the term open

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harbour to those plans which leave a large gap between the pier and the shore, and so leave room for the sea to come in to the south of the breakwater ?—That would be an open harbour, but one would undoubtedly be of a larger extent than the other.

17,325. (*Mr. Coode.*) You said that material coming into the bay came from the south ?—Oh dear, no !

17,326. Did you form your opinion from the relative quantity of sand on the beaches north and south on the bay ?—I hope Captain Sulivan did not construe my answer into that shape. If I did say so I did not intend to say that any substance came from the south. What I meant was, that I could never bring my mind to the fact that the bay was affected with substances from the Tees. We have heard a good deal about the substance in this bay. I think if we had foreign matter coming to it we should have had an increase of sand instead of a decrease. The currents in the bay itself are very gentle, and therefore, if they were getting a greater supply than their physical powers could deal with, there would be some left. It is not my idea that any foreign matter comes to it, but if a breakwater was constructed round the outer part of the bay, it would guide the sea into the entering angle, and the tide coming down from the south may cause a scour that does not take place now. A quantity of substance would probably pass behind the inner end of the breakwater, and ultimately would force its way into the heart of the great harbour, and create an injury. The only current that would go out on the north side would be simply through the Narrows. There would be no current in the harbour to keep it clear, as immediately it passed the Narrows on the south side it would cease, and deposit any substance that there might be in suspension.

17,327. You spoke yesterday of a conference with Mr. Rendel. Now no man could have a higher respect for Mr. Rendel than I have ; but I wish simply to know whether he was acquainted with your views as you expressed them ? Did you express to Mr. Rendel your view of the relative area required for a vessel in a close, as compared with an open harbour ?—I cannot say. I do not remember acquainting him with my views. On the contrary, in the conversation I held with him, I do not know that we discussed the matter. I think he was quite capable of judging of these matters for himself.

17,328. You referred to the wave turning round when it met with a projection. Are you aware that Mr. Rendel proposed to build his wall from the bottom ?—I do not know how he proposed to build his wall or construct his harbour.

17,329. Such was his proposal. Now, that being so, do you think a wave would wheel round to the same extent when it came in contact with a deep wall as it would when it came in contact with an open beach ? —I do not understand your question.

17,330. You said, in reply to Captain Sulivan, that when the wave met an obstruction it would turn round and break at right angles to that obstruction. That is a wave falling on the shore ?—Yes.

17,331. Well, would the wave turn round to the same extent when it met with a vertical wall, as when it met with an open beach ?—When the wave meets with a wall to any extent we always find there is a deflected wave.

17,332. Have you studied the effect of waves in deep water ?—Yes.

17,333. Have you ever marked their action when meeting with a wall in a depth of 15 feet ?—I have not.

17,334. You handed in some returns of wrecks within the limits of the port ; what are the limits ?—The limits is from the south end from Seaton, and a place to the northward of Hartlepool called Black halls.

17,335. How far north of Hartlepool ?—About four miles northward of the Heugh light.

17,336. You made reference to sections you had been in the habit of taking. Will you supply a set of sections on the beach corresponding with the periods at which you have undertaken to supply the soundings ?—I will. In 1846 I did not take so many sections over that beach as in 1847, but the beach was so very regular that I did not think it would make any difference if I had.

17,337. How many did you take in 1846 ?—Three or four and 10 or 12 were taken afterwards.

17,338. Will you supply the three or four you took in 1846, and the sections in corresponding positions taken in 1858 ?—I will. I took sections in different places, but perhaps the most important part is to the southward of the West Harbour piers.

17,339. Yes, between the two harbours also ?—Very well.

17,340. (*Chairman.*) The gale on the 4th and 5th January 1857, which I understand was one of the most destructive gales on the coast, was made a subject of report by you to the Commissioners of Hartlepool, was it not ?—Yes.

17,341. Will you furnish a copy of that report to our secretary ?—I shall be most happy.

17,342. Are you well acquainted with the harbours of the Tyne, the Wear, and the Tees ?—I know them very well.

17,343. You heard the questions I put to a previous witness with respect to the freshes in those rivers with a strong gale blowing on the shore. Do you agree in the account he gave as to that ?—I agree perfectly.

17,344. (*Mr. Lindsay.*) At what rate do these freshes run out of such a river as the Tyne ?—I think I can recollect of a common spring tide, that when trying the lead between the bar and the low lights, I found five knots current without the influence of a fresh.

17,345. This was the ebb tide ?—I remember making these observations from the commencement of the ebb tide down to nearly low water. It attained different rates at different times of the tide. I think the greatest strength of the tide, if I recollect aright, was five knots. I remember going in with a little cutter with a very heavy breeze, the wind from the north-east. She used to sail pretty fast, but I could not get through the Narrows with her. I had to get a steam-boat and tow her through the Narrows, and it was as much as she could do.

17,346. Is it not the case that vessels often take the Tyne on the ebb tide ?—They do ; and many are driven ashore in consequence.

17,347. As a general rule, on the average, what extent would you say the freshes add to the strength of the stream. Is it beyond five knots ?—In the Tweed I have seen from two knots an hour to 10.

17,348. In the case of the Tyne, what do you think the tide is increased by these freshes ?—In some cases five knots will be added to it.

17,349. You surprise me with that. Do you mean it to be put down in evidence that you have known the ebb tide from a river harbour run out to sea at the rate of 10 knots ?—Oh dear, no ! You are asking me what I would suppose the freshes to add to the natural stream, and I say, I have no doubt it would add in some cases five knots.

17,350. But you stated, in reply to a previous question, that in ordinary spring tides you had known the ebb tide to run out five knots an hour ?—That is a fact.

17,351. You said you think the freshes will add to that other five knots ?—I do in some cases.

17,352. Then do you know of water having gone out of the Tyne to sea at the rate of 10 knots an hour ?—I do not mean to say it would run through the sea.

17,353. I say running from the river to the sea ? —I have no doubt that if we paid particular attention to it, it would be found at the Narrows at the Low Lights more sometimes.

17,354. Is this a matter of common occurrence ?—An extreme occurrence.

17,355. Does it often run out at the rate of eight knots an hour ?—At the Low Lights I believe it does.

17,356. Do you think it frequently does?—I should not use the expression frequently, but I should think very frequently.

17,357. You say very frequently it runs out at the rate of eight knots?—Yes, I said so; I certainly give it as an opinion; I do not give it as a fact.

17,358. You have not measured it?—I have not measured it to give that as a fact.

17,359. To what extent have you measured? Have you measured anything beyond five knots?—That is the greatest I have found, taking the average from the Low Lights down to the bar intermediate of that. If I had tried it, very likely I should have found a greater current. I can remember the case perfectly of taking the average; not on the bar, but in the Narrows.

17,360. (*Capt. Washington.*) You only spoke at the time of the fresh?—The five-knot time. I am not aware there was any fresh in the river; it was a spring tide.

17,361. Did you measure it?—Oh yes.

17,362. Are you aware that in the tide in very heavy freshes the fresh naturally overruns the flood tide, and it is not felt at all?—Quite so; you would have no inward tide at all. The fresh from the country supplies the water to the levels, and checks the waters of the flood tide.

17,363. Do you think it would be any advantage to vessels taking a harbour of refuge, that there should be three entrances; one from the south-east, one from the north-east, and a direct passage, rather than one central entrance?—I should not prefer the entrance upon an angle. The only thing I should give my sanction to at all, if the close harbour was to be abandoned, would be, that the two entrances should be in the outer wall.

17,364. In the line of tide?—Just so.

17,365. Do you know that the north and east piers do fall in with the stream tide: at sea, I mean?—The north pier certainly does.

17,366. And the east pier?—Oh yes.

17,367. Don't you think that it is desirable, in constructing piers to cover Hartlepool Bay, to interfere as little as possible with the set of the stream?—I do; the north pier on the flood, and the south pier on the ebb.

17,368. You said you objected to opening out the ends. Is it not an advantage that a vessel making for the piers should have the possibility of escape either way in a slight degree, and therefore is not an angle the most advantageous point at which to put an opening for a ship to take?—I should not prefer to make an entrance in an angle of two piers; it is not the best point, considering the navigation. A sailor would be more afraid to steer upon an angle than upon a whole pier, with the entrance in the centre of it; he has not so much to guide himself in the first instance.

17,369. Is not the entrance to West Hartlepool nearly upon an angle?—It is, to a certain extent.

17,370. And is not that considered an advantage?—But these local harbours are so much embayed that the sea is comparatively smooth when we reach them.

17,371. Have you seen Mr. Walker's design for the improvement on the entrance of the Tyne?—I have not.

17,372. You are not aware there are conveying piers like the entrance to West Hartlepool, and that Mr. David Stevenson has projected piers of the same sort at the entrance of the Wear?—Yes; but I think not such a sharp angle as this. The piers are what we should call curvelinear piers, which does away with such an acute angle; although this is not an acute angle, it is a right angle.

17,373. Is it your opinion that it is better not to have an entrance at the end?—I give my opinion candidly, that if the idea of a perfect closed harbour were abandoned, if there are to be two entrances, I should prefer them in a pier, one the outer or seaward pier, about 200 or 300 yards from the south angle, and the other about the same distance from the north angle, so that vessels would steer directly into the harbour from the sea. The ebb tide would pass them both, so would the flood tide, excepting water sufficient to supply the harbour on the flood.

17,374. (*Capt. Sulivan.*) You have said you have known cases of ships partly loading inside, and then finish loading outside. If your closed harbour was built, would it cause the larger ships to come, which would take a portion of their cargo in at 17 feet, so that they would load to 17 feet before they got over the sill, and perhaps load to two and three and twenty feet in the bay, and thus very much increase the trade of the port?—I think if a harbour such as I have drawn were constructed, it would be a very easy matter to load ships up at the outer piers.

17,375. But would it be the means of bringing trade to the port, and bringing a much larger class of ships to come in in ballast loaded to 17 feet in the docks, and to 22 feet in the bay?—I have not the slightest doubt that they may do so.

17,376. (*Mr. Coode.*) You have described the two openings you have recommended in the eastern pier in the plan just handed to you. What width would you take for the ships to enter?—I should not have them less than 800 feet. I should make them less than one main entrance.

17,377. Do you give that opinion after mature consideration, or is it simply an answer at the moment in reply to my question?—Oh dear, no! I have considered it.

17,378. (*Chairman.*) You were going to make some observation, and I stopped you, and told you, you would have an opportunity of making them when your examination was done. Will you now say anything which you may wish to state?—It was to Captain Washington I was going to make the observation. It was in consequence of what he conveyed to me last night about the statement of Captain Otter's compliments. I wish to convey to Captain Washington, and to all the parties mentioned, that that was the only thanks I have received for my long services, and not the only remuneration. Captain Washington very likely will be kind enough to convey the matter to Captain Otter, but not in the same words, but that he will convey to Captain Otter, that I am exceedingly thankful to him for the flattering compliment he paid me; but at the same time it is the only thanks I have received for my long services yet; but that I was remunerated. I think there was a difference between thanks and remuneration.

17,379. (*Capt. Washington.*) I will convey them to him, but it is not much the habit of Government to return thanks for services?—No, I do not say that it is; there are many ways of returning thanks.

(*Chairman.*) I think it right, bearing the rank I do in Her Majesty's service, to acquaint you that the Admiralty are very chary in returning their thanks for services, it being our rule that it is a man's duty in every station in which he may be placed, to serve the country to the best of his ability, and to consider that when he has done so that he has done no more than his duty. After a service of 30 years, in which perhaps, upon the whole, I may have been as fortunate as many of my brother officers, it has only been my good fortune, to the best of my recollection—at this moment, I cannot speak with certainty—to receive the thanks of the Admiralty two or three times; and if I may venture, which is hardly right for me to do, to offer an opinion on the conduct of my superiors, I would say that they are perfectly right in the course they pursue.

BIBLIOTECA DEL C. O. A. M.

Mr. ROBERT RUSSELL examined.

17,380. (*Chairman.*) You are connected with the port as Chart Inspector of Wrecks for Lloyd's, are you not?—I am out-door manager under the Wreck and Damage Committee at Lloyd's, and of course my

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duties lie all over the coast, wherever wrecks may occur.

17,381. You are a seafaring man ?—I was master of a ship some years.

17,382. How long have you been at sea ?—30 years.

17,383. And how many years in command of vessels ?—I should say 17 or 18.

17,384. And the vessels which you commanded, in what trade where they chiefly employed ?—Principally in the foreign trade.

17,385. How long have you been ashore ?—Six years.

17,386. You have been present during the course of this inquiry ?—Yes.

17,387. Will you now give your opinion as to the advantage or necessity of a harbour of refuge on this district of the coast, or where you would put it, and for what reasons ?—The necessity for a harbour of refuge upon the eastern coast, of course, is not supposed to be denied for one moment ; the number of wrecks we have each year clearly prevents that without any further say upon it ; and my opinion is that a harbour of refuge ought to be formed in this bay, and it is founded upon the great indentation of coast ; and that all the vessels trading to the northern ports more or less get embayed in it in coming to the different ports and loading ; consequently, if a gale of wind sets in, many in the number of vessels in the bay, have necessarily to run to the place where they know it is the best port.

17,388. Then you consider Hartlepool, which is about the central point between the Tyne and the Head, as the best place for a harbour of refuge ?—Certainly. I consider it is from its natural position a much larger place in fact than anywhere else.

17,389. Do you think there is any difference as respects light and loaded ships, as respects the position of a harbour of refuge ? Do you think that touches the question, or that the same place would do equally well for both ?—I do not know that I have ever taken any particular notice of the exact position that light or loaded ships come ashore in. I have seen from the returns, that the greater loss is upon the whole of the coast as six of laden vessels to every one of light.

17,390. In making their passage up from the coal ports loaded vessels generally make an offing, do they ? or do they keep on shore ?—With the wind off shore, I think it is general for all vessels going up the coast to shape a course not for the headlands, but in fact to hug the shore as close as they conveniently can ; with the wind there probably would be a difference, they would keep as far off as they could get.

17,391. And, therefore, meeting with an inshore wind they should at once make the offing with a view to safety ?—No doubt they would get as far as they could, or at any rate till they considered themselves at a safe distance from shore.

17,392. Then making the passage with an off-shore wind, do they hug the coast for the sake of making their passage, and of getting the advantage of the wind or the tide, or what is it ?—No doubt it is partly custom, and partly from the winds occasionally drawing round north ; and getting the land ahead of them, they get a better lee than in dropping close in.

17,393. So they keep in shore because the wind compels them ?—Yes, that is the practice ; they keep in shore with an off-shore wind ; I know that from my own observation.

17,394. Does it frequently happen that when ships get up to the Head that the wind southerns upon them? —That very frequently happens.

17,395. Does it occasion any crowding of vessels in the neighbourhood of the Head, that ships creep up as far as the Head with a scant wind off shore, and then the wind meets them from the south, and so checks them ?—Yes. I have seen a good many vessels hove to under Flamborough Head, with the wind away from the south and south-west.

17,396. As respects light ships when they get away from Hartlepool, bound for other ports, they make as straight a course as they can ?—With the wind off shore they hug the land as close as they can to make sure of their ports, because a light collier is not much of a thing when she comes in contact with a strong wind. She sometimes goes one foot ahead and ten to leeward.

17,397. Are the shifts of the wind sudden on this coast ?—I am not able to say that the shifts of wind are more sudden than in other ports. It occasionally happens, as everywhere else, that the wind draws round suddenly, but I do not know that this coast is particularly liable to sudden shifts.

17,398. In the fall of the year, when ships leave these coal ports and hug the land, are they exposed to risk from finding themselves in shore on the sudden change of wind ?—No doubt of it.

17,399. Can you say, from your own knowledge, that that is a frequent occurrence ?—I would not say from my own experience it is a frequent occurrence, but I have known it in my own experience.

17,400. Then, under these circumstances, would you be disposed to recommend one large harbour at this point in preference to the improvement of the principal harbours along the coast ?—Well, I think, as a matter of refuge only, I should be inclined to recommend a good harbour, than one or two small ones that would not be applicable with all winds and with the wind veering from north and south.

17,401. But these vessels coming too close probably are exposed to the danger of being caught on a lee shore by sudden shifts of wind. Would it be better that they should have several ports to go into than only one ?—No doubt, if there were harbours fit for vessels to run into with an onshore wind ; still, I think, that one good harbour on this bay would be better than two or three small ones in other places.

17,402. But if the ports of the Tyne, the Wear, and the Tees should be so improved as to take in vessels drawing 16 feet water at low water, would you consider that a preferable improvement to making one large harbour for them ?—There is no doubt, as regards the trade of that particular place, it would be all important to make harbours fit for the ships to run into in all weathers ; but I do not know they would be applicable to anything except the northern trade ; I do not know they would be applicable to ships going up and down the coast. No doubt ships would sometimes go and make use of such harbours wherever they might be going to.

17,403. Then you are decidedly for one harbour of refuge ?—I am, decidedly, for many reasons. I would rather have one good one than a lot of bad ones.

17,404. Then you would be disposed to call a harbour of refuge—a harbour on this coast—which would take in laden vessels drawing 16 feet at low water spring tides, a bad one?—No ; I should call that a harbour applicable to the general run of the trade up and down this coast ; it would not be for all the trade, but it would be for perhaps nine-tenths of it.

17,405. And applicable to that portion of the trade probably which was most in want of this harbour of refuge ?—Yes, I should think so.

17,406. What portion of the trade that comes into these ports are in most want of this harbour of refuge ?—I should think that the ordinary run of colliers was more in want of harbours of refuge than any other class of vessels, because they are most of them less weatherly than the bigger description of vessels that come down upon the coast.

17,407. As respects the colliers, are they generally well found ; first, as respects their gear aloft, masts, sails, rigging, running rigging, and standing rigging ? —Well, I think some of them are very well found ; some of them are like all other coasters, very badly found.

17,408. So considerable numbers of them are badly found ?—No, not on the whole ; they may be taken as tolerably well found.

17,409. Would you say the proportion of badly found vessels is not greater than is to be found among vessels going foreign for the same distance and of the

same size?—I think the proportion of badly found vessels and laden vessels in the coal trade is larger than the proportion of badly found vessels going foreign.

17,410. As respects the hulls, are they sound and strong generally, or are there a considerable number, at least, of ill-conditioned vessels in the trade?—They are generally sound and strong, until such time as they have got age on their side, which makes them tender.

17,411. Is it not the necessary practice of putting them on the ground with heavy cargoes in, that gives them a tendency to strain and leak in bad weather?—No doubt it will do them no good. No doubt vessels lying on the ground with heavy cargoes strain more or less.

17,412. And you assent to that as being a fair description of the colliers?—Yes.

17,413. When these vessels are taken in a heavy gale of wind off this coast, they necessarily strain a good deal; does a good deal of work come upon the people in the shape of pumping?—No doubt.

17,414. Are they sufficiently manned in point of numbers?—No doubt they are generally. Every man, no doubt, has to do his work; but considering the voyages and the length of them, I think they are tolerably well manned.

17,415. Would you be disposed to say that in those vessels in the winter time, when they have been at sea during the course of bad weather for two or three days, that it may not unfrequently happen that a considerable number of their crews are pretty well done up with the work of the ship and the pumping?—No doubt but that in strong winds, when they have been knocked about for many days up and down the coast, their crews get thoroughly exhausted, and I do not say incapable, but at any rate they will be all the better for a good rest. We had an instance the other day of an American vessel, that got in off the bay and could not come in, and the description to us was that they tried to wear her off the shore, and that the people were so done up that they could not work the ship.

17,416. Does that kind of thing happen occasionally amongst colliers?—I do not know of my own observation, but I think it is just probable it may occasionally happen.

17,417. That being the case, do you consider that a harbour, which might hardly be said to be absolutely necessary for the saving of their lives, would yet be a great boon to them where they could put in during foul winds, and get a day or two's rest after a week's hard work at sea?—No doubt if there were harbours up and down the coast applicable to these colliers to shore into when they have been knocked about, that would be used as a rule.

17,418. Would it be advantageous, when these vessels have got down to the southward, that they should not have to run back for the harbour, but hold what they have got of their voyage?—No doubt it would be advantageous, so that they could afterwards go upon their voyage.

17,419. (*Mr. Lindsay.*) Referring to the questions which have been put to you by the Chairman, and to the object that the Commission has in view, the saving of life and property, do you think that the construction of one great harbour in any part of the coast between Flamborough head and the Farn Islands would do more to save life and property than the improvement of the Tees, the Wear, and the Tyne, if that were possible, so as to admit vessels at all times of the tide, I mean the description of vessels trading along the coast?—I think, if such improvements could be made at all the harbours along the coast, it would do more good than one harbour, if it could be done so that they could run for them in safety.

17,420. Say the Government resolved to spend two millions of money for humanity's sake upon this coast, is it your opinion that the expenditure of that money, distributed among those harbours named, would do more good to save life and property than the expenditure of that money at any one spot?—So far as I am able to judge you would hardly spend two millions of money at one harbour without making it anything extraordinary.

17,421. That is not what I want your opinion upon. If the existing harbour could be made accessible at all times of the tide, would that do more to save life and property than the spending it on one great harbour?—No doubt it would. That would do all the good you describe. It would do more good than it would at any one lump.

17,422. I am speaking to you as a master of a ship, do you know sufficient of this coast to be able to tell me anything about the distances between Flamborough Head and St. Abb's Head and the intervening places?—No, I do not remember the distances.

17,423. You are not sufficiently familiar with the coast to speak in regard to distances up and down the coast?—I do not remember the distances up and down the coast.

17,424. (*Capt. Sulivan.*) You say the improvement of the three harbours would be better than the making of one large harbour; would you qualify that by saying that if with the certainty of the money being laid out it could produce the desired effect in these harbours, and keep them open at the necessary draught of water at all times by night or day?—Exactly, I say that unless these three or four harbours are improved and made fit to run into in all weathers it is better to make one than to have a lot of bad or indifferent ones.

17,425. Would you think it a good thing to risk a large sum of money for the prospective improvement of the harbour when there would be no certainty that the desired object would be obtained?—I should not like to do it.

17,426. If you had your choice, and were still going to trade from the coal ports to London, would you prefer, for the safety of your crew, and the vessel keeping always to the collier trade, and more especially to laden colliers; a moderate harbour of refuge in two places of the coast as near Flamborough Head and Hartlepool, which would take laden colliers at all times of the tide, by night and day, with enough water to spare the entrance; or would you rather have one large harbour in any one place that would take large ships, and give more space inside?—No, I should prefer two.

17,427. Two moderate harbours to one large one?—Yes.

17,428. Supposing that the money could be laid out at Hartlepool and Filey, would those be the places that would answer better than any others the necessity of the trade on this coast north of Flamborough Head?—Yes, I should think the two places, Hartlepool and Filey, would be two as good places as could be selected this side of Flamborough Head.

17,429. Would Filey be good for those vessels that have got off the Head, and with bad weather, or would it be safer than running back to their ports?—No doubt vessels caught off Flamborough Head find a harbour of refuge under their lee without running back, and the one that would catch them first on the way.

17,430. Would Hartlepool be especially valuable for those that do not weather the high land, laden vessels going to the south, and light vessels returning back to their ports and caught off the bay?—No doubt.

17,431. We have been told that some masters dislike having to go into a harbour even where that harbour was under their lee, except their own ports. Would you like to say that? Do you believe that many ships, in bad weather off Flamborough Head, with the prospect of being driven back to the Tyne and to the Firth of Forth even, would hesitate for a moment which they would choose, either going into Filey, if they were far enough to windward or to Hartlepool, if they were to leeward of Filey, rather than risk being driven to northward?—I do not know what others would do, but I should take the nearest place.

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17,432. Generally speaking, do you believe the owners of ships would save more wear and tear and risk of their vessels by taking a prudent course and going into a harbour if it was near them, than they would by knocking about and trying to go on their voyage?—I think considerably they would save more by ships going into a harbour than they would by ships knocking about.

17,433. (*Capt. Vetch.*) You have heard of freshes coming down the Tyne and the Tees, that they are very great obstructions to vessels entering those ports, would not that be rather detrimental as harbours of refuge to vessels wanting shelter?—There is no doubt but a strong current coming out would be a great hindrance to vessels coming in; and I know from my own observation that the currents in the Tyne and the Wear are greatly increased by the freshes. When the snow breaks up in the winter, the currents are very strong, and a great deal of damage is done even in those rivers.

17,434. Then if vessels were trying to come right into this harbour at times of flood tide, when the currents were coming down with freshes, they might not be able to go in?—Very likely they would not.

17,435. Therefore these ports would not serve at all times of the season?—They would not be so certain as a place where there would be no tide.

17,436. I want to ask you, if only one site was selected on this coast for a harbour of refuge, would Filey or Hartlepool, in your opinion, be the best place?—If there was to be one, I would say Hartlepool by all means.

17,437. If a number of vessels were to leave a number of ports at the same time from the Tyne down to the Tees mouth, with the same state of wind, and were to proceed southwards on their voyage, if that stream of vessels were caught off Flamborough Head with adverse winds, would Hartlepool or Filey be most able to receive that stream of vessels running northward for refuge?—I have no doubt that they would get into the bay and go to Hartlepool.

17,438. (*Chairman.*) Have you ever had to run to Hartlepool in heavy weather by your lead?—I never had myself, but I know the practice of the trade is to make the land from the Baltic. Vessels bound from the Baltic to London, usually, indeed, always I may say, endeavour to make the land from Lowestoff; and vessels down from the Humber generally endeavour to make the land off Flamborough Head. That is so far as my observation upon it has gone.

Mr. Simon Fisher examined.

Mr. Simon Fisher.

17,439. (*Chairman.*) How long were you at sea?—40 years.

17,440. How long have you been ashore?—I have been ashore one year. I have gone four years, more or less, one voyage. For 30 years and upwards I commanded a vessel.

17,441. Are you still employed in the command of a vessel?—No, I have been staying at home for the last few months, but I was at sea last winter.

17,442. And what description of vessels have you chiefly commanded?—Vessels trading backward and forward on this coast from London to the Orkneys and Shetland Islands; the north west of Scotland, the Dogger Bank in the fishing business more especially.

17,443. You have been present during the course of this inquiry?—Part of it.

17,444. You are aware of the object of it?—Yes.

17,445. Now, taking this district of the coast from Flamborough Head to Berwick, where would you put one large harbour of refuge, if one was decided upon for the safety of the coasting trade?—I am here before you as a disinterested person altogether; I have not the least interest at all. Supposing a harbour was constructed at Hartlepool or Tees Bay, I do not see a prospect where I can reap one single farthing, therefore I do not give my evidence in favour of Hartlepool on the grounds of self interest. If there was a harbour of refuge at Filey Bay that probably might be an advantage to me, but seeing a greater benefit must arise from a harbour in Hartlepool Bay, and not only that, but it would be the means, I feel confident, of saving 20 ships while the other would not save 10 or, probably 5, I am in favour of one at Hartlepool; it is in the centre nearly between the two extreme points, Souter Point and Flamborough Head. Frequently for several days there is a heavy sea rolling over the bar and the ships cannot get to sea; presently there comes a fine day, and out of the various ports between the Farn Islands and Huntley Fort come 500 sail of ships. The greater part of these ships are bound for the southward; some are fast and some slow; they are distributed along the coast, probably for 50 miles. If the wind is westward when they tow out of the ports, and very frequently it is the case when the wind is easterly, there is a surge or ground swell upon the bar, and it is dangerous to tow out unless there is a good depth of water, therefore they are more likely to tow out with a westerly wind than drag along the shore; many of them probably reach as far as Whitby, some reach Filey, and some few reach the Tees, and some short of that, probably from having come out last. What is the consequence? These ships dragging up in shore for the benefit of the westerly wind and the wind suddenly changes, as we often have known it upon this coast, and a gale comes on from the east-north-east, they are caught in the bight of the Tees Bay. There being no harbour of refuge they cannot get any confidence of escape, and with the greatest peril and danger they drag away to the south without any prospect of life or property being saved; they put their ships' heads to the northward and drag away; probably they cannot lie north-north-east; the ship is making a north-west course; they are dragging into Hartlepool Bay; the master must find himself in difficulties, he gets land ahead, he weighs his ship and goes ashore. In 1844 I crossed the Tees Bay in a gale of wind from east by north to east-north-east; I observed as many as 30 or 40 sail, and probably if I had gone to the mast-head I might have seen 50 vessels dragging to the southward, about a south-south-west course, lying south-south-east under low canvas. I said to the crew on board, "What would be the consequence if "the gale continues throughout the night?" The gale did increase with rather more fury, with thick rain; they dragged till they saw the Yorkshire coast, and about eight of them went on to Redcar reef and every soul perished; 27 sail wrecked in that gale besides what had been lost in other gales. I recollect two other gales besides; one, I think, was in 1833, and one was later than that, considerably. Three different times have I crossed the Tees and seen a number of ships in a most wretched and distressed state, with nothing but death and destruction before the bulk of them; and I found after I had arrived at home that my judgment was not at all out, for I found many wrecked along this coast for want of a harbour of refuge in the Tees Bay. I prefer a harbour in Hartlepool Bay because the advantage is greater of bearing off the land between Hartlepool Bay and Flamborough Head. You see between Hartlepool Bay and Souter Point the variation is upwards of five points and a quarter; it gives a ship an advantage when caught to the northward of Hartlepool by a gale of wind from east-north-east to drag into Tees Bay. Ships that are caught at Flamborough Head have got every advantage to drag to this bay. Five points and a quarter give a ship a great advantage in running to a harbour of refuge in the bay; because, if a ship is caught any distance from the land off Souter Point, she dare not make the Tyne, probably because of the tide; she can drag to Hartlepool Bay, and she can lay south-south-east; if she is anything of a ship at all she will make a south-south-east coast with four points; if she is a good distance off she will clear the

Heugh of Hartlepool sufficiently to gain the harbour of refuge. If a ship is caught towards Scarborough—if she is a fair distance off—a north-east course will bring that ship to the harbour of refuge; she will lay under in a gale of wind to the east and by north, and surely if she will lie east-north-east, and she will make a north-north-west course, and by doing that she will reach her refuge in Hartlepool Bay. Ships caught in a gale of wind at south-south-east or south-east off Flamborough Head, and cannot weather, I consider every captain that is in my presence will naturally say he should get a good offing should the wind last her, and by his dragging to the eastward during the gale he will get a good offing in Tees Bay; if he finds he could not clear himself, and the gale increased, he would have Hartlepool here a harbour of refuge dead to leeward to run to. He could approach the harbour of refuge in this bay by the soundings; the ground rising very gradually for about 40 fathoms till you come to eight, nine, or seven, which would be a great advantage; and I speak from my own experience, and the pains I have taken to gain soundings in every part of the sea I have coasted by. I have no doubt the general bulk of captains are well acquainted with the soundings, and would be able to tell by the depth, and the soil they would be bringing up by the grease upon the lead when they were approaching Hartlepool Bay.

17,446. When you talk of the variation being five points do you mean the variation and leeway upon the voyage?—The variation of the land on the north and south side.

17,447. You are resident at Greenwich?—Yes.

17,448. Did the vessels you sailed in belong to the port of London?—Yes; the vessels I sailed in belonged to myself.

17,449. Then I understand you to say you would recommend a harbour of refuge at Hartlepool simply for this, that when vessels in an eastern gale cannot weather the Head, they are pretty sure if they make leeway, that they would not weather the land to the northward?—It is a great chance if they do.

17,450. And, therefore, if the gale lasts they drag down to leeward, till at last they find themselves at the bottom of the bay?—That is the case, and the cause of the destruction that has taken place in various gales.

17,451. (*Mr. Lindsay.*) I understand you to say, when you referred to those 30 vessels which you saw in the bight of the bay, that the gale was blowing strong from the east-north-east?—Yes.

17,452. Were they in a position to be saved by a harbour of refuge at Hartlepool?—They could not have reached the Tyne nor Filey, from the distance these ships were off the land, and the course they were making upon that tack, they making a south-south-west course, and on the other a north-north-east course, and what possibility was there then of their reaching the Tyne, or a harbour of refuge at Filey Bay? They could have reached no other place in the bight of the bay but Hartlepool. They might have reached Whitby, but that would have been like running to certain destruction.

17,453. Have you known many vessels crowded round Flamborough Head?—I have known as many as 50 or 60 sail, sometimes probably more.

17,454. You said you saw 30 vessels in the bight of the bay that morning, and if you had gone to the masthead you might have seen 50?—No doubt.

17,455. And how many have you ever seen off Flamborough Head from the deck of your ship. Have you not seen more than 50?—I have seen 50 or 60, probably 100.

17,456. Might you not have seen 200 by going to the mast head?—I might, but there was no necessity.

17,457. Might you have seen 300?—I do not think that I should. I might probably during 30 years experience, when a large fleet had been windward, have known as many as 500 or 600 between Harwick and Yarmouth.

17,458. Well, now you have stated the case of the 30 or 40 vessels caught in the gale from east-north-east in Hartlepool Bay, but what would become of the 300 or 400 vessels caught off the Flamborough Head, which could not weather the Head?—If caught off Flamborough Head, they would have dragged round to the Humber.

17,459. Say they could not have reached the Humber?—They would have had to go ashore, and there would have been no other prospect.

17,460. If a harbour of refuge is necessary to save the lives of the crew of those 30 sail which were caught in the bight of this bay, do not you think that a harbour of refuge would be still more necessary to save the lives of those on board all those 300 or 400 ships that might be caught in the same gale off Flamborough Head?—It is a very different thing to be caught off an extreme point.

17,461. Answer my question?—Yes; but that I consider is a very different thing altogether, vessels being caught in a bight, and cannot clear the land, and others being caught off an extreme point and having every advantage.

17,462. If a vessel is in a position that she must go ashore, do you consider she is in any better position off Flamborough Head than she would be in the bight of a bay, so far as regards the saving of the ship and the lives on board?—I say if they could not clear themselves they must go ashore.

17,463. Then in cases where they cannot weather Flamborough Head to the southward and clear themselves, do not you think it necessary, as you stated to the Commissioners, you thought it necessary for a harbour down here for those you named, do not you think it equally necessary to have a harbour further south to save the lives of those men on board the 300 or 400 ships?—I should have no objection at all to a harbour at Filey, if we have resources to construct a harbour there as well as at Hartlepool, but we are not prepared with money to construct a harbour of refuge at Filey and here too, therefore, I prefer this port to Filey, because it would save 10 where Filey would not save one.

17,464. Are there more ships to be found off Flamborough Head than Tees Bay?—There is as often as great a fleet off Tees Bay as off Flamborough Head.

17,465. Do ships from the Baltic bound south come to Tees Bay?—Ships bound for the Baltic to London do not fetch Flamborough Head except a great chance. They always shape their course to Lowestoft, because they have got the Dogger Bank and the Silver Pits to guide them.

17,466. But ships bound to Hull?—They generally shape their course for the Humber and Leamington.

17,467. Do ships from Archangel sight Flamborough Head as a rule?—Some do, but that depends on where the wind is.

17,468. Do the colliers from the ports in the north sight Flamborough Head as a rule?—I should think not.

17,469. Do they pass it?—That depends upon circumstances.

17,470. I ask do colliers from the north bound to London pass Flamborough Head?—Certainly they do.

17,471. Do vessels from Scotland pass Flamborough Head?—Certainly they do for London.

17,472. That being the case, are there not more vessels as a rule off Flamborough Head than off any particular point in the bight of this bay?—I cannot say that vessels distribute themselves generally. Suppose 500 sail tow out at the various ports between the Tees and the Coquet Island in one day, which is the case often; some of these vessels are fast, some slow, and they distribute along the coast. If a gale of wind comes on they are not all kept in one position. It is not the fact that they should, or I do not know what would be the consequence.

17,473. Whether do you think one great harbour at Hartlepool, or two harbours, one at Filey and one at Hartlepool, would do more to save life and property?—I think probably there would be more ships

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saved by two than by one, but it would depend upon what sort of harbour was constructed at Filey.

17,474. Speaking to you as a sailor, and not as an engineer, say you have two millions to spend on this coast between Flamborough Head and the Farn Island to the best advantage for the saving of life and property, whether would you spend the whole of the two millions at one spot at any part along the coast, or distribute it over Filey, Hartlepool Bay, the Wear, and the Tees?—I should prefer spending the two millions over one large harbour of refuge here in preference to one at Filey and the other here; and the two millions of money will be necessary to construct a harbour of refuge sufficient to hold the number of ships that are exposed to danger off this port. I am no judge of how much money it would take to construct a harbour at Filey; and then whether that would leave a sufficiency to construct a harbour here sufficient to receive the ships that would sometimes be constrained to run for it, because we would make the remedy rather worse than the disease if we lose more ships here by not having a sufficiency of room to contain those that run for it owing to having constructed a harbour at Filey.

17,475. Is it your opinion if two millions could be spent on the improvement of the harbours so as to make them accessible at all times, the spending of that two millions on Hartlepool Bay would do more to save life?—That is my deliberate opinion.

17,476. You know the coast of Scotland pretty well?—Yes.

17,477. Do you think a harbour of refuge is necessary between Aberdeen and the Pentland Firth for the saving of life and property?—Yes. Suppose there had been a harbour of refuge at Wick, would it not have been the means of saving both life and property in several instances, for the number of boats that go out there fishing at times is not less than 1,400 and as far as 2,000 sail.

17,478. Then you think it would be necessary to have a harbour of refuge at Wick, on account of the fishing boats and the lives exposed to danger in them?—Not exactly for that, because I have known ships ashore and to be stranded for want of a harbour of refuge about the Caithness shore.

17,479. Suppose no fishing boats at Wick at all, and looking to the vessels that trade to the Baltic, and to Archangel and America, whether do you think a harbour of refuge at Wick, Fraserburgh, or Peterhead, would do the most good?—Decidedly at Wick; because if a ship is caught off Buchan Ness, she is off an extreme point, and has every advantage to drag if the wind is from the eastward and north-east through the Firth; but if the wind is to the south, or anyways that way, she would get the Moray Firth.

17,480. Do you know Long Hope and the different anchorages about the Orkneys?—Yes; Long Hope is a very excellent harbour now, and since they have constructed a light on the head it is easier of access by night and by day; though I fear at times destruction will take place there to both life and property from that light (yet it will save many ships); owing to the two spits of rock, one light obstructs the other, and vessels will catch one or other of those rocks.

17,481. Can you tell me any wind that will carry a ship into Wick and will not carry her through the Firth?—That will depend upon the tide she gets.

17,482. Would the same wind that carried a ship into Wick harbour carry her through the Pentland Firth?—Of course it would.

17,483. It would be during such winds as those that you would require a secure shelter in a harbour of refuge at Wick?—Generally speaking.

17,484. Wind blowing upon shore?—Yes.

17,485. Would you have any hesitation in a ship of 200 tons going through the Pentland Firth with a south-east gale and the tide running to the westward?—None at all, the tide would carry us down.

17,486. Would you have any hesitation in going there with a fair gale in an adverse tide?—I dare not approach it if the tide were anyways rapid at all. I have seen difficulty and danger to life and property more than once or twice in attempting that.

17,487. If it was adverse would not you consider it prudent or safe to go through Pentland Firth?—I think if a ship would run 10 knots, it would be nine chances to one she would run over the tide if it was a spring tide. I have even run 14 knots over that firth—14 miles an hour between Steomar and Swamar.

17,488. Say you were off that coast, and caught in a south-east gale, and the gale was so strong that you considered it advisable to secure shelter, your only shelter would be at present Long Hope?—That would be the only shelter at present.

17,489. What would you do?—I should endeavour to drag through the firth, and keep the ship afloat; I dare not take the firth in a gale of wind from the south.

17,490. You would heave to, to wait the tides?—Yes.

17,491. Would you consider there was more danger to your ship from being hove to than scudding?—It depends upon whether I ran out into the entrance of the firth to get into the tide way or not. If I got into the tide way I should be liable to have everything washed over, and the ship too; but I should not do that; as an experienced man I should know what time the tide flowed, and should not run into the tide sea to heave to.

17,492. You would heave to and dodge the tide in?—Certainly.

17,493. Or get under the southern headland and dodge in?—I could not, because there would be no headland.

17,494. If you were approaching the Firth you could find shelter to some extent?—No; there is no projection or shelter with the wind from south-south-east or south-east.

17,495. Then if you were so close that you saw you could not heave to, and that it would not be prudent to heave to, and the flood tide coming on, would you consider yourself in very great danger?—Of course; the only step I could take would be to run my ship ashore, as I saw one 12 years ago, laden with tobacco from Virginia, run ashore, and a very fine ship she was.

17,496. Have you, in your long experience, known many ships founder in going through Pentland Firth?—There have been a great many lost since I frequented these ports.

17,497. How long have you been trading?—Over 35 years, with the exception of this last year.

17,498. Do you know any part of the west coast of England or Scotland?—I have never been further round than Portsmouth.

17,499. You have not been anywhere about St. George's Channel or the North Channel?—No.

17,500. (*Capt. Sulivan.*) Do you know that vessels bound round to the north by the Pentland Firth, that in their insurance policies there is a provision for reduction of the premium if they go through the Caledonian Canal, instead of going round the north coast?—I am not able to answer that.

17,501. Your vessel would not be insured?—No; I had nothing to do with commercial ships.

17,502. Would you consider the fact of about 1,000 vessels in Scrabster Roads, on the other side of the firth, in one year, is a proof that if there was a harbour on the east side of the Pentland Firth, it would be nearly as available, if not quite, as Scrabster Roads has proved to be on the west?—Undoubtedly.

17,503. Would a harbour at Wick also be valuable for the trade bound eastward, such as timber from America, that had passed the Pentland Firth, and being caught and unable to get to windward, it being able to save them running back into the Pentland Firth?—Certainly; that would be a very great advantage.

17,504. We have had it in evidence that the westerly winds before changing to easterly gales more generally draw to south-west than come on to blow from east-south-east, and then to eastward, whereas you speak of sudden shifts from westerly

winds to easterly gales ?—I do not say it is always the case ; for years that I have frequented this coast, I find that a gale commences very frequently from south-south-west, but rain generally spoils the wind. It makes to the south and gradually to the south-south-west. It increases and blows harder and harder, and as it works to east-north-east there is a most terrific gale.

17,505. Suppose this fleet of colliers going down with the westerly winds, and when towards Flamborough Head, meeting exactly this weather, would not a shift of wind take them more off the coast, instead of setting them into the bay as it drew ahead, and so when it got round and became a lee shore to them, would they not be more off the coast than in the bay ?—Certainly.

17,506. If a fleet of ships in that position were caught by the easterly gale that you describe and which appears to have been exactly the description of gale of January 1857 would not a harbour somewhere between Flamborough Head and Whitby be an excellent position for most of those ships to take refuge in ?—I don't see that that is the case at all ; these ships taken with the gale of wind at south-south-east below Whitby and Flamborough Head would drag away to the eastward, and if they had a harbour of refuge here it would be directly under their lee.

17,507. Decidedly off Whitby ; but I am speaking of vessels that had got down with a wind towards Flamborough Head, then, as the wind drew round and caught the vessels and crowded them together under Flamborough Head, and then drew round to the eastward, would they not be in a position to take Filey Bay ?—Allow me to make a remark there. If the vessels are caught between Whitby and Flamborough Head, and put their heads to the northward, they drag down to Whitby, and how are they again to get back to Filey ?

17,508. You have heard of the gale of 1857 in which some 27 vessels, including the *Whitby* ones, were wrecked between Flamborough Head and Whitby; do you think that those vessels could have been far enough to windward to weather Whitby and get back to Hartlepool, or were they by the stress of the gale driven so far to leeward that they could not weather the high land ?—I think that the captains of the ships caught there near the Head considered there was great risk if they bore away for the ports ; there would be peril and danger in approaching the ports for want of water, and rather than run the risk they hung to windward with the hope that the gale might moderate or the wind veer round to the northward. Well, they dragged away till the gale increased to that rapid fury that they found they could not clear themselves upon either tack ; they had no harbour of refuge when night coming on to flee to ; they could not clear the land to the southward or northward ; when they got close inshore many of the ships became disabled so that they made no headway but they were driven at the mercy of the winds and waves.

17,509. If vessels were in the position you describe would not Filey Bay be a good position to save these vessels ?—That would have been an advantage under these circumstances.

17,510. You having said that Filey would have saved those vessels lost in its neighbourhood, I ask you whether those wrecked in the neighbourhood of Hartlepool, having weathered the high land of Yorkshire, would have been saved by a harbour of refuge in Hartlepool Bay ?—I believe they would.

17,511. I should like to give you an opportunity of explaining what I am sure is in direct contradiction of what is in the reporter's notes, because in answer to one question you said two moderate harbours would be better than one large one ?—Certainly.

17,512. Immediately afterwards you said the one large harbour at Hartlepool would be better than two small ones ?—Yes, but I said if you could construct two with one sum of money—if you could make one large enough to receive the number of ships that would come here, and have a sufficiency left to construct one at Filey as well, I should consider that would be an advantage ; if not, I will rather expend the whole in this one place.

17,513. When you stated two moderate harbours instead of one large one, did you mean by moderate harbours, harbours that would in either of them take such a large number of vessels but between the two would give as much accommodation as one large harbour ?—That was my meaning.

17,514. Then suppose harbours such as these were constructed would you prefer two moderate harbours sufficient to take all the laden colliers at all times of the tide or one large harbour that would take larger vessels than colliers ?—I would give the preference to the two.

17,515. (*Capt. Vetch.*) Are you well acquainted with the north-east coast of Scotland ?—Yes.

17,516. Do you know Wick Haven ?—Yes.

17,517. Do you know Peterhead ?—Quite well.

17,518. You are aware probably that at Wick in the fishing season there are 1,400 boats often crowded there ?—Yes.

17,519. You are aware probably that the quantity at Wick is double that at Peterhead ?—Yes.

17,520. If for the saving of life and property a harbour of refuge is to be provided at one of these two places, which would you consider of the two most deserving of attention ?—Wick, certainly.

17,521. You are probably aware that Wick, at present, is but a natural cove and has no artificial protection ?—Just so.

17,522. You are well acquainted with the Pentland Firth ?—Yes.

17,523. Do you know any navigation of the same length on other coasts that is so difficult and dangerous a passage ?—I consider it the most dangerous passage there is anywhere between the Island of Skye and the Irish Channel. There is another passage which is not commonly taken and which is more dangerous than that, that is the passage between the Islands of Duray and Comache.

17,524. That passage is not so much frequented as the Pentland Firth ?—Yes.

17,525. Suppose the Government decided to provide funds for a harbour of refuge on this part of the coast, would you prefer for the saving of life and property that that harbour should be constructed at Hartlepool or Filey Bay ?—Hartlepool by all means ; I am confident it would save 20 ships where the other would not save 10, besides the lives.

17,526. (*Chairman.*) What kind of land is it about Hartlepool ?—It is very good land to make. The red cliff at the south of Huntcliff a few miles behind Redcar, is very excellent land to make. In coming in from the sea from the north east there is a mountain called Barnaby Moor, and it is such a remarkable square topped mountain that any person acquainted with the coast could not be mistaken. I consider it one of the best parts of the coast to make coming from foreign ; the soundings are also good to guide you in there, so that there is no port to equal it along here.

17,527. And in hazy weather how then ?—The soundings there will be a great guide.

17,528. But when the land is three miles off and you cannot see it distinctly ?—The lead would be a wonderful guide.

17,529. Leave the lead alone ; in hazy weather when the land cannot be seen distinctly only for two or three miles, what kind of land is the land about Hartlepool to make ?—Very excellent ; you will see the Heugh projecting out frequently when you cannot see any other land in the neighbourhood.

17,530. Do the soundings diminish gradually ?—Generally speaking they do.

17,531. You said something about the soil, you can easily tell by the soil what part you are in ?—All practical men frequently use the lead, but you must have a piece of grease on the lead, otherwise it will not bring up the soil ; those that used the lead with

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the grease at the bottom readily ascertain when he is approaching, if he has practised it.

17,532. In running into Hartlepool from 40 fathoms water, what will be the variations of the bottom which will enable you to know whether you are north or south of your port, or whether you are running in directly for it?—It is in 40 fathoms water you find the ground soft and oozy; as you approach the shore it becomes sandy; but I cannot exactly describe the soil of 40 fathoms, all the way close into the Heugh of Hartlepool. I will not attempt to say the colour of the soil because I have never practised the lead upon these parts having no necessity so to do.

17,533. So that when you speak of running in by the lead, you speak not so much of your own knowledge as what you had heard to be the case?—By the depth of water and not the colour of the soil.

17,534. What is the greatest number of vessels you have seen in Yarmouth Roads and its vicinity?—Sometimes 800 or 900 sail.

17,535. Considering the large number of vessels at anchor there, for what number of vessels do you consider a harbour of refuge should be made on this coast?—It ought to hold at least 500 or 600 sail.

17,536. (*Sir F. Smith.*) Have you seen the plan proposed by Mr. Jackson?—Yes.

17,537. Do you imagine that the plan coloured blue will contain 500 or 600 vessels?—I fear not without the assistance of the docks.

17,538. We have heard some reasons against vessels for refuge going into the docks as it would interfere with the trade. Suppose, in point of fact, that you cannot get the accommodation with this plan, without the docks or with the docks, would you apply the public money to making accommodation which would not do all that is contemplated by Mr. Jackson's plan?—I should certainly think Filey would be the place; I would give the preference to it.

17,539. I think Mr. Ward Jackson's first plan would involve a cost of two millions, and that the smaller plan would not require one million. Suppose that if the two millions be granted for the whole coast would you then extend the plan to the two millions rather than to the one million?—I think that in case one million expended here, would not a harbour capable of containing 500 sail, it would be best to spend the two millions here in preference to spending part of it at Filey.

17,540. Suppose two millions were granted for this part of the coast, and that the larger plan of Mr. Jackson would involve two and a half millions, and, therefore, you are driven to the smaller plan, how would you apply the residue, would you apply the whole at Filey or elsewhere as well as at Filey?—I have no idea of what they would expend at Filey or what kind of harbour they would construct there.

17,541. Well, assume that Filey costs 500,000*l.* and that the harbour here costs a million, that is one and a half millions, you have got half a million to spare, where would you apply the half million beneficially besides at Hartlepool and Filey, or would you not apply it all looking to the saving of life chiefly rather than property?—I think at Whitby, or otherwise the Tyne; but I am afraid it will be spent in vain at the mouth of the Tyne from its rapidity and being a bar harbour—in probably five or 12 months after you carried it into five fathoms. At all the bar harbours I have been acquainted with, although piers have been extended hundreds and hundreds of times, they are still bar harbours—the same as they were before they carried the piers out.

17,542. You think a bar will always go to seaward with the extension of the piers?—Yes, where there is any rapid tide to carry it out to sea. As soon as the current loses its power, down sinks the sand and forms the bar.

17,543. Do you know Aberdeen?—Yes.

17,544. Do you think public money could be advantageously expended there for the saving of life and property?—You see they carried that pier out I do not know how many hundreds of feet, but it soon filled up and became a bar harbour. I fear spending much money would do very little to improve the entrance of the harbour at Aberdeen.

17,545. Then you are not disposed to spend a million there in the chance of saving life and property?—If I thought it would be the means of saving life and property, I would be willing it should be spent there.

17,546. (*Capt. Sulivan.*) As there is a difficulty where this extra half million is to go, and as 500,000*l.* would make a very small harbour at Filey, what would you say to giving the extra 500,000*l.* to Filey, and so make a good harbour there as well as at Hartlepool?—I should have no objection.

17,547. Do you think that would be the means of saving life and property on this coast?—I think it would.

17,548. (*Capt. Vetch.*) Suppose that a harbour capable of containing 700 vessels at a time, which, as I understand you to say, would suffice for the whole of the ships requiring shelter on this coast, at one time would you consider such a harbour as that more essential than dividing she sum of money between this place and Filey?—According to the plan there is but one entrance, which would have I fear a very sad effect upon the ships dragging from the north. Ships dare not put back to the Tyne, knowing that there is not a good harbour of refuge; but if they knew that there was one here they would press on to obtain it; but some would fall short of reaching this breakwater or pier and go ashore in the bight near the Heugh.

17,549. Will you look at this plan and tell me what you think?—(*Witness examines plan.*) I still hold my opinion that the entrance on the north side next to the Heugh would be a very great advantage, only it should be confined to not more than 500 feet of width so as not to admit the ground swell.

17,550. Then with that you think it would answer the object in view, if it would contain 600 or 700 sail of ships with a sufficient depth of water?—I certainly think that that would be at any rate a means of saving an immense amount of life and property.

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17,551. (*Chairman.*) Have you been or are you connected with the port of Hartlepool?—I have executed works for the West Harbour and Dock Company.

17,552. (*Sir F. Smith.*) I believe you prepared an estimate for the red scheme for E. Jackson?—Yes.

17,553. And you prepared in the course of last night the estimate for the blue scheme?—Yes.

17,554. Have you in any material degree altered your prices?—So far as I was justified in the difference I made for the conveyance of the material to and from the shore.

17,555. When you formed your estimate for the large plan, I presume you had thoroughly considered the subject and the contractor also, as to the cheapest way to execute your work?—Yes.

17,556. I suppose you did the same thing last night?—Yes.

17,557. Is there any difference in the mode of action which will cause difference of prices?—Yes.

17,558. Will you explain?—Yes.

17,559. Because No. 1, the old one, was at a greater distance from the land, consequently less accessible by waggons?—Yes.

17,560. What is the difference of distance between the two ends and the main land?—Rather more than double the one than the other.

17,561. Is that not shown to be so on this plan; it does not so appear?—It is about that.

17,562. At any rate that would only apply to the northernmost portion and not to the southernmost pier?—No. That cannot apply to the southernmost one.

17,563. The southernmost one is closer than the

north ?—If boats are to be used, a small distance is not of much importance.

17,564. How do you propose to get the material from the southern portion to the northern portion of the blue scheme, by staging from the shore ?—Yes.

17,565. What do you intend to do with regard to the northern and red scheme ?—It will have to be boated.

17,566. Is that alone the cause of the difference of price ?—It is.

17,567. Does that apply to the whole scheme or only the northern portion ?—It applies to the whole in the aggregate, but the whole weight applies to the northern.

17,568. Do you intend to change the system for the construction of the southern one ?—Decidedly not the system, only it is lighter and shorter.

17,569. When you say lighter, what do you mean ?—It does not go into such deep water.

17,570. The other scheme will be the same, will it not ?—Yes, only the deepest part taken off, it will not be required.

17,571. The upper part of the cross section will be the same, and the difference will be in the extension down to the formation ?—Yes.

17,572. Will you explain in a concise manner what is the form of construction you are about to adopt, and how you will proceed to carry out your work ?—In the first place I will deposit rubble as shown there until it attain the width and height.

17,573. What is the entire breadth to the top of the rubble ?—I do not recollect exactly the breadth, but the quantity I can give from estimation.

17,574. Up to what level does that rubble come ?—About 12 feet below low water.

17,575. Then above that three courses, what is the material ?—Concrete blocks form the interior.

17,576. To what level do these concrete blocks come ?—I don't recollect, but it is estimated separately.

17,577. If I understand you it is set at 12 feet below high water ?—Low water.

17,578. Then do these three courses represent 12 feet ?—It takes four courses to represent 12 feet.

17,579. And therefore these three courses only represent nine feet ?—Yes.

17,580. And these nine feet are nine feet of concrete block ; that is, facing of concrete block ?—It is sandstone.

17,581. Then how much is hearting and how much is external courses ? What is the thickness of the sandstone structure ?—There is just one course of sandstone in the outside, and the interior is concrete blocks.

17,582. Then above the concrete blocks you have a different coloured material which I presume is stone ?—Yes.

17,583. The front is ashlar blocks ?—Yes.

17,584. What is the next ?—It is sandstone ; ashlar of a rougher character.

17,585. Not squared stones ?—They are not all squared, merely roughly.

17,586. What is the scale of it ?—Eight feet to the inch.

17,587. Have you ascertained to a certainty that you have the material necessary for all this work within a moderate distance of the place ?—I have ascertained it.

17,588. How far have you to go for your rubble ?—Between two and three miles.

17,589. I suppose it is a known point ?—It is.

17,590. Then you must know exactly how far ?—I do.

17,591. I presume distance has something to do with the cost of that part ?—It is within $2\frac{1}{2}$ miles.

17,592. Where do you propose to get the other material ?—Partly from Bramly Fall, near Leeds, and part from Westerton, near Bishop Auckland.

17,593. What is the actual distance of these places ?—Westerton is 25 to 28 miles by rail ; the other will be about 60.

17,594. What will they draw your stone for at these respective distances ?—What I have been paying for haulage from Leeds is 4*s.* 2*d.*

17,595. You have had stone from that distance to these places ?—Yes, for several years I have had my own engine and waggons merely paying the dues.

17,596. The quantity you are going to use is rather considerable, is it not ?—Yes.

17,597. Do you imagine that the great demand you make will not enhance the price ?—I do not expect it will, because it will have counterbalancing advantages.

17,598. What do you pay for the stone on the spot at both places ?—According to quality, from 9*d.* to 10*d.* per foot, and some 8*d.*, and some 6*d.*—10*d.* being the best.

17,599. I presume you will use the best quality ?—According to the work.

17,600. That is to say for the external work the best, and for the internal work the lighter ?—Yes.

17,601. Are you determined upon this form of breakwater from considerations of other works of the same kind, or, is it a section drawn somewhat at random ?—It is not my business to make the plan ; I refer you to the engineer, Mr. Caseburne, who is the engineer for the Harbour and Railway Company.

17,602. I was not aware of that ; I thought you were both engineer and contractor ?—No.

17,603. And that all you have got to do is the execution of the work ?—That is all.

17,604. And do you now know the extent proposed by Mr. Jackson for the blue scheme ?—Yes.

17,605. And you have gone very closely into the calculations ?—Yes.

17,606. Are you prepared to say any round sum which you would be willing at once to contract for this work ?—What I have given there is an approximate thing. I should like to go a little more closely into it before I took the contract for it, but I am prepared to say it will be very near it.

17,607. But when an experienced contractor gives an approximate estimate, he always takes a safe margin ?—Yes.

17,608. And you have ?—Yes.

17,609. Then you would undertake to do this for Mr. Jackson ?—You may say so generally.

17,610. I may assume that to be the fact ?—Yes, provided nothing comes in the way to make it more disadvantageous to carry out the details of the plan.

17,611. The soundings are well established ?—Yes.

17,612. The circumstances are well known to you ?—Yes.

17,613. Therefore what could arise to cause that change that would get rid of your safe margin ?—Very little; in taking the prices, the greater distance, and making the staging more difficult and inaccessible.

17,614. But I assume that the work is to be carried out precisely according to the dimensions given in to you as shown on this plan ?—Then I say, I am quite ready to do it accordingly.

17,615. So that the Commissioners going away from here and considering this project, may assume, as a moral certainty, that you are prepared to execute the work for the sum stated ?—Yes.

17,616. (*Capt. Vetch.*) Is the section shown, a section of the work generally ?—Yes.

17,617. To what height above low-water mark is the rubble stone carried ?—None approaches nearer than nine feet to low-water mark, and at the outside 12 feet.

17,618. Then the stones are procured from a quarry about $2\frac{1}{2}$ miles distant, from which you have already got a tramway ?—Not all the way.

17,619. Then with respect to the superstructure I think you propose to go a distance of 76 miles, as far as Bramley Fall ?—Yes.

17,620. Will it come up the tramway also ?—Entirely.

17,621. What will the Bramly Fall stone cost ?—Some 10*d.* per cubic foot.

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Capt. Vetch.

17,622. To what height does your parapet rise above high water ?—At 18 feet.

17,623. And how much above the platform ?—The platform is 16 feet only above low water.

17,624. What will be the height of the superstructure including the parapet ?—The height of the masonry will be 44 feet altogether.

17,625. (*Mr. Coode.*) You are a man of considerable experience as a contractor, and as this estimate has been put in with your name attached, I would like to ask you a few questions. Have you had experience in the construction of works of a similar kind to this shown in the model ?—Of a similar kind, but not so extensive.

17,626. May I ask you where ?—Some here and some at Plymouth.

17,627. What part of Plymouth Harbour ?—At Mill Bay.

17,628. That was a dock, was it not ?—Yes.

17,629. Have you ever constructed a breakwater in any way ?—Not unless you call a dam I put up across there, a breakwater, about a quarter of a mile in extent. I merely used it as a coffer dam.

17,630. That was in the bay inside of Plymouth Breakwater ?—Yes.

17,631. The cost as given in your estimate yesterday was 439*l.* the lineal yard at seven fathoms depth? —Yes.

17,632. And the average work as last proposed by Mr. Jackson was also in seven fathoms depth, was it not ?—It is bound to seven fathoms, but it comes nearer the last at one end.

17,633. Does not a great part of that work range from six to eight fathoms in depth ?—It reaches not eight, I think.

17,634. Is not the average of that work in seven fathoms water ?—I should rather say six.

17,635. You give that answer deliberately?—Six, or six and a quarter, will be the outside, I think.

17,636. Do you know that there is a work of a similar kind, in course of construction at Alderney ? —I do not know.

17,637. If you were told that the work at Alderney is constructed under nearly as possible similar circumstances to yours, built in the same form or section, and concrete blocks used to the extent to which you use them, but with the masonry work not so good as shown on this drawing ; that the material is got from a quarry about two miles distant, and is all run on to the works by the stage, I ask you whether you think you can construct this work at Hartlepool more rapidly than they have done at Alderney ?—I would, for a sufficient and ostensible reason, because that at Alderney is done with granite.

17,638. How much is done with granite ?—I understand nearly all.

17,639. I may tell you, you are under a mistake. That used for the facing of certain portions of the work is precisely similar to that you propose to use from Bramley Fall, and the cost so far will be just the same. Having made these explanations, I should like to ask you if you can give other reasons why you can construct it cheaper ?—I think I can get other materials cheaper, and on account of cheaper work.

17,640. Is that easily got here ?—It is cheaper got than usual.

17,641. Here is the fact before us ; and as you have had no experience in works similar to these at Alderney, being constructed in a precisely similar way, I give you that information to see if you have any reason to offer, to show us you can do this work cheaper than they are doing at Alderney ?—It would be presumptuous to compare this with Alderney. I do not know anything about it, but that I understand they have granite to work with, which is double the cost.

17,642. It is used to the same extent and precisely in the same way as you are proposing, and the concrete blocks are used in a similar way ; but there is not so much squared stone in the work at Alderney as there is here ; then how can you construct the work here more cheaply than they are going to do at Alderney ? You are a very experienced man in the construction of docks, but not in the construction of breakwaters ; and, I ask you why you can construct this work cheaper than they can at Alderney ?—I can only say it is probable that the quarry can be more easily wrought.

17,643. What difference will that make so far as regards the rubble, for it would only apply to the rubble ?—Of course it would, and then by applying the same thing to the ashlar, and bringing it about one half, it would make a considerable difference, which I have no hesitation in saying may be done.

17,644. How much a yard do you think you can do it for cheaper than they are doing it at Alderney ? —I cannot name it, it would be presumptuous in me to say what they can do it for at Alderney, because I have not seen it.

17,645. But, inasmuch as the work is the same, and the circumstances precisely the same, I want to know why you can do the work more cheaply ?—As they have the work to get out of granite rock it will take twice the money.

17,646. But it is not granite ?—But it may be as bad, and I only give it as a probable reason and because you press me for a reason.

17,647. You say you can do this work in the course of five years ; will you look to the plan again, and tell me whether after mature consideration you are still prepared to give the same answer ?—Yes.

17,648. To what extent will you use staging in this work ?—I would use staging at the north pier, and run it out with waggons.

17,649. And the other breakwater, how would you construct it ?—I do not see any way so ready as boats.

17,650. And in the time which you have named, have you taken into account the loss which must necessarily occur during the winter season, or have you assumed you can work all the year round ?—I have assumed the ordinary stoppage and loss.

17,651. As regards the works connected with the shore, or as regards the sea ?—Both.

17,652. What allowance of time have you made for loss ?—About one half of loss.

17,653. Notwithstanding this allowance you would construct the works within five years ?—Yes.

17,654. Are you aware when the pier works at Alderney were begun ?—I do not recollect the time.

17,655. Do you think it was 10 or 11 years ?—It may be for anything I know.

17,656. Will you look at this Parliamentary Paper on Harbours of Refuge, No. 262, dated May 1858, and tell us is not the work executed up to that date, from the report of the engineer, an average of 960 yards ?—Yes, 960 yards.

17,657. Now if you look down the total column of work certified up to the date of the report, perhaps you will see the total sum ?—545,554*l.*

17,658. Will you be good enough to divide that by the number of yards executed and tell us what is the cost per lineal yard ?—It is under 570*l.* per yard.

17,659. And your estimate 439*l.* per lineal yard ? —Yes.

17,660. In fact a difference of 129*l.* per lineal yard in your favour ?—Rather less.

17,661. And you hope to make this work at 129*l.* per yard cheaper than Alderney ?—No doubt of it.

17,662. Will you look to the date of the commencement ?—1847.

17,663. And this is dated March 1858, a period of 11 years ?—Yes.

17,664. And the quantity laid down in 11 years, is what ?—Not 100 yards a year.

17,665. So that you propose to do here three times the amount of work in half the time that they have done at Alderney ?—I have no hesitation in saying so.

17,666. You still think you can do the work in five years ?—Yes.

17,667. The works proposed are 2,800 yards long, and the cost per yard 439*l.* ?—Yes.

17,668. Will you be good enough to work it out

and tell us what the result is?—It is reduced, you know, first by the barging and then by the staging, and then by the lessening of the depth.

17,669. Then you hope in two years to do the work the greater part of which is detached from the shore, at a cost of 439*l.*, whereas at Alderney in as nearly as possible similar circumstances, they have only accomplished their work at 568*l.* per yard, and that too connected with the shore, and you still think you can accomplish your work at the sum you state?—It does not alter my opinion.

17,670. And your opinion is not founded on experience of works of a similar kind?—I have done something very similar.

17,671. But that is in the case of a dock and not a breakwater?—It is in the case of piers.

17,672. What extent of that work was done below low-water spring tides?—200 or 300 feet.

17,673. And in what depth of low-water spring tides?—Seven or eight feet.

17,674. Was that accomplished by divers?—No, by half-tide coffer dams.

17,675. Do you propose to do this by half-tide coffer dams?—No.

17,676. Then the work is in fact of a different character?—Yes.

17,677. And you have not in the course of your experience executed any similar work?—Not exactly similar.

17,678. Now with regard to this quarry that has been mentioned, about two miles from here; has the ground been opened to any extent?—To the extent of 40 or 50 feet in depth.

17,679. And what length of face?—Perhaps not more than 100 yards, but there are two or three openings in a hole which shows it is not less than a mile in extent, and that it might be obtained at 50 to 100 in depth.

17,680. And is the material similar to that on the platform?—It is.

17,681. Is this a fair representation of the quality?—It is.

17,682. What size of blocks will you be able to obtain for ashlar purposes?—I would not think of getting any for ashlar except for this rough part.

17,683. It would be chiefly rubble and some of a similar character to ashlar?—Yes.

17,684. And the distance from the site of the work is what?—Between two and three miles.

17,685. As to the price per foot or yard, have you allowed for the setting of masonry under low water?—Yes, 3*d.* per foot extra.

17,686. How much for the portions above low water?—1*s.* 6*d.* per cubic foot.

17,687. That is for setting?—No, for setting and riding.

17,688. 1*s.* 6*d.* a foot for the ashlar above low water, and 3*d.* per foot extra below low water?—Yes.

17,689. Can you tell any work that has been set at anything like these prices under similar circumstances or anything like similar circumstances?—I have known this much or somewhat similar to the piers.

17,690. But you have already answered that they were not similar circumstances, because they were half-tide coffer dams. Have you done work like this at anything like these prices?—I have not done work of exactly a similar description, but this is not worse than I have done.

17,691. What allowance have you made for extras at the head of these breakwaters?—Nothing.

17,692. There are five ends, and you have allowed no extra prices for these circular ends?—No.

17,693. What amount have you put down for staging between the two?—It is put in the piers.

17,694. Can you tell how much the distance will be?—About 400 or 500 feet.

17,695. And then it will come to how much to make it complete?—12,000*l.*

17,696. Is there a special sum put down for this staging?—There is that much calculated for it.

(*Chairman.*) It is the opinion of the Commissioners, that the examination of a few more nautical men, upon the list of witnesses handed in, will probably afford them all the evidence they require upon nautical subjects. We wish to ask you whether the examination will satisfy you and the other persons interested?

(*Mr. Jackson.*) I shall be quite satisfied with it.

(*Chairman.*) Are there any persons interested in this inquiry who will not be satisfied with the course we propose to take?

No answer.

(*Mr. Jackson.*) Within the last hour, I have understood that two or three who stand on the list have not arrived. I know the circumstances of the case, and that they are detained from unavoidable circumstances. One would have been here had he arrived in London in time to come; that was Captain Pulwart. John Findley has been here, but was obliged to go and take command of a ship in Sunderland. No. 7 is a captain who has received damage to his ship in Dundee.

(*Chairman.*) As Mr. Pulwart trades to London, if you are desirous of receiving his evidence, it can be taken in London.

(*Mr. Jackson.*) I should be very glad if Henry Renfrew could be heard in London.

(*Chairman.*) If you will give his name to the secretary we will summon him to London.

Mr. JOHN MENZIES examined.

17,697. (*Chairman.*) You are resident at Leith?—Yes.

17,698. You are a pilot by profession?—Yes.

17,699. A North Sea pilot?—Yes.

17,700. And how long have you been at sea?—39 years past.

17,701. Have you been in command of vessels during any part of that time?—Yes.

17,702. For how long?—17 years.

17,703. And in what trade were the vessels employed which you commanded generally?—Most of them to London from Leith—Leith smacks.

17,704. Have you been present during the course of this inquiry?—To-day I have.

17,705. You are aware of the object of it?—Yes.

17,706. Now, from your experience of the sea, would you prefer that the Tyne, the Tees, and the Wear should be so improved, if possible, as to make them low-water harbours for vessels drawing six feet, or that we should have a single large harbour, and if you preferred a single large harbour, tell me where you think it ought to be placed?—I should say the more harbours of refuge the better; but I should say none of them could be improved so that they could do what you say, neither the Tyne, the Tees, nor the Wear.

17,707. But the improvement of the ports is after all more a question for engineers than pilots or seamen, and therefore, I now want your opinion as a seaman who knows the coast, where it would be best, that is if it could be done?—To improve the whole of them you mean.

17,708. Granted that it is possible that these three ports could be improved, which would you as a seafaring man employed on the coast prefer—that they should be improved, or that you should have one large harbour in any particular spot?—If they could be improved, so as to be refuge harbours, it is all very well, but I think you could not improve them so much as you could this place.

17,709. Am I to understand, that if the three ports could be improved to the extent to which I have described, you would then prefer that plan to one large harbour?—Oh yes, I would.

17,710. Now suppose that these ports could not be improved as I have described, which would you then

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prefer as a site for one large harbour, the neighbourhood of Hartlepool, or the neighbourhood of Flamborough Head ?—I would say Hartlepool.

17,711. Will you give your reasons ?—The same number of vessels I should say pass here as Flamborough Head, but the light vessels generally strive to get down to their loading ports, which makes them congregate here more than about Flamborough Head, and they would always be coming to their port of destination by coming north.

17,712. Have you ever run for Hartlepool by your lead in thick weather ?—I have.

17,713. And from what distance out to sea have you run ?—Just 12 months now, I came in with one of Her Majesty's vessels by the lead, it was as thick as could be, and I could not see the land at all.

17,714. And what was your course in ?—We steered south and south by west occasionally.

17,715. Then you were steering along the coast pretty much ?—Yes, we had come along the shore, the vessel had been along the coast for three months last year, she was the *Otter*, Lieutenant Simpson, in command.

17,716. Well, when a vessel is running from sea along shore in thick weather, will you tell me if Hartlepool is easy to be found by the lead ?—It is quite easy. The soundings become gradually less as you come in.

17,717. But when you are coming in the course you describe, south and by west, which is pretty much along shore, do the soundings increase from the northward as you get into the neighbourhood of Hartlepool ?—They do.

17,718. Can you tell by the bottom whether you are in the neighbourhood of Hartlepool ; I do not mean by the depth, but by the nature of the bottom ?—You know perfectly well you must be in this neighbourhood, or you would not have shallow soundings for such a distance.

17,719. Then it is by the soundings you know you are getting down to Hartlepool, and not by the bottom ?—Yes, you know it by the bottom too.

17,720. What description of bottom do you get ? —Generally sand and shell, till you come into the bay where you fall in with mud and clay ; you come into shoal water before you get into mud or clay.

17,721. Have you ever run into Hartlepool, right in from the sea, dead on the land ?—Never ; but that is all the same as coming from the sea ; we knew our position pretty well, we had seen Souter Point.

17,722. Is it quite the same running into Hartlepool from 40 fathoms water as running along the shore from 20 ?—No, that is not the same ; but I say, we barely knew our position, because we had barely seen Souter Point, but till that I had seen nothing.

17,723. You have never run right in from the sea from 40 fathoms water into Hartlepool ?—Never.

17,724. Could you, as a pilot, give the nature of the bottom from 40 fathoms in, if you were sounding in thick weather, do you know the nature of the bottom ?—Yes.

17,725. What is it ?—Sand, and black specks, and small shells.

17,726. Is the bottom sufficiently distinct to enable you to tell whether you are to the north or south of Hartlepool, as you are running in dead from the sea ?—Yes.

17,727. You are sure ?—I am sure of that.

17,728. Then if you are 10 miles to the north of Hartlepool, running in dead on shore would you not have the same soundings as to the character of the bottom as you would have running in a straight course into Hartlepool ?—You might not perceive it in 10 miles further to northward, it is darker and coarser.

17,729. Twenty miles to northward would you perceive it ?—You might.

17,730. Ten miles to the south would you perceive it ?—It becomes finer there.

17,731. Therefore you would tell by the character of the bottom whether you were 10 miles to the southward of Hartlepool if running in from the sea ?—I should not say 10 miles.

17,732. Twenty miles ?—You might see it in 20 miles.

17,733. (*Sir F. Smith.*) Do you think that masters of foreign vessels would know of it ?—They have generally got soundings marked on the chart.

17,734. I know but the character of the bottom ?—Yes.

17,735. And you think they attend to that carefully ?—They can't help doing it when they look upon it.

17,736. (*Mr. Lindsay.*) You say you can tell by the soundings when you are drawing to the land off Hartlepool, with much more facility than drawing to the land off Flamborough Head ?—Oh yes.

17,737. How will it be with other ports in the bight of the bay? Would the soundings lead you in with greater facility than they would at the Wear or the Tyne ?—You know the Wear is not so far off.

17,738. Well, then, we will take the Tyne. Are the soundings as regular in coming in from the sea to the Tyne ?—No, it is deep water close to the Tyne.

17,739. I am speaking of the cause of danger as compared with the Tyne and Hartlepool ?—You will come into shoaler water all at once off the Tyne.

17,740. Then if guided by your soundings, and you had nothing else to guide you, you would run with greater safety for Hartlepool than for the Tyne ?—Yes.

17,741. That is, you would get your soundings more gradually, and therefore that is one reason why you would give the preference to Hartlepool as a site for a harbour of refuge ?—Yes, it is certainly the easiest to be got at.

17,742. Now with regard to making the land, does the land afford greater facilities for making the harbour at Hartlepool than the land does at the Wear or at the Tyne ? I am speaking of thick, hazy sort of weather, when you cannot see the land at a great distance ; whether is the harbour easier made out in such weather at Hartlepool, the Wear, or the Tyne ?—You can easily know Hartlepool, if you see it at all, by the Heugh and the lighthouse.

17,743. Are the marks as conspicuous at Hartlepool for making the harbour as at the Wear or the Tyne ?—There are marks at the Wear and the Tyne, more at the Tyne certainly than here, for you have Tynemouth Castle and lighthouse, and the Collingwood monument, and all that.

17,744. Therefore you think the marks of the harbour are more conspicuous at the Tyne than at Hartlepool ?—At the Tyne they are.

17,745. The Chairman asked you with regard to the improvement of the existing harbours, and I understand you to say if the harbours could be all improved the improvement of those harbours would do more to save life and property than one harbour of refuge ?—Yes, I say the more harbours of refuge the better.

17,746. But say it rested between this place and Filey; and say that a large harbour could be made at Filey of considerable depth of water, and at the same cost as it could be made here, and looking at the whole of the trade along this coast that passes Flamborough Head and the bight of the bay, and looking to the prevailing winds which are the most dangerous ones, at what site if left to yourself would you construct one great harbour ?—Well, I would say here.

17,747. Then do you think that if that sum of money was divided between Hartlepool and Filey it would do more towards saving life and property than if the whole sum was expended at Hartlepool, and that if it would make them both efficient it would be better to have Filey and Hartlepool ?—It would be better to have Hartlepool and Filey than Hartlepool or Filey alone.

17,748. Do ships find good anchorage in Bridlington Bay in easterly gales ?—Not in easterly gales ; they must go out to the Humber.

17,749. Then in easterly gales there is no port along the coast between the Humber and the Firth of Forth where ships can find shelter ?—No.

17,750. In these easterly gales, when a ship can weather Flamborough Head to the southward, is it the case that they are generally able to reach the Humber ?—If the wind is to the east they will, that is if they are able to carry canvas.

17,751. That being the case would there be any necessity for a harbour of refuge at Bridlington ?—It would be essential there as being a protection from easterly winds as well as from north-east.

17,752. Say it could be made a protection from easterly, the most dangerous and prevailing winds, do you think it could be of as much service as it would be at Filey ?—No, I should say not, for all the vessels try to get as far north as they can to reach their harbours.

17,753. Then if it rested between Bridlington and Filey, you would give the preference to Filey ?—No ; I would rather give it to Bridlington Bay, because it would be more extensive.

17,754. I understood you to give an answer to me that you thought a harbour of refuge at Filey in easterly gales would be more advantageous to the ships frequenting this coast than it would be at Bridlington Bay ?—No; I said if Bridlington could be sheltered from easterly winds, south-east, and north-east it would be a fine anchorage and good harbour.

17,755. Would it do more good, do you think, there than at Filey ?—A great deal.

17,756. Then will you consider your previous answer to me when you said that when ships in easterly gales can weather Flamborough Head they easily reach the Humber ?—Yes.

17,757. What, then, would be the good of a harbour of refuge at Bridlington ? Has a ship more need of a harbour of refuge in easterly gales, which can weather Flamborough Head, than she has if she cannot weather it away ?—If there was a harbour there it would be much better than at Filey.

17,758. You are still of the opinion it would be better than Filey ?—Yes.

17,759. I am speaking of colliers bound for London, are you of opinion a harbour of refuge for them would be of more advantage at Bridlington Bay than Filey ?—Yes, if it was properly constructed, it would.

17,760. Are you still of that opinion after what you have stated to me ?—Filey would not hold more than 300 or 400 ships.

17,761. But you spoke, not taking into consideration the size of the harbour, assuming that in either place the same sum of money would make a harbour of the same size, what site would you say would be the best ?—It would take a deal of money to make a harbour at Flamborough Head.

17,762. But we are not engineers ; which site do you think would be of most service, Bridlington Bay or Filey Bay ?—I would say Bridlington Bay.

17,763. Therefore you would not be inclined to give a very favourable opinion of Filey as a site ?—No, I do not like it.

17,764. I draw from your answer that you do not consider a harbour at Filey would be of any material advantage to the ships that frequent that coast. Am I to understand that ?—No. I say it would be very good were it properly filled up.

17,765. (*Capt. Sulivan.*) If vessels are bound south-east off Flamborough Head, with south-east or southerly gales, would many vessels be able to fetch into Filey that could not round Flamborough Head and get into Bridlington ?—All that were to the windward could.

17,766. But would not many ships that could not weather the Head yet weather Filey ?—Yes.

17,767. Would not Filey take all the ships immediately off the Head as well as those that could not weather the Head and get into Bridlington ?—Yes.

17,768. Suppose the great object was the colliers bound to the south ; say the colliers that weathered the Head with these dangerous easterly gales could get into the Humber under ordinary circumstances, but for those that could not weather the Head there is no refuge ? Do you not think that it would be better to provide some refuge for these colliers north of the Head than immediately south of it ?—I would say so.

17,769. Now are you aware what is the depth of water in Bridlington Bay ?—Yes ; there is very little water inside the Smithic, unless you are close in shore.

17,770. When you speak of a breakwater at Bridlington, I suppose you mean it would be erected on the Smithic as the only point ?—Yes.

17,771. That would leave a great distance between the pier and the shore, would it not ?—It is only half a mile distant.

17,772. Then being a breakwater made out into the sea it would be much more expensive than one run from a point ?—Yes.

17,773. If you knew that from six to four fathoms could be enclosed at Filey Bay for a good space, and that you cannot get that depth in Bridlington Bay, would that be another reason why a harbour should be on the north of the Head rather than on the south ?—What do you say ?

17,774. You can get more depth of water covered to the same extent, with the same expensive breakwater, I am supposing that, as you say, one might be made to the sea ?—One would have to be made to the sea, but I would not propose to make a harbour there at all. I am only answering your question.

17,775. I understood you to answer Mr. Lindsay ?—He asked me if it would do, and I said it would.

17,776. But he understood you to lay out the money in Bridlington rather than Filey Bay ?—Yes ; there is more space there.

17,777. With more space you would require a much larger breakwater to cover that space ?—Yes.

17,778. Therefore it would be very much more expensive ?—Yes.

17,779. I see you say it is shallow water ; but in Filey Bay you can have from five to six fathoms at less expense ; would you say then that you would make a harbour in Bridlington Bay ?—No, not if it could be for less expense ; but looking to the vessels that Bridlington Bay contains, Filey Bay would not contain half.

17,780. Does it generally contain light colliers bound to the northward ?—It is only light vessels it does contain.

17,781. And it affords very good protection to those with north-east wind ?—Yes.

17,782. You said that two harbours, if sufficient for the purpose, would be better than one large one ; would you think a harbour of refuge sufficient for the purpose of saving life and property that would take all the largest class of colliers in perfect safety in the heaviest sea at all times of the day and night ?—Yes ; I should say that was a very good harbour.

17,783. If two such harbours could be made with that depth on this coast, say one at Hartlepool and one at Filey, would you think that better than one large harbour at this place with deeper water ?—Well, as I have told you, Filey cannot contain so many vessels.

17,784. I am not asking you that ; that is a question for the engineers. Suppose it could do what I tell you ?—Then I say it would be better than one.

17,785. In what port do you get your North Sea certificate ?—From the Trinity House of Leith.

17,786. Have they power to grant licences outside of the Firth of Forth for the North Sea ?—Yes.

17,787. How far ?—All round Scotland and to the south.

Mr. Abel Haisman examined.

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17,788. (*Chairman.*) You reside at Rochester ?—I do.

17,789. How many years were you at sea ?—Twenty-six.

17,790. Do you follow the sea now ?—I have been on shore since 12th of last September.

17,791. Are you a shipowner ?—Yes ; and go to sea at times ; I have been constantly employed within the last 12 months at sea.

17,792. In what trade have the vessels been employed chiefly that you have commanded ?—Chiefly in the coal trade ; sometimes in the Baltic, in the Hamburg and Mediterranean occasionally, but principally on the north-east coast.

17,793. Are you aware of the objects of this enquiry ?—I am.

17,794. Give me your opinion as to which would be the most advantageous, the improvement of the three ports of the Tyne, the Tees, and Wear, or the establishment of one large harbour of refuge, supposing that these ports could be improved to take in ships drawing six feet at low water ?—I am decidedly for one large harbour.

17,795. Will you give me your reasons ?—Because it is not affected by the tide, and can be entered at any time without any interference from the freshes during the winter season, which are most prevalent between the months of September and March or April, both freshes and gales of wind. Harbours are comparatively useless from April to September during the summer months, because the weather is more moderate and fine upon the coast than from September to April or May, consequently during the winter you have the worst of weather, and rivers are more affected with freshes after heavy falls of snow ; and what frequently befalls a master in taking these bar harbours is that the current is setting in at flood tide, and just when you come within the influence of the current it whips you to the back of the north pier, or if taking Shields you get on the Herd Sand. Sometimes when you imagine when you have the flood tide you find you have the ebb. These things frequently cause you to loose your ship and your life too.

17,796. Then if you had to decide in favour of one harbour, where would you put it ?—In Hartlepool Bay.

17,797. Will you give me your reasons for preferring Hartlepool Bay to any other place along the coast ?—Because there are more indraughts in the bay than anywhere else along the coast. The flood tide sets you in more to the southward and westward in Tees Bay than anywhere else upon the coast, consequently with a gale of wind between these points you make great leeway, you are more under the influence of an inshore set in crossing Tees Bay than anywhere else, you come bumping into the bay before you are aware of it, consequently it makes Tees Bay more dangerous than anywhere else upon the coast, because the tide there sets more parallel north and south ; between Robin Hood's Bay and Tynemouth is, I consider, the most dangerous part of the coast, in consequence of the indrafts prevailing more thoroughly right into the bay than anywhere else. (*Plan out of Select Committee's Report of* 1857 *produced to witness.*)

17,798. You see the line of embayment drawn on that plan. Suppose a loaded collier was on that line or more out, with the wind dead on shore, would there be any chance of her weathering either extreme of the bay ?—None.

17,799. Then the only option she would have would be to run for one of the ports ?—Yes ; I have seen many gales in which it would not have been possible for a ship within that line to keep clear of the coast.

17,800. As a general rule, would you say that laden ships within or on that line would infallibly go into the bay ?—Yes.

17,801. What style of vessel is it that you have generally commanded ? Have they been a better description of vessel should you say than the general run ?—I have commanded good ones, and very indifferent ones. I had an old North American ship as the first of my experience, which is not the best description afloat. She was about 25 years old, but it has been my good fortune since then to have rather a better class of ships.

17,802. Ships, brigs, or barques have they been ?—Brigs and barques.

17,803. In a gale of wind, as a general rule, would it have been safer for you to have scudded or laid to ?—It would depend which way the wind was.

17,804. I do not mean to say as respects escaping the land. I suppose you to be in the North Sea, or anywhere you please, in a heavy gale of wind with a heavy sea on. Would it be safer for you, as a general rule, to scud or to heave to ?—It would depend entirely on the build of the ship how I should form my conviction of her for scudding or lying to.

17,805. Yes, ships being different ; but taking the ships you have commanded generally, which would have been safer, heaving to or scudding ?—There are times when you must heave a ship to. There are times when there is great danger of her broaching to, and that is worse than bowing the sea. There are emergencies when it is not possible to scud, but it is a last resource to lay a ship to. I believe all the time you can carry your canvass, to run a ship you are safer, but there are gales of wind and seas so heavy that it is not safe to scud.

17,806. And then you would heave to ?—Yes ; provided the position of the land would allow me to do so in safety.

17,807. I have given you lots of sea room ?—Yes.

17,808. I want you to give me the result of your experience as to the ships generally employed in the coal trade on this point. With lots of sea room, would they be safer scudding or hove to in a heavy gale of wind and heavy sea ?—On the coast I should never attempt to heave a ship to.

17,809. Without reference to the coast. I give you plenty of sea room ?—It would apply to that class of ships as well as to any other. I speak of ships as a general rule.

17,810. Has it ever occurred to you to run into Hartlepool Bay in thick weather by your lead only ?—Frequently.

17,811. What are the character of the soundings as respects depths ?—Gradual shoaling as you draw into the bay.

17,812. As respects the character of the bottom, what are the soundings, say from 12 to 15 miles out from land ?—About 30 fathoms, and you gradually shoal your water till you draw into nine and eight fathoms water, and then in thick weather you are close enough in.

17,813. I mean as respects the nature of the bottom ?—I never examined the nature of the bottom particularly in running in ; I depended entirely upon my shoaling.

17,814. And you found your shoaling a sufficient guide ?—Yes, regularly from the shoaling of my water.

17,815. Is that regularity of which you tell me sufficiently marked when you are running dead in for Hartlepool to make you quite sure you are not either north or south ?—Yes ; you cannot get such gradual soundings anywhere else upon the coast between Flamborough Head and the north.

17,816. (*Mr. Lindsay.*) Do you remember the 4th of January gale, 1857 ?—I was in the Mediterranean on 4th January 1857. I was coming down from Marseilles to Malaga.

17,817. I will not trouble you with any questions as you were not upon the coast at that time ?—I was on the coast in a very heavy gale in January 1854, when about 30 or 40 ships came ashore in the bay.

17,818. How was the gale ?—It commenced south-east. I came down just ahead of the fleet. I got in

a single ship the tide before it backed into east-north-east.

17,819. And there were a great many ships lost?—A great many.

17,820. Where were they?—The bay was full of ships on shore and knocking to pieces. I never saw such a sight in my life.

17,821. Would all these ships have been saved if there had been a harbour of refuge at Hartlepool?—Every one.

17,822. Any lives lost?—Yes; I well remember seeing them, and could render no assistance.

17,823. And would every ship that was within the line of embayment to which you have just now referred have found shelter in Hartlepool during that period?—There was nothing to have stopped them, they must have come in in safety, if the broken water had been kept out by any piers.

17,824. Were any ships lost during that gale between Whitby and Flamborough Head, do you think?—I cannot say positively, but I should imagine not. In my experience, which lasts over 20 years, constantly on this coast winter and summer, never stopping, in Mr. William Lee's employment, I think where there was one ship lost to the southward of Whitby, there were ten lost to the northward. We all consider ourselves comparatively safe when we get to the southward of Whitby to what we were to the northward of Whitby.

17,825. That is, you always consider yourselves safe when bound south?—Yes.

17,826. Do you consider yourselves more safe with this sandy beach of Hartlepool under your lee, than the rocky shore of Whitby, or Flamborough Head?—We consider ourselves more comparatively safe when not embayed. You never consider yourself so safe, at least, I never do, as when I am on a parallel coast. I feel myself more secure when clear of the bay.

17,827. Saying that you were going along your usual track from Rochester to Hartlepool or from Hartlepool to Rochester, and say you were caught on the rocky shore between Whitby and Flamborough Head, with that heavy gale from east-north-east, would you consider yourself in a safe position?—Yes; I could get the Humber.

17,828. When clear of Whitby you could get the Humber?—Yes.

17,829. I suppose you mean as long as you were able to carry canvass?—I always considered myself comparatively safe when I was clear of the Tees Bay, because when to the southward and eastward of Whitby, and with the wind at east-north-east, it will be very raw weather that will very seldom occur on this coast, if the ship has anything of canvass, but that she will get the Humber.

17,830. Say you were in the usual track of vessels between Whitby and Flamborough Head, and you were caught with an east-north-east gale, so that you were obliged to shorten sail, to close-reef topsails, and reef courses, do you think that in such a case as that you could weather away the land?—I should not get so close under the land in winter time. We never make so free with the Yorkshire land during September, March, and April as at other intervals. Consequently we have more sea room. I never make so free supposing the wind is likely to incline inwards. We always give the Yorkshire land a greater berth during those months, except it is a dead set westerly gale, and we can depend on it.

17,831. Suppose Scarborough was bearing due west of you, at the time you were so caught, at what distance would you consider you required to have the land to be safe, and to weather away Flamborough Head, or to run back and find shelter in Hartlepool Bay to the north?—Well, Scarborough lies in a sort of bight and I never got near Scarborough.

17,832. How far to the eastward would you be?—I shall want to be from 15 to 20 miles.

17,833. If you had been at that distance from Scarborough under such circumstances, you would not have felt that your ship was in peril?—I should not, because I should have had Flamborough Head bearing to the westward and south of me.

17,834. When ships are bound to London in the winter season, they generally keep that distance from the land?—Quite so.

17,835. (*Capt. Sulivan.*) During the winter months if ships generally got such a good offing, would not that make them much less likely to be embayed within the line of Tees Bay?—Undoubtedly.

17,836. Suppose two harbours could be made sufficient for the largest sized colliers in all weathers and at all times of the night and day, would you prefer these two, one near Flamborough Head, and one in the bight of the bay, to one larger or deeper harbour at either of these points?—I should prefer one large deep harbour in the bay of the Tees, Hartlepool in preference to two smaller ones.

17,837. Do you think one large harbour in Hartlepool Bay would save more lives in the vessels driven to the very last extremity, and better enable them to keep the sea, than one harbour at Filey and another at Hartlepool?—No doubt of it; Hartlepool would save ten to one, because where there is one ship and one life lost to the southward and in the neighbourhood of Flamborough Head, there is ten lost to the northward.

17,838. Will you give me an idea about how many vessels you ever knew lost for want of a harbour of of refuge somewhere about Tees Bay, and the district right and left of it?—In the gale I spoke about they were innumerable.

17,839. Roughly?—Do you mean all that foundered in the gale as well as stranded?

17,840. Yes; those that were lost right and left of Hartlepool, and in Hartlepool Bay, within a short distance that a harbour in Hartlepool Bay would have saved?—I should say that in that gale of wind, above 100 sail, I have no hesitation in saying, were on shore on the sand, in January 1854.

17,841. If a harbour in Hartlepool would take in safety 300 or 400 vessels of the same size as those you say were wrecked, do you believe that any one gale would occur that more vessels would try for it than it would hold?—Yes.

17,842. More than the 300 or 400 which you tell me was the greatest number you ever knew?—Yes, because some went into ports; there were 1,500 sail of ships on the coast in that gale in the vicinity of Tees Bay.

17,843. All the vessels so embayed off Hartlepool, if they could not get off, would have chosen the beach at Hartlepool in preference to any place right or left of it, would they not?—They tried the chance of getting into their own harbours, you know.

17,844. Then you still think that a couple of harbours, one near Flamborough Head and one in the bight of the bay, moderate harbours, able to take 300 or 400 colliers each, at all times of the tide, night and day, would not be so good for the saving of life and property as one large harbour in Hartlepool?—I do, and for this reason; I never saw so many ships in the neighbourhood of Flamborough Head as I have seen in Tees Bay, not by one fourth.

17,845. All the flocks of ships that are off Tees Bay and going south will be equally in one part of their voyage off Flamborough Head; will they not, and any fleet of light colliers going north must have been equally off Flamborough Head a little before?—Oh, no; because ships coming north when the tide don't suit they heave to. There is a large fleet waiting for the harbours at tide time.

17,846. This waiting for the tide would not apply to entering a harbour of refuge that could be entered at all times of the tide?—Certainly not, I am speaking of the present state of things.

17,847. I am speaking of two harbours constructed that would take 200 or 300 ships in. Will you tell me one thing,—what becomes of all the old colliers?—The same as what becomes of all the old men and women.

17,848. Do you ever see in the coal ports any pro-

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portion of colliers that are broken up to those that are built ?—I don't understand.

17,849. Do you ever see a fair proportion according to numbers of colliers that are building and added to the stock broken up in port as unfit to go to sea ?—I see as many new ships get wrecked as new ones on the coast.

17,850. I don't ask that ?—I don't know whether the proportion is not greater.

17,851. I ask you what becomes of the old colliers, whether they are broken up in port, or whether it is a rare thing to see a collier broken up in a collier port ?—Well I can answer the question as near as I can.

17,852. I ask you whether you have ever seen any old collier broken up in the collier ports having been condemned as unseaworthy ? Can you call to recollection having seen the ribs and planks of a collier, and the men working at her and breaking her up ?—I really don't know what becomes of them if they don't go the same way as old men and women.

17,853. (*Chairman.*) From your knowledge of the coasting trade, and the coal trade especially, have you any reason to suppose that a larger number of colliers founder at sea than of other vessels employed in other trades ?—I don't think they do ; they are generally provided with very excellent pumps, and the crews don't mind working at them as much as southern ships do. I believe there are as many ships founder in the southern trade, if not more, than colliers ; colliers generally are better provided with pumping gear, holding ground, tackle anchors and chains ; many are better supplied with holding tackle than many foreign going ships.

17,854. Do you attribute the circumstance that the greater number of colliers in proportion do not founder at sea to the circumstance of their being better provided with pumping gear, and having more occasion to use it in consequence of their bottoms not being so good ?—Not altogether ; but in the case of a few hours, when they leak heavily, they can fetch a port or get assistance from the shore ; whereas a ship crossing the Atlantic has no alternative ; she cannot make a port and have her leak stopped. Many a ship is carried, as it is termed, into port in the sailor's arms because she has a port close at hand ; but this cannot be done in crossing the Atlantic, and this is one of the many reasons why so many founder there.

17,855. When they are carried into port in the sailor's arms, as you describe it, are they carried into port in consequence of their bottoms not being good and sound, or is it from the circumstance that they frequently lie on the ground and therefore leak and strain more than others do ?—Some of them do strain by lying on the ground ; you cannot lay an old ship on the ground without straining her if she has a full cargo in, unless it is a very soft bed.

17,856. And therefore you consider that the leaky condition of the colliers which you have described is, to a certain extent, the consequence of the character of the trade in which they are employed ?—I do not say that, but you cannot lay a ship on the ground without straining her ; some ships are built for lying on the ground when used in that trade, but if the owner knows his ships will not stand the ground, he will not lay her on the ground. All ships at sea are liable to spring a leak through straining in heavy weather, and being deeply laden, and struck by heavy seas.

17,857. And therefore, according to your experience, colliers are as seaworthy in respect of their hulls as other vessels, and do not founder at sea in consequence of being unseaworthy more than other vessels ?—I do not believe they do so.

17,858. (*Mr. Lindsay.*) You are not here with your ship at present ?—I am not.

17,859. Did you come down from Rochester to give evidence here ?—Just so.

17,860. (*Capt. Sulivan.*) During the last few years you were in the coal trade, what coal ports did you usually trade to ?—Old Hartlepool, Sunderland, West Hartlepool, and Shields.

17,861. Equally to all ?—More into Hartlepool Bay than any other parts.

17,862. (*Mr. Lindsay.*) Did you come down of your own free will to tender evidence, or were you invited to come here ?—From the earliest information I had of this Commission, I felt a deep sense of the importance of it, and from feelings of humanity and the necessity of a harbour of refuge, I felt it my duty to give my opinion that it should be according to my idea in the right place, which was Tees Bay and Hartlepool ; and I received a letter last week from Mr. Jackson, telling me that if I could come they would be happy to see me, and that you were expected here at the earlier part of this week.

17,863. And with the feeling you held as to the necessity of a harbour of refuge you gladly accepted the invitation ?—I did ; I felt it my duty from feelings of humanity to come down here, after witnessing so much loss of life and property as I had done, and I feel I have only done my duty as an humble individual in society in expressing my knowledge of it.

(*Chairman.*) Thank you.

Mr. JOHN CLARK examined.

Mr. J. Clark.

17,864. (*Chairman.*) You belong to Whitby ?—Yes, I am an inhabitant of Whitby.

17,865. How many years have you been at sea ?—Thirty-seven.

17,866. And in what capacity generally ?—Since 1828, as master generally.

17,867. And in what trade have you been employed chiefly ?—The Baltic for the first 15 years, and since that in various trades, Archangel, American, Hamburg, and Mediterranean.

17,868. Have you been present during the course of this inquiry ?—Yes ; I live in Hartlepool now, and have been living here 12 years.

17,869. And you have heard the evidence of the witnesses who have preceded you, I mean the seafaring men ?—I have.

17,870. Do you generally agree with them as to its being more advantageous to have one large harbour than to have an improvement to the three ports, the Tyne, Tees, and Wear ?—I do.

17,871. Will you give your reasons ?—The first reason I have is, that in the Tyne and Wear in the winter season there is a strong fresh and a strong tide, and though there may be sufficient water a ship steers badly, and if there was a large fleet of ships coming in they cannot get away and they come together, whereas coming into a place like Hartlepool, where it is still water, as soon as you are in, you down with your anchor and the ship is safe.

17,872. Have you ever made Hartlepool in thick weather ?—I have more than once.

17,873. Is the land easy to make out in thick hazy weather when you can only see it at a distance of two or three miles ?—I do not know but that it is quite as easy to make out as any other port on the coast, more particularly with a lead.

17,874. But is the land easy to make out ?—I have the Heugh and Lighthouse, and the bold land to the north and south of it.

17,875. And it is quite as easy to make out as Tynemouth, for instance ?—Quite.

17,876. And quite as easy to make out as about the Wear ?—Quite as easy.

17,877. And is it as easy to make out as the Head ?—I would not say that, as I can see Flamborough Head probably further, but if it was anything like, I could see the land two or three miles off, and I could come in with more safety.

17,878. Have you ever run in by the land in thick weather ?—Frequently.

17,879. And is it a thing you have no hesitation in doing in a heavy gale of wind blowing on shore ?—I cannot say I ever ran with a heavy gale of wind

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on shore; we had to guard against that; we had no place to run to.

17,880. You could run for Hartlepool at high water, even in a gale of wind, in a small vessel?—Undoubtedly.

17,881. Have you ever run into Hartlepool in a gale of wind on shore?—Never but once.

17,882. On that occasion did you run in by the lead, or did you see the land?—By the lead.

17,883. And you had no hesitation in doing it?—None whatever.

17,884. And how did you know when you were running in by your lead, that you were not either to the north or south of Hartlepool?—I knew well when I was to the north of it by the soundings.

17,885. That you were running in direct for the bay?—Yes.

17,886. Explain to me how you knew?—East of Hartlepool you have a sandy bottom, not particularly fine but with small shells; at a little south, say Redcar, you have the ground coarser there. If you get north there is plenty of ballast chalk and gravel, and all sorts of mixtures put together, you can't tell what sort of bottom it is, but if you get south of that you know that you are in the neighbourhood of Hartlepool.

17,887. And that distinction between the bottom of the north and south is marked at what distance out from shore?—About 15 or 20 miles, but I would not say I could go north so far as that.

17,888. Then in thick weather when you could not see the lights or the land, would your soundings assist you into Hartlepool, keeping your way along shore?—Yes, right into Hartlepool pier almost. I have done so outside of the Long Scars.

17,889. And come in quite by your soundings?—Yes.

17,890. And feeling your way in from the south, could you do it by your soundings?—Yes.

17,891. Both north and south?—Yes.

17,892. (*Mr. Lindsay.*) Do I understand you to say you are master of a Whitby ship?—Not at present.

17,893. You were?—Yes, many times.

17,894. And you belong to Whitby?—Runswick in the neighbourhood of Whitby.

17,895. Were you at sea during the gale of the 4th January 1857?—I was not.

17,896. Were you at Whitby shortly after that gale?—I was not.

17,897. Then you are unable to speak as to the fact whether there were many ships driven ashore about Whitby?—Only from what I heard.

17,898. (*Capt. Washington.*) Do you know Runswick Bay?—I do.

17,899. Do you think it would be a good place for a harbour of refuge?—Upon a small scale it is the best upon the coast.

17,900. Would it be a convenient part of the coast for vessels to run to?—Not at all; it is merely in case of necessity.

17,901. More as a stopping place than as a harbour of refuge?—Just so.

17,902. It would be useful as that?—Very useful.

17,903. Have you any doubt upon your mind, after your experience at sea, as to the best site for a harbour of refuge on this coast?—Hartlepool.

17,904. You are quite sure of that?—Quite sure.

17,905. (*Capt. Sulivan.*) Do you reside at Hartlepool?—Yes.

17,906. I asked you that, as in the list of witnesses you are put down as residing at Whitby, as if you did not belong to Hartlepool?—I have resided 12 years at Hartlepool. Hartlepool is my place of residence.

17,907. From what you know of the coast would you say that two harbours at Hartlepool or Filey, provided that each was accessible at all times of the tide for the largest colliers in safety, would be more useful than one large harbour at either place?—I don't say it should; that there is so little need of a harbour of refuge at Filey.

Mr. Robert Jordison examined.

Mr. R. Jordison.

17,908. (*Chairman.*) I see you have followed the sea for a number of years; how many?—About 40.

17,909. And of that period how long have you been in command of vessels?—About 30 years.

17,910. And in what trades have the vessels you have commanded been chiefly employed?—Chiefly in in the North American trades and Baltic, occasionally coastwise in the spring of the year.

17,911. Where are you resident now?—In Runswick just now.

17,912. And were you a native of that place?—No.

17,913. Of where?—Of Sunderland, in the county of Durham.

17,914. Have you been present to-day during this inquiry?—Most of the time, I think.

17,915. Have you heard the evidence of the three or four last witnesses?—I think I have.

17,916. Do you generally agree in their evidence?—Generally speaking.

17,917. That it is more desirable to have one large harbour, say at Hartlepool, than to improve the three harbours, the Tyne, Tees, and Wear?—I should say it is better to have one large harbour than to improve the harbours you have mentioned, for I think the harbours could not be improved to that extent that would do the good that a large harbour of refuge would.

17,918. Will you state to me any further reasons you have for preferring one large harbour to the improvement of the three?—As Mr. Clark stated, freshes and those things come down rivers such as the Wear, Tees, and Tyne, and of course makes it more dangerous to take those harbours, as he had stated before, and that is one reason I should think for keeping this bight open, that is, from Robin Hood's Bay down as far as the Farn Islands, as preferable to going south of Whitby point and a lee shore.

17,919. In the evidence given us in other places we have been told it is the general practice for vessels always to run back for their own ports when taken in a breeze of wind; would that in your opinion be an objection to this one large harbour, because if we make one large harbour and they did not use it, you know it would be of very little service?—I don't know that I ever ran back in my life for the port from which I had sailed, that is, upon this coast.

17,920. Then you are not disposed, from your knowledge of the general practice on the coast among colliers, chiefly to agree in that statement which has been made to us that they generally run back to their own ports?—Some small vessels might, but the vessels I generally have had charge of could not do so with safety. I have gone all the way from north of the Humber down to Leith Roads twice in one voyage, but not wholly from there, because I have been taken off Sunderland down to Leith Roads, and then come from there as far as Leamington Church and back to Leith Roads in eight or nine days after.

17,921. You have heard the character that has been given us of Hartlepool Bay, as to vessels making it by the lead, do you agree in that?—I believe there is a more regular sounding coming into Tees Bay, that is Hartlepool Bay included, than there is perhaps north or south, but I would not pretend to run down upon this bay in a gale of wind and thick weather, or weather that I could not see the land or the lights. I should not attempt it with my lead. I should not have that confidence in myself, but there is a difference of men having more practice. Those having more practice on the coast than I have would be more likely to do so than I would be.

17,922. But you have been employed a great deal in the foreign trade, or North Sea trade, and in the coasting trade; now from your knowledge of the coasting trade, and of coasters and colliers who do make a very great use of their lead, and who are very

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good hands at it, do you suppose they do it, though you would not ?—They might do so, but I would not.

17,923. How many voyages have you made home from the Baltic in the fall of the year ?—Nine or ten, perhaps.

17,924. What is the northernmost land you have made on this side ?—I tried to steer for Flamborough Head, but sometimes I have made Buchan Ness and the Firth of Forth, in some voyages when bound for London.

17,925. You have only made 10 or 12 voyages ; now would you say you have made the land as far north as Buchan Ness two or three times out of that ?—I should say seven or eight times, but it was not on account of any preference I gave to the land there.

17,926. From your knowlege of the winds that prevail in the North Sea at the fall of the year, do you think the bulk of the ships will make the land as far to the north as Buchan Ness ?—Not without they are driven there if bound to the south.

17,927. I do not ask you whether they go there voluntarily, but whether they are driven there by the wind, many of them ? I ask you whether many of the ships that come home from the Baltic in the fall of the year make the land as far north as Buchan Ness ?—It has happened so with me, not to be always to the northward of Buchan Ness, but down about the Bell Rock, and St. Abb's Head, and sometimes about the Coquet Island, and as far as Tynemouth.

17,928. In fact you are not able to speak as to what others have done ?—I cannot.

17,929. Have you made the passage north-about ; to and from America ?—Yes ; frequently.

17,930. How many times would you say ?—I should say about 16 to 20 voyages perhaps.

17,931. From your knowledge of that passage north-about, if Peterhead Bay or Wick Bay were to be improved and made a harbour of refuge, which would you prefer ?—I should say Wick Bay for a harbour of refuge in preference to Peterhead on that coast, for if I was off Peterhead I could make my way round with the wind from the southward, in behind Conrad's Head, and, if I chose, I could run down for Wick, or dodge under the weather land, and if the weather and wind would permit, if the wind was from the north I could get to the southward, and into Leith Roads, if I could not get down on to this coast.

17,932. So that you would give a decided preference to Wick ?—I would give a decided preference to Wick.

17,933. (*Mr. Lindsay.*) From your knowledge of that coast, should you think that a harbour of refuge is necessary ?—Near Wick ?

17,934. Along that coast, the east coast of Scotland ?—I should say so ; I should think that ships would be very glad of a refuge harbour instead of going to Long Hope.

17,935. Quite so ; then you think a harbour of refuge along that coast would be the means of saving life and property ?—I should think it would.

17,936. (*Capt. Washington.*) I think you are a native of Runswick ?—No, near to Sunderland.

17,937. You have lived some time at Runswick ?—I have lived about seven or eight years at Runswick.

17,938. Then you are acquainted with Runswick Bay ?—Well I have never been further than just going off in a boat to catch the steamboat ; I don't pretend to know much about Runswick Bay as far as regards the bay or anything. It might make a small harbour of refuge, but not a large one, it is infested with rocks all round at low-water mark, except a bit of sand at the head of it.

17,939. Is that the case, that the shores are very rocky ?—It is all rock thereabout, except at the head of Runswick Bay there is a small bit sand.

17,940. Do you consider it a suitable place for a harbour of refuge ?—I should say not, without it should be a very small one.

17,941. Would it be a very useful place for vessels ?—If it was improved it might, but it will require something to be done to make it safe to stop in ; of course in summer time frequently ships go in and stop one or two tides, but as soon as the wind draws in from the east they are obliged to leave it.

17,942. Do vessels often go there ?—Very rarely ; unless they are vessels belonging to the place.

17,943. Would Robin Hood's Bay be a better place ?—I should say not ; I don't pretend to know a great deal about Robin Hood's Bay ; I have passed it often.

17,944. Do ships often stop there ?—I have seen ships stop there, both light and laden, in summer, but not frequently in winter.

17,945. Vessels do keep off that iron-bound coast, do they ?—I have always endeavoured to keep off it, if I could get off it ; if I was off it and saw the wind was going to come on the land, I generally gave it a wide berth.

17,946. Once again, are you quite clear in your opinion as to which is the best site for a refuge harbour on the coast between Flamborough Head and the Farn Islands ?—I have formed the opinion many years ago, that a harbour of refuge was wanted on this coast, and as a harbour, only one, I should say Hartlepool Bay is the best in my opinion.

17,947. Are you in any way connected with Hartlepool ?—Not in the least. I have not a stone, nor a foot of ground in fact anywhere in England, not of my own to call my own property.

17,948. (*Capt. Sulivan.*) If you had a place to select for a second harbour for the collier trade bound south after Hartlepool where would you put it ?—If I was obliged to give a positive answer I should say Filey, perhaps.

17,949. Suppose it a fair harbour at Hartlepool and another at Filey, that is five or six fathoms, that would take colliers at all times of the tide, night and day, and of the largest size, would two harbours of that size be better for the collier trade than one large harbour at one place ?—If they were equally efficient and suitable I would say two harbours are better than one.

17,950. Each would not be so effective as a large one, because if it went to seven or eight or nine fathoms with a larger area it would take more vessels, but suppose it went to the moderate depth of five or six fathoms, and that you divided the money between two ports, each taking 300 or 400 vessels for refuge, and the deepest colliers and even the largest vessels by night or by day, would that be better than one harbour carried out to two or three fathoms deeper water ?—I would say one good harbour would be better than two bad ones.

17,951. I am not asking you about that. I said two good harbours from their depth and size ?—I understood you to say that if a harbour was made at Filey you would not make this so large and spacious if made here, that is making one harbour of refuge on the coast.

17,952. I ask you whether one harbour if carried to deeper water, that is up to seven, eight, or nine fathoms, or two at five or six fathoms at Filey and Hartlepool, would be the best, keeping in view not the accommodation of the trade of any port but the saving of life and property, and principally for the collier trade ?—Well, two harbours might pick up more ships, but I don't know that there would be that safety in these small harbours of about five or six fathoms that there would be in one seven or eight or nine fathoms.

17,953. You think they would pick up more ships ?—Yes ; I think they would pick up more ships, light ships.

17,954. Now with respect to the answer you gave respecting vessels returning for their own ports ; do you apply that principally to light vessels running to the north ; is it those you think don't run for their own ports, or were you speaking of loaded vessels ?—I spoke of loaded vessels.

17,955. But do you consider that light vessels run-

ning northwards generally try to make their port?—No, they make to the port where they intend loading.

17,956. Well, I mean, when I say their port, the port they are bound for?—Yes.

17,957. But a loaded collier will persevere on her voyage, I suppose, if she can?—Yes.

17,958. And would it be a convenience for these loaded vessels that cannot round Flamborough Head and can fetch Filey to have a harbour there rather than run back into the bight of Hartlepool?—It would certainly; if there was a harbour of refuge at Filey not many ships would run back to Hartlepool, unless they were obliged and could not get further.

17,959. While the vessels that were embayed and could not weather the high land near Whitby would find perfect shelter in a harbour at Hartlepool?—Of course they would.

Mr. Thomas Bayley examined.

Mr. T. Bayley.

17,960. (*Chairman.*) You reside at the Tyne?—Yes.

17,961. Are you a native of the Tyne, or of what place?—Of the Tyne.

17,962. How long have you followed the sea?—Twenty-seven years.

17,963. And for what time have you been captain?—Five.

17,964. In what trade have the vessels been employed that you have commanded chiefly?—The coasting trade from Seaham.

17,965. The coal trade?—Yes.

17,966. You have been present during the inquiry to-day?—Yes.

17,967. Have you heard the evidence of the three or four witnesses that have preceded you?—Yes.

17,968. Do you generally agree in their evidence?—Yes.

17,969. Is there any point on which you are disposed to differ from them, or should you like to bring under our notice anything that they have omitted to state?—Not one.

17,970. It appears that you were caught in a gale on 4th January 1857, off Whitby, and that you were wrecked in Hartlepool Bay?—No; I was caught between Filey and Scarborough.

17,971. And that you were wrecked in Hartlepool Bay?—Yes.

17,972. Will you describe to me the nature of the gale, and how you were wrecked?—Yes. I started from between Filey and Scarborough on Saturday morning at 10 o'clock, the wind south-south-east, keeping my head off till the wind got southward. It turned fine weather. Afterwards it broke out to north-north-west, and then easted; and as we went northward, I got it as far east; I had it that till 10 o'clock on Sunday morning. At 3 on Sunday afternoon I made Seaham, and I put the ship's head to southward again. I could not weather Souter Point, and I got to southward, and again weathered the Heugh. There was nothing else for me but either get the Humber, or go round and beach. Had there been a harbour of refuge, I should have got into it, and many besides me.

17,973. Where were you when the gale took place?—Between Scarborough and Filey.

17,974. You sailed out of Seaham?—Yes; on the Sunday.

17,975. How many days had you been out when the gale caught you?—I came out on the 2nd. It was on the morning of the 3rd.

17,976. How far to the north were you? You were off Souter Point not Seaham Point. You never got to the northward of Seaham?—Never.

17,977. When you were wrecked in Hartlepool Bay, where did the vessel go on shore?—Middleton Sand.

17,978. Where is Middleton Sand?—Between the two harbours.

17,979. And were your people all saved?—I lost one overboard, but the rest were saved.

17,980. At what time of the tide did you go on shore?—About the last quarter flood.

17,981. And were you running for the harbour when you went on shore?—Trying for the harbour.

17,982. And what drove you on shore?—I only could weather the Heugh on the larboard tack, and could not have ventured much further southward, without losing my life and my ship.

17,983. And when you went on shore, how was the wind?—About east and by north; but we had not seen the compass for more than half an hour, we had no light in the binnacle.

17,984. What tack were you on when you went on shore?—The starboard tack hauling up to the harbour.

17,985. Then you drove on the sands, in fact?—I struck, and unshipped my rudder, close into the harbour's mouth.

17,986. If it had not been for that, you would have got in?—I cannot say.

17,987. You might?—Perhaps I might.

17,988. Do you agree with the previous witnesses as to the facility of making Hartlepool better with the lead than any other part of the coast?—I never did it.

17,989. (*Sir F. Smith.*) What was the size of your ship?—She carries 230 tons.

17,990. Very heavy laden?—Yes.

17,991. Well manned?—Yes.

17,992. And a harbour of refuge would have saved you?—Yes.

17,993. (*Mr. Lindsay.*) What was the name of your ship?—The *Duke*.

17,994. You said the gale was south-east, I understood?—South-south-east when it began.

17,995. And you were off Scarborough?—Yes.

17,996. And you were bound for Lynn?—Yes.

17,997. With a cargo of coals?—Yes.

17,998. What distance were you from Scarborough at the time when the gale caught you?—About five miles.

17,999. If there had been a harbour at Filey, could you have reached it?—It would have been a chance. I would not say I could, or could not. The gale came on so heavy that I had to put up under close-reefed topsails.

18,000. Say you were caught in that position, and if there had been a harbour of refuge at Filey, would you have attempted to make it?—I would have tried hard for it.

18,001. Now say that during part of the gale, when the wind was east and by north during the latter part of it, when you were in that position, would you in that case have reached Hartlepool?—I should have run for the Humber; I should have gone round the head.

18,002. What, in your position! Five miles off Scarborough?—Yes.

18,003. Five miles from the land, wind east and by north, blowing a gale, and you distinctly think you would have weathered away Flamborough Head?—I should have carried canvas and tried it.

18,004. Do you think there would be much hope?—I should have had hope of doing it. I should have had no heavier canvas to carry than I would have had to get here.

18,005. Say there was only one harbour to be made on this coast, and it rested between Filey Bay and Hartlepool as a site, which would you prefer?—Hartlepool.

18,006. Knowing the coast as you do, and the number of ships passing along the coast, do you think one large harbour at Hartlepool Bay would tend more to save life and property than two moderate harbours, one at Hartlepool Bay, and another at Filey Bay?—I should say one good harbour at Hartlepool.

18,007. Now, considering this in a perfectly unbiassed manner,—because your word is of more weight than you can suppose,—if it was divided between

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these two moderate harbours, or one large harbour, and that one large harbour at Hartlepool, do you think that this one large harbour would do more to save life and property than the two moderate harbours?—I do.

18,008. (*Capt. Sulivan.*) What is the deepest draught of any collier you have known in the coasting trade to London from the North?—I have never been in the London coal trade.

18,009. Well, trading from the northern ports anywhere south?—Generally, in the Seaham trade, they are not heavy draught; 14 feet is the heaviest draught.

18,010. Taking the large colliers you see alongside you in other ports?—I have never seen one more than 16 feet to my knowledge.

18,011. If you were going to trade now in a collier drawing 18 feet, and were going to pass up and down the coast every winter for the next 10 years, which would you rather have, a harbour at Hartlepool and a harbour at Filey, each being able to take 24 feet at all times of tide night or day, or one large harbour at Hartlepool taking 30 feet?—I would say one large harbour at Hartlepool that would take 30 feet.

18,012. Rather than have two that would take your vessel at all times of tide?—Yes.

18,013. (*Capt. Vetch.*) Suppose, as was suggested just now, that there were two moderate sized harbours provided, one at Filey, and another of moderate size at Hartlepool, what proportion of the vessels out of 100 would go to one place, and how many to the other?—That would all depend upon where they were catched, and how they were placed.

18,014. I speak on the average; take for instance a season, during an entire season, or 12 months if you please, and what would be the proportion that could take one harbour, and the proportion that could take the other?—I would say Hartlepool.

18,015. That more vessels would go to Hartlepool than Filey?—Yes.

18,016. Do you think there would be many more?—Yes, light ships particularly.

18,017. Do you think there would be double the number?—I should say there would.

18,018. (*Capt. Sulivan.*) You say with light vessels in particular. Is it the case that light ships press to the northwards towards their own ports?—Yes.

18,019. And therefore would commonly find themselves caught in this bay, and so find Hartlepool frequently valuable?—The more so if there was a harbour of refuge.

18,020. Yes, I am supposing a harbour of refuge, and taking the fleets of colliers that leave Seaham, Sunderland, and the Tyne, all laden, and passing to the southward, do you believe that a larger proportion of laden colliers would find greater benefit from Filey than light colliers would?—Yes, all the laden colliers would find benefit.

18,021. I say, would a larger proportion of laden colliers find greater benefit from Filey than light colliers would bound for the north?—Yes.

18,022. You said just now you might have fetched Filey?—Yes; it would have been a trial.

18,023. Had the wind been blowing hard from the east you would have endeavoured to go under Flamborough Head?—Yes.

18,024. If there had been a harbour at Filey under your lee, would you have gone on much more confidently and tried to weather the Head, knowing that you had safety under your lee, in a harbour at Filey Bay?—Decidedly.

18,025. (*Chairman.*) Can you tell me what proportion of the fleet caught in the gale of January 1857 had got so far south as Flamborough Head?—Not half a dozen.

Mr. Robert Chadds examined.

Mr. R. Chadds.

18,026. (*Chairman.*) Do you reside at Lynn?—Yes.

18,027. Are you a native of that place?—Yes.

18,028. How long have you followed the sea?—Twenty-five years.

18,029. How long have you been in command of vessels?—Twenty years.

18,030. In what trade have the vessels you command been chiefly employed?—In the coal trade.

18,031. Were you wrecked at Hartlepool in the gale of the 4th January 1857?—Yes.

18,032. Will you describe to me the circumstances, beginning with where you sailed from?—I sailed from London on the Friday morning with a loaded ship, and we get down as far as Flamborough Head, and the gale caught us off Scarborough—Scarborough lying west-south-west from us at a distance of eight or nine miles. When the gale first caught us it blew our foretopsail away, and we had to bend another. We had to carry canvas and get round Whitby; the wind easted and the snow came on. After that we split the foresail; then we were obliged to carry canvas and get to northward, and one sail went away with half of the other. At daylight in the morning Hartlepool was bearing west of me; we got the maintopsails secured, when I come ashore.

18,033. Was Hartlepool the port you were bound to?—Yes.

18,034. And when you were wrecked were you endeavouring to enter the harbour?—Yes; I could not get the ship clear of the rocks, and I drove into the bay in the last extremity. I felt very comfortable when I got the ship before the wind, when I knew where I was going. The ship came, and the men let go the wheel, and she broke the wheel chain, and the ship flew towards the stem buoys, and we had no command over her after that.

18,035. And the ship was lost in consequence of the wheel ropes breaking?—Yes.

18,036. And if it had not been that you would have run in?—Yes.

18,037. You have heard the evidence of the previous witnesses?—Yes.

18,038. Do you agree generally in the opinion they have given that one harbour at Hartlepool is the best to be done?—Yes.

18,039. (*Mr. Lindsay.*) What was the name of your ship?—The *Agnes*.

18,040. Was she a laden ship when lost?—Yes.

18,041. What part of Hartlepool were you lost in?—Close by Seaton Sand; close by the piers.

18,042. If there had been a harbour of refuge at Hartlepool would your ship have been saved?—Yes; she would have been clear of the land when she broached to.

18,043. I think you said, in reply to Admiral Hope, that your ship was lost because you carried away your wheel rope, and she was not under command?—Yes.

18,044. Then under command you would have fetched into the present harbour?—Yes.

18,045. Then if your ship was not under command, do you think you would have fetched into a harbour of refuge?—She was not under command after she broached to and broke the wheel chain.

18,046. Where did she broach to?—Abreast the Stone Buoy.

18,047. When she came into the ground-swell?—Yes.

18,048. Consequently, at the entrance of a harbour of refuge properly situated, there would not have been that ground-swell, and the accident would never have happened in all probability?—No.

18,049. (*Capt. Sulivan.*) How had you the wind before you weathered Flamborough Head?—South-south-east.

18,050. Blowing hard?—Not to make a gale of it.

18,051. Before a large fleet of ships with you?—I am of opinion that I was ahead of most of the fleet.

18,052. Would they have been caught with that gale further south than you?—Yes; as they went back to the Humber, and could not round the Head.

18,053. Many vessels in that gale around the Head

were lost between the Head and Whitby? — No doubt.

18,054. For all those vessels would a harbour at Filey have been very valuable?—Yes, if they could have fetched it.

18,055. Those lost between the Head and Whitby only I am speaking of? I am speaking of when the gale went to eastward, those that were too far to leeward to weather Whitby Head on the one hand and the Head on the other. Would Filey have been a valuable harbour for many of them?—It would.

18,056. For the coasting trade, more especially for laden ships, suppose that a larger proportion of laden are lost than light, and that the loss of life is greater in the laden, and assuming, therefore, that a harbour for the protection of lives is more required for the laden than for the light, would a harbour that would take the largest loaded collier at all times, by night or day, at Hartlepool and Filey, be better than one large harbour at Hartlepool?—I would like to have a large harbour at Hartlepool, and more of them.

18,057. But if you have harbours which would take the largest colliers, and give them perfect shelter by night or by day, would not for the collier trade these two ports within 40 miles be better than one?—Decidedly.

Mr. MALTMAN SHAW examined.

Mr. Maltman Shaw.

18,058. (*Chairman.*) You are a resident in Lynn?—Yes.

18,059. You are connected with the port as a shipowner?—Yes.

18,060. Have you been to sea?—No.

18,061. Have you been present during this inquiry?—The latter part of the day.

18,062. Will you favour me with your opinion as to the advantage of a single harbour of refuge on this coast, or rather will it be better to improve the three ports, the Tyne, the Wear, and the Tees?—I have no nautical experience to bring to bear upon it, but I speak merely the sentiments of those with whom I am accustomed to meet, namely, shipowners like myself. I have heard the opinion expressed very strongly in favour of a harbour of refuge at Hartlepool in the Tees Bay, and more especially I may say that I myself, as also many other shipowners, think had there been a harbour of refuge here it would have saved in many instances our ships. My ships have run in here when I believe they could not be anywhere else. It is not that I frequently trade from here, because I trade from Seaham; but I instruct my captains that in all cases when it comes on bad weather, if there is no chance of their reaching the ports of Seaham, Sunderland, or the Tyne, wherever they are bound for, that they are to go to West Hartlepool, and not run any risk. Such are my instructions and those of many others. I do not bring any nautical knowledge to it, but looking to the geographical position I am convinced it is the best place.

18,063. (*Mr. Lindsay.*) Is there any shelter in Hartlepool during easterly gales?—I cannot profess to bring any nautical experience upon it. I tell you the captains have orders to go to Hartlepool if they can get it.

18,064. Why do you tell them to go to it in preference to other places if they found difficulty?—If bound for Seaham I say go there if you can, but if it is difficult, get to Hartlepool, because I believe it is the place of greater safety when they get to the north.

18,065. They can go into West Hartlepool in gales of wind when they cannot get into Seaham?—So they tell me.

18,066. Have you had conversations with your brother shipowners of Lynn as to the desirability of a harbour on this coast, and are they all of opinion that there ought to be a harbour of refuge on this coast?—Entirely.

18,067. You have had no conversation with any who say a harbour of refuge was not necessary on this coast?—Certainly. I cannot imagine such an opinion to be existing.

18,068. And in your conversation with them, do they seem to think one great harbour would suit the trade better than the improving of the existing harbours if they were to make them accessible at all times?—The question never presented itself in that form.

18,069. And the general opinion is with the Lynn shipowners, that along the whole range of this coast Hartlepool is the best place for the construction of this harbour?—It is.

18,070. And that is the opinion of the owners of ships trading to the Tyne also, and to the northward of it?—Yes.

18,071. (*Capt. Sulivan.*) For the coal trade that you are concerned in at these ports, and for the general coasting trade of England, which do you believe will be the best for saving life and property, two harbours, one near Flamborough Head and the other at Hartlepool, that will take the largest colliers and coasters in England at all times of the tide, or one larger one at Hartlepool that would, in addition, take the larger ships that come to our coasts?—To the shipowner or trader unquestionably two harbours must be better than one if they be of equal capacity.

18,072. I say provided they were large enough and deep enough to take the colliers and coasters at all times of the tide. Would two, large enough and deep enough for them, be better than one large one at Hartlepool which would take the larger over-sea ships as well?—Speaking of the colliers you have described, two ports would be better than one.

18,073. Have you had experience as a shipowner about the class of colliers and the state in which they go to sea?—I think I have had a fair amount of experience.

18,074. I do not think it is a thing to make light of when we think it is a thing on which seamen's lives would depend. Is it the case that coasting colliers are run till they are foundered and lost, or is it the case they survey them and pronounce them unseaworthy when they are broken up?—To the best of my memory I have only known three or four vessels broken up.

18,075. Do you find these old colliers broken up in the ports?—I do not. I know an instance of a collier being 50 or 60 years old, one of my own vessels ran down about a year and a half ago, a vessel 50 or 60 years old, which was classed A 1 for five years.

18,076. These old vessels must wear out, and do you know whether they are worn out, surveyed, condemned and sold, or, whether they are run till worn out, and lost, by foundering?—I think they are repaired two or three times in their existence. That is the practice in the coal trade.

18,077. But at last what becomes of them?—I mentioned an instance of one that a vessel of mine ran down off Whitby last year that was 50 years old, and she was classed A 1 for five years.

18,078. What became of her?—My ship ran over her.

18,079. Was she not broken up?—No, she went down.

11,080. Can you tell me of any colliers broken up and sold for old timber?—I have seen a great many ships in the breaking-up yards, but I cannot say whether they were colliers or other ships. I believe, as a rule, colliers are as well found as any other class of coasting vessels.

18,081. Is it the case that vessels when they are sold, that they will not carry a better class of cargo, they are put in the collier trade, because it is of less consequence their leaking?—I think so, because coal is not a perishable article.

18,082. (*Mr. Coode.*) You are a shipowner of Lynn? Are the shipowners of Lynn of one mind as to the desirability of a harbour of refuge on this coast?—I do not know that they are of one mind,

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but I speak the general opinion, and I have consulted many.

18,083. How many will that be ?—Some half dozen or three persons.

18,084. (*Chairman.*) You mentioned a vessel within your experience, 50 or 60 years old, as having been repaired several times; is it the general practice among colliers to repair them and give them thorough repairs, so as to make them in fact new vessels ?—It is the case.

Mr. Robert Huntley examined.

Mr. Robert Huntley.

18,085. (*Chairman.*) You are a resident in Greenwich and a shipowner ?—Yes.

18,086. Have you ever been at sea ?—Yes.

18,087. What number of years ?—I have merely gone a few voyages.

18,088. You have never followed the sea as a profession ?—No; but I have been from the Orkneys to London.

18,089. You have been present during the inquiry ?—Yes.

18,090. Will you give the Commissioners your opinion whether it would be better to have a single harbour of refuge on this coast, or would it be better to improve the ports of the Tyne, the Wear, and the Tees; or if you consider one harbour preferable, where you would place that harbour ?—I have no objection to seeing all the harbours improved, but as to a harbour of refuge, I decidedly give my preference to one.

18,091. Where would you put it ?—In Tees Bay.

18,092. And will you state your reasons ?—Because it is the deepest on the coast, and I think you will find you can make the Tees Bay when you cannot make the other ports so easily. I have twice come down from the Dogger in a fog loaded, and brought in deep water; the fog has cleared away and I have found myself all right.

18,093. (*Sir F. Smith.*) Do you insure your vessels habitually ?—Some of them.

18,094. Do they trade chiefly round this coast ?—All of them.

18,095. Do you imagine that if a harbour of refuge were made in the Tees Bay, Hartlepool, it would tend to diminish the amount of premium paid to the underwriters ?—I think it would very much.

18,096. (*Mr. Lindsay.*) How many vessels have you trading on this coast ?—Five.

18,097. How long have you been owner of vessels trading on this coast ?—About 14 or 15 years.

18,098. And is it your opinion, and the opinion of all your captains, that if only one harbour was to be made that Hartlepool is the best site ?—The whole of them. I have taken the evidence of all my masters, and also questioned about 50 of the men and a number of individuals in our locality, and the whole of them seem to give their opinion in favour of Hartlepool Bay.

18,099. Before you came down here to give your evidence to-day you felt it to be your duty to ascertain not only the masters' opinions, but the opinion of the seamen in your employment as to which was the best site for a harbour of refuge ?—I did.

18,100. And they were all of opinion that only one harbour ought to be made, and that that should be at Hartlepool ?—Yes, and two gentlemen volunteered their services and came down with me. One you have heard and one you have not.

18,101. They were so strongly impressed with the necessity of a harbour of refuge on this coast ?—Yes; I have also, during the last two months, been much in the north of England, and knowing the number of clever persevering men along the coast, I have asked where would be the best place for a harbour of refuge, and to get it out, I have generally taken Filey Bay. But the arguments the whole of the men brought forward have all been in favour of Tees Bay; and I have no doubt I could bring 50 men forward that I have taken evidence from during that time who would say the same thing.

18,102. Will you state one or two of the leading reasons that they have given against Filey Bay, or did they state any?—They stated the principal reason was this being the deepest bay.

18,103. Did you discuss with them the importance of the existing harbours, so as to make them accessible at all times of tide ?—I did not, because I was not aware of any other particular form of harbours until I came down here.

18,104. So that you are not able to offer an opinion upon the point, whether the construction of one large harbour at Hartlepool, or the improvement of the existing harbours would do more to save life and property ?—I think one would.

18,105. (*Capt. Sulivan.*) Did you discuss the question with these men, whether to have one at Hartlepool and one at Filey, that would take the colliery trade at all times of the tide, would be better for their trade than one at Hartlepool ?—I did not discuss it about two, but only one.

18,106. Which would you prefer for your trade, the colliery trade of England; and which would bear most on the premium for insurances, two harbours that would take the deepest colliers at all times of tide, one at Hartlepool and one at Filey, or one larger, that would take large ships at Hartlepool alone ?—I think one would answer all purposes, if you make it large enough.

18,107. Do you think it would be better for the colliers passing the east coast of England that two harbours deep enough to take them at all times of tide should be made, one at Hartlepool and one at Filey ?—No doubt it would; it would be serviceable; but Hartlepool would save ten to one more than Filey. The evidence I have principally got from men in the trade has been that they frequently fall in with the waves rather to the north of Filey.

18,108. That would be an argument for Hartlepool as against Filey, if there were only one; but would that be an argument against one at each place that would take in all the largest and deepest vessels that pass the coast at all times of tide, and at all times of night and day ?—There is no question but it would be of great service.

18,109. I ask if it would not be of great service to the collier trade; London trade more especially; though that one might take in still larger ships more easily?—For my own part, I should be quite satisfied with one good one.

18,110. Would two be better than one ?—It would be decidedly best; there is no question.

18,111. Would you say, that taking all the ships embayed in this bay, whether loaded or light, and that most of the light were running to northwards, that one at Filey Bay would be more especially useful to vessels caught off Flamborough Head in a south and south-east gale, and so prevent their running back, or risk running back to being driven on the coast ?—According to the plan I have seen, Filey.

18,112. I do not ask about any plan. I am supposing the engineers could make a plan in either case all right. I say a harbour that would be useful for all the largest colliers at all times of tide and in every gale of wind ?—According to the evidence I have heard, the nautical men and men of a good deal of experience up and down the coast, entirely object to a harbour at Filey, on the ground that there would be so much broken water; they have not got water enough in an east-south-east gale; in six or seven fathoms it is nothing but broken water.

18,113. Are you aware this is the first evidence we have had to that effect out of 100, and we have heard many give objections to Hartlepool that it is shallow so far out, and that the sea breaks, while we have not heard the same objection, until you have put it, to Filey. Would that do away with your objection as to the sea, and if you also consider that at Filey a

harbour can be made at least as deep and probably deeper than one at Hartlepool Bay. I say, supposing that all that was required could be done by engineers, then I ask for vessels off Flamborough Head, and caught there, the vessels we hear of being driven back off the coast, would a safe harbour at Filey Bay be very valuable ?—It would.

(*Chairman.*) I see in the list with which you have supplied me there are to be a considerable number of gentlemen who come from a distance, and I am unwilling, under the circumstances, that their names should not be recorded on our minutes. I shall therefore call the names over, and they will be kind enough to stand up and answer. Mr. Porter, you belong to Gravesend ; you are described as having been 55 years at sea, nine years as master, and as having been engaged all your life in the coasting and fishing trades, and as having saved 79 lives in smacks and schooners.—Mr. Weatherly, you reside at West Hartlepool ; you are described as a captain ; you have had great experience in the Baltic and coasting trades, both in command of sailing and steam ships ; you served under Sir Charles Napier in the Portuguese navy.—Mr. Sidey, you reside at Berwick ; you are described as 50 years of age, and 45 years at sea, 25 years master ; and principally engaged in the London and Berwick trade.—Mr. Grange, you are described as residing at Scarborough, 55 years at sea, 45 years master ; had great experience in the coasting trade.—Mr. Rich, described as residing at Rochester ; a captain, 45 years at sea, 22 years master ; of great experience in the Hamburgh, Baltic, and coasting trades.—Mr. Layton, you are described as a North Sea pilot, residing at Hartlepool, 48 years at sea ; of great experience in the North Sea, Baltic, and coasting trade.

(*Mr. Jackson.*) He has gone to pilot a ship ; he could not stay longer.

(*Chairman.*) Mr. Peaty, you are described as residing at Shields ; as having been a captain, 48 years at sea, 38 years master, and North Sea pilot.—Mr. Spence, captain, Greenwich, 28 years at sea, eight years master; making 16 or 18 voyages every year between London and West Hartlepool.—Mr. Spenster, West Hartlepool, captain, 20 years at sea, 12 years master; was master of the *Dapper*, bound from Hartlepool loaded, was driven back and wrecked in Hartlepool Bay, and all hands drowned except two.—Mr. Pearson, West Hartlepool, captain, 50 years at sea, 30 years master; of great experience on the coast.—Mr. Wilson, residing at Hartlepool, captain, 30 years at sea, 21 years master ; had much experience in the Hamburgh, Baltic, and coasting trade. — Mr. Brown, you are described as residing at Leith, and as being captain, 55 years at sea, 30 years master, Marine Manager of the London and Leith Shipping Company.—Mr. Manners, described as belonging to Leith, captain, 54 years at sea, 30 years master ; principally in the Leith and London trade. — Mr. Jackson, you are described as residing at Leith, captain, 58 years at sea, 38 years master; principally in the Leith and London trade.—Mr. Prestgirdle, of Greenwich, master and owner of smacks, 63 years at sea ; engaged all your life on the east coast of England and Scotland.—Mr. Minn, described as residing at Lynn, captain; was in the gale of the 4th January 1854.—Mr. Porrell, resident at Lynn, captain, 24 years master ; trades principally between Seaham and Lynn.—Mr. Winterton, Rochester, 20 years captain, 34 years at sea. I want to ask you, gentlemen, whose names have been called, whether any of you in substance, or in any material point, disagree from the seafaring evidence which you have heard given by the others. If any of you do, speak out ; if you are all agreed, then I expect nobody will answer.

No answer.

Captain CHARLES BOHR examined.

18,114. (*Chairman.*) Do you understand English ?—Yes, I understand it well enough ; except, perhaps, some words which I cannot understand well enough.

18,115. You commanded the ship *Love*, of Hamburgh ?—Yes.

18,116. How many years have you been at sea ?—Twenty-three.

18,117. For how many years have you commanded vessels ?—Eleven.

18,118. In what trade have the vessels you commanded been chiefly employed ?—In the coal trade between here and Hamburgh, sometimes bound south for stone.

18,119. Have you been present here to-day ?—Yes.

18,120. And have you attended to what has been going on ?—Yes, I understood it perfectly.

18,121. Give us your opinion as to where this harbour of refuge should be, as you have been accustomed to trade to this port ?—I should say the harbour should be somewhere in the Tees Bay.

18,122. Will you tell me why ?—Every ship that takes the sea loaded, with the wind blowing from east-south-east, and south-east, the worst gale, it will keep the ship right into the Tees Bay, the flood tide is setting into the bay, so that it would be a smart sailing ship to keep out of that bay and east the shore.

18,123. Has this question of a harbour of refuge on this coast been the subject of conversation among your captains at Hamburgh ?—It has, a good many times.

18,124. And have they heard anything of this Commission being appointed, or of the possibility of a harbour of refuge being made ?—Yes, sometimes ; for some years the papers have said something about it.

18,125. You think they understand there is something going to be done ?—Yes.

18,126. Are you able to speak at all as to the others; their opinion upon the subject as well as your own ?—Yes, all I have spoken to would like to get it somewhere here ; that is, it must be somewhere in the Tees Bay.

18,127. (*Mr. Lindsay.*) Have you been long trading to this coast ?—Many years ; the first time I was into Hartlepool was 15 years ago, and I have been constantly trading to Newcastle, Sunderland, and very often to the river Tees, up to Middlesborough.

18,128. Then you have, in fact, for the last 15 years been trading from Hamburgh to the coal ports here ?—Sometimes. I have been two or three times up the Baltic, and sometimes to Archangel, and sometimes in the Humber. I have been from Newcastle to Spain.

18,129. Do you foreign captains consider this is a very dangerous coast ?—Yes, one of the most dangerous places there is on the east coast of England.

18,130. And are you very much afraid when caught upon it with an easterly gale ?—Yes, as every one knowing its position must be afraid.

(*Chairman.*) You were going to make some statement, Mr. Jackson ?

(*Mr. Jackson.*) It was with reference to what Mr. Lindsay had mentioned respecting the return that was put into my hand ; he said he would be glad to know whether there was any person who could state any inaccuracy in it. It is very far from me to find any fault at all about it ; I said I was not able to do that. I merely stated that I had got no return from official documents, and these are all that I have found. It was not improbable that some that have been given in that printed paper may have been those that foundered at sea, and of which there is no record ; or they may have been known to have foundered. But a gentleman has called upon me and stated, with reference to a ship he was put down in the list as having sailed from Hartlepool, I allude to the *Dapper*, laden, and numbered among the 27 in the wrecks north of Whitby, as having left Hartlepool

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on the 1st, and been wrecked. He has called, and says his ship was not wrecked at all, while he was bound to Dieppe, and reached Dieppe without loss or damage. He is put down in the list as being wrecked north of Whitby. I am also informed that the preceding witness, who was the master of the *Agnes*, of Lynn, was bound from Lynn for Hartlepool, light, it is put down here that he was wrecked bound from Hartlepool to London, laden.

18,131. (*Mr. Lindsay.*) The second return does not bear so much upon the point I had in view in the first return. The return of wrecks you have deposited gives 13 ships as being lost in that gale, and this return gives 27 wrecks. Have you been able to ascertain upon which return the Commissioners may place the greatest confidence as to the number; and are you prepared to show that any one of these 27 ships was not lost during the gale of the 4th of January between Flamborough Head and Whitby?—I have not been able to make any very accurate inquiry on the subject, but upon looking it over, as I mentioned yesterday, it is possible the one has taken a ship as having been wrecked between Whitby and Filey; that one return has called a ship that was wrecked near Whitby, north of Whitby, and mine vice versâ; and this return might have considered it south of Whitby. Now, I find in the printed return several ships enumerated in the 27, one called as being wrecked near Whitby, on the south of Whitby, while in the return that has been handed in by me they may have been included as having been wrecked really north of Whitby.

18,132. As the names of the ships are stated which were lost near Whitby, and are included in that return as lost between Flamborough Head and Whitby, does your list include some of these ships as lost near Whitby, to the north of Whitby, because that may account for it?—I understand it does, and that may account for the difference.

18,133. Will you give the names of ships lost northward of Whitby that are put in as lost between Whitby and Flamborough Head?—I understand the *William Pitt* is one, and perhaps the *Matador*.

18,134. You have these as being lost north of Whitby in your list?—The point I mentioned was, that a person whose vessel is put down here in the printed list as having been wrecked north of Whitby, was not wrecked at all. The shipowner is here, and he says that his vessel, the *Severn*, which was put down as having been lost, was not lost at all.

18,135. That does not bear on the point, as his ship is put down as having been lost to the north, in the Tees Bay?—All I mean to say is, that as I have not gone very carefully into it, I cannot speak to it.

18,136. It has with me an important bearing, because if these ships which are marked down in that return as lost near Whitby were lost to the north of Whitby, and not between Whitby and Flamborough Head, in the gale of January 1857, they might have been saved if there had been a harbour of refuge at Hartlepool; but if they were lost to the south of Whitby and in a position not able to weather the point, then a harbour of refuge at Hartlepool would not have saved these ships?—If I had my list I could compare it; but I have not had any time for that purpose.

18,137. I will leave that list, and perhaps, if you desire to do it, you will send a communication to the secretary?—I will do that.

18,138. (*Capt. Washington.*) You said something about the *Agnes*?—Yes.

18,139. (*Mr. Lindsay.*) But that ship is not in the list I have spoken of at all?—The whole is incorporated, if the printed paper gives 28 as having been wrecked north of Whitby, and I have given 54.

18,140. It must be incorporated in the No. 2 paper as well. There are two ships; one is stated to be from Hartlepool, laden, and the other from Lynn to Hartlepool, light?—The next ship in the list is one belonging to Mr. Ranson, a shipowner, in the room: he says, "My ship was not wrecked, and it was bound from Hartlepool for Dieppe."

18,141. We have never been questioning or inquiring into No. 2?—I took the liberty to object to No. 2, because it gives only 28 and I made 54.

18,142. (*Capt. Washington.*) And what about the *Agnes*?—It is put down as "Unknown; Hartlepool, "from London, laden; wrecked near Hartlepool; crew "saved; left Hartlepool on the 2nd." Now that vessel was bound from London to Hartlepool, light, and was wrecked in this bay.

18,143. (*Capt. Sulivan.*) Had you made this mistake in your list by taking credit for one vessel more lost than was lost in Hartlepool Bay, it might have been taken, might it not, as having been rather unfair for comparison in your favour?—I did not complain of it.

18,144. But I ask you this question: It might have been said that you had put in one ship more than was lost in your district, and it might have been tried to be shown that possibly it would rather make the comparison tell too favourably for your district, might it not?—Yes; but there could be no return in favour of it, if it is an incorrect return. I do not want any return that is in that way.

18,145. I ask you whether you had put one more ship than was lost in your district; there might have been a report that you had taken credit for a ship to make your comparison better?—No doubt.

18,146. Then if they have given you credit for one more ship than was lost in your district, does it not, if anything, rather tell against their own argument, and in favour of Hartlepool district; and if so, what have you to pick out as an instance of unfairness or inaccuracy in that list?—I do not wish any return should be put in of wrecks in Hartlepool district that did not exist. I would be very sorry to have it said that because their numbers are increasing in Hartlepool district, that therefore I take credit for it.

18,147. I am sure you would, but this has been rather against those who drew up the table. Surely that is a thing that Hartlepool ought not to complain of as showing an inaccuracy?—I did not complain, but this is really and truly a statement made to myself since I came into the room by the shipowner, therefore I merely communicate it to you as I have heard it.

18,148. If your list has no more inaccuracies than one loaded for one light ship, that is a very wonderful inaccuracy to bring forward?—It is just within a single second that this extraordinary instance has been mentioned to me. Mr. Lindsay asked if there was any person present that was in No. 1 that ought not to be, and here is the captain behind me of the *William Pitt*.

18,149. I should like you, Mr. Jackson, to answer my question, and the question I ask you is whether you thought that a mistake of one vessel, even if it had happened, was a mistake that you ought to bring forward? Was it not too trifling to alter the evidence that might be given in any place by yourself or anybody else?—I think so.

18,150. Was it not too trifling a thing to bring forward to prove the inaccuracy of the list?—I qualify it by saying it was mentioned to my amazement. I would not myself have questioned the accuracy as to whether it was light or loaded. I might have made that mistake, but I understand the actual point Mr. Lindsay wants is, was there any ship put into the list No. 1, as having been wrecked between Flamborough Head and Whitby, that was in point of fact wrecked north of Whitby. I am told—I do not know the man—that the *William Pitt* was wrecked north of Whitby, and he is put in as wrecked between Whitby and Filey. I do not know him; he is here, and therefore you can ask him.

Mr. Isaac Stockton examined.

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Mr. Isaac Stockton.

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18,151. (*Mr. Lindsay.*) Were you the captain of the *William Pitt* on the 4th January 1857 ?—No.

18,152. Did the ship *William Pitt* belong to you ?—Half of her belonged to me.

18,153. Was that ship lost during that gale ?—She was on shore during the gale near Whitby. I was in Hartlepool.

18,154. What part of Whitby ?—About 300 yards to the north of Whitby Harbour.

18,155. Would that ship have been saved if there had been a harbour of refuge at Hartlepool ?—I believe not.

(*Mr. Lindsay.*) Mr. Jackson, I thought it my duty to call your attention to it, and seeing your return contains 13 losses between certain points, and another return 27, it will be satisfactory to us, as it is a question of facts which we have to deal with, and facts alone, if you could inquire into this matter and satisfy your own mind and mine which return comes nearer the truth.

(*Mr. Jackson.*) I shall be very glad to do that. May I ask if we can elucidate this matter by comparing notes ? I shall be sincerely glad if I can communicate with the author of this paper. He may have had access to returns or official documents which I have not had an opportunity of doing, and I pledge myself to communicate every source of information that we have received. If the gentlemen who is the author of this document will give his name, I am sure I shall be most happy to meet him at at any time, and to go any distance.

Mr. Isaac Stockton recalled.

18,156. (*Capt. Sulivan.*) I wish to ask whether another part of the return is correct, that she was caught in the gale of February ?—I believe not and the reason is, I have seen the log. I believe she was near Robin Hood Bay at the time, and I believe she was down near the length of Huntcliff, and had to put her head round south in consequence of her ballast falling over on the lee side. She wore round for Robin Hood Bay, and went aground within half a mile of Whitby Harbour. They squared the main yards and ran her ashore. Had there been a harbour at Hartlepool under the circumstances, and the situation she was placed in, she could not have got down to Hartlepool.

Mr. Thomas Smith examined.

Mr. T. Smith.

18,157. (*Chairman.*) You are a seafaring man ?—Yes.

18,158. How long have you followed the sea ?—Twenty-nine years.

18,159. Have you been master of a vessel ?—Yes ; I am master at present.

18,160. For how many years ?—About three.

18,161. And you wish to offer some observations on the subject of our inquiry ?—Yes.

18,162. Will you be good enough to proceed ?—The object which I have in speaking is, that I should like to see two great breakwaters made, and I should like to see them put in the right place. And my object is that there should be a great breakwater made in Hartlepool Bay as a rendezvous for vessels of all classes, as a rendezvous for coasting vessels and merchantmen, and men-of-war in case of any emergency, that we shall have batteries all afloat ready to take up any position we may think proper.

18,163. Will you stop. I see you are probably not acquainted with the precise object of our inquiry ; we are not here to inquire which are the most eligible situations for ships of war or batteries, but what are the best places for harbours for the shelter of merchant ships, and, therefore, instead of asking you to proceed with your statement, I will put a question to you. You prefer Hartlepool Bay for this harbour of refuge? —Yes.

18,164. In preference to the improvement of the three ports, the Tyne, Tees, and Wear ?—Yes.

18,165. And you also prefer Hartlepool to Filey Bay ?—I don't prefer Filey at all.

18,166. Do you prefer Hartlepool Bay ?—Yes ; Bridlington Bay and Hartlepool.

18,167. Would you put a breakwater in Bridlington Bay and thus spend the money ?—Yes. I will give you three reasons why I object to Filey Bay. In the first place, Filey Bay is a rocky iron-bound land, and if I was going into Filey Bay in a gale of wind and missed it, undoubtedly I should lose my ship and undoubtedly myself. Provided, again, the wind was at the eastward, I would have no passage out of Filey Bay but must lie there, whereas had I been in Bridlington Bay I would have gone away at my pleasure. And in the next place, should I be going along the coast with a heavy gale of wind from the north-east and in snowy, stormy weather, when it is not prudent to put a ship into the deeps, I should prefer going into Bridlington Bay till the weather moderated. Was there a breakwater in Bridlington Bay on the Smithic, it is not for me to be an engineer, but say something of a south-south-west direction, there would be shelter both for laden ships and for light.

18,168. Then suppose we are only to have one of these harbours, would you prefer Bridlington or Hartlepool Bay ?—Decidedly Hartlepool first, and I gave my reasons.

18,169. I understand your reasons, you gave very good reasons. If it is decided to place a harbour at the other side of Flamborough Head, I understand you decidedly to prefer Bridlington ?—Decidedly. Allow me another remark on my reasens for Hartlepool. Should there be a gale of wind from the east, ships from the Farn Islands could fetch Hartlepool Bay, ships from Robin Hood Bay could fetch Hartlepool Bay or go to the southward of Bridlington, which they thought proper.

Your reasons are very good, and we are much obliged to you for giving us the advantage of them.

(*Chairman.*) Are there any other parties present who are interested in this inquiry, and who wish to tender their evidence ?

No answer.

Sittings at Hartlepool closed.

REDCAR.

Wednesday, 20th October 1858.

PRESENT :

Admiral HOPE (Chairman).

Sir FREDERICK SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

REDCAR.
20 Oct. 1858.

(*Chairman.*) I understand, Mr. Dodds, that you take charge of the proceedings as representing Stockton ?

(*Mr. Dodds.*) I have the honour to appear, with my friends, Messrs. Aldermen Trotter and Craggs, who have been deputed by the Corporation of Stockton to represent them on this occasion. But we don't intend, on the part of the Corporation of Stockton, to tender any evidence to you, because the evidence which will be produced on the part of the Tees Conservancy Commissioners is identical with that which the Corporation would have produced had they produced any at all. It appears, therefore, unnecessary. I have also the honour to appear as chief clerk to the Tees Conservancy Commissioners, and am accompanied by Mr. Trotter, who is the chairman of that body, and by Messrs. Craggs, Bolckow, Fallowes, and other members of it ; and on their part we propose to tender to you the evidence of witnesses, most of whose names are enumerated in the list which I have had the honour to hand in to you. Mr. Trotter will give some brief particulars as to the Tees Conservancy Commissioners in the first instance, after which the witnesses will be produced in whatever order may be wished. I may add, that public notice was given on Saturday at Stockton of your intention to hold the inquiry here on Tuesday and Wednesday, and that immediately on the decision being come to as to the day, further notices were prepared, of which copies have been read by Mr. Oxley, and were very extensively distributed in Stockton. There were also communications to the Mayor of Middlesborough, who is present, and will inform you that they have been made public there also.

(*Chairman.*) Mr. Oxley, I think I understood you to say the gentlemen who managed the case for Redcar were to come at half-past 12 to-day ?

(*Mr. Oxley.*) Yes ; Mr. Coulson, Lloyd's agent. And there is a Captain Mackenzie who will be brought in the list of witnesses, and he will give some important evidence ; and he is obliged to leave this evening. He is present in the room, but must go back to Shields.

Mr. THOMAS MACKENZIE examined.

Mr. T. Mackenzie.

18,170. (*Chairman.*) You are a resident at North Shields ?—Yes.

18,171. How long have you followed the sea ?—Thirty-nine years.

18,172. Of that period how long have you been in command of vessels ?—Twenty.

18,173. In what trades have the vessels been employed chiefly that you have commanded ? — The coasting, home, and foreign.

18,174. By coasting do you mean the coal trade ?—Yes, and the oversea trade to the Baltic I have been in.

18,175. And for what period did you command a vessel in the coal trade ?—The period was one connected with the other. I was not 10 years in one trade. It was equally divided, perhaps a voyage or two in each trade, perhaps five or six, as circumstances required.

18,176. Have you made the passage north-about to America ?—Oh yes, several times, both north and south.

18,177. Then how many times have you made the passage to and from the Baltic ?—I can hardly answer you how many voyages during the 20 years.

18,178. And you have come home pretty late in the fall of the year ?—Yes, as late as December.

18,179. Tell me how far to the northward you ever made the land in coming across after taking your departure from the Baltic ?—I have made it as far north as 60 degrees, the Shetland Islands.

18,180. And has that frequently happened ?—Not frequently, on two different occasions.

18,181. How often do you think you have made the land to the north of Buchan Ness ?—Never, except once I think, in coming home in the fall of the year.

18,182. When I say to the north of Buchan Ness I, of course, include the Shetland Islands ?—Yes, I have only on one occasion.

18,183. And generally speaking, where did you make your land coming across in the fall of the year ?—Flamborough Head ; we are desirous of getting sight of it.

18,184. You make Flamborough Head if you can with a fair wind ?—Yes.

18,185. But do not the winds prevail from the southward and westward in the fall of the year ?—Yes.

18,186. Then don't they drive you very much out of your right course ?—Yes.

18,187. Then where would you say you have generally made the land ?—Generally Tynemouth Castle, Huntcliffe, or anywhere we could fetch. We do the best we can.

18,188. Yes, but what have you actually done ?—Tynemouth Castle generally, sometimes Huntcliffe. We have generally managed to get in there.

18,189. And when you are coming across from the Baltic, when you take your departure from the Scaw or the Naze, and probably with the wind hanging to the southward and westward, how do you make your passage ; do you stretch across to the opposite coast and make westing ?—Generally in the fall of the year, with the wind hanging at south-south-west, and it blows hard, we get a good sailing reef out of that, but in all probability the wind will fall into the north-east for a few hours. At the end of that time we wear the ship and come the other way.

18,190. If you find the wind hanging to the south-west and westward you keep the coast till the wind comes round to the north-west ?—Yes.

18,191. Have you been present at any of the sittings of this Commission anywhere else ?—I have not.

18,192. One object of our inquiry is to decide where a harbour of refuge can be best placed for the passing trade between the Firth of Forth and the Pentland Firth, and the two places which have been more particularly brought under our notice are Wick, the position of which you are probably acquainted with, and Peterhead ; now give me your opinion which would be the best place ?—The Tees Bay, in my opinion.

18,193. I am talking now of between the Firth of Forth and the Pentland Firth ?—I should say Peterhead.

18,194. Well, now bearing in mind that the object of these harbours of refuge is not so much as a con-

venience for trade as for saving of life, give me your reasons for preferring Peterhead to Wick ?—Because I think there is more room at Peterhead.

18,195. You think it to be a more eligible site for a harbour of refuge ?—Yes.

18,196. And that Wick will not be sufficiently large ?—I think not.

18,197. Now what is the longest passage you have made across from the Baltic in the fall of the year ?—20 days. I think I never was longer to Hull or London.

18,198. And coming across in the fall of the year is the weather very coarse ?—Oh yes ; we must expect it, and we find it to be so.

18,199. With a great deal of sleet, snow, and wind ?—Not with a south-west wind, we don't have much snow or sleet, but generally rain and blowing hard.

18,200. It is pretty hard work for the people ?—Yes, it is all that.

18,201. And when they get across, after a three weeks' voyage, they are pretty ready I suppose for a little rest if they can get it anywhere ?—Oh yes.

18,202. Now do you know the coal trade, and the kind of thing which sailors have to go through in bad weather ?—Yes.

18,203. And which would you say as a rule would be the hardest work, two or three days' passage up in the winter in a collier, or coming across the Baltic late in the year ?—I would take the three or four days' passage to London, because it is short and sweet, whereas the Baltic is neither one thing nor another.

18,204. Therefore coming across from the Baltic is the harder of the two ?—Yes.

18,205. And perhaps a harbour would be more acceptable as respects the refreshment of the crews than to colliers ?—Decidedly.

18,206. Have you ever been to Archangel ?—Once only.

18,207. Do you know the strength of the tide in the Pentland Firth ?—Yes, I am quite aware of it.

18,208. And being made aware of it, would you, with a fair wind right through the firth, run into the firth against the tide running out ?—I would not if I could keep the sea.

18,209. Then what would you do ?—Keep the sea, if possible, till the tide ceased.

18,210. Well now, putting the question of the tide on one side altogether, is there any peculiar difficulty in running through the Pentland Firth ? Is the land free from danger ?—Very free from danger if it is clear weather.

18,211. And if it is not clear weather is there any peculiar danger attaching to that firth more than to any other passage of the same width ?—Yes, there is, simply for this reason. The lead is of no use in thick weather in the Pentland Firth. Of course on other coasts we can generally take hold of the lead and ascertain our whereabouts.

18,212. Therefore you have considerable hesitation in running down on the Pentland Firth in very thick weather, unless you were sure of your position ?—Decidedly so.

18,213. You think there would be no donger about the Pentland Firth as respects the tide if you could wait for the lee tide ?—Yes, in clear weather.

18,214. Then as to heaving to, suppose it was blowing very hard from the south-south-east, and you were running down on the Pentland Firth, would you have any difficulty about heaving your vessel to if she were heavily laden ?—I would have to ascertain my position, and if I thought I could see anything I would run through ; if not I would haul the ship out to sea rather than run into a place where I could see nothing.

18,215. Suppose you hauled out to sea and it was blowing hard, and that she was under her storm sails ; and suppose it was a brig, and that you had to heave her to under the maintrysail, would you then have any difficulty about bringing your vessel to the wind, and heaving her to till the tide slackened ?—Not any, if the position of the vessel would allow it.

18,216. Well, now tell me about this tide that runs out of the Pentland Firth; it makes a very unfair and tumbling sea, does it not ?—A desperate sea.

18,217. And how far from the entrance of the firth does that desperate sea extend, how far out ? I suppose if we go to four miles each way we go to a great extent?—I should rather say three.

18,218. Would you say you could heave your ship to with as much ease 12 miles from the entrance of the Forth as you could do anywhere else in the North Sea?—I would not hesitate about it provided the ship was clear of the land when hove to.

18,219. But I am talking of the danger to the vessel arising from the tide sea ; if a vessel was hove-to 12 miles from the entrance of the Forth, would you be afraid of a tide sea ?—I would not.

18,220. If you were running down from the Pentland Firth, and knowing the tides, would you shorten sail a little, so that you would arrive at the proper time of the tide?—Most decidedly I would.

18,221. Well, now we come to the north-east coast of England. You are aware that the object of our inquiry is to provide some shelter or refuge for the passing trade on this coast; which would you prefer, to have one harbour of refuge on a particular part of the coast or the improvement of the three ports, the Tyne, Tees, and Wear, if it was possible to improve them so that vessels could go in drawing 16 feet at low water ?—I should say, in the first instance, as regards the improvement, that we ought to have a harbour at Redcar.

18,222. Therefore, you prefer one single harbour at Redcar to the improvement of the three ports?—No, I do not, if the improvement of the three ports is to be taken into consideration.

18,223. Then you do not want a harbour at Redcar; is that it?—Oh yes; we must have one at Redcar.

18,224. We should have one at Redcar. Suppose we had a million of money to spend, should we spend it in making a harbour at Redcar, or should we spend it in the improvement of the Tyne, Tees, and Wear, so that vessels could run into them at low water, which would be the best ?—Most certainly that would be very good, yet I think we ought to have a harbour at Redcar.

18,225. But just think the matter over, and tell me which of the two you would prefer if you could not have both ?—The Tyne is already improved, and the improvements which are going, on when they are finished, is as much as will ever be done for the Tyne. I don't think much more can be done for it ; when they are finished we will have all we desire in that point of view; and as for the Wear it is of no consequence whatever ; it will never be a harbour of refuge in my opinion.

18,226. And the Tees ?—Stockton Tees! Oh dear, that will never be a place of refuge in the world as long as I live—it may be hereafter.

18,227. Well, now you have given very good and solid reasons why you would prefer Redcar to the improvement of these three places, for the best of all reasons, you say they cannot be improved; that it is impossible ; that is your answer, is it not ?—Yes ; I said so on two occasions.

18,228. Well, now let me make a supposition for you, for engineers do wonderful things now-a-days : say that these three harbours could be improved, and that they could be so improved that we should get vessels drawing 16 feet water into them at any time of the tide, would you then prefer a single harbour here to these three rivers so improved ? — Most decidedly not ; could there be 16 feet water got into them at low water.

18,229. Then you would prefer them to one in that case?—Decidedly so, with 16 feet water at low water.

18,230. Suppose we could not manage quite 16 feet water at all, but could get 16 feet water at the Tyne, and 16 feet water at Hartlepool, and that we could

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get say 10 feet at the Wear, how would you say then?—One part of it is very good, but still we are wanting when we come into the bight; we come in a gale of wind easterly and north and south, and we meet each other, as it were, and drive right into a bight, into a net, as it were, and the harder it blows the faster we go ashore.

18,231. And, therefore, for that reason the lower down in the bight you can place your harbour the better; is that your opinion?—Yes, it is.

18,232. The more down in the bight, the more useful it will be, you think, in saving life?—Decidedly so.

18,233. (*Sir F. Smith.*) You have been several times to the Baltic?—Yes, I have.

18,234. Can you give the tracks of any of your passages from the Baltic?—Yes, I can give you them if you hand me a chart.

18,235. Perhaps, you will be able to do it hereafter. With regard to Peterhead and Wick, you stated that you preferred Peterhead to Wick, because there is not space enough at Wick?—Yes, I said so; but I am not so well acquainted there as I am with our own coast here. I have only been a few times there, and cannot give a very positive opinion; but I have given my opinion as far as I have seen it.

18,236. But you would not give a very decided opinion on that point?—Decidedly not.

18,237. If Wick could be made large enough for the purpose, would you then prefer Wick to Peterhead or not?—No, I would prefer Peterhead as far as I have seen.

18,238. You mean as a harbour of refuge?—Yes.

18,239. Is there any wind in which a vessel cannot get out of Peterhead?—Decidedly, a wind directly off land.

18,240. Would she be able to get off if directly off either on one tack or the other?—If she could carry canvass she would.

18,241. You are well acquainted with this district, are you not?—I ought to be, I have been 39 years knocking about it.

18,242. And you seem to have a decided preference for Redcar as a harbour of refuge?—I have.

18,243. Do you prefer it to Hartlepool?—I do.

18,244. Will you tell me why?—At Hartlepool they have already a harbour which may be taken at the proper time of tide to save life, whereas at Redcar we have no harbour.

18,245. But we apprehend, and I believe others concur with us, that if a harbour of refuge is made, it should be such as could be taken at all times of the tide?—Yes.

18,246. And are you quite aware that you cannot take the harbour of Hartlepool at all times of the tide?—No, it cannot; it is only at the proper time of the tide that it can be taken.

18,247. Are you aware that on this coast a very great number of lives are lost?—I am well aware of it.

18,248. The object of Government and Parliament is to provide some security for seafaring men; in fact, the best security that can be found for a reasonable sum of money?—Yes.

18,249. Now, you seem to think that the improvement of the three harbours that have been named by the Chairman, if they could be improved sufficiently to give 16 feet water, would be preferable to a harbour at Redcar?—Well, no; I would really not. I would like to see a harbour of refuge at Redcar.

18,250. Suppose a harbour did not exist at Hartlepool,—we will put that out of the question for a moment,—do you think that if no harbour did exist either in the docks or otherwise, then that Redcar could be compared to Hartlepool as a site for a great harbour of refuge?—Yes, I do indeed.

18,251. Will you say why?—In the first place, the Tees Bay is a shoal bay; there is little water in it, and I witnessed plenty of it two years ago when I lost a ship on the rocks. As I went north, ranging along to clear the land, it was a continued broken sea in the Tees Bay, whereas when I wore ship, and came southward to take the rocks on Redcar or Hartlepool bight, there was as much difference in the sea as possible, so that my vessel made three points less leeway as she came to the southward than she did in the open of the bay.

18,252. But if we could get a harbour of refuge with seven fathoms water in front of Hartlepool, would not that answer all your purpose, and take you into water free from shoals?—It will be a ridiculous thing, a harbour in Hartlepool, because the Salt Scars will always be where they are, and vessels will be wrecked as they are now.

18,253. But they would be in a fair way for a harbour of refuge, would they not?—Vessels which are wrecked here cannot obtain Hartlepool.

18,254. Oh! it is supposing you cannot get there?—Yes.

18,255. If you could get to Hartlepool you would not have the same objection?—I have no objection whatever if I could get to Hartlepool.

18,256. Do you think you could form a harbour here to the same extent as you could at Hartlepool?—I think it could.

18,257. Suppose you were told you could not get to the same extent a harbour at the same cost as you can at the front of Hartlepool, would you still prefer Redcar to Hartlepool?—I know nothing of engineering; my object is to get a harbour to run to in an easterly gale.

18,258. Regardless of cost,—Is the situation of Redcar here better than Hartlepool?—I do really think so.

18,259. Do you think there is any place along the coast between Flamborough Head and the Tyne equal to Redcar?—I do not.

18,260. Do you think there is any place like Redcar for a harbour of refuge?—Not in Tees Bay.

18,261. Well, what do you think of Filey?—Filey would make a very good harbour—a beautiful harbour, perhaps the best of the lot, but it is too far to the south.

18,262. Then, if you object to Filey as a harbour of refuge you would object also to Bridlington?—Bridlington is a harbour when the wind is in the right way, but it is too near the Humber.

18,263. What do you think of Sunderland, as a place in front of which a capacious harbour might be formed?—I should say it would make a very good place if there was a harbour of refuge there.

18,264. Suppose the expenditure should be the same, would you prefer Hartlepool or Sunderland; which of these places would you select to lay out the same amount of money, and to get the same amount of accommodation?—As regards Sunderland and Hartlepool, Hartlepool I prefer before Sunderland, because I have the Tyne under my lee when I am down there.

18,265. And you think the Tyne will be a very good harbour of refuge as far as it goes?—It is already one.

18,266. But is it not a bar harbour?—It is.

18,267. Suppose that the bar could be removed into deeper water, and that you could get an entrance of 16 feet at low-water spring tides, do you think that would be sufficient for the ordinary purposes of the coal trade?—I think so.

18,268. Do you think that in thick weather you would venture to run into a harbour at Hartlepool by the lead by the soundings?—If I could keep the sea I would not attempt it; it would have to be a case of emergency.

18,269. Would you be afraid in thick weather to run into Hartlepool by the lead?—I would not be afraid if I could see anything; but the lead I would not run into with unless the shore was before me.

18,270. You would not trust the lead alone?—I would not.

18,271. You think that the soundings and bottom immediately abreast of Hartlepool and 10 miles north

or south of it, are so nearly alike that you could not feel certain of your course?—They won't indicate the road right to Hartlepool in a fog.

18,272. (*Mr. Lindsay.*) I think you said you preferred Redcar to Hartlepool?—I do prefer it.

18,273. As a sailor, can you tell me in what gales a ship can get into Redcar that cannot get into Hartlepool?—Yes, I will state one. I believe on January 4th, 1857, there was about as heavy a gale of wind as ever blew on this coast; the fishermen acknowledge that they never saw the sea higher. I lost a ship on the Salt Scar, that is, the Redcar Rocks.

18,274. How was the wind when you drove on shore?—When the storm first came on we left Flamborough Head, and it was from the south-east. The ship's head was laid to sea to gain an offing; as she came north the storm increased and the wind veered more into the eastward; when she got into the bight of Hartlepool the wind got into the east-north-east. I made Hartlepool light, and had then to contend with the broken sea. It was no use heaving the lead to ascertain where the ship was; consequently she must go ashore. The question was then for me whether I would risk the South Gare to go ashore, or take the Redcar Rocks. I preferred the latter and wore the ship round, set all the canvas and stood to southward. The ship's head lay south-east half south. As soon as I got into deep water, the ship made better way through, and I considered she might so round the Salt Scars, and on to the sand by Marske; But I was deceived, the ship grounded at dead low water in that gale on the Salt Scars.

18,275. Did the wind range from south-east to east-north-east?—From east-south-east on shore, and east by north, and north-east; it never varied more.

18,276. What was to prevent the ship when off Redcar from going into Hartlepool Bay with that gale if you had been a prudent distance from the shore?—A prudent distance I could not hold. I had carried all the sail I could. I had washed the ship quite clear by carrying canvas to keep an offing, and could do no more.

18,277. Was Redcar a lee shore during any portion of the gale?—The shore was not often to be seen.

18,278. Did the wind blow upon the land?—Decidedly.

18,279. Upon the land down here?—Decidedly.

18,280. What is the course into Hartlepool Bay?—From here?

18,281. Yes.—North-west by west.

18,282. Very well; then do you mean to say you would not, if you had been at a prudent distance from the land, have gone right down into Hartlepool Bay?—The ship would not fetch off; if she had been far enough off she would.

18,283. No harbour of refuge can prevent a captain getting too near the shore. If you had been at a prudent distance from the land, do you mean to tell me that gale would not have carried you into Hartlepool Bay?—I could not hold a prudent distance. I had done all I could, and could do no more. I could only hold the position I had.

18,284. The wind during this gale was blowing right into Hartlepool Bay, was it not?—It was east-south-east at first, but the wind veered into east-north-east.

18,285. It is very natural for you to hold your opinion about Redcar, but I am fond of facts; you tell me the gale was blowing from south-east, veering to east and by north?—No, it began with south-east.

18,286. And it finished with east and by north?—Yes.

18,287. Would not that blow right into Hartlepool Bay, or nearly so, from the sea?—But the ship had not got far enough north.

18,288. That is another question; but if you had been at a prudent and proper distance from the land, the power of that gale need not have driven you upon the land at Redcar?—Everything was carried off from the head that even the ship would carry, and I could not hold a prudent distance from the land. Everything was gone, the decks were swept by carrying so much canvas. I could do no more than carry all she would hold.

18,289. Where were you bound to when you were caught with the gale; we'll begin it again?—To Spain.

18,290. Where from?—Newcastle.

18,291. Where were you when the gale caught you?—Off Flamborough Head, bound south and south-west.

18,292. Then the gale caught you at south-east?—South-south-east.

18,293. Then that was a fair wind for you to run along the coast, and seek refuge in some harbour in the bight of this bay?—I did not want refuge at the time; I wanted the sea. With the wind to the south-east, I did not want refuge, I could have cleared the land, and that was all I wanted.

18,294. Were you driven down from off Flamborough Head to Redcar?—If I had held the wind to south-east, and got a proper position off the land, I would have squared away and gone north-about to my port.

18,295. But with the wind at south-south-east, as you say it was, could you not have gone north-about, and was there any necessity for your coming so close to the shore?—As the ship went north, she only carried two close-reefed topsails. The wind easted, and she broke off. Therefore she would just merely drag along the land.

18,296. With the gale south-east and her head to the northward, you would not need to be close in with the land down about Redcar?—That was only the beginning.

18,297. I am aware of that?—It was only the beginning of the gale, it was very soon to the east. It began at south-east.

18,298. Then do you mean to say that you were regularly driven into Redcar, or were you running for any place at the time your ship was lost at Redcar?—I most decidedly say I never ran before the wind, except for wearing the ship. The wind was straining her all to pieces by carrying canvas to keep clear off the land.

18,299. Then you say that you were in fact close hauled to the wind during the whole of the time?—Yes.

18,300. And you were driven, you say, ashore while close hauled, and wrecked upon the rocks at Redcar, and could not help yourself from being on that land?—Most decidedly.

18,301. You give that as your answer during this gale ranging from south-south-east to east and by north?—Yes, south-east and south-south-east.

18,302. Very well, that is your answer. Did I understand you to say, that if the existing harbours could be improved so as to let ships in at all times of the tide with 16 feet of water, you would prefer that to any one harbour?—Yes.

18,303. But supposing there were only to be one harbour, and looking to the whole trade upon the coast and all things considered, the saving of life and property, the convenience to ships, and say it rested between Hartlepool Bay and Filey, which would you prefer now?—If there was only to be one harbour, I would prefer Redcar.

18,304. We may talk about Redcar afterwards; tell me if it rested between Hartlepool and Filey, which would you have?—Filey is too far south, and I would not prefer it at all.

18,305. You would rather have Hartlepool than Filey, if it rested between the two places?—Yes.

18,306. If it rested between the two places, with all the disadvantages you conceive of Hartlepool, for you say it is a shoal; but you say, you would prefer Hartlepool to Filey?—Decidedly.

18,307. Now, then, I think I understood you to say, you would prefer Redcar as a site to Hartlepool?—Decidedly I did.

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18,308. Well, say there could only be a harbour made at Redcar that would hold 100 ships riding at anchor, and say that a harbour could be made at Hartlepool that would hold 300 ships, would you then prefer Redcar to Hartlepool?—With a harbour here to contain 100 ships, I still prefer Redcar.

18,309. You still think that a harbour that would hold 100 sail of vessels at their anchors would be of more service for the coasting trade, and for the vessels going along the coast, than a harbour at Hartlepool that would hold 300 sail?—I do think so.

18,310. (*Capt. Washington.*) In the gale you have been telling us of, Flamborough Head bore south-west?—Yes.

18,311. About what distance?—Eight miles.

18,312. How did Filey bear at that time?—It could not be seen.

18,313. Could you have fetched Filey?—At that time I could have fetched Filey, but I would not go at that time to a harbour of refuge. I wanted the sea.

18,314. How long did you try to hold your own?—We held our own from Saturday night at eight o'clock until Sunday morning at four.

18,315. About what time did the gale strike you?—We had it not very heavy till Sunday morning at four o'clock. That would be the 4th. It then increased, and blew so hard that the ship could scarcely carry any canvass at all. The ship's decks were swept with every sea, and as we went north the wind kept drawing round to the east. It was no use put-the ship's head to the southward.

18,316. Whereabouts were you on Sunday morning when the gale came on heavy?—I estimated myself to be somewhere abreast of Scarborough. See anything you could not for snow, and sleet, and sea foam.

18,317. At that time would the wind have allowed you to fetch a refuge in Filey Bay, had there been one?—Not at the time the gale came on. I was beyond it. Filey was gone.

18,318. What happened afterwards?—Well, I carried all the canvass I could to clear the land, and as I went north the wind headed me.

18,319. You were on the starboard tack at that time?—Yes, with her head to the northward. I thought, when we got round Whitby, we would get a point or two off the land, but the wind backed into the east; therefore we only laid north.

18,320. About what rate were you going?—We were not making more than 2½ or 3 knots.

18,321. You were making as much leeway as headway?—Decidedly. We dragged along until 11 o'clock at night, and the ship broke off from the north-north-west, and when the shower cleared off, I saw Hartlepool light west and by north. The sea then was continually breaking. I weared the ship and came to the southward, fearing I would get upon the South Gare, and determined I would sooner risk the rocks at Redcar than go ashore at the mouth of the Tees.

18,322. But you did not run for the rocks?—No; but I knew the beach was my portion. I could not keep off till daylight.

18,323. You run for the beach?—No; I wore the ship to put her head the other way to take advantage of the wind. If I had stood on as I was going when the ship bore the wind at north-north-west, I should have stood decidedly on to the South Gare, and there been drowned in a very few minutes. That was not my object.

18,324. You said Hartlepool light bore west and by north?—I estimated myself about eight miles from it; but I may have been deceived. My duty was to get the ship's head round to the southward as fast as I could.

18,325. The wind was then east-north-east?—Yes, or north-east by east.

18,326. And Hartlepool light bore west and by north?—Yes.

18,327. Consider a little. What was to prevent your putting your helm hard a starboard and running into Hartlepool Bay, if there had been a refuge there?—She would not have looked at it. The sea was heaving right on the ship.

18,328. If you had put your helm up and run before the east-north-east wind, you would have made a great deal of way?—She would not have fetched the Heugh if she had had all the sail and all the men in England.

18,329. You wore round, and ——?—Got her on the other tack to clear the South Gare.

18,330. What happened?—We went on till we grounded upon the rocks at Redcar.

18,331. Where? Inside the buoy?—Yes, on what is called the Salt Scars.

18,332. Did you know you were so close to the shore as you proved to be?—No; I expected to clear.

18,333. You did not think it was sufficiently desperate to put your helm up and run for the beach?—Decidedly not; so long as she held off I would not. She was a valuable ship.

18,334. Did you loose the lives?—Not any.

18,335. How were you saved?—By the lifeboats, and in the end the cobles.

18,336. Could the cobles come off?—The cobles had to go off to take the remaining part of the crew off when the lifeboats could not get near enough to the ship.

18,337. She lay dry at low water?—Nearly dry; about a foot off the water upon the top of the rocks.

18,338. At that time, had there been a harbour of refuge at Redcar, you could have run into it?—Most decidedly so; in fact, had it been daylight I would have got in. It is already a harbour of refuge at daylight, so far as lives are concerned, but we want daylight to see the path.

18,339. Do you consider it a refuge in an east-north-east gale?—Yes, with daylight.

18,340. Does not that blow right on the bluff of the rocks?—No, at angles a little, and as we advance in the water is comparatively smooth. If it is life you wish to save it is all right; but property will go to the wall at the present time.

18,341. Were there any other vessels caught in the same gale up about Flamborough Head?—Many. I can hardly say how many wrecks there were, but I believe there were four or five light vessels in ballast upset in Tees Bay. Many were wrecked about West Hartlepool.

18,342. Were many running off Flamborough Head at the time you were caught?—Many were knocking about, but what became of them I cannot say; many of them perished.

18,343. In going south with a laden ship have you often been stopped off Flamborough Head for want of some harbour to go to there?—I have often been detained off Flamborough Head, but with a good ship we never think about a harbour till a gale of wind comes on.

18,344. It is a common case, is it not, that the wind southers as you open the Head?—It generally does.

18,345. What do you do then, get under the cliffs and lie there?—We generally come down and get into Filey Bay, but some prefer keeping under canvas.

18,346. Is that a common occurrence?—It is.

18,347. Have you seen any number of large vessels doing that?—I have not; it is generally among the smaller craft. No large ship will go there.

18,348. Do ships anchor all along the coast from Flamborough Head to Filey?—Not all along; never on the north part of Speeton Cliffs, but on the Head.

18,349. If there was a refuge at Filey would it not be very convenient for those vessels?—Very convenient; but if it is to be only one it is too far south; it is too near the Humber if we are to have no more than one.

18,350. Then you say, if there was to be only one harbour, it should be somewhere in Tees Bay?—Yes.

18,351. I think you said your reason for that was, that ships could not get off shore if once caught with a gale that embayed them between Souter Point

and the cheek of Robin Hood's Bay ?—They cannot get off; it is impossible. They may in an ordinary gale, but not in such a gale as that was of the 4th January 1857.

18,352. Did many wrecks take place at Redcar at that time ?—Many; I think the beach was strewed with numerous wrecks.

18,353. Do you know how many ?—I cannot say exactly how many, but there were a great many.

18,354. Where do you belong to yourself ?—North Shields.

18,355. (*Capt. Sulivan.*) You say the light bore west and by north from you when you first made Hartlepool light ?—Yes.

18,356. You were heading north-north-west ?—Yes.

18,357. Do you think any good vessel, if her helm had been put up and kept away at five points, would not have made nearly a straight course ?—She would not in such a sea; it was a continual broken sea.

18,358. Would you hesitate, on a lee shore, if you saw the mouth of a harbour of refuge under your lee, in the heaviest gale that blew, and it was five points under your lee bow, to put your helm up and run for it ?—Most decidedly not.

18,359. Would you have any doubt about fetching the entrance of any harbour, if you made your harbour you were bound to in a heavy gale under two close-reefed topsails five points on your lee bow,—would you have any hesitation in putting your helm up immediately and steering for that entrance ?—Decidedly not, if I thought I could make up the course.

18,360. Had you in this case done so, or even been a point more to leeward of it, would you not have gone right into any harbour of refuge, had one existed in Hartlepool Bay ?—I don't know; a harbour of refuge was certainly not there then; where it is to be I know not.

18,361. Suppose the space between Hartlepool Point and the Long Scars to be enclosed and made into a harbour of refuge, and that the entrance was marked by a light, and there had been five points on your lee bow in that gale, do you think that in a ship not damaged, and having two close-reefed topsails set —— I beg your pardon for interrupting you, but she was damaged.

18,362. But she was under command of the helm ?—Yes.

18,363. Do you mean to say you could not have borne up five points and ran into that harbour of refuge ?—If it had existed I should have seen the lights, and known whether the ship was making the course good or not, but as it was there was nothing for me but to come the other way.

18,364. But if there had been a harbour of refuge could you have any doubt about making your course ?—If I saw the place I should be better able to ascertain than I can here.

18,365. I am speaking to you as a sailor. You have borne up for the entrance of harbours when you have made them in very heavy weather and very heavy seas ?—Not very many; I generally prefer the sea.

18,366. I am speaking of ports you are bound to Do you feel any hesitation in a gale of wind when you find a port five points from your lee bow, and you can carry sail to keep the ship up ?—It depended upon how the sea run.

18,367. In the gale then that blew you on shore, you could not weather the land on the port tack, and you expected to go ashore on the Redcar rocks,—now place yourself in the same position, with a harbour of refuge at Hartlepool, and with the certainty that on the port tack it was only a question of where you went on shore, would you not immediately have put your helm up instead of wearing, and run for that entrance on your lee bow five points, and tried to get into Hartlepool ?—If I had seen the harbour, and knew the position to go to, I would immediately have borne up, but it did not exist.

18,368. But suppose it to be made there, would you have any fear of bearing up for it with five points on your lee bow ?—No; a final effort might have been made.

18,369. The vessels then that were closer in with the land than you might have not fetched Hartlepool as you did, might they not ?—Under these circumstances decidedly.

18,370. To them it would have been more difficult to reach Hartlepool ?—Yes.

18,371. Now suppose vessels coming from the northward in the same gale, close-hauled on the port tack, drifting with the way, and the course south or south-south-west, some of these ships might have weathered the Heugh and got into Hartlepool when they could not have fetched Redcar, might they not ?—Under these circumstances.

18,372. Therefore, when in some cases ships might fetch a harbour at Redcar coming from the south, and could not fetch Hartlepool, in other cases vessels coming from the north might fetch one at Hartlepool when they could not fetch Redcar ?—Yes.

18,373. You were eight miles off Flamborough Head when the gale took place, and it drew round to the eastward, and so you put your head to the northward ?—Yes.

18,374. If there had been a good harbour in Filey Bay then, and you knew it, would you then have tried the port tack to fetch Filey ?—Most decidedly not: I wanted the sea.

18,375. But when you found the gale throwing you off to the northward, and were still to the eastward of Scarborough, and were 10 or 12 miles from the coast, would you not then have tried to fetch Filey instead of risking being driven on shore to the northward ?—In all probability I would.

18,376. Were there many ships off Flamborough Head with you ?—Yes.

18,377. Many of these ships were to the leeward of you ?—Many.

18,378. Were there many to the windward ?—I saw a few, not many; five or six, probably.

18,379. Of these vessels to the northwards, would many of them have been saved by a harbour at Hartlepool, and would many of the vessels to the southward, if they had been able to fetch into a harbour of refuge at Filey, have been saved ?—Decidedly they would.

18,380. A large amount of laden vessels going south are, I believe, caught off Flamborough Head in the way that you speak of, though not always so severely ?—Yes.

18,381. To deep-laden vessels more especially would Filey Bay often become a valuable harbour for that class of vessels so situate, to prevent their being driven back to their coal ports again, and even sometimes to the Frith of Forth ?—Most decidedly.

18,382. For light vessels coming up from the southwards to Flamborough Head, would a harbour in the depth of the bay nearer than northern ports be more valuable for them ?—I think it would.

18,383. Looking to the collier and existing trades of the east coast, and more especially keeping laden vessels in view, in which there is the greatest loss of life,—if you had to choose between a harbour that would take in large American ships in Tees Bay, or two smaller harbours, one in Tees Bay and one in Filey that would take the whole of the coasting trade at all times of the tide, by night or by day, which would you have, the large one in Tees Bay, or the two smaller ones, one in Tees Bay and the other in Filey Bay ?—I would take the large one in Tees Bay.

18,384. What, for the collier and coasting trade, and including all the foreign trade, would you rather have one deep harbour in the bight of the bay than a harbour there sufficient for all the collier trade, and another near Flamborough Head sufficient for the same trade ?—Generally when a gale of wind comes on ships bound north come into a net, and once in you never come out; if it blows hard you cannot get out of that bay, it is impossible; and every seaman I

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have known, and I know a good many who have dragged the mouth of the Tees, say the same.

18,385. If you had a harbour in the Tees Bay that would take every coasting vessel and every collier, deep or light, caught under the circumstances you have mentioned in Tees Bay, with another harbour further south, for those further to windward or caught between Flamborough Head and Whitby, would it not be of great additional value ?—Most decidedly ; the more harbours of refuge the better.

18,386. Then if both harbours would take all the coasting trade, and you looked only to the coasting trade, which would you therefore have, one or these two ?—Well, I would rather have the large harbour in the Tees Bay, that is the thing most dreaded.

18,387. But I have been asking you, suppose you have a harbour in Tees Bay, that would take every collier, heavy or light, that gets embayed in Tees Bay, would that supply the wants more especially of the coal trade vessels embayed ?—Perhaps it would on some occasions, and perhaps on some occasions it would not.

18,388. But I am speaking of the depth of water at all times night and day ?—If there was room it would do it.

18,389. Are there not very many vessels driven back from Flamborough Head to all the ports ?—Decidedly.

18,390. Then while all the vessels in the bay would get refuge in Tees Bay, would not the vessels that were off Flamborough Head, if there was a harbour at Filey Bay, take that ?—Most decidedly.

18,391. And then would not that divide the vessels partly between the two harbours ?—Decidedly.

18,392. Then would you not consider that an advantage for deep-laden ships bound south to have two such harbours ?—Most decidedly so.

18,393. Suppose there is anchorage ground for a number of laden vessels in ordinary stress of weather to use it, what water between the head of a harbour of refuge would you think it safe to run in with the deepest collier you know ?—The deepest collier they generally say draws about 16 feet, and in entering a harbour that is clear to the sea, even if we could obtain ten fathoms at the entrance we should do well.

18,394. Suppose such a thing to be got in any harbour, would you have any hesitation in running for the Tyne, putting the tide out of the question, for Sunderland, for Hartlepool, the Tees or any other harbour on this coast in a gale of wind, if at clear low water spring tides there were five fathoms ?—I would run for none of them if I could get round Souter Point to get the Tyne.

18,395. So that if you weathered, you would not hesitate for a moment in running for any harbour—at the Tyne for instance, if the Tyne was deepened at all times of the tide to five fathoms at dead low water ; would you have the least fear in running for it at any time of the tide ?—Decidedly not.

18,396. Then if two collier harbours were made, refuge harbours, on this coast, that at lowest spring tides had five fathoms on the entrance and good anchorage ground inside, you would have no hesitation in running for them at any time ?—I would not.

18,397. (*Capt. Vetch.*) You have made numerous voyages from the Baltic to this coast, and I think on one occasion you fetched the land to the north of Peterhead ?—Yes.

18,398. You know the north coast of Scotland very well ?—Not so well as I know the south coast.

18,399. But you know Peterhead ?—I do.

18,400. And do you know Wick ?—I have seen it in passing.

18,401. And as a harbour of refuge you prefer Peterhead ?—I do according to my knowledge of the coast, which is only limited.

18,402. Leaving out of view altogether a harbour of refuge, but merely looking to the saving of life and property, and informing you that at Wick there are 1,400 boats fishing with crews of four men each, and that there are 900 arrivals, and about the same number of departures of vessels from that port, double the number of those belonging to Peterhead, and that they have no shelter in the present natural harbour, and returning to the single question of saving life and property, do you consider that the Government would be more authorized in protecting the harbour of Wick or that of Peterhead ?—My knowledge of the coast is limited, but so far as I see I would prefer Peterhead.

18,403. I ask for the purpose of saving life and property ?—Yes.

18,404. That is the question ?—I prefer Peterhead.

18,405. Then you think a harbour of refuge at Peterhead would save more life and property than one at Wick under those conditions I have stated to you ?—I do.

18,406. Do you consider that Tees Bay, including Hartlepool Bay, or some other part of the north-east coast of England would be preferable for a harbour of refuge ?—The east coast of England, you said ?

18,407. The north-east coast ? — The north-east coast north of the Tyne ?

18,408. No. That between Blyth and Whitby say ?—Redcar.

18,409. That is in Tees Bay, is it not ?—Yes.

18,410. Not in its present condition, I suppose ?—Under its present condition it is a harbour of refuge, so far as life is concerned.

18,411. Have you any plan showing what kind of refuge you require? (*Plan produced.*) Suppose a harbour to be constructed at Redcar such as we see on this plan, and another harbour to be constructed in Hartlepool Bay, do you still prefer the harbour at Redcar ?—I do.

18,412. Will you state your reason why ?—Simply because there is already a harbour at Hartlepool, and we have got none at Redcar. The harbour at Hartlepool may be taken at a proper time of tide and save life, whereas here there is not one, and the place is in the depth of the Tees Bay.

18,413. Do you consider the open bay of Hartlepool to be a harbour of refuge as it now stands ?—(No answer.)

18,414. (*Mr. Coode.*) You said, when engaged in the Baltic, you were generally desirous of making Flamborough Head ?—Yes.

18,415. Has it happened that you have made Flamborough Head oftener than any other point ?—Yes, simply because I steered for it.

18,416. That is just what I wanted to know. On that occasion when caught in the gale of January 1857, where did you sail from ?—From Shields.

18,417. When did you sail ?—On the 1st January.

18,418. Evening tide or morning tide ?—About mid-day on the Friday.

18,419. What time did you reach Flamborough Head ?—On the morning of Saturday.

18,420. About what time ?—About eight o'clock, I think.

18,421. When was it you bore up ?—I never bore up yet.

18,422. When was it you put about ?—The wind was from south-east ; we knocked about, first on and then off, and did not know whether the wind would easter or wester.

18,423. Then you knocked about all Saturday and until Sunday morning ?—No, on Saturday night about four o'clock we made sail in a north direction ; at four o'clock on Sunday morning we lay east-north-east.

18,424. You held your own well till Saturday afternoon at four o'clock ?—Sunday afternoon.

18,425. (*Chairman.*) Do you know of a French brig which ran in at low water, and the crew saved their lives in their own boat, on that 4th of January ?—Yes, it was not a brig, it was a schooner.

18,426. Will you tell us about it ?—It was a vessel from Elsinore, laden with grain, bound, I believe, to Newcastle. After leaving the Scaur in Jutland, the

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distance to this coast being nearly 500 miles, the master proceeded on, and the ship sprung a leak. No sun, moon, or stars could be seen to ascertain whereabouts the ship was, and he was obliged to run in for this coast. He ran for the first land he made, or rather the sea breaking over the Salt Scars, with the unfortunate *Emma* lying on them. He saw comparatively smooth water, and so beaching over the ship he ran where it was smooth, and came into the harbour safe right abreast of the Swan Hotel. He deliberately put a boat out, took all the crew in, and they landed themselves without any help except a little from the inhabitants, and bringing with them, I think, six chickens.

Mr. CHARLES TROTTER examined.

Mr. C. Trotter.

18,427. (*Chairman.*) You reside at Stockton ?—I do.

18,428. You are Chairman of the Tees Causeway Commissioners ?—I am.

18,429. Will you now proceed to make to the Commissioners any statement which you wish to offer relative to the subject of their inquiry ?—As Chairman of the Tees Conservancy Commissioners I have appeared before you to-day to state that it is the wish of my brother Commissioners, and of myself, to give only such information as we hope may lead you to a just decision as to that course which is likely to save the greatest amount of life and property, whether that be by the improvement of the existing harbours, or by making one large harbour. All the wish and object we have is that the greatest amount of good may be done by the public money that shall be spent. On behalf of the Tees it was some few years ago here pointed out, I believe by an engineer connected with the Admiralty, that, by the construction of a breakwater of some two thousand two hundred yards, the mouth or entrance of this harbour would be permanently fixed or placed, and it would be then equal for the reception of the trade which usually frequents the coast, at all times of the tide, and even of the very large class of vessels that have been alluded to. There would not be a depth of less than 16 feet water at the lowest time of tides. We therefore anticipate, from the information we have, that it would be more than that. The Admiralty themselves, I think, have considered this, as I dare say will be brought before your notice by other witnesses more conversant with the subject; the Admiralty, I say, themselves have given some notice of this, as, when the Bill of 1852 was before Parliament, at the instigation of the Admiralty, a clause was introduced into that Bill giving power for the construction of this very breakwater, the breakwater sketched out by Mr. Bald the engineer; and it has been our opinion, and is our opinion, that the greatest amount of life will be saved by the improvement of the existing harbours, and the improvements proposed need not be very expensive, because these harbours are now partly at this time harbours of refuge. I might also state that, suppose a large harbour were constructed in the Tees Bay, should that be on the north side of the Bay that would afford shelter to the mouth of the Tees to some extent, and will be of use to the entrance of the Tees; but from the opinions and information we have before us it will then be necessary that—the Tees Conservancy themselves, not having it within their power—it will still be necessary for the Government to put up the breakwater of which I have made mention, otherwise it will always be a source for carrying down silt and refuse to damage the harbour on the north side; and unless the mouth, the entrance of this river, was fixed in such a position as would prevent that, we consider that that would do injury to a harbour that might have been formed at a very considerable and enormous cost. I believe that, probably, that is all the statement that I have to make. I appear simply before you, not as a nautical man or particularly acquainted with these matters, but simply from my position as being Chairman of the Commissioners. We do not say one word against any other parties that are applying for the assistance, but simply with the view of assisting you to form the best possible judgment to judge of it.

18,430. You have obtained plans and estimates prepared ?—Yes, the estimate of this breakwater we propose will be under 80,000*l.* with a contractor that has had very great experience, and will undertake to do it; and we have one very great advantage, it will afford shelter from within a year of the time the work will commence.

18,431. (*Mr. Lindsay.*) There will be witnesses who will be able to speak both nautically and engineeringly on this subject ?—The witnesses are all here.

Mr. JOHN FOWLER examined.

Mr. J. Fowler.

18,432. (*Chairman.*) You are resident engineer to the Tees Conservancy Commissioners ?—I am.

18,433. You are prepared to lay before the Commissioners any plan and estimates for the harbour of refuge to which the previous witness has alluded ?—Yes, I am.

18,434. Will you now proceed to do so, making any statement which you may consider necessary to a full explanation of what is proposed ?—[*Plan put in.*] I may state that, having given evidence in London before the Select Committee of the House of Commons, there are several matters which I will not go into. I stated there that I preferred the mouth of the Tees for a harbour of refuge, because it was the most leeward point of this most leeward part of the coast. The greatest depth of water I have known upon the Tees Bar at low water is 12 feet 6 inches, the average depth is from eight to nine feet. When the wind is on shore there is always from three to four feet more water than is due to the state of the tides; hence, at such times, the average depth at spring tides is from 12 to 13 feet, and at neaps from three to four feet more. Were the position of the bar fixed, the depth of water over it permanent, and the position marked out by a breakwater, with a conspicuous lighthouse on its end, it is clear a good harbour of refuge would be provided, even if no more than the average depth of water is obtained. I am quite certain that several feet above the maximum will be obtained when the whole contents of the estuary are received and discharged through a permanent and properly defined channel. The general draft of merchant vessels trading on the coast varies from six to 15 feet, a few draw as much as from 18 to 20 feet, but the average draught of vessels seeking shelter is not more than from 10 to 11 feet. Looking, therefore, at the amount of scouring power which the Tees possesses, and at the depth which it sometimes produces upon the bar even now, when it is broken up, and its force diffused over a large surface, with its line of greatest action sometimes in one direction and sometimes in another, I am quite certain that if the entrance were curtailed, and the force concentrated in one permanent channel, the result would be such as to render the Tees available as a harbour of refuge for the mercantile shipping frequenting the coast at almost all times of the tide. To effect this object I propose to construct a pier from Seaton Snook across the North Gare in a circular direction, as shown on the accompanying chart, for the purpose of arresting the water passing to and from the Tees over the North Gare, and of directing the whole of the flood and ebb tides in one direction, which will have the effect of maintaining a well-defined channel more to the southward than the present channel generally is, and conse-

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quently easier of access in an embaying wind. For the purpose of assisting the direction of the tide outwards, and to get clear of the scarps at the seventh and eighth buoys, and also to obtain a more yielding bottom for the enlargement of the anchorage within by scourage, I propose to construct an inner work or guiding wall from a point near "Jack-in-the box," as shown on the plan to the fifth buoy pool, by which I propose to conduct the channel by an uniform and gentle curve to the westward of the ninth buoy rocks, and into the fifth buoy pool in such direction as shall scour it out on the side in which it is capable of enlargement, without artificial means. The form of the channel and the nature of the bottom leave no doubt in my mind that the depth at low water will be from 12 feet at the upper end to 18 or 20 feet at the commencement of the lower pool, in which the depth would remain as at present, from three to six fathoms, but the area would be greatly extended, an anchorage would be obtained of three miles in length, with a depth at low-water springs of two to six fathoms. Another advantage obtained by the avoidance of the rocks would be a depression of the low-water surface, a more speedy transmission of the tidal wave, and a greater range of tide in the upper reaches of the river. The pier being projected parallel to the direction of the wave and also of the flood and ebb tide, will not injuriously affect either the wave or the current; the wave rolls in from the main sea, and will simply be cut in two by the pier, the portion going into the river and being dispersed upon the beach at either side, and the flood being drawn from all parts of the bay only attains force when it collects within the pier. The ebb of the sea passes with considerable force along shore from south to north, but the river ebb being always the strongest, their junction does not take place until beyond the pier head. In connection with the accommodation to be afforded when the works have fully developed their effect, it should be stated in the first place, that the number of vessels which can be accommodated in a given space is much greater in a river or harbour removed some distance from the sea than in a harbour separated from the ocean only by piers, for however well the piers may be arranged to prevent the inroll of the waves, still, unless the entrance be so much contracted as to render access to the harbour dangerous in stormy weather, a large space will be totally unfit for anchorage, and a still larger space will be but partially sheltered. In north-east gales four miles, and in south-east gales three miles, of the Tees will be sheltered from the storm, with a depth of 12 to 40 feet at low water, quite sufficient, with moderate regularity in berthing, to accommodate all the vessels that are likely to require shelter during one storm; for it should be borne in mind that neither the number nor the draught of vessels is likely to increase for many years, in consequence of the substitution of screw steamers for ordinary sailing vessels. The quality of holding ground in the Tees is excellent, being of clay; and even where the clay is overlaid with sand, as it occasionally is, ships never drive in it. The approaches to the bar and the lower reaches of the river are well marked out by the three pairs of leading lights; two pairs are moved from time to time to suit the alterations of the bar. Should the proposed works be carried out, two pairs of lights would be sufficient to lead up to the same point, and being permanent an ample fund will remain for the erection of a first-class light on the pier head. The situation of the pier and the nature of the ground do not admit of its being constructed of masonry. It should either be constructed of rubble incased in timber, as at Blyth, or the material may be discharged from a staging of timber allowed to find its own level and slope, and afterwards be paved from low water upwards. The pier being, as already stated, projected parallel to the direction of the wave, the head only would be exposed to the force of the sea. The objection therefore that exists against long slopes and random rubble breakwaters placed at right angles to the direction of the wave would not be applicable to the present case. The facility with which slag may be obtained in large quantities, and in blocks of three to five tons, renders it very desirable that it should be made available for the construction of the work. I have paid much attention to it, and have had it at the fifth buoy for the last five years, and find that the salt water has produced no chemical change upon it, and that from its great hardness it resists the mechanical action of the waves, and maintains its angular surface where whinstone and sandstone have become round like beach pebbles; it has combined firmly together and not been moved by the force of the wave or current. The slag runs from the furnace in a small continuous stream, generally into metal frames placed on waggons; when the frame or box is full it is almost immediately taken away and turned over the slag bank. While the slag is in a semi-fluid state the continuous but small stream fills up the box, layer after layer, and gives to the block a laminated character; whilst turning it out when hot breaks it up into fragments. In the centre of the block where it remains fluid, if it be not turned out too soon, or when the slag is run into moulds in the ground, and allowed to partially cool before they are removed, the block is more solid. Were moulds built in the ground, and the produce of two furnaces run into one mould, and the slag retained in the mould for an hour, all of which can be done at trifling expense, blocks of nearly five tons may easily be cast at once, and if allowed to cool would be perfectly solid. From repeated observations on different furnaces I find that the average yield of each furnace is 38 feet per hour, and that $17\frac{1}{2}$ cubic feet of solid slag weighs one ton. In the course of a few weeks there will be 36 furnaces in blast on the banks of the river, which will yield sufficient material to construct the pier on the Blyth plan in 11 weeks, and on the other plan in 39 weeks. The timber work, however, could not be prepared in the time mentioned in the first case, and a longer period would be required for the material to consolidate in the second; but it might be so far completed in 12 months as to shelter from the storm, properly direct the current, and be sufficiently conspicuous for vessels to run for during gales. Should slag be objected to for the outer upper face of the work, abundance of stone may be obtained at Eston, Upleatham, and Marske, which would not materially increase the cost. The cost of constructing the north pier of slag, paving its surface, and forming a platform and parapet of timber on piles, will be 70,000*l.* Considering the great amount of life and property annually lost upon the coast, and the immense improvement which could be effected in so short a time, and at so little cost, in the entrance to the Tees, I think that that work ought to be the first step taken in providing shelter for the tempest-tossed mariner on the north-east coast. The original proposition for the improvement of the mouth of the Tees was to carry the north pier beyond the South Gare, ending in about five fathoms at low water. A closer examination of the power of the estuary, backed by the opinion of several intelligent seafaring men belonging to the locality, having convinced Mr. Bald that by its being carried a much less distance very great improvements could be effected, and the cost of carrying the work out to five fathoms, a distance of about 3,000 yards, being so much beyond the means that was then likely to be at the command of the conservators of the river (no furnaces being in operation at that time), he ultimately resolved to construct the pier about one mile in length only, being convinced that by that length the low-water depth upon the bar would be increased to 16 or 18 feet, which would be quite sufficient for all purposes of refuge required upon the coast. Being of the same opinion, I thought it unnecessary to project any further works, except the guiding wall within; but having always been of opinion, that by more extended works greater depth of entrance, and the entire removal of the bar, with a large sheltered area, being considered necessary by some, I have projected the north pier out into five fathoms at low water;

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and for the purpose of giving greater shelter, and also checking any movement of the sand from the southward, I have also projected a south pier in a north-by-east direction, also into five fathoms, leaving an entrance between the piers 700 yards in width. If the works are carried out to the extent I have shown upon the plan, I am decidedly of opinion that the bar would be entirely removed, and that it could not form again outside the works, for the following reasons:—1st, The bar can only be maintained at its present height from the alluvial matter brought down by the upland water and from the sand, and shingle abraded from the land on both sides of the mouth of the river. 2d, The Tees is not at any time heavily charged with solid or alluvial matter; little sand and no gravel ever reaches the sea, even during the greatest floods. The great bulk of the grosser substances brought down being decayed vegetable matter. is not likely to accumulate outside the piers, and the force of the current will not allow it to settle within. 3d, The present bar is composed, not of material brought down from the interior, but from land gradually being washed away on both sides of the Tees mouth, but the supply from all sources does not equal the loss sustained by friction, for the bar is advancing westward. 4th, The action of the wave (the principal cause of bars) is almost entirely confined to the foreshore between high and low water, and diminishes very rapidly as the depth increases. Shingle, gravel, and sand may be moved at any depth by the current, but is not affected by the wave at a greater depth than two fathoms, as is satisfactorily proved not only by the angle at which rubble works permanently stand, but also by the fact that persons who go down in diving bells do not perceive any extra motion during storms, and are often surprised on being raised up to find the surface so violently agitated. Pieces from wrecks lying in deep water having been known to come on shore during storms, only shows that time breaks up the wreck, and head winds, by retarding the surface current, increases the force of the bottom current, and enabling it to lift and carry with it material that in the ordinary state of the weather would remain unmoved. This action, moreover, is more likely to remove than to cause the formation of bars. Whatever sand and gravel is abraded from the land on the sides of the entrance to the Tees, and carried along the shore, would be checked in its progress by the piers, and would not be carried by the wave into five fathoms. The continual action of the wave would prevent any material accumulation from taking place behind the piers; but even if the sand edge was to advance as rapidly as the land recedes, nearly 900 years would elapse before it had advanced as far as the pier head, and when there it will have to go as much further before it is in the same relative position to the gorge of the estuary as it is now. Lastly, I agree with Mr. Calver in his opinion that a bar cannot form at the narrow entrance or gorge of an extensive basin, such as the entrance to the estuary of the Tees will be when the projected works are constructed. Where works at the mouths of harbours have been unsuccessful in removing bars, it has been because they were too limited in extent, generally ending about or a little beyond low-water mark. I am not aware of a single instance where such works have been carried out in clear ground into such a depth as to give any reasonable ground to expect that the bar would be removed. The small cost at which works in the Tees have been carried out, compared with the original estimate, and the facility with which slag may now be obtained at a low cost, convince me that works at the mouth of the Tees will be constructed at much less expense than similar works on other parts of the coast less favourably circumstanced. Accordingly I find that they will be constructed on the plan adopted by Mr. Abernethy at Blyth for the following sums:—The south pier 150,000*l.*, north pier 126,000*l.*, inner guiding wall 9,500*l.*; total 285,500*l.* Gathering from what has come to my knowledge of the various circumstances in which vessels are placed at the commencement of a storm, and from the frequent sudden change in the force and direction of the wind, I am decidedly of opinion that no single harbour, however large, deep, or easy of access, will meet the requirements of the coast between Flamborough Head and North Sunderland. Should one large harbour, however, be decided on, I have no doubt but Tees Bay is the site that will be most available, and the only question is, whether within or on which side of the Tees mouth such a harbour should be constructed. I have lately given very great attention to this question, and am fully convinced that if the north side of the bay is even partially sheltered, it will fill up more or less rapidly, and this in proportion to the amount of shelter given. Under present circumstances, prevalent east-south-east to east winds cause large accumulations of sand on that side of the bay, while north to north-east winds have a contrary effect. With the former wind the sea and river current are forced close inshore. In the latter case the wind is nearly directly opposed to the seat ebb current, and at right angles to the river ebb. After crossing the bar the current is turned entirely by the force of the wind and sent more direct out to sea, while the back sweep or under tow of the wave on the Seaton and Hartlepool foreshore carries the sand deeper into the bay. Again, the set of the ebb tide out of the Tees when not affected by the wind, is seldom more easterly than just clear of Hartlepool Heugh, and it is often directly across the Long Scar, carrying with it whatever sand or silt is brought down by the river water, as well as the heavier matter taken up during storms about the mouth of the Tees, and on the foreshore and shoals between the North Gare and Hartlepool; this being partially suspended is carried forward by whatever current there may be, until beyond the influence of the wave, where all that is heavier than the rate of current will move is deposited. I have compared the old charts with the present depth, and find that southward of the Long Scar Rocks there is from two to three fathoms less water than there was in the latter part of the last century; and between the Long Scar and the Heugh there is a decrease of one fathom in the last 20 or 30 years. This is confirmed by the unanimous statement of the old fishermen and pilots in the locality. A comparison of the charts also shows that the Tees mouth has been gradually moving more in the direction of Hartlepool, and is periodically close inshore in front of Seaton. That this is the cause of the shoaling in Hartlepool Road there can be little doubt, and that such shoaling has not proceeded more rapidly is in my opinion entirely due to the open state of the bay, which allows the free action of the north and north-east wind. The position of the bar being the balance for the time being of the forces acting upon it, it is clear that if one of the most active of these forces, viz., the north and north-east wind, be destroyed or lessened in degree, the position of the bar must yield to the opposite forces, and be kept close inshore, the worst position for Hartlepool that it can have. The first step, therefore, in constructing a harbour at Hartlepool ought to be to fix the outlet of the Tees, and turn its discharge as much southward as possible. I find that the south side of the bay between the Tees mouth and the Salt Scar Rocks has slightly increased in depth, while the low-water line has gone further westward. I have never observed nor understood that wind or storm from any quarter makes any alteration in the depth on that side, whilst the bottom is clear level and good holding ground. In the present position of the entrance to the Tees it is quite impossible for any detrital matter to be carried from it in that direction, the ebb tide of the sea passing close inshore, with a velocity of from one to two miles per hour northwards, and carrying the ebb of the river with it, while the flood radiates from the south as well as from the north side of the bay to the Tees mouth, and may be seen rushing through the washway between the South Gare and the Bransand with considerable velocity. A line drawn north-west from

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the Salt Scar buoy will shelter a square mile of surface for every mile of breakwater, with the depth gradually decreasing from seven fathoms to two fathoms. The Salt Scar rocks considerably reduce the size of the wave in gale from east-south-east, and might, if found desirable, be raised so as to produce still greater shelter. The abundance of slag which can be obtained, as well as the extensive beds of freestone that exist in the immediate neighbourhood, leave nothing to be desired in the way of material, and will form an important consideration in the cost. Both slag and freestone may be run direct from the furnace or the quarry to the place of deposit. Looking therefore at both sides of the bay, I am decidedly of opinion that a protected anchorage sufficiently large to accommodate the mercantile shipping, and also to be used as a naval station, cannot be formed upon the north or Hartlepool side of the bay without considerably sheltering the Tees mouth, reducing the swell upon the bar, and increasing the depth over it; yet the ebb of the Tees passing over sand-banks lying in an exposed situation, where the rate of the current will be from two to three miles per hour, and then through a sheltered harbour with only half the velocity, leaves but little hope that the depth of water in such harbour can be maintained. On the south side, the shelter given to the Tees would scarcely be felt, but the unvarying depth, with the natural set of the tide of the Tees in the opposite direction, gives far greater certainty for the depth being maintained, while the position of the harbour would be improved, for many vessels running for the south with a scant wind could enter here that could not make Hartlepool, while vessels coming from the north, if able to round the Heugh, would have the wind free to the north entrance of a harbour on the south side of the Tees mouth. (Witness quoted the following extracts from the Admiralty Report of April 28, 1851 :—"It appears "further from the inspector's report, that at the time of "the inquiry there were 11 feet of water on the bar at "time of low water, and that the tidal area within the "entrance amounted to nearly 9,000 acres, and the "tidal flow extended to 20 or 21 miles, while the depth "of water on the bar of the Tyne was only from 7 to 8 "feet, and the tidal flow 16 miles. Such an extensive "tidal area presents an immense power to scour a deep "channel and entrance, if judiciously regulated and "applied, and it seems well deserving the attention of "those locally interested, the importance of taking "advantage of the resources which nature offers for "constituting in the Tees not only a good mercantile "navigation but a deep-water harbour, to which vessels "might run for shelter at all times of the tide." From Mr. Bald's report to the Admiralty, of March 1851 :— "That the natural pool at the floating light, where "200 ships could formerly anchor in safety, might be "regained to any extent and depth required, offering a "safe asylum harbour to ships to run to when overtaken "by tempestuous weather. The anchoring pools of "7½ acres and 4 acres, situated at the eighth and ninth "buoys, are also valuable places for ships to lie and "anchor. I see no reason why a depth of five or six "feet of more water should not be obtained over the "bar of the Tees. The Tees is capable of any improvement as to depth of water to permit all kinds of "vessels engaged in foreign trade to navigate safely "up it." From Mr. Calver's report to the Admiralty:— of May 31, 1851 :—"In conclusion I would beg to "record my opinion, that were a north pier formed at "the mouth of the Tees to the extent indicated in the "parliamentary plan of the Tees Commissioners of "1852, and now recommended by Mr. Rendel, it would "be followed by the most beneficial results; it would "give certainty to the position of and depth over the "bar of an important river, possessing at present a large "trade, which promises to become greatly increased in "future years; it would render the entrance of the Tees "available for refuge purposes, and thus confer a great "boon upon the whole coasting trade; and it would "render unnecessary a large outlay at a neighbouring "site, to secure a similar advantage, and where there "are also physical drawbacks which do not exist in the "present case."

18,435. Have you any estimates therefore which you will lodge on a separate paper?—The contractor is here, and he will hand in an estimate for the work for the smaller scheme. I have not got a contractor's estimate for the other.

18,436. What is to be the expense of the smaller scheme?—The contractor's estimate is under 77,000*l.*

18,437. (*Sir F. Smith.*) I have listened to your lecture on river engineering with very great attention, and I am sure you will excuse my asking you some material question, inasmuch as it is quite impossible to carry that very interesting statement which you have laid before us entirely in our memory. Of course I shall read the documents with interest afterwards. You say the contractor will lay before us estimates. Is it not usual for the engineer to bring estimates before the parties who have to investigate the matter. Of the contractor we know nothing, but the engineer we know, and must know a good deal. I think the more ordinary course is, that the engineer should speak to the cost. The engineer will be an important element in the question; the contractor may not be. I have a detailed estimate myself; but I thought it better that the contractor should hand in his estimate. It is better that you should examine the contractor's estimate and be responsible for it, and for you to lay before us the scheme, because the individual who is the engineer is important. I understand your principle of construction has been adopted, and has been carried out at Blyth?—The principle adopted at Blyth is the principle upon which I have estimated. I have estimated for the long slope.

18,438. To be based on slag, is it?—Yes.

18,439. But one of your schemes is Mr. Abernethy's scheme at Blyth?—It is.

18,440. Are you aware of any other position like this where this scheme has been carried into effect?—No.

18,441. You never heard of its being tried at Nairn?—No.

18,442. And you are willing to adopt Mr. Abernethy's scheme upon his mere showing, without being aware if it has been tried and is successful?—I have seen it at Blyth.

18,443. But if you were told that the breakwater has not succeeded at Nairn, would you be disposed to adopt the same principle upon the experiments now making at Blyth?—Not for the large scheme, and I have not adopted it for the smaller scheme.

18,444. And for this smaller scheme you would use Abernethy's system, and for the larger scheme you would take the slag system?—The contractor's estimate given in was for the higher part of the stone.

18,445. But the lower part is of slag?—Yes; and I made an estimate of the price of slag, and I have no doubt the stone can be obtained; and it may be constructed of stone for the same money.

18,446. What is the length run from the quarry to the proposed breakwater or piers?—The quarry at Marske on the south side of the Tees from the south pier will be about five miles distant, and is situated at an elevation of from 300 to 400 feet above the level of the sea.

18,447. There will be no expense of the downward traction?—No; at Eston it will be about six miles on the north side.

18,448. Do the freshes run out very strong into the sea here?—No, they do not; and I will give you the reason why they do not. The area of the basin of the Tees is only 750 square miles, while the estuary of the Tees is 8,000 acres. I make it 7,000 or nearly 8,000, but Mr. Bald made it 8,800 acres. The area of the basin of the Tyne I find put down at 11,420 square acres, while the tidal area is only 1,694 square acres. That is published by Mr. Taylor.

18,449. Who is Mr. Taylor?—Mr. Thomas John Taylor.

18,450. Were you talking of square miles or square

acres ?—I gave the area of the basin of the Tees as 750 square miles, and the area of the estuary I make out nearly 8,000 acres. Bald gives it at 8,800. The basin of the Tyne is 1,142 square miles, while the estuary of the Tyne, or tidal portion, is 1,694 acres. We have an immense quantity of tidal water flowing into the Tees every tide. I made about 150 high-water cross sections in the tidal portion of the Tees by calculating from that with 16 feet flow. There is in the Tees, supposing it is high water at all parts of the Tees at once, upwards of 100,000,000 tons of water between high and low water mark. On an average the discharge from the Tees of fresh water is only 2,000,000 tons per 24 hours, so that there is 100,000,000 tons of water, only 1,000,000 of which is fresh or land water. I happened to take the velocity, and make an approximate calculation of the fresh water which came down the Tees. In December 1856, on the break up of the storm—I believe it was on the 8th, 9th, and 10th—the quantity of fresh water then was multiplied by 26, for there was 26 times the average quantity of water discharged in 24 hours. So that it brought up the discharge from the Tees to 52,000,000, or about half the quantity of salt water in a spring tide that is ordinarily thrown into the estuary. Now, that was a fresh, the greatest that had been known for 20 years. I have never known anything like it, and I have been 12 years on the Tees, that is, only one third. From the same authority as I quoted before, Mr. Taylor, I find the Tyne in floods is sometimes increased to 120 times the average discharge. Therefore there is so great an amount of tidal water thrown in, that the amount of fresh water is not felt. It is only about one per cent.

18,451. How far will the influence of your tidal water reach ?—The total length is about 27 miles from the .

18,452. What is the prevailing wind upon this coast ?—West ; another witness will give in a tabular statement.

18,453. When there is any easting, what is the prevailing wind then ?—I cannot exactly say what is the prevailing wind from easterly winds. I know what is the most destructive wind on the coast.

18,454. What is that ?—That is the north-east wind ; but the embaying wind is from east-north-east to east-south-east.

18,455. Do you leave your proposed harbour mouth open to the north-east ?—Exactly open to the east by north.

18,456. Will not the heavy sea set in ?—Yes, to a certain distance, but the anchorage will be above that.

18,457. You seem to apprehend there will be no, or very little bar at the mouth ?—With the smaller scale there will be 18 feet low water.

18,458. Will there be a bar or not ?—There will be from 16 to 20 feet upon the bar,—you may call it a bar. There is a bar at the Tay, and 22 feet upon it.

18,459. But will there be a bar at the mouth of your harbour permanently of greater or less height ?—I think there will.

18,460. Do you know an instance of a tidal harbour at which there is not a bar ?—There is not a bar in the Thames.

18,461. The Thames is a very exceptional case ?—The Humber is another. In rivers such as the Tees I do not.

18,462. Then I understand you to say there is an amount of sand from the mouth of the Tees towards Hartlepool ?—Yes, in certain winds.

18,463. What winds are those ?—South by east.

18,464. But have you had any particular means of ascertaining the exact amount of water, or is it from mere report ?—It is from many years' observation upon it that I have come to that conclusion. In front of the Low Light near Seaton, and at Seaton, I have known as much as five or six feet of sand thrown up in the course of a week or two.

18,465. What became of that ? Does it continue or move away again ?—It moves with a north or north-east wind towards the Tees mouth again.

18,466. Is it not likely to come back and help to form an obstruction to your harbour ?—Yes, it does come ; but when it comes to the Tees it comes by what is called the inner deep or swashway, and during the north-east wind it is carried in and lodged in the Tees.

18,467. Is it not as likely that the deposit will come with the tide from the north as with the tide from the south ? Is it not more frequent that the sand is moved by the water from the north than by that from the south ?—That is the general run upon the coast, I understand, but not on this part of the bight, because the flood tide is not the strongest until outside the Heugh.

18,468. Have you ever turned your attention to the formation of a breakwater, to inclose the rocks at Redcar ?—I have not paid any attention to that.

18,469. Then your scheme is entirely to make a harbour available for shipping ?—Yes.

18,470. As a refuge ?—My reason for not turning any attention to the harbour within the rock was, that I found by the chart that there is a considerable amount of irregularity in the soundings, indicating foul ground ; I therefore turned my attention to the north side of Redcar rocks.

18,471. I see you go out to five fathoms water ?—I do with the larger scheme.

18,472. And do you require that depth ?—Yes.

18,473. Then you apprehend, if you go into such depth of water, that you will never have any inconvenience from sand coming in ?—I think no sand is carried out to such a depth by the action of the wave on the inclosed piers ; there would be no current.

18,474. Then you think if the piers were carried out beyond five fathoms, it would be money thrown away ?—That would depend entirely upon the position.

18,475. So that if six fathoms be not necessary here, but five fathoms is sufficient, is it because there is more tendency to fill up ?—There might be a necessity to go further in a case where there is not such a scouring power as we have, which will drive all materials outside, and the tendency of the bay is to deepen ; that is the cause the line comes in towards the land.

18,476. Do you know from actual observation that the soundings are deepened ?—The coast line.

18,477. Or do you assume that to be the case ?—The soundings I know from actual observation. I know that on the south side by the soundings it is deepening, and on the north side they remain something similar until you come between the five-fathom line, or between the five and four. The first alteration I find is in the three-fathom line.

18,478. Is that a considerable alteration ?—No very considerable alteration.

18,479. But really, practically speaking there is no such an alteration as to cause any alarm, is there ?—Not so long as the bay is kept in its present condition.

18,480. Is there any set of sand from the south going past the Redcar rocks ?—I apprehend there is. The sand to the south of Redcar has gone away considerably.

18,481. What has become of it, do you think ?—I think some of it may have come towards the Tees.

18,482. But do you think any portion coming towards the Tees will come round your south pier head ?—I think not.

18,483. And you think if it did you would have power to drive it into the deep water ?—I think so.

18,484. Where do you propose that vessels coming in for refuge should come to ? How far do you propose that they shall come up?—They may come up as far as Middlesborough if we carried out the improvements.

18,485. Supposing you carried out the improvements, what depth of water do you expect to have at

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Middlesborough ?—The least depth up to Middlesborough will be seven feet at low water.

18,486. That will not be for refuge for vessels coming in ?—That is the lowest depth.

18,487. What depth is there now to Middlesborough? —In some places 16 or 17 feet.

18,488. At low-water spring tides ?—Yes.

18,489. What is the mean depth ? — The mean depth where laden vessels lie will be about 10 to 16 feet.

18,490. At present ?—Yes.

18,491. But I thought I understood you to say you hoped to get seven feet ?—That is, seven feet over the shallows.

18,492. Seven feet of increase ?—No.

18,493. My question was what depth of water you will have at Middlesborough at low-water spring tides when the improvements are carried out, and you said seven feet. Then I understand you to say there are now 10 feet as the mean depth ?—Yes, and the improvements are entirely below Middlesborough.

18,494. I ask you how far vessels will come for protection, and you say some as far as Middlesborough ? — The smaller vessels might go as far as that.

18,495. And the larger vessels drawing 18 feet of water ?—They might go as far as the eighth buoy, which is immediately below some rocks shown upon the chart. Then there is another part of the channel, about half a mile above that, where there has been a considerable depth; our works have forced sand down to it, but it is again clearing out.

18,496. How many acres will you have between the eight-feet buoy pool and the mouth of your proposed harbour ?—In the fifth buoy pool I expect to have 150 acres.

18,497. Up to the five-feet buoy pool do you mean? —At a little above the ship.

18,498. Will you keep to one point, and give me the quantity of acres you will get up to the eight-feet buoy ?—There will be, I expect, about 180 acres.

18,499. From the harbour's mouth up to the eight-feet buoy pool ?—That will be available for shelter.

18,500. For vessels of 18 feet draught of water at low water spring tides ?—No; 150 for vessels 18 feet water up to the head of the fifth buoy pool.

18,501. At all times of tide ?—Yes.

18,502. For 150 vessels or 150 acres ?—150 acres.

18,503. What is the depth of water now upon the Bransand at low-water spring tides ?—It is dry at low water.

18,504. And that is a part of your anchorage, is it not ?—No, the anchorage is on the opposite side. The anchorage I expect to be scoured out by the action of the current where it was formerly; that is, towards Seaton Snook.

18,505. Do you mean to anchor vessels in the channel only, or keep the whole space between the south pier and the guide wall as anchorage ?—I do, leaving a channel for traffic of 100 yards in width.

18,506. Am I to understand that your anchorage is to be the westward of the guide wall near the Bransand—on the west entirely, and not to the south? —Yes.

18,507. Will you point out to me where your entrance to your harbour is to be ?—Close by the north pier ; the channel will be scoured out to about 700 yards in width.

18,508. Will not the scouring extend to the east pier, also to the south pier ?—Only at the outer end.

18,509. What is the reason for not carrying the same guide wall from your channel, from the eastern side of your channel, down to your eastern pier ?—I think it will not be necessary. I will construct the north pier to about 2,000 yards, and I expect the South Gare by that means will be washed away and lodged partly within the south pier, and form a well-defined low-water sand edge, but principally behind the north pier.

18,510. Then do you think the sand of which the South Gare is now composed will not go out beyond the harbour's mouth, but will turn round and lodge against the wall of the northern pier ?—If the north pier is carried out to that extent before the south pier is carried out beyond low water.

18,511. Have you bored the South Gare ?—Yes, it is composed of sand to the depth of 21 feet.

18,512. Is it hard compact surface, or has it a tendency to move ?—It has a tendency to move.

18,513. Are you prepared to say that the South Gare is shown upon this plan as an exact configuration? —I am not.

18,514. And are you prepared to give in a plan to show how far it deviates from the plan of the Admiralty of 1853 ?—I have not made a survey, but if I was to make a survey of the Gare to-day I might go a fortnight afterwards and it would be quite different, the changes are so frequent.

18,515. Does the North Gare change much ?—It changes, but not so rapidly and frequently as the South Gare.

18,516. Is the South Gare increasing or decreasing? —The South Gare is decreasing, that is, lowering in its surface. We always have an improved depth of water when the South Gare is high. It is now very low, and consequently our channel is nearly a mile in width, and we have a loss in depth of water.

18,517. Your channel is now to the west of the South Gare ?—Yes.

18,518. And you are going to form your wall over this channel, and form a new one ?—I am.

18,518*a*. Of considerably greater width ?—Something about the same width as it is now, about 100 yards wider.

18,519. What is the interval between the North and the South Gare ?—1,800 feet.

18,520. And what is the width between your pier head ?—700 yards.

18,521. Then that is wider than the present channel? —It is further out.

18,522. Then the estuary of the Tees will be enlarged to that extent ?—Yes.

18,523. (*Mr. Lindsay.*) I think you said the estimate of your plan was 280,000*l.* ?—Yes.

18,524. And that was for the construction of your piers upon Abernethy's plan ?—It was.

18,525. Do I then understand you to say, if an extended plan was adopted you would not consider it feasible to adopt Mr. Abernethy's plan in that case ? —I do not think I said that, but before I did not adopt it. I would make myself satisfied it was sufficient.

18,526. You are not satisfied now ?—After I have heard that at Nairn it has failed. I have seen it at Blyth, and I considered it was as much exposed there as it would be at the Tees, and I saw no indication of any failing there.

18,527. Speaking to you as an engineer of considerable experience in these works, what would be the cost of these piers constructed in the usual way ?— With the facilities for obtaining material which we have, they might be constructed for under 400,000*l.*

18,528. Now between these piers you have got the North and South Gares, the Bransand, the Seal Sand, and various other sands, and I think you said all the shifting sands ?—No, I said the South Gare only.

18,529. You have got within the limits of these piers, for which 400,000*l.* will be required, all the sands I have named. Now, speaking to you seriously, and looking on this chart before me, do you think it would be advisable to spend 400,000*l.* of the public money to enclose these sands, and make the site you have pointed out a harbour of refuge where ships could run to in the prevailing gales of wind, and there anchor ?—I do.

18,530. Now tell me how many ships drawing 18 feet water could anchor within the limits of these piers in a gale of wind which blows right in. Have you calculated that ?—That will entirely depend on the arrangements which are made ; I could lay down moorings in the anchorage as we have at present at a very little cost.

18,531. Where will you lay the moorings down ?—I have had applications to lay them down at the fifth buoy, and I would lay them down there.

18,532. And what anchorage would you have ?—I have no doubt, when the channel is regulated, 2,000 vessels.

18,533. What depth of water do you expect to get up to the fifth buoy at low-water spring tides ?—About 18 feet below the fifth buoy; the water is as deep as 7½ fathoms in some places.

18,534. You intend to sluice the channel, as I understand, through the South Gare ?—Yes.

18,535. Or cut the channel ?—Either way, sluice the channel.

18,536. Do you think you will be able to sluice the channel through that sand-bank and a depth of 18 feet water, low-water spring tides ?—Yes, to 30 or 40 feet in some places. I have seen it sluiced to that extent twice within the last 12 years. The channel to the fifth buoy pool, in the higher part of the fifth buoy pool, is nearly double the area it was when Mr. Calver's survey was taken, and it can be sluiced as much and as far as it has been in former times, to my knowledge.

18,537. What sand is there at the North Gare at the present time ?—The sand will range from three to six feet at low-water spring tides above low water level.

18,538. Then it is six feet dry at low water, consequently you will be obliged to sluice a depth of 24 feet to get 18 feet low water-spring tides ?—Yes.

18,539. I am ignorant of these matters ; I am no engineer, but I want to get some information, and I can only get it from such men as yourself; do you mean to tell me, looking at this apparently tortuous river, you can bring a force of water down this river that will drive through a sand-bank for a channel to the extent of 24 feet depth, and maintain it ?—I do; it has been done, and in more than one instance, in the Tees already. Not to that extent, but it was because it was not so well situated, and in fact, to do it we had not the same bottom, but I myself have constructed works which have had the effect of making the channel where the sand was 4½ feet, and these works were done above low-water level. We have now from 12 to 14 feet low water, which is 14 or 16 feet scour. And if you compare it with Mr. Calver's survey, you will see that a deepening of the channel, and a great straightening of the same, has taken place near Jack-in-the-box, and, reasoning from the effects which these works have already produced, I have no doubt that when the works are carried out as the Commissioners intend, the channel will be scoured out at the fifth buoy considerably beyond its present area.

18,540. Then you give it as your opinion, as an engineer, after calm consideration, that looking, to the course the river has to take, you have no doubt you can at the North Gare drive away the sand by scouring the river so as to make the channel 18 feet depth at low water, which is now dry at six feet ?—I have no doubt whatever.

18,541. I understand you do not think it prudent to give a roadstead ?—No.

18,542. (*Capt. Washington.*) You have been long a resident on the banks of the Tees, I think, Mr. Fowler ?—I have been 12 years here.

18,543. And you are well acquainted with the river ?—I am.

18,544. Within what limits have you seen the channel entrance of the Tees within 12 months ?—I think it ranges about one mile and a half.

18,545. Can you give it me in the points of the compass ; have you ever known it as far easterly as east ?—I have ; I have known it east by north. That was the most easterly.

18,546. And what is the most northerly point you have known it vary ?—I think it varies nine or ten points. I have seen it west by north, but whether it was west by north or north-north-west, I am not sure.

18,547. Do I understand you in the present state of the river you have seen it vary to east and to north-north-west, that is, eight points of the compass?—Yes.

18,548. Now, which of these points have you the best water over the bar ?—In 1847, the first year I was upon the Tees, the channel was to the westward. It was something in very nearly the same form as Hewitt's survey of 1832. There was as much as 12 or 13 feet at low tide.

18,549. What was the direction at that time ?—North by west, or something near that, was the direction. Then, where it was in its most southerly position, I have seen 10 or 12 feet. I do not remember what it was when the most water I have seen, but I have seen between 11 or 12 feet when in its most easterly position.

18,550. And also in its most northerly position ?—Yes.

18,551. Do you think the direction has nothing to do with the depth if over the bar ?—I think not. I believe it depends more upon the height of the Gare Sand on either side of the channel.

18,552. What direction do you propose to give your entrance ?—About east by north.

18,553. Is it so on the design you have laid before the Commissioners ?—I believe so.

18,554. And that was your intention ?—It was.

18,555. Have you adopted it purposely because it was in that direction you found the best water ?—Because that is the direction which will answer all the winds that are most dangerous along the coast.

18,556. East by north is the most prevailing wind on this coast between Flamborough Head and the Staples ?—It is.

18,557. I think you said you had had borings through the Seal and Bransand ?—There were borings taken, but not under my direction, on the Bransand, Seal Sand, and Tod Point. I also bored on the North Gare and South Gare.

18,558. To what depth ?—I did not bore below the clay.

18,559. At what depth did you reach clay ?—Starting from the inner end of the pier, clay is reached about five feet below the level of the sand, that is, from the land end of the pier. Then at low water the clay appears, and as we go out until near the channel on the North Gare the clay is at a depth varying from three to four feet. Then beyond the North Gare, at the edge of the channel, it is six or seven feet, and it deepens until outside the South Gare it is about 33 feet.

18,560. The depth of sand is 33 feet ?—Yes, outside the south pier in the bay.

18,561. Clay or sand ?—We get clay at 33 feet below low water spring tides.

18,562. And then how much sand do you get ?—Three feet.

18,563. I wish to know at what depth from the surface of the sand do you reach the clay generally ?—The sand shifts so much; there is about eight or nine feet of sand upon the North Gare; when it moves more to the southward on the outer end of the Gare there will be more sand and the clay is deeper. At the westernmost part of the Gare the clay is about six feet below the surface. On the north side of the pier it lies about 3 feet or 3½ feet.

18,564. Is it clay generally in the present channel ?—Generally it is clay.

18,565. Where vessels ride in the different pools ?—Yes.

18,566. Is it good holding ground ?—It is.

18,567. And it is through the sand you propose to scour, and not through the clay?—Not through the clay. There was another reason why I brought the channel more to the south, to clear that clay which is called the fourth buoy scarp.

18,568. You are not in favour of running out a pier or jetty from Seaton Snook Point in a south direction ?—No, I think not. I do not see what purpose it would serve.

18,569. Was that not a proposal made formerly by the Tees Commissioners ?—No, it was in an easterly

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direction that they proposed running it out. Originally the proposition for Seaton Pier by Mr. Bald, was running it in an easterly direction.

18,570. Can you tell the Commissioners the slope of the bed of the river Tees?—The difference of level at low water from the bar to the Bransand tide gauge is about six inches.

18,571. I think you have told us the tide flows up 27 miles?—Yes, taking the course of the river from the far-away buoy.

18,572. On the rise there is 16 feet?—Yes.

18,573. Will that not be nearly three inches a mile the whole way?—Yes.

18,574. Is that a very small slope for the bed of a river?—There are many rivers where the slope is much smaller.

18,575. Do you happen to know the slope in the neighbourhood of the River Wear?—I do not remember it. There are parts of the Tees where the slope is very great—13 inches to the mile; that is just in the gorge going over the eighth buoy pool. The lower part of the river, it is about six inches.

18,576. Is that before the improvements?—I have not taken the slope since then, but before the improvement commenced the slope was about three inches to the mile to the eighth buoy. Then again, from the Jack-in-the-box, the slope was about six inches per mile up to Middlesborough.

18,577. But take it from the bar to the source, the general average slope is about six inches per mile, is it?—Oh yes.

18,578. Of the rivers in the north-east coast of England, between Flamborough Head and the Farn Islands, has the Tees generally a greater depth over the bar than any of the others?—It has.

18,579. Do you attribute that in any measure to the small slope in the bed of the river?—Yes, and the estuary together. The quantity of tidal water that comes in is so large in proportion to the land water.

18,580. Is the approach to the Tees well buoyed and lighted?—Yes.

18,581. By the Tees Commissioners?—Yes.

18,582. Is there any one in the room, pilot or anyone, who can speak to that point?—Yes.

18,583. Are the lighthouses and buoys under your charge at all?—The buoys in the lower part of the Tees are not under my charge. (The Trinity Houses buoy agent will be here.) The lighthouses are under my charge. We move them as the agent of the Trinity House orders them to be moved.

18,584. They are kept up entirely at the expense of the Tees Commissioners?—They are.

18,585. Will you state the whole revenue derived from the river, at the disposal of the Tees Commissioners?—I cannot exactly state that. The next witness, I believe, will be able to do it.

18,586. Did you say the buoys were under your charge in some measure?—Above the ninth buoy, but the principal buoys in the river are not under my charge.

18,587. Why are the buoys coloured exactly the opposite colours to any other river in the United Kingdom, I believe?—Why are they black on one side and red on the other, do you mean?

18,588. No; what side is the black approaching seaward?—On the right hand.

18,589. And the red on the port end?—Yes.

18,590. Is that not contrary to the general buoying around the country?—I believe it is, but I do not know. I have not taken much notice.

18,591. Is there any particular reason for that?—Not that I know of.

18,592. (*Capt. Sulivan.*) What is the height on this South Gare above low water?—I think the greatest height I ever saw was 3 feet. Now it is scarcely visible at low water.

18,593. You said the mouth is moving towards Seaton Snook Point?—Yes.

18,593*a*. Do you fancy it moves more rapidly?—It goes from east to west periodically over a number of years, and then it breaks out at east again and continues to move to westward. The tendency for a number of years, however, has been to westward.

18,594. On the whole you believe the tendency is to throw the silt and sand on shore more in the direction of the South Scar and Long Scar at Hartlepool?—Yes.

18,595. You said the bay at the south of Long Scar Head silted up two fathoms in the centre, comparing it with the old chart?—Comparing it with the old chart in front of the stone, that is the case.

18,596. That is the bay south of the Long Scar rocks?—Yes.

18,597. Have you any old chart of that day, showing the depth on the Long Scar in Hartlepool?—The same chart shows the depth. There is only one sounding. Two or three depths are shown on the line.

18,598. Shown from the head to the end of the rocks? Can you give the name and date of that charter, in order that we may put it upon record?—Dobson's, 1787.

18,599. Does it state what the soundings are registered to?—Yes, it does.

18,600. The soundings are given from the half tide to the mean level of the sea?—Yes.

18,601. And you have reduced these in the calculations you have made?—Yes.

18,602. What is the depth given in Hartlepool?—Four fathoms at the place where the three is now.

18,603. Will you send me that chart? [*Chart put in.*] You say these are given at the state of the tide?—Yes.

18,604. And upon that, four, is marked in this chart as near as one can guess, for it is certainly somewhere near where the three, is marked on the other chart; but if there are so many references, you have got to look for more than one fathom?—Yes, on that chart; but here is one by Pallister Thompson in 1815, at low water spring tides, and this is from the original, at the Admiralty.

18,605. Are these soundings reduced to low water or mean?—Low water spring tides.

18,606. Can you make us the present of the chart?—I can.

18,607. The other I will not trouble you about, because I think it may be considered quite valueless. This one I think you can hardly put any dependence on?—Not for the feet, but for the fathoms I think it would be. I do not find the pilots are very much wrong in the soundings, although they may not come to a foot or an inch.

18,608. Will you look where it is four fathoms in Hartlepool Bay on the chart you are looking at?—There is about three at present.

18,609. And suppose the rise and fall to the same be then as now, it is almost certain there is rather more water in Hartlepool Bay than there was by this chart?—Yes.

18,610. (*Capt. Vetch.*) When you say Tees Bay proper, do I understand that which is enclosed by a line drawn from the Seaton Point to near Tod Point upon the other side. Is that Tees Bay proper, or the estuary?—That is the line I have measured the area of the estuary from.

18,611. Is the estuary, as you call it, about 3¼ miles wide at its mouth, viz., from Seaton Snook to Tod Point, and that Tees Bay proper lies outside; and does not the river discharge into the bay near No. 4 buoy? Is it not from Seaton Snook to Tod Point?—Yes.

18,612. Does the river discharge into the Bay near the fourth buoy?—Yes.

18,613. Is the channel of the river pretty constant?—There is very little difference in the width of the channel there.

18,614. Does it move to the east or west at all?—It moves from east to west.

18,615. How much do you suppose it moves in the course of a number of years?—I think within my own knowledge it has moved 80 fathoms. It is now

going back, and we know this because we have moved the light ship twice to the south, a distance 40 fathoms at a time.

18,616. Do I understand the channel at the fourth buoy has moved 80 fathoms within your knowledge? Can you state how far the entrance of the river has moved one way or the other in your knowledge?—About eight or nine points of the compass—a mile and a half in position.

18,617. I want to know the amount eastward or westward?—Looking to the chart, I think it would be about a mile.

18,618. But at the entrance has it moved a mile within your knowledge?—Yes.

18,619. Have you any buoy at the mouth to show the depth of water there?—We have.

18,620. At the outer buoy, I mean?—I suppose you mean the bar buoy.

18,621. I mean the bar buoy?—The depth of sand will be about 20 feet below the soundings that are given at this time.

18,622. Twenty feet of sand below the soundings, which are there about one fathom and a quarter?—From, I should say, rather 18 feet.

18,623. The sand exists from that down to about 20 feet?—18 feet.

18,624. I think you said that the South Gare Sand travelled from east to west, and when it got to the extremity it moved back again?—It does.

18,625. To what extent will that amount to?—The greatest distance will be about a mile. It moves from east to west, and when it moves west it breaks out in a new channel, and we have two channels.

18,626. But when it gets back to east or west, where have you the greatest depth?—I have seen it deepest in both extremities; on the whole, in the middle.

18,627. By what means do you propose to guide the stream out by the pier guide wall coming down to the point?—We give the ebb tide a set upon the pier.

18,628. Then that pier is to be constructed upon 20 feet of sand, is it not?—It is.

18,629. How will you effect that—by piling?—Yes. I will drive a staging, commencing at the inner end, and bringing the material upon the staging, turn it down.

18,630. Then you expect by running out two piers, one on each side, you will drive away the sand sufficiently to scour the mouth down to what depth?—16 or 18 feet. I do not know if the seven-feet bar would be identified in the smaller design.

18,631. Will you have one pier or two piers?—One pier in the smaller design.

18,632. Will one pier prevent the sand coming in from the opposite side of the narrow channel?—I believe the current out will counteract that tendency.

18,633. The amount of backwater will counteract it?—Yes.

18,634. Then you expect by means of this guide wall to drive out the sand with greater effect?—Yes.

18,634*a*. And to clear the entrance?—Yes.

18,635. May not the direction in which the sand is carried be diverted into Hartlepool Bay?—It will be diverted. The outflow of the tide will be diverted from Hartlepool roadstead.

18,636. From Hartlepool?—Yes, by the construction of the pier.

18,637. What will be the depth of the water at the pier head?—Very considerable at the right hand, approaching Hartlepool.

18,638. Suppose you succeed in driving the sand of the channel confined by the pier, would it not again deposit in front of the new entrance, and form a bank there?—I have no doubt it would, to a certain extent.

18,639. And that bank would be in the direction between the mouth of the Tees and the roadstead of Hartlepool generally?—Yes.

18,640. So that if a bank was formed there with strong easterly gales, that bank might be driven into the entrance of Hartlepool Bay?—I think the sand will ultimately lodge behind the north pier.

18,641. Now, considering that the north and south piers will be on banks of sand that run out nearly a mile from the mouth of the estuary, and which shift to the extent you say, do you think it at all likely that a mass of moving sand would settle and get firmly fixed at the mouth of the estuary?—The sandbanks near the entrance on both sides of the channel are low, and are consequently moved about by every wind and wave; but when the works have been constructed so as to guide the channel permanently, and prevent the action of the wind and waves, the sand becomes firm, and the sand edge well defined.

18,642. But after spending 200,000*l*. upon these sands, which at present are constantly moving, have you any conviction it would be effectual?—I am quite convinced it would be effectual. When I say I am quite convinced it will be effectual, I understood your question to refer to the channel and the shifting sand within the pier.

18,643. By-and-by we shall be able to see your plan, and consider it more at leisure.

18,644. (*Mr. Coode.*) Can you tell us of any place which has been similarly treated to this proposal of yours? Can you name a place where we can see anything of a similar mode of treatment attended with success?—Do you mean the inner or outer piers work?

18,645. I mean the mouth of a river such as the Tees, treated in a manner similar to that which you now propose, and I ask you if you can tell us of any instance, and what the result has been?—I believe the water has been considerably deepened at Harwich by certain works that have been constructed there. At Aberdeen, too, the water has been considerably deepened; but if your questions have reference to the extension of the piers in deep water, I am not aware of a single instance in which that has been so.

18,646. Then the only two instances you have named are Aberdeen and Harwich. Can you say Aberdeen has been attended with success?—To a certain extent it has.

18,647. To what extent?—I believe originally the water was four feet low water spring tides; I think now it is nine on the bar at Aberdeen. The mouth of that river is different from the Tees. The Dee is a large river with a great slope upon its bed, consequently it carries down with it a large quantity of gravel and rough sand, which is not the case in the Tees, and therefore there is a stronger tendency to form a bar than there is in the Tees.

18,648. Is there anything like a similar amount of material to form a bar in the river at Aberdeen that there is here?—At the north side there is.

18,649. Do you speak of the result of Aberdeen from your own knowledge, or from hearsay?—Not from my own knowledge.

18,650. Have you any doubt on the question of the benefit which has been obtained at Aberdeen? I want facts; I do not want your idea. Can you tell us the effects?—I have not sounded the bar, but from the vessels I know pass out and in, and from what could pass before, I know it has been improved.

18,651. You speak of vessels going in and out; do they go in at low water?—Very near low water. The London steamers are built to draw 10 or 12 feet, and they are the largest steamers trading to London. They were not capable of entering the river before the construction of the works.

18,651*a*. Has anything of a similar kind been done at Harwich, or has the deepening there been effected by means of dredging?—I believe by means of dredging.

18,652. Then that is not a parallel case to that you propose in the Tees?—Not exactly a parallel.

18,653. You spoke of the immense scouring power in the Tees. Are you satisfied there will be that enormous power which you referred to, two or three

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times ?—I do not see anything which will lessen the power. There is an immense scouring power now.

18,654. Have you measured the rate of the ebb tides in freshes ?—I have ; I have measured the rates of ebbs and flows as well.

18,655. Will you give us some results of your trials ?—Yes ; but in connection with this I would state that its connection with the rate of tide and what is produced by the current now has no proportion to what will be, because it is spread over a large surface. And when I speak of the rate, I do not think the rate will be materially increased because the channel is narrowed. It does not depend upon rate alone. A shallow stream with a great velocity has not great power for scouring sand away; a deep stream with less velocity has very great power. I have taken the rate of current in the Tees on several occasions and at nearly every part of it, and I find the greatest velocity at the narrowest part below the light ship was $4\frac{1}{2}$ statute miles. That was at the fourth buoy in the ebb, and half tide with a fresh.

18,656. What was the breadth at half tide?—It would be about 1,100 feet.

18,657. That was at the floating light ?—Immediately below it, at the fourth buoy.

18,658. To what extent do you propose to reduce the mouth of the estuary at that point ?—I propose to widen it very considerably. I want no more power there, because the last time I threw the lead over there I had 45 feet low-water spring tides.

18,659. Then the fact is, your pier might have the effect of widening the passage very much ?—I think it will, for it is kept narrow by the north-east wind bringing in the sand, and the pier, I expect, will have the effect of keeping that out. In fact I am quite certain of that.

18,660. Then the form of channel occasionally moves near the light ship, and sometimes the greatest depth of the channel is in one part and sometimes in another ?—By the inner work I propose to construct, the current will be guided permanently in one direction. Then I have kept out the sand which fills up the channel in gales from the north-east, so that all the force of the currents will be exerted to scour the channel out to the north. Then the force that has a tendency to fill it up is prevented from going upon it by the piers, and in that way I expect the channel will be widened considerably ; perhaps there may not be so much depth, but this depth is considerably greater than we require.

18,661. Do you mean to say the result of your works will not increase the stream in any way ?—I think it will not materially increase the stream ; I think it will equalize it more.

18,662. You say not materially, then you imagine there will be some increase ?—I would not like to say what effect these piers may have in increasing the rate on the bar.

18,663. You have $4\frac{1}{2}$ miles now ?—Yes, and I expect that will be reduced to three. As the rate and character of the wave upon the bar has been spoken of, I wish to state what I have found the rate upon the bar in spring tide to be.

18,664. Will you give the results, shortly ?—On 8th September last, the morning tide ranged 19 feet 6 inches, and at half ebb with the wind west-north-west, strong wind, the rate of current was 17 fathoms on the bar in 35 seconds, the average of two trials 6 feet below the surface, that is rather more than $1\frac{7}{8}$ mile per hour.

18,665. Is that the greatest velocity you have at any time ?—It is the greatest I have found.

18,666. How often have you measured it ?—That is the third time in spring tides.

18,667. What is the grestest velocity you have had at any time in any part of the site of the proposed works ?—Not $4\frac{1}{2}$ miles.

18,668. You say you propose to concentrate the force ; if you do, I do not see how you can avoid having some increase, at any rate ?—I might concentrate the force and not reduce the sectional area of the channel. If I reduce the width and increase the depth I obtain a greater force and a channel 16 feet deep, and half the width will only have about the same rate.

18,669. By reducing the channel you do not apprehend difficulty in keeping the current the same ?—No, because the power of scouring depends upon the rate, and depth.

18,670. You say the best of stone may be had ; where is that ?—At Marske, nearly five miles from here.

18,671. What kind of material will you obtain there ?—Red sandstone.

18,672. Will it stand the action of the water and the weather ?—Yes, well.

18,673. Do you get it in large sizes ?—Yes.

18,674. To what extent ?—I have not measured it, but I went round it. For in some places it appears at the surface.

18,675. I mean as to the size ; will you get blocks of large size ?—Yes, I can get blocks of seven or eight tons.

18,676. And at what rate do you expect to get these stones delivered on to your works, including everything ?—At about 2*s.* 6*d.* per yard.

18,677. And you will bring them five miles for 2*s.* 6*d.* a ton, will you, and get them delivered at the works ?—Yes.

18,678. Does that include the price of staging ?—No.

18,679. Perhaps you will send to the Commissioners transverse sections of the works which you propose, and also some general particulars of estimate under a few heads, not in great detail, stating where you propose to find the material, and at what distance from the works ; the Secretary will furnish you with the arrangement of scales which we require ?—Yes, I will do so.

18,680. Is the material on the Seal and Bran Sands, alluvial matter or sea-sand ?—It is sea-sand.

18,681. Without admixture of matter from the river ?—Well, I think there is a little alluvial matter on the top.

18,682. At what point does the material brought in from the sea meet the material brought down from the river ?—I have not observed any of the materials from the river lodge above half a mile below the Jack-in-the-box in this plan.

18,683. About half a mile seaward from the Jack-in-the-box ?—Yes, inside there is a deposit of vegetable matter brought in from the sea, but I do not mean to say no matter will lodge lower down that.

18,684. You said you proposed to adopt what you call Mr. Abernethy's system, as is done at Blyth ?—Yes, I do.

18,685. Do you know the level at which the piles terminate at Blyth ?—Yes.

18,686. Will you state to us what it is ?—I cannot tell within a foot or two ; they do not extend to low-water spring tides.

18,687. Have you made your estimate according to the rate named in Mr. Abernethy's statement before the Committee of the House of Commons ?—No, I have not ; I have made it according to my own rate.

18,688. You have made allowance for the different circumstances, have you ?—Yes.

18,689. Are you satisfied that it will be a permanent structure ?—No.

18,690. How will you propose to deal with it, if, after a few years, any repairs become necessary ?—I think it may be built in masonry. Almost the same plan has been adopted at Sunderland, West Hartlepool, and Leith.

18,691. Then your estimate does not include the total cost of the work, but only that which carry them on to a certain period of time. When do you expect it would be necessary to construct these masonry walls you speak of ?—Perhaps in 30 or 40 years. It would stand, except occasional repairs by creosoting, it might stand for 50 years.

18,692. Do you think it will stand 30 or 40 years

without repairs being necessary ?—I do not think it will without some repairs.

18,693. Then, when do you think the repairs will become so heavy that it will be desirable to build the masonry wall, remembering that these works will be exposed to a considerable depth of water, whereas at Blyth they have scarcely been carried to low water? —I should say not more than 30 years.

18,694. And you think they will last 30 years without the necessity for the masonry wall ?—I think in 25 years the repairs will not be heavy.

18,695. And you think they will stand the occasional gales and wind for 25 years ? And do you give that as your deliberate answer ?—I think it will, if fairly built.

18,696. Have you seen some works at Nairn which were constructed under Mr. Abernethy's direction ?—They are works on a similar principle, but were not constructed by him.

18,697. Have you ever seen them ?—No.

18,698. Do you know what their condition is at this moment ?—I do not.

18,699. You have not heard that they have been materially damaged ?—I have not, except just now I have heard that they have not answered as well as was expected. In giving in the estimate of the cost of doing it in permanent masonry, I made an error ; I should have stated 400,000*l.* to 500,000*l.* as the estimate, instead of 400,000*l.*

18,700. In your evidence before the Select Committee of the House of Commons, in answer to the question (4335), " This slag appears to be much heavier than any stone or rock," you say " Yes ; from the weight I have taken, it runs about 20 feet to the ton " ?—I stated that granite was between 13 and 14 feet. I had not taken the weight so correctly as I have done since, and I now find it is 17½ feet to the ton.

18,701. Then you mean to say you said " Yes," when you should have said " No " ?—I did not say " Yes." I said it was not, and said that the weight very much varied, and that granite only ran 13 or 14 feet.

18,702. I see no such weight in your evidence. I suppose you had an opportunity of correcting this ?—Well, the quantity was not reported, but I had an opportunity of correcting it.

18,703. Did you correct it ?—I did.

18,704. Would you answer the question differently now from what you did then ?—I did not answer the question, except in regard to weight. It was 20 feet.

18,705. You now say only 17½, and the rest of your answer will remain the same ?—Yes. I distinctly stated that the quantity very much varied, and that was not reported.

18,706. Does any stone about here require as much as 17½ cubic feet to make a ton ?—No ; I think it is heavier than that.

18,706*a*. You said you made your estimate for slagging so liberally, that stone could be obtained at the same money, you had no doubt. At what rate did you put down that slag ?—It comes to about 2*s.* 6*d.* per yard. I have taken it very much in detail, and taken everything.

18,707. Was that the same rate you named to the Select Committee of the House of Commons ?—Yes, taking everything, it was.

18,708. I see in Answer 4330, wherein you make reference to the cost of these works, you say the total cost will be 1*s.* 3*d.*?—Yes ; but I add the price for construction, the waggons, towage, and all the timber work, and 20 per cent. contingencies after all.

18,709. Then the cost you gave the Select Committee of the House of Commons was not the total cost ? —It was the total estimate of the price, but the other material was not detailed.

18,710. How much is that to the ton ?—17½.

18,711. In reply to Question 4335, you say, " Slag is 20 feet to the ton." How do you reconcile the two ? Was that a mistake ?—Yes.

18,712. Then the " Yes" in the other part of your answer will require correcting also. It does not weigh much heavier than any other stone or rock, not even when reduced to 17½ cubic feet per ton ?—It does not ; but I ought to explain that the slag is taken as it is run in. I have no doubt but that if run properly it would weigh heavier, where it was necessary to do so, but in the great body of the work I do not think any additional core would be required, because it was found to be less to the ton than 17½.

18,713. Did I understand you to state, in reply to one of the Commissioners, that 100,000,000 tons of salt water has run in and out over the bar every 24 hours ?—Yes, every 16 feet spring tide there was this within the estuary.

18,714. You reported to the Tees Commissioners on some improvements which you suggested for the improvement of the mouth of the Tees ?—Yes.

18,715. In that report I see it is stated 400,000,000 of tons flow over every 24 hours, which quantity is right ?—I misunderstood your question. I said every tide.

18,716. I ask you again. I read from your notes, which were " 100,000,000 tons of salt water every 24 hours." You said that ?—Every tide.

18,717. Then you mean there are 100,000,000 tons of salt water which will pass over the bar at every ebb and flow ?—Yes.

18,718. Spring tides rise 16 feet ?—Spring tides, and neap tides about half that quantity.

18,719. Now, as to the form of that deep water channel which you expect to produce within these proposed works, have you formed any idea in your mind as to the form the channel will be ?—I have.

18,720. What direction will it take towards the mouth or entrance ?—North, or in a northerly direction until it is beyond the light ship. That is the point where I expect the sand will be scoured away until it comes to hard ground. It will be conducted along the edge of the hard ground and along the edge of the north pier into the bay.

18,721. And the breadth of that channel at low water, what do you expect that to be ?—Perhaps from the light ship from 1,500 to 2,000 or 1,800 feet.

18,722. In breadth at low water ?—Yes.

18,723. How much greater will that be than at present ?—That will be about the average breadth of it, with the exception of a narrow gorge at the fourth buoy. The breadth of the channel below the fourth buoy will be 1,800 feet. and the breadth above is above 1,800 feet—about 2,000 at the narrows, in this chart about 1,900 feet.

18,724. You proposed to lay down moorings at the fifth buoy ?—Yes.

18,725. What was the object ?—To moor vessels to.

18,726. Vessels coming in in gales of wind ?—Yes.

18,727. You proposed that vessels coming in to take refuge shall use these moorings ?—Yes.

18,728. Do you not apprehend that vessels coming in on a dark night will not bring up at those moorings, and so prevent others getting up the channel ?—No.

18,729. You do not think if a man came in at night to take shelter, he would bring up as soon as he found himself in moderately smooth water ? You think he would run up the channel to make room for others ?—The small vessels would, I have no doubt. They always do run well up.

18,730. But if large vessels happen to come in first and bring up, that would prevent the smaller vessels getting further up ?—The large vessels would take the deeper water, and the smaller vessels could go where the large vessels could not.

18,731. And you think there would be a general understanding among them as to the appropriation of the channel ?—A vessel coming into the harbour requiring the greatest depth of water will take up a position, and the other vessels not requiring so much water would be able to put them to where they found a favourable position.

18,732. Then this improved channel of yours will be so arranged that each shall find accommodation,

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and there will be room for 2,000 vessels ?—I do not think that will ever be required.

18,733. Suppose a lot of large ships should come in first, which is more than probable, this being the nearest the mouth of the river, would they not bring up in deep water ?—They naturally do so. They run as far up as they possibly can, and in the Tees it is not like a harbour in a bay. There is no bight. A great many vessels prefer running on the ground to being off it.

18,734. You spoke of men taking up positions. From your experience, do you think that if a man came in and found sufficient water, he would run up the river because he had been accustomed to do it ? —I find the smaller vessels usually try to get up and leave room for the larger.

18,735. That is as matters are now ?—Yes.

18,736. Will you present to the Commissioners the results of borings you made over the bar and through the proposed channel ?—I will do so.

18,737. You spoke to one point near the fifth buoy where the water had been very much deepened ?—I have ; in the Jack-in-the-box I spoke to its having been very much deepened.

18,738. Not the eighth buoy ?—No.

18,739. What is the rate of water above that channel where the great deepening took place ?—Six inches per mile.

18,740. And the rate below that ?—About nine inches per mile.

18,741. But you think that the hole would not in any degree affect it ?—No.

18,742. To what would you attribute it ?—I attribute it to the fact that the current will spread over a large surface.

18,743. Do I understand you that the spreading of the current has the effect to make a deep hole ? —Not a deep hole, a deep channel.

18,744. A deep channel will be the consequence of the current being spread over a large surface ?— The consequence of the direction of that channel concentrating it. It originally spreads over a large surface, and the effect of our works will be to deepen it.

18,745. That was the effect of the works you were constructing. You said in answer to Captain Vetch that you had known the channel move to the extent of a mile within your experience ?—Yes, I have about one mile.

18,746. When you first knew it, was the mouth more in an easterly or a northerly direction ?—It was at its extreme north point.

18,747. And it worked back towards the east ?—No, it broke out at the east. It does not work from west to east, but from east to west; when it gets to the extreme west another channel breaks out to the east of that channel, and gradually becomes a principal channel.

18,748. What depth of water did you find at the bar when the depth of water in the two was about equal ?—Seven feet six inches. There was a greater depth in the old channel, but the new channel was straight, and when it had not a depth of seven feet six inches the line of buoys was removed into that channel.

18,749. At that time there was a greater depth than now in the old channel ?—There was, but it was corrected.

18,750. Did the seven feet six inches channel deepen rapidly over that period ?—It was in 1848. The lines were shifted, and when the Admiralty steamer was down in 1851 there was a depth of 11 feet on the bar.

18,751. There was a gain of between three and four feet between 1848 and 1851 ?—Yes, I think there was a shoal.

18,752. At what rate did the channel progress towards the north in the course of a year, or say over a period of years ?—In exactly 10 years ; and, very singularly, the buoy agent's letter was dated exactly on the same day 10 years, and it gave us notice to shift the lights to the same position.

18,753. And was the progress uniform over that same period ?—No; it took some moves back to the east, and the depth was sometimes a foot or two less, sometimes a foot or two more.

18,754. Varying according to the prevailing winds, I suppose ?—Varying according to the particular winds.

18,755. (*Chairman.*) Did Mr. Bald make any estimate of a breakwater at Seaton Snook ?—Yes.

18,756. What was the amount of his estimate ?— I think the full estimate was 100,000*l.* or a few thousands under ; about 97,000*l.*

18,757. Is the breakwater shown on the plan in the position suggested by the late Mr. Bald, the Admiralty inspector ?—The position, but not exactly the same form. Mr. Rendel was the first to suggest that form.

18,758. (*Capt. Sulivan.*) In giving a tracing of that chart will you insert the figures so that they may read to the southward instead of to the northward, as now, so that they may correspond with the Admiralty chart ?—Yes.

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18,759. (*Chairman.*) You are a civil engineer, and reside at Norton ?—I do.

18,760. (*Sir F. Smith.*) For what object do you appear before us to-day ?—At the request of the Tees Conservancy Commissioners, to examine the soundings across the bay on one side and the other, and to give an opinion as to the best place that I imagine would suit for a harbour of refuge in Tees Bay.

18,761. Do you concur generally with the opinion expressed by the last witness ?—I do, quite.

18,762. Is there any difference between you and him ?—I cannot say there is.

18,763. Then I won't ask you any questions. Have you some soundings you brought with you, as shown on this plan ?—This plan shows the soundings that have been taken, and also the proposed harbour of refuge, with the section of a site.

18,764. Do these soundings differ from the soundings on the chart of the breakwater ?—Very little, except the three-fathom line in Hartlepool Bay.

18,765. I perceive this is not a corresponding plan or copy of plan of Mr. Fowler's ?—It has nothing to do with that.

18,766. Then you do not appear in conjunction with Mr. Fowler ?—No.

18,767. But with a rival plan ?—No, not a rival plan ; but I accompanied him to take the soundings, and give my opinion as to which was the best site in the bay.

18,768. Then this is a totally different mode of dealing with the subject ?—Quite so.

18,769. Then I am afraid I must trouble you with an examination ?—My plan does not refer to the drawn river, although it is there merely to show the entrance.

18,770. I perceive, Mr. Fraser, that you deal with the Tees as part of your scheme, and that you also enclose Redcar Rocks ?—Merely showing Mr. Fowler's plan as laid down in connection with the harbour itself. It is only to show the improvements when carried out in the Tees by Mr. Fowler.

18,771. Then your project is a project for a harbour of refuge at Redcar ?—Simply for that.

18,772. Now, Mr. Fraser, what is the extent of your outward breakwater ?—4,100 yards is the total length.

18,773. And in what depth of water is it to be placed ?—About 7½ fathoms.

18,774. Then that breakwater we will call the northern breakwater, if you please ?—Yes.

18,775. Pray will your harbour be open to the

west winds in any manner sweeping across Seaton Carew ?—It will slightly.

18,776. It will very considerably, will it not ? It is almost entirely open to the westerly winds ?—It is open, but that is a land wind.

18,777. It is ; but we were told by the last witness that the prevailing winds are west and west-north-west, and if so, coming from that low land, a vessel may be very much exposed in a harbour there ?—The land is a screen from the west wind ; no wave will ever be generated inside.

18,778. What is the style of construction you propose for the north breakwater ?—The section will show that.

18,779. I have not the section before me ?—There is one within the plan.

18,780. I thank you. Although this section gives a very general idea of the mode of construction, we want it in evidence, and therefore it is necessary that some such description should be given ?—It consists of a rubble breakwater, formed in 7½ fathoms water, having a base of 190 feet; sea slope, 1¼ to 1; harbour side, 1 to 1.

18,781. And on that do you propose to put a work of cut stone ?—An upright wall on both sides.

18,782. What is to be the total height of that upright wall ?—Forty-five feet the outside one.

18,783. What to ?—The 12 feet below low water.

18,784. And the inner one ?—Thirty-three feet.

18,785. That is to be in seven fathoms water ?—Seven and a half.

18,786. How do you propose to place your cut-work ?—By the diving bell—the lower course do you mean ?

18,787. Yes ?—That will be set by a diving bell.

18,788. And both by tide work ?—Yes, by staging.

18,789. Is the filling to be of rubble or concrete ?—The filling between the walls ?

18,790. Yes ?—Of rubble.

18,791. Can you tell me what will be the lineal cost per yard of that work ?—223*l.* per lineal yard.

18,792. Where do you propose to get your rubble material from ?—Principally from the Cleveland hills.

18,793. What will be the length of the run ?—It varies from five to six miles.

18,794. What will be the cost per ton ?—One and ninepence.

18,795. Where do you propose to get your ashlar ?—From the same hills on the upper lifts, which is freestone.

18,796. What will that cost per cubic yard, including traction ?—Do you mean dressed and set ?

18,797. Yes, complete ?—Twenty-seven shillings per yard.

18,798. And is there an abundance of that material ?—There is an unlimited supply.

18,799. Then you have to purchase that at a great cost at the quarry ?—The prices I have named include that purchase.

18,800. Now you have got another construction, which can hardly be called a breakwater, for it extends partly along the shore and out into deep water; what is the length of that wall ?—It is a pier to break the force of a south-east gale.

18,801. Is it to be the same section as the other ?—No, different ; an upright wall.

18,802. That is entirely of cut stone ?—Faced with it, and the interior built with slag, blocks, and freestone.

18,803. What price do you expect it will be got at,—the price set by the last witness, or have you got your own price ?—My own price.

18,804. Will you state what that is ?—5*s.* 8*d.* a ton, or 8*s.* 6*d.* a cubic yard.

18,805. What action of the tide do you expect will render this wall necessary ?—It is to break the sea from the entrance of the harbour, principally in rough weather.

18,806. Do you expect that if you do not place this wall you will have any accumulation of sand within your harbour ? Is any part of your object to prevent the sand from coming from the southward ?—Why, the wall has no object that way to stop the travel on either side.

18,807. You expect then, in fact, that you will have no sand within the harbour ? You heard the observation of the last witness respecting the shifting of sand at Tees mouth ?—Yes.

18,808. Do you object to that wall now ? Will it injure or assist your project, or not ?—I don't know it will assist my project at all, but my project will assist that at the Tees.

18,809. That is to say, you think your project will assist any portion of Mr. Fowler's in the improvement of the river, and that that wall of his will not at all interfere with this ?—None whatever.

18,810. Do you conceive if a harbour of refuge is demanded for Redcar interests, that the operations by Mr. Fowler are necessary so far as regards refuge ?—It is, if it is not the intention to make one large harbour for the whole coast.

18,811. If two large harbours were placed on the coast you would surely not contemplate forming one at Redcar and the other in the Tees ?—Certainly not.

18,812. And then which two would you prefer, laying out a certain sum of money, as proposed by Mr. Fowler, on the Tees, or the formation, at a greater cost, of your breakwater in front of Redcar Rock, as being the most likely to give the amount of shelter required ?—The greatest amount of shelter will be given by the proposal that is made by me.

18,813. And is it the best place for ships ?—Yes.

18,814. And do you think it more likely to be permanent than the improvement of the inside navigation?—I do.

18,815. Do you know anything of the shifting of sand from the Tees mouth towards Hartlepool ?—I cannot speak from my own knowledge.

18,816. Have you been long upon this coast ?—No, about three years.

18,817. Residing here the whole of the time ?—A little more than three years.

18,818. And how have you been employed ?—I have not been employed ; I have not been following my profession of late.

18,819. But still you have studied the subject ?—I have.

18,820. You give as your deliberate opinion that a harbour of refuge in front of Redcar will be superior to that proposed to be made in the Tees ?—It will if only one larger harbour is to be made.

18,821. It will be more suitable for vessels of all draughts of water ?—It will.

18,822. I dare say you have considered this plan for the improvement of the Tees. You would hardly come here without having done so ?—I have.

18,823. And don't you think it is expecting too much to suppose that if this improvement is made, with vessels seeking for refuge, that the small vessels will be so accommodating as to go into the shallow water to make room for the large vessels in deep water ? Is it likely that when a captain comes in from a voyage to save the lives of his crew that he will be so very cautious, and take care not to occupy that which will be useful to other people ?—The small vessels would generally run into the higher reaches of the river.

18,824. If she wanted to make her voyage as soon as possible, would she do that ?—That would depend on the captain.

18,825. We presume the captain will make the voyage as soon as possible ?—It would depend upon the harbour regulations.

18,826. Can you regulate this in a gale of wind ?—I think the harbour-master could, by being on the spot in a gale of wind in a steamer.

18,827. Is there a harbour-master ?—I am not aware.

18,828. I hope we shall have him to tell us how he

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will arrange that. The total cost of your plan will be how much ?—About 1,105,000*l.*

18,829. One and a half million ! Then I will ask you no more ?—1,105,000*l.*, I beg your pardon.

18,830. (*Mr. Lindsay.*) Is that the cost of the upper breakwater ?—The cost of both.

18,831. Including the pier to be run out on Redcar Rock ?—Yes.

18,832. And have you gone very carefully into these calculations ?—I have, several times.

18,833. Are you quite certain that such a breakwater as you propose can be made for this sum ?—In my own opinion I am.

18,834. Have you had experience in the construction of breakwaters such as this ?—I was at Granton Pier some 20 years ago.

18,835. And did you built it ?—No, but I was connected with it.

1,836. You have not had under your superintendence the construction of any large work ?—Granton is the only large work similar to this that I was connected with.

18,837. Were you engineer for Granton ?—I was second there with my father.

18,838. You never have had experience in the construction of a breakwater in a depth of seven fathoms? —I cannot say I have.

18,839. For that sum what area of sheltered anchorage will you have in four fathoms and upwards ?—241 acres.

18,840. What will you have from three fathoms and upwards ?—Two and a half fathoms, I have no three fathoms. It will be 232 acres.

18,841. I think you misunderstand me. What area, what acreage, will you have from $2\frac{1}{2}$ fathoms and upwards ?—Shall I read it to you ?

18,842. I wish it in evidence. You began with 742 acres for six fathoms ?—Yes.

18,843. Do we understand by that that you will have 742 acres from six fathoms and upwards ?—Six fathoms line at low water.

18,844. I wish it in a different way in evidence; from six fathoms and upwards you will have 742 acres ?—Yes.

18,845. From five fathoms and upwards you will have 1,144 acres ?—Yes.

18,846. Then you will have from four fathoms and upwards 1,385, and from $2\frac{1}{2}$ fathoms and upwards 1,617 ?—Yes.

18,847. You mean to say you have that great area of shelter anchorage for 1,105,000*l.* ?—I do.

18,848. Would you be able to speak of the advantages, in a nautical point of view, of a harbour at that site, compared with a harbour in Hartlepool Bay ?—Not well.

Therefore I will reserve my questions on that point to a nautical witness.

18,849. (*Capt. Washington.*) You said the soundings in this chart were taken by yourself ?—In connection with Mr. Fowler.

18,850. And you found very little change from the Admiralty chart of 1848 ?—1853, Mr. Calver's.

18,851. Very little change from that ?—Very little, except the three fathoms line.

18,852. Where is that altered ?—Between the Long Scar Rock and the Heugh.

18,853. Will you state what changes you found in Hartlepool Bay ?—The three-fathoms line seemed to have advanced a little seaward.

18,854. To what datum have you reduced your soundings ?—To the datum of water in Hartlepool tide gauge.

18,855. The same as that used in the Admiralty chart ?—Yes.

18,856. Are you quite sure of that ?—I have no reason to doubt it. It was the datum that was given me in those reduced in the Admiralty chart.

18,857. Were you actually sounding, yourself, in the bay ?—I was there in the steamer.

18,858. How many days did you occupy in sounding Hartlepool Bay ?—We were not quite one day. We were several hours.

18,859. Did you sound it in sections with the line and rod ?—Yes.

18,860. But did you run out sections from the shore, or sound promiscuously ?—I sounded on the lines shown there, from the far-away buoy to the Heugh.

18,861. Then across from the Heugh to the Long Scar ?—Yes.

18,862. Altogether five sections ?—Yes.

18,863. Would you consider these sufficient soundings to enable you to say there had been a change in the depth ?—Looking to the contour line that is put down, and that is a copy of Mr. Calver's chart, and drawing our line from the point we took, there is only $2\frac{3}{4}$ fathoms.

18,864. What is the decrease ?—About 18 inches.

18,865. Do you know where the silting comes from of what we see is this large mass of the estuary of the Tees ?—From the sands around Tees mouth, and what is brought out of the Tees.

18,866. Do you mean the sandy beach, east and west of the entrance ?—On either side of the river Tees.

18,867. Is there a large amount of sand floating about in that bay ?—The water is highly charged.

18,868. It is ?—It is; I have seen it.

18,869. And would you not fear any of that depositing behind the breakwater you have designed ?—I think not, on account of the shore current. As long as that was not impeded, there would be no fear.

18,870. Do you propose a jetty to run out over the Salt Scar, which will stop this scour ?—That will not interfere with the current at all.

18,871. Then you have no reason to fear there is as much sand floating about in the bay as would harm a refuge harbour as you have placed it ?—I think not. In my own opinion I have no doubt.

18,872. Have you been long connected with river works, or with works in the sea ?—I have for several years. I cannot call to mind the date.

18,873. Have you been in the habit of sounding ?—Not much.

18,874. (*Capt. Sulivan.*) Will you explain a little more what you stated about the current keeping the harbour clear ?—The natural set of the current is round the point of the Salt Scar Rock.

18,875. What tide are you alluding to ?—The ebb tide.

18,876. The northern tide ?—Yes.

18,877. That sets round the end of the Salt Scar at present ?—It does.

18,878. And then does it sweep along the shore in the direction of the three and four fathoms line ?—It sweeps towards the Tees mouth.

18,879. Parallel with the sand of Tees Bay ?—Rather in a line with the sand.

18,880. But parallel with it ?—Yes, parallel with it.

18,881. Do you know, does the tide running from the southward with a north-east or northerly gale accumulate any sand where you propose putting your harbour, and the west of the Scar ?—It does at the west end of the Redcar Rocks, and immediately to the southward of that.

18,882. Is there any deposit of sand brought in by the flood tide, or north-east or northerly gales ?—Do I understand you on the south sides of the pier ?

18,883. The west side of the Redcar Rocks, that is, in the corner of the bight, inside your proposed breakwater ; is there any accumulation of sand there brought from the northward by the tide or gale ?—I should say not.

18,884. Then you have no fear of this harbour silting up by the sand brought opposite the mouth of the Tees from the northward into this corner ?—It cannot well come there.

18,885. Is there any accumulation of sand at present at the back of the Scar Rocks, on the south side of them, brought by the southerly gales, or by the ebb tide ?—Over the rocks ?

18,886. Is the back of the rock, on the south side, filling up with sand ?—I cannot speak of that from my own knowledge.

18,887. You have not examined the Redcar Rocks ?—I have examined the Scar on which the pier is shown.

18,888. Very near where you propose putting, on the south side, do you see any accumulation of sand collected from the south-east ?—Yes, there is sand there.

18,889. Do you see any change except in that one place that you remarked in Hartlepool Bay,—the three-fathoms line ?—No.

18,890. I think, by the way you have drawn the three-fathoms line, you have taken the three-fathoms line of 1846 with that of 1853, which by the other plans has been shown to have extended out a little to that ?—It was a copy of a chart similar to this.

18,891. You see a little bight in the three fathoms line ?—There is a kind of gap.

18,892. If you examine the plans made later than the one of 1838, even, I think, the plans made in 1846 and 1849, you will find that that is already filled up, and was known to have filled up, to 1846 and 1849 ?—I have not seen that that is the case.

18,893. If we have charts showing that up to 1849 this little gap, called the three-fathoms line, has been filled up, would that do away with the result of your observations, apparently showing a growing out of the three-fathoms line ?—Of course I cannot prove more from the chart. We had none of them.

18,894. In the line you have drawn here from the north buoy across to the Long Scar, did you find that agree with the chart you compared it with ?—As nearly as possible.

18,895. (*Capt. Vetch.*) I want to ask you what is the particular object of placing this breakwater where you have placed it ?—My reason is because I think it will enclose the largest area and give the greatest depth of water with the least expense.

18,896. And is that for commercial purposes, or for the purpose of refuge ?—For the purpose of refuge.

18,897. Now, considering that Redcar appears to have little or no commerce, whereas at Hartlepool there are immense docks, very nearly the first or second in the kingdom, do you not think that if you manage to supersede a shelter at Hartlepool by one at Redcar, you should show that it would be more beneficial to trade ?— I don't know that the trade of a port ought at all to interfere with the position of a place for a harbour, if such place is shown to have deep water. It is the object of saving life and property that I look to.

18,898. You would not take into consideration the immense trade that comes into the bay of Hartlepool and the docks, but would leave that exposed to the same casualties they are now exposed to ?— I don't understand your question.

18,899. Do you mean by your harbour of refuge on the south side of the bay to make it unnecessary to construct one on the north ?—Certainly.

18,900. And that you would expose the trade on the north of the bay unsheltered to the winds and storms of this part of the coast ?—No, it would not, because the harbour here would not interfere in any way. Ships could take refuge in this harbour of Redcar, and proceed to Hartlepool if they pleased.

18,901. How are vessels to get into the dock at Hartlepool in an off-shore gale ?—They would never think of going to Hartlepool if there were a harbour of refuge at Redcar.

18,902. Is it not necessary for the purposes of trade that a fleet of vessels going out and into the dock at Hartlepool should be protected at all times in the bay ? Is that not necessary ?—It is so ; but they would get to sea more easily from Redcar at the flow of the tide, if the gale had ceased.

18,903. If all things were the same, and there was also trade at Redcar as in the docks at Hartlepool, there would be the choice between the two, and I think you ought to consider the magnitude of the trade and the shipping at the other side of the bay, and that it would be very strangely placed at Redcar in comparison with the trade of the two places ?—It would be an inducement, certainly.

Great ingenuity is due to you for this proposition, but if it is meant to supersede the necessity of one on the other side of the bay, it appears a very grave question.

18,904. (*Mr. Coode.*) If you had to choose between two sites in the same bay within four miles of each other, would the fact of there being docks already formed at one place, and not at the other, induce you to select that site where the trade was, rather than where the trade was not ?—Not if there was an insufficiency of water.

18,905. Don't you think it possible that at any particular place, where a trade already exists, it might grow up to such an extent that vessels trading to that place might eventually interfere with those going there for refuge ?—No, I don't think so.

18,906. You don't think that vessels occupying a harbour where trade exists might increase to such an extent as to interfere with those going in to take refuge ?—Of which site do you speak ?

18,907. I assume that you select a site where there already exists a great and increasing trade, then I ask you whether, if that site were adopted, the trade at that site might not eventually grow to such an extent as to occupy that harbour for trade purposes, and so curtail the use for refuge purposes ?—I quite agree with you.

18,908. You did not understand my first question ?—I did not.

18,909. The length of the breakwater you propose is about 4,100 yards ?—Yes.

18,910. The average depth of water is about seven fathoms, if I read your plan right ?—Yes.

18,911. And the price per lineal yard is, I think you said, 223*l.* ?—Yes.

18,912. Can you tell me of any similar work constructed in the way you have described, at anything like the same amount ?—No; it is a low figure. That arises from the material to be had easily.

18,913. Tell me the work you referred to, as you seemed to make reference to some work ?—I cannot. Take the total length of Mr. Rendel's plan of Hartlepool, and it will be 190*l.* a yard ?

18,914. Are you aware that at least one third of Mr. Rendel's design contemplated the erection of a work on the rock, above the level at low water ?—But it was an upright wall breakwater, was it not ?

18,915. That is true ; but are you aware of the fact that Mr. Rendel contemplated the erection of works above low water to the extent of one third of the whole design ?—I cannot say I knew it was one third, but I knew it was some distance.

18,916. Is it not for a considerable portion of the distance ?—It is for some portion of it.

18,917. Therefore you made reference to Rendel's design ?—My answer had reference to the works actually constructed.

18,918. Do you know any similar work constructed at anything like the same rate ?—I do not.

18,919. You say you propose obtaining the material from the Cleveland hills ; what distance will that be from the site of the works ?—Varying from five to six miles.

18,920. And the price per ton of that rubble put into the work will be what ?—About 1*s.* 9*d.* per yard.

18,921. Put into the work ?—Yes.

18,922. And the yard will be in weight ?—About $1\frac{1}{4}$ ton.

18,923. What have you allowed for the cost of the material raised at the quarry ?— a load 3*d.*

18,924. Per ton ?—Per yard.

18,925. What is the nature of the rock ?—It will be freestone, and alum shale and slag for the rubble.

18,926. Is that freestone hard or soft ?—Hard.

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18,927. Have you ever seen any of the same material exposed to the action of the sea ?—From that district?

18,928. Yes. I mean alum shale ?—Both the alum shale and freestone seem to harden with exposure.

18,929. Can you speak of any place where it has so hardened ?—At Granton.

18,930. Have both materials been used there, or only one ?—Chiefly the liver rock.

18,931. If I rightly understand you, they were put in together ?—Only one, I beg your pardon.

18,932. One was used then at Granton Pier ; which was it ?—Sandstone.

18,933. Was it of a similar kind to the one you propose to adopt in this instance ?—No, it was of a different kind and a closer grain.

18,934. If the sandstone hardened at Granton pier, it does not follow it will harden here ?—No ; but we have specimens of that on the beach, and to be seen.

18,935. I presume the same kind as you propose to use ?—Yes.

18,936. Does that stand the action of the sea well ? —Yes, it hardens.

18,937. And it is to cost 8*d.* a yard put into the waggons ?—Yes.

18,938. Can that be done ?—It can.

18,939. Has that ever been done ?—I cannot say.

18,940. Do you think, in your judgment as an engineer, that that material can be raised for 3*d.* a cubic yard, and put into the waggons ?—At the top of the incline, you must recollect.

18,941. It can be quarried and put into the waggon at the rate of 3*d.* a cubic yard ?—It can.

18,942. And you have allowed how much for leading,—3*d.* for the incline ?—Twopence.

18,943. An incline from the quarry is there ?—Yes, down to the railway.

18,944. Is it a railway incline, or a road ?—It will have to be a self-acting incline.

18,945. What length will that incline be ?—I have never measured the distance.

18,946. What is the distance by railway, the whole distance ?—From Easton six miles, and from Marske and Upleatham five miles.

18,947. What price have you allowed for conveyance ?—About 3*d.* to 4*d.* per ton per mile.

18,948. We'll keep to yards, if you please. How much will it be ? I would rather take the delivery in the waggons first ?—It would be 4*d.* per yard for delivery.

18,949. Having arrived at the beach, how do you propose to deal with it ?—Either by staging or by boat. The former I would prefer.

18,950. From what point would you carry your staging ?—Along the rock, using it for the work, putting a line down till we come to the opening, and then bridging it across, and carry out the breakwater.

18,951. Would you use staging for the whole length ?—I would.

18,952. But that is not entered in this price ?—This is for boating.

18,953. With regard to that, how would you deal with it, having arrived at the beach ?—You have it, you know, in the waggons on the shore. I would run on the waggons as they came from the quarry, into boats made suitable, so that they may be towed out and the material tipped from the waggons or dropped from the bottoms of the waggons over the work.

18,954. If the waggon is in the boats, how would you manage that ?—By having a side-lift through the barge, so as to lay over the side.

18,955. You would lower down the side by the barge and turn it over ?—Yes.

18,956. You have allowed for conveyance of boat from the shore to the side of the breakwater, at how much ?—3*d.* per yard.

18,957. And for tipping, how much ?—3*d.* more; that will include the expense of taking the boat out and in.

18,958. I presume that in all cases the amount you give for haulage will include taking back the empty waggon ?—Yes.

18,959. Then we have 3*d.* for putting into the waggon, 4*d.* for delivery, 3*d.* for taking out to the site of the work, and 3*d.* for discharging, and 5*d.* for the incline will be 1*s.* 6*d.*, royalty a penny, and the remainder for wear and tear, which will be 2*d.* The royalty is demanded now, is it ?—Yes.

18,960. Do all these prices include the use of plant in every case ?—It includes the whole.

18,961. Now as regards the stone for the masonry, where will you get that ?—From the upper lift. It is about 50 feet thick sandstone.

18,962. Large sizes ?—Yes; five or six tons can be got out.

18,963. What particular geological formation does it belong to ?—It is the upper sandstone above the alum shale.

18,964. And you are satisfied that will withstand the action of the sea ?—Fully so.

18,965. What number of cubic feet will be required to make up a ton ?—I should say about 16 or 16½.

18,966. You say your ashlar dressed and set will be 27*s.* per cubic yard. Is that for work under low water ?—Yes, both on the pier and breakwater.

18,967. At what rate would you expect to construct the part under low water ?—I think that price would cover the whole for freestone.

18,968. But I should like, instead of lumping it, to know at what rate you would expect to construct the work under low water ?—I have taken the whole of that in the breakwater at 1*s.* per foot, knowing the one would counterbalance the other. It is only 12 feet below low-water mark.

18,969. Only 12 feet below low-water mark. Have you ever constructed works below low-water mark ? —I have set in seven or eight feet.

18,970. By what means ?—By rods and bars.

18,971. Do you propose to set this in low water by these means ?—No, because it is out in the sea.

18,972. In what case have works under low water been set at anything like that rate ?—I cannot say at the moment.

18,973. You say it is only 12 feet under low water. If at six or seven feet at low water would that tend to reduce the rate ?—Certainly not much.

18,974. As compared with 18 feet or 20 feet ?—It would reduce it.

18,975. Do you propose to use cement under low water ?—No.

18,976. What size blocks will you use ?—As large as they can be got for the outer facing.

18,977. When you say that, I presume that in framing this estimate you formed some idea of the size of the blocks; how much is it ?—From five to six tons for the lower course.

18,978. How would you set these in the breakwater ?—From the staging above.

18,979. And notwithstanding that you boated the rubble, you would run a staging to set the masonry? You said you would convey the rubble from the shore by boats. I asked you how you would propose to set the masonry; and you said you would use staging for that ?—Most decidedly, there must be staging made after the rubble was brought up.

18,980. Would not the staging be connected with the shore ?—It would in that case.

18,981. Do I understand you would construct staging after the rubble was deposited ?—Yes.

18,982. How would you place the uprights or piles of that staging ?—Either by a frame, or I would put the uprights in the rubble itself, and bury the foot of them.

18,983. How would you support that frame when you put it in the rubble, because when first put down it would require some support ?—I would stay it.

18,984. How would you do that ?—Put anchor blocks in, and pick them up afterwards, the same as the staging at Dover.

18,985. Is not that constructed directly from the

land, and does it not proceed step by step from the land ?—It does.

18,986. Then you would construct it by staging similar to that at Dover ?—Yes.

18,987. But it makes a considerable difference whether it is attached or detached, does it not ?—It makes some difference.

18,988. Will it make a material difference ?—Not very great, except in storms.

18,989. What will be the difference in case of storms ?—I am not prepared to say ; no man can.

18,990. In what direction will that difference lie? May it have the effect of sweeping away the approach to it ?—Most decidedly.

18,991. And if it has that effect it will add most materially to the cost ?—It does.

18,992. Will it do so to a greater or less degree when detached ?—I do not think there can be any material difference.

18,993. Will there be any difference?—There may be.

18,994. Will the risk to the staging be greater or less in the case of a detached breakwater ?—It will be greater to a slight degree.

18,995. (*Sir F. Smith.*) I don't think we have got from you the time you would require to complete your breakwater ?—Seven years.

18,996. Have you any knowledge of any work of this kind having been completed in seven years ?—I cannot. I make no reference to that period for any similar work.

18,997. Then on what do you ground the estimate of time ?—Looking to the rate at which other works are constructed, I have taken the average of 3,000 tons a day being deposited.

18,998. What other works of the same kind are done at that rate ?—I don't know from my own knowledge ; but from what I have heard and believe, Holyhead does that.

18,999. Do you know the rate of work at Alderney? I think if you would inform yourself on that head, you would see that you could not complete it in this time ?—I do not say complete it, but it would answer the purposes of refuge.

19,000. What height would be sufficient to do that? —My height is about 78 feet.

19,001. What will be the height of your rubble work to afford sufficient protection for vessels coming in in gales of wind at all times of the tide ?—If it was brought up within 12 feet of low-water mark, it would afford great protection.

19,002. You imagine you would complete it in height in seven years ?—I do.

19,003. You have two schemes for forming your work,—one by staging, the other by boats. Do you give a decided preference to staging, or to boats ? If you use boats, I presume you would depend on the state of the weather for the progress of the works ?—Much.

19,004. At times there would have to be a cessation of the operations of throwing in the material ?—There would be.

19,005. Have you taken this into consideration in your calculations, and that the detention of all your workmen would increase vastly your cost ?—I have only assumed 250 as working days in the year.

19,006. And have you put your prices at each place for the work at 300 days instead of 250 ?—Yes ; workmen as soon as not wanted are discharged.

19,007. If you discharge the workmen, you must either lose these workmen altogether, or must pay the rest increased wages ?—It is the general rule to keep the principal workmen. If there is a storm you do not discharge them.

19,008. Your prices are ample for that ?—I believe they are.

19,009. (*Capt. Sulivan.*) Were these soundings taken by yourself ?—The lead was not thrown or the rod taken by myself ; the men belonging to the Tees Conservancy were there.

19,010. I am speaking of those soundings inside your red breakwater ?—Yes.

19,011. Taken by yourself ?—I was on board the boat, and saw them taken.

19,012. Were they reduced to the same datum as the Hartlepool soundings ?—No; the Tees gauge was taken for those.

19,013. Does that agree with the Hartlepool ?—I think there is between four and five inches difference between them.

19,014. Does it agree generally with the datum on which the Admiralty chart is made ?—I believe so.

19,015. Have you compared them with the Admiralty chart ?—I am not aware of that.

19,016. If so, if there is a fathom less water there at present, that corner of the bay must be silting up, if your soundings and the Admiralty soundings are correct ?—(No answer.)

You had better compare them again before you make too sure of that.

19,017. (*Mr. Coode.*) Are you aware of the nature of the works being constructed at Alderney ?—I am not.

19,018. If told that the system is just the same that you propose to adopt, and that they have been hard at work for 11 years, and have done 960 yards, would that shake your confidence in the time you have allowed yourself for the completion of these works ?—It would not, because there may be circumstances there which we would not have to combat with here.

19,019. The only respect in which I know the circumstances will differ from those here will be, that at Alderney they run directly from the shore with staging : the staging there is attached to the shore ; now, would that facilitate the progress, or would it retard the progress ?—I should say it would facilitate it.

19,020. Then being acquainted with these facts, would you still remain of the same opinion ?—Not knowing Alderney, I cannot make the comparison.

19,021. Now that you are aware of the fact, that they have been at work for 11 years, and 960 yards of that work have been run out by staging from the shore, would that shake your confidence in the time you have allowed yourself for the completion of this work ?—I am not aware of the quantity of material they deposit per day.

19,022. The work is in all respects the same, with the exception that there they have the advantage of being connected directly with the shore, and the greater part of the water within which their works are constructed is only about 3½ fathoms ; they this year came to a place with 10 fathoms. Now being made acquainted with these facts, do you still remain of the same opinion as to the time you would require to complete these works ?—It would not alter my opinion.

19,023. You still think you can construct these within seven years ?—I do not say I could complete these. I believe protection will be afforded in that time ; the breakwater can be carried out sufficiently.

19,024. And how could you afford that protection ? —The deposit of rubble.

19,025. You said that bringing the rubble up to 12 feet at low water would answer all the purposes of a harbour of refuge ?—I think it would.

19,026. Then why do you put the masonry above the rubble ?—I do not say it would in all weathers, because if left unprotected the rubble would soon be breached through.

19,027. To what extent do you intend the answer to apply ?—I would break the force to a certain extent, and ships would be able to enter it.

19,028. Would not the effect of a disturbance in the water be, that a vessel would run the risk of dragging her anchors and driving on shore ?—She would not.

19,029. Do you believe that a rubble bank such as you have described would answer all the purposes of a harbour of refuge ?—I beg to withdraw the word "all." I did not intend to use it.

Well, it is right that you should have an opportunity of withdrawing it.

REDCAR.

Mr. John Anderson.

20 Oct. 1858.

Mr. John Anderson examined.

19,030. (*Chairman.*) You reside at Edinburgh ?—I do.

19,031. And are by profession a contractor ?—A contractor and engineer.

19,032. (*Sir F. Smith.*) You are an engineer and contractor ; that will be the right way to put it ?—Yes.

19,033. Have you had anything to do with either of the designs we have had before us to-day ?—I was called in 12 months ago to give an estimate, by the Tees Conservancy, for the jetty at the mouth of the Tees, on the north side, and I did so, and I have got the estimate here, prepared according to the engineer's plans, and I propose to extend that 2,000 yards for the improvement of the mouth of the Tees, at a cost of 76,700*l.*

19,034. What section is that wall ?—Do you mean the angle or its base ?

19,035. The general height and depth ?—Twelve feet above low water.

19,036. Have you the section before you ? Has Mr. Fowler any section of that work ?—I had when I made the estimate, but I have not seen one since.

19,037. Then perhaps you will tell me what is the total height of the work at the eastern extremity ?—I don't recollect in the absence of the plan.

19,038. Is it in 4½ fathoms water, or rather more ?—At the very end it appears to be four fathoms water.

19,039. I see in the plan that a portion of the work is coloured red and another portion is coloured yellow. What does the difference mean ?—It is all coloured red on the north side ; my estimate only refers to that on the north side.

19,040. How long is that portion ?—About 2,000 yards.

19,041. The portion coloured yellow you have no estimate of ?—I have not ; on the south side I have not estimated for.

19,042. Then it is the curved breakwater of 2,000 yards you estimated for ?—Yes, I have estimated for that.

19,043. And the cost of that is what ?—76,700*l.*

19,044. Will you be so good as describe the character of this work ?—There is a great deal of timber, 19,000 feet of creosoted timber; 1,000 tons of malleable ironwork to bind it together ; there is 757,000 tons of slag stone for a foundation, and that is three items marked upon the entrance of the breakwater here.

19,045. The sum of 76,700*l.* is for a length of 2,000 feet up to 2½ fathoms water; what will be the probable cost of the other portion of about 800 feet in, say, 2½ fathoms to 4½ fathoms ?—The water is then so deep that you would be obliged to have a different description of breakwater ; timber would not do.

19,046. Then you don't approve of continuing from the published soundings the distance of 2½ fathoms ?—No; you cannot get the timber long enough.

19,047. How do you propose to construct the remainder ?—I would do it in the usual way by tipping in rubble stone, and getting up a proper heart above high water.

19,048. May I ask you, from your experience as an engineer and contractor, what slope is that rubble likely to take, and stand the wear it will have ?—I know the Granton breakwater very well, and the angle there is 2½ on the seaward side, and 1½ on the inward side.

19,049. Would 1½ do on the seaward ?—No.

19,050. Then if we had a project showing 1¼ slope, you would think that, not a judicious slope ?—No; I think that would not stand on the seaward side.

19,051. How would you propose executing that portion of the work you have estimated at 76,700*l.* ? We'll take it from the beginning, and suppose the breakwater going out, how would you give the orders for the work ?—I begin at the shore end and drive piles into the ground 12 or 14 feet, and then put in fastening irons and drop the material among the piles.

19,052. Some go beyond the piles and some within it ?—Just where it likes, and let the sea take it to the proper angle.

19,053. And you would confine it with planking, because if you don't what would become of your slag, because that is to confine it, is it not ?—If there is planking in it would be, but I am not sure there would be ; the planking gives a little, but not far ; there is planking on both sides.

19,054. At the part with slag it is not laid with any timber ?—The timber is all at the outer end.

19,055. What am I to understand, that there is to be planking or not ?—That there is to be planking for a small portion at the outer end only.

19,056. What length of that portion ? There are no figures on here. What is it ?

(*Mr. Fowler.*) 100 yards of timber at the outer end.

19,057. Have you details of that before you ?—Yes.

19,058. Surely you can tell, by looking at your quantities, which are the lengths, without referring to Mr. Fowler ?—I cannot tell the quantities of the wall running on it, because they have not been brought before me.

19,059. I regret very much that it is so, because when you were brought before us to give evidence I thought we should get all the details which Mr. Fowler would not volunteer to give ?—There is no timber to 100 yards at the outer end.

19,060. Then the remaining portion towards the shore has no planking ?—None ; it is slag and stone, and they are to find a position as they may, and the only way to make a staging has to be the means of depositing that material.

19,061. It is not to be used for any other purpose, except for 100 yards at the outer end ?—That is to be the permanent.

19,062. But we have been told that the plan now submitted to us is based upon a scheme adopted by Mr. Abernethy at Blyth ? The material is, to a certain degree, and the very commencement. Can that be an accurate statement ?—I know nothing of what Mr. Abernethy has done.

19,063. Then I can tell you, and this is very different. Are you disposed to think that the construction of this outer portion that is enclosed in timber will be durable, without any other application whatever ?—If it goes through the process of creosoting it will preserve its life.

19,064. How long do you expect the timber erection will remain ?—Twenty years good. I have put a great many jetties in the river Tees without creosoting, and they are good and existing yet.

19,065. You have not had occasion to renew any one of them ?—No. Fifteen years ago I put up a timber bridge creosoted. I had occasion to take it down the other month, and no one could tell but that that bridge was put up yesterday.

19,066. Very well-seasoned timber and not creosoted, do you say ?—Yes, creosoted.

19,067. It is contemplated by the engineer of the Blyth breakwater to enclose it with masonry, of solid ashlar masonry, because it is contemplated that it will last 40 or 50 years yet?—This here is only a small portion, and suppose it only lasted 40 or 50 years, yet it is only 19,000 yards.

19,068. You think it is quite unnecessary to do anything towards it during 40 years ?—Yes.

19,069. That is, to case it in with solid masonry ?—I do not think there is any occasion to do anything but slight repairs, beyond what is provided for on the plan.

19,070. You know Blyth breakwater, I presume ?—No.

19,071. Then at Blyth harbour, where the pier is constructed, a great portion is not so much exposed

as yours ; therefore you may estimate that you would require some explanations here that that does not ?—Yes.

19,072. Then this system of constructing the breakwater is applicable to general purposes, so far as 4½ fathoms water ?—There is only a small portion of that in this deep water. It is only 100 yards; the other is in very shallow water indeed.

19,073. How would you do in deep water ?—By driving piles and binding them together with iron, and putting in the slag for a foundation for that part.

19,074. Have you given an estimate of Mr. Fowler's scheme ?—No, only for the north side.

19,075. And that is to cost what ?—76,700*l.*

19,076. If you were required to give off-hand a rough estimate for the extension to 800 yards more, what would you say that 800 yards would cost extending to 4½ fathoms water, and commencing where your estimate ends ?—I begin at 2½ fathoms water ?

19,077. Yes ?—150*l.* or 160*l.* a yard.

19,078. What would it amount to for 800 yards ?—128,000*l.*

19,079. That would make how much altogether ?—204,700*l.*

19,080. It has been remarked to me by one of the Commissioners that I am in error in supposing that that part of your work which is to be in connection with the shore was formed on Mr. Abernethy's principle. Am I wrong in supposing that ?

(*Mr. Fowler.*) You are.

19,081. (*Capt. Sulivan.*) You made a little mistake in these figures?—120,000*l.* is the sum.

19,082. You wish to correct that ?—Yes.

19,083. Making 196,000*l.* in all ?—Yes.

19,084. Including your 76,000*l.* for the breakwater? —Yes.

19,085. (*Mr. Coode.*) What price do you allow for the creosoted timber ?—3*s.* 6*d.* a foot.

19,086. Is it to be creosoted both in the piles and upper work ?—Yes.

19,087. You said you intended to use slag and stone in the work. Is that so ?—Yes.

19,088. In what proportion ?—It is only in case slag cannot be got in sufficient quantities that the sandstone would be used.

19,089. Do you think that you could get sandstone for the same price as slag ?—A little more; but I don't apprehend it will be necessary to use any slag for the 757,000 tons.

19,090. Did you hear the evidence given to the Commissioners by Mr. Fraser ? Do you know the quarry to which he alludes ?—I know these quarries very well.

19,091. Do you know the nature of the rock ?—Yes, it is of very firm quality.

19,092. Did you hear the price he stated for quarrying and putting into the waggons ?—Yes.

19,093. Do you consider that price sufficient ?—No.

19,094. What do you consider it will be ? The cost of working and putting in the waggons ?—Yes, I am doing that work daily with a large number of men, and I think 1*s.* 6*d.* per yard is not too much for working and putting into the waggon.

19,095. 1*s.* 6*d.* a cubic yard ?—Yes.

19,096. And in that you include the material ?—No.

19,097. You include nothing but the men's labour ? —No.

19,098. Not the cost of superintendence, or plant, or contractor's profit ?—No.

19,099. You mean to say you are doing work of a similar kind, and it costs you 1*s.* 6*d.* cubic yard for labour ?—I do.

19,100. Is the stone of the same kind ?—Very similar.

19,101. Is it so similar that the difference in character will make no material difference in the cost? —This is in favour of the latter.

19,102. In favour of the stone mentioned by Mr. Fraser ?—No, in favour of the stone I am working now, and it is costing me that.

19,103. If I rightly understand you, your answer is that which costs you 1*s.* 6*d.* per cubic yard for labour alone, will, if you had to do the same thing at the quarry named by Mr. Fraser, be done for a little more ?—To do it here would be a trifle less.

19,104. How much less ?—A penny a yard.

19,105. Would it make a difference of 2*d.* a yard ? —No, and I am not sure I have any profit at what I am doing.

19,106. Do you pay any royalty for what you are doing ?—No.

19,107. You spoke not of anything more than the labour of quarrying the stone and putting it into the waggon ?—Yes.

19,108. Do you agree with Mr. Fraser as to the 3*d.* a yard ?—Oh dear no.

19,109. Do you agree with him as to the 3*d.* to 4*d.* a yard per mile for haulage ?—Well, it is low; I put down myself more than that.

19,110. And what would you put down if you had to include royalty, and if you had to include the construction of a railway, and the delivery of the stone, which we call leading. Do you consider 3*d.* to 4*d.* per yard per mile would be sufficient ?—No, I think 1*d.* for the use of the plant, construction of railway, interest of money, maintenance, and locomotive power.

19,111. Do you not think a penny a bare price ?—A penny is a bare price.

Mr. Joseph Dodds recalled.

19,112. (*Mr. Lindsay.*) You have undertaken to take charge of the proceedings here to-day ?—As respects the case of the Tees Conservancy merely. Simply as regards the case of the Tees Conservancy, not the Redcar case.

19,113. The reason I address you is, that I was under the impression that you had taken charge of the whole of the proceedings here, for I find so many plans brought before us,—one by Mr. Fowler, one by Mr. Fraser, and various other plans floating about for different modes of constructing a breakwater,—one on the Long Scar Rocks, one to the west and one to the east of these rocks—that I am anxious, for my own guidance, for you or some gentleman to undertake to put down on one of those charts the various plans that have been brought forward for our consideration, so that to-morrow, when we come to examine the nautical witnesses, we may really know what we are examining them upon, and ascertain from the nautical witnesses if any of those various propositions would suit the object we have in view, and if so, which in their opinion would be the best plan ?—I should be very glad to endeavour to find some surveyor who will do that, and I am sorry I cannot assist or inform you of the number of plans which are to come before you for Redcar. I can only say I have heard of three more. I have seen them exhibited in this room, and I believe one or two of them are nearly on the site suggested by Mr. Fraser. I have not seen these plans, nor was that any part of my case.

While addressing you I am also addressing the parties interested in the various plans we have had, and it would facilitate the proceedings to-morrow, so far as I am concerned, if these gentlemen will give to you their plans, or will put on this one plan a rough sketch of all the others, so as to give one some idea of the various plans to come before us.

Mr. Fowler recalled.

19,114. (*Chairman.*) You have heard what is wanted. There are several plans which have been laid before us, or perhaps will come before us, and it would be convenient for us to have them on one

REDCAR.

Mr. J. Fowler.

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chart. Will you be good enough to take charge of the matter for us ?—I will.

(*Mr. Dodds.*) I have found a gentleman who will place the three upon one chart to-morrow.

Mr. LISTER examined.

Mr. Lister.

19,115. (*Chairman.*) You are a resident of Seaton Carew ?—I am.

19,116. And you have been 30 years a pilot ?—I have.

19,117. And are you perfectly aware of the object of the present inquiry ?—Yes.

19,118. Will you give me your opinion as to the best site for a harbour of refuge for this north-east coast ?—I consider it would be a great improvement to the entrance of the Tees if a breakwater was constructed of the west side of the bay, running in a west direction and enclosing an area for 150 sail. That, in my opinion, would meet all the exigencies of the case.

19,119. (*Mr. Lindsay.*) Is the plan one of your own ?—It is.

19,120. Will the breakwater have nothing to do with the roadstead ?—It will not. It will be a protection from a north-east sea, and give a better lead both in and out, and I expect that it will deepen the channel.

(*Mr. Dodds.*) The plan proposed is the same as that proposed by Mr. Bald.

(*Witness.*) It was proposed many years before Mr. Bald came to this neighbourhood.

19,121. (*Capt. Washington.*) Do you consider that your breakwater will deepen the bar ?—I do ; the channel at the entrance to the river is $2\frac{1}{2}$ miles ; if reduced to $1\frac{1}{4}$ it will have a greater power, because it is now spread to such an extent that it has lost its power upon the bar.

19,122. Do you think what you propose would be sufficient ?—I would not have anything more done ; I think it would be quite sufficient.

19,123. I see you are buoy-master of the river ?—Yes.

19,124. Are the buoys in good order, and are there enough of them ?—Yes.

19,125. Do you know that the buoys are coloured differently in other rivers ?—I don't know that.

19,126. How long have you known the Tees Bay ?—Forty-six years.

19,127. Could anything else be done to improve the Tees Bay, as well as to construct a breakwater ?—A pier or breakwater might be made from Hartlepool Heugh to the Seaton buoy. I would advocate a good pier from the Heugh. The Tees is a natural enemy to the Hartlepool road and to the Tees Bay generally, for whatever comes out of it goes into the bight.

19,128. Do you think it would be desirable for any work to be constructed at Hartlepool to keep out the sand ?—I do.

19,129. There are two life-boats at Seaton ?—Yes.

19,130. Have they put out to sea for the purpose of saving life ?—Yes, but I never helped to man them.

19,131. Have they been the means of saving many lives ?—Not many.

19,132. I suppose a great many vessels have been wrecked upon the Long Scar and the Heugh ?—Yes.

19,133. (*Mr. Coode.*) Is there a great deposit to the north of the Tees, generally settling upon the Seaton beach and the north end of it, which is south of the Long Scar Rocks ?—Yes.

19,134. And a great deal goes into the west dock at Hartlepool, and they have to dredge it out ?—Yes ; the docks, at all events, silt up, and the silt looks a very great deal like the stuff that comes out of the Tees. I have seen some of it near the Cliff House that has been taken out of the dock.

19,135. Do you know of your own knowledge that that was taken out of the dock ?—I don't know of my own knowledge, but I have been told so.

19,136. Have you any reasons to disbelieve the statement ?—I have not.

19,137. (*Capt. Washington.*) Do you know anything about the silting up in Hartlepool Bay ?—There was a good specimen of the silt in Hartlepool Bay when the old harbour was opened. The depth of water at that time, and the depth of water they have now, prove that there is a silting up.

19,138. Has there been any decrease in the sand on the beach ?—No.

19,139. Do you think there has been any increase ?—I will not say that there is. The Hartlepool pilots have told me that there has been a silting up in the bay of five or six feet within the last 20 years.

19,140. We know from accurate soundings that that is not the case. Do you know Mr. Mossman, the haven-master ?—Yes.

19,141. I dare say you know he is an accurate man; a careful sounder ?—I don't know anything to the contrary.

19,142. Then you will be glad to know that, from his certain knowledge, during the last 10 years there has been no increase ?—Then the pilot's statement must be untrue.

19,143. (*Mr. Lindsay.*) Have you ever had any conversation with the West Hartlepool pilots on this subject ?—No.

19,144. (*Capt. Sulivan.*) In order that you may not seem to put in what is not correct, I will ask you, if that silting up has gone on from 20 years ago to 10 years ago, would it not partly confirm the statement made to you, although the silting had not taken place during the last 10 years ?—True ; that is correct.

Thursday, 21st October 1858.

PRESENT :

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.
Mr. LINDSAY.
Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.

Mr. EVANS, Secretary.

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(*Mr. Dodds.*) With reference to the observation which fell from Mr. Lindsay last night, as to the plans which were before you, I hope Mr. Fallowes will be able to clear up some little confusion which has arisen from plans not intended for the Commissioners being handed up. He will explain that what the Tees Commissioners promote essentially is the new breakwater shown upon the Plan No. 7, in the Blue Book of 1857. That was suggested to Captain Washington by Lister, the last witness of yesterday, upon the occasion of an inquiry before the Commissioners on Tidal Harbours, in the year 1845. Lister's evidence was taken on the 29th October 1845, and will be found in the Appendix to the Second Report of the Commissioners, page 362. Since then, the subject was brought under the notice of Mr. Bald, who was the Admiralty engineer appointed to make an inquiry into the Tees, upon the occasion of a Bill

being introduced for the purpose of transferring the Tees Navigation Company to the present public body, the Tees Conservancy Commissioners, the conservancy of the river. Mr. Bald then sanctioned what had been originally suggested in the year 1845, and upon his recommendation to the Admiralty in the year 1852, a clause was inserted in the Tees Conservancy Bill a copy of which I will hand in—Clause 53, which enables the Admiralty to construct this particular breakwater; and upon the Parliamentary plan of that year, Mr. Bald laid down the particular breakwater in question. That is the work which Mr. Fowler estimates will cost somewhere about 70,000*l.* to 80,000*l.* Subsequently, in the year 1854, I believe, Mr. Rendel, at the request of the Admiralty, also reported upon that scheme, and sanctioned the form of it, with some trifling alterations. Again, after that, in the year 1855, Mr. Calver reported upon it very strongly. He improved upon it, and made some little alterations in its form and extent; and upon these various opinions expressed by Mr. Bald, Mr. Rendel, and Mr. Calver, Mr. Fowler laid down the particular breakwater to which I have already referred, as given on the Plan No. 7, annexed to the Report of the Select Committee of the House of Commons in the year 1857. That is the plan which I, on the part of the Tees Conservancy Commissioners, am anxious should have the consideration of this Commission. That is the plan put in by Mr. Fowler, where the breakwater is shown in a deep red colour. In the year 1857, Mr. Anderson was called upon to give an estimate of a sum for which he would undertake the construction of that breakwater. All the details were then before him, and he gave the estimation, which he submitted to you yesterday. That was upon the original plan, upon the plan coloured red, put in yesterday, the cost of which he estimates, according to the Abernethy system, would be about 285,000*l.*, according to some other systems, about 460,000*l.*, which, from his evidence, I think you will find he is of opinion, would make Tees a safe harbour at all times of the tide. Mr. Fraser was called in to assist Mr. Fowler with reference to this matter. When he was called yesterday, he was called for the purpose of confirming Mr. Fowler's estimation and plans, with reference to the small breakwater, the cost of which will be 70,000*l.*; and secondly, with regard to the larger plan for the improvement of the Tees; and thirdly, to state his opinion as to the best site in the Tees Bay for a harbour of refuge, in the event of the Commissioners deciding to recommend one large harbour instead of improving the existing Tees harbour. Hence the plan Mr. Fraser put in, for the construction of a large harbour on Coatham Sands. There are two other gentlemen with whom the Commissioners had communicated, who have similar designs, varying in the slightest degree from Mr. Fraser, and constructing the harbour at the same spot. Perhaps, with this explanation, what appeared a little confused yesterday, may now seem a little more systematic to the Commissioners; and they will, perhaps, be better able to understand the evidence. The evidence which I shall adduce will be principally in reference to the shorter breakwater, the 70,000*l.* breakwater, which was brought under the notice of Captain Washington by Lister, and to which the Tees Commissioners have constantly adhered, having seen no reason whatever to alter their opinions which were formed by their predecessors, the Tees Navigation Commissioners, and have since been sanctioned by authorities of such eminence as Mr. Rendel, Mr. Calver, and the late Mr. Bald.

19,145. (*Chairman.*) Then I distinctly understand that, as regards the Tees case, it is the smaller of those two plans, which appear on the chart?—Just so.

19,146. The estimate of which was, in round numbers, 70,000*l.*?—The larger work, which we have also submitted, would give from 18 to 20 feet water at low water, spring tides, and of course would be very much above 20 feet at high water. No doubt we should very much prefer this to our own original plan of 70,000*l.* Nevertheless the 70,000*l.* project would, in our opinion, be everything that could be required for the local shipping connected with the Tees, and would indeed afford a considerable refuge for the ordinary colliers frequenting the coast, because we have already 10 feet of water over the bar. All, therefore, that we require is, a breakwater which would limit the entrance to the Tees, which is now two miles and a half across, fix it and make it certain. With a lighthouse at the end of the pier, vessels would be able to run to it. Now they cannot run with any certainty, on account of the sandbanks which are constantly moving about. Subject to the observation as to the preference for the larger scheme of improvement, we advocate the 70,000*l.* scheme.

19,147. The Tees Conservancy case is primarily the reduced plan of 76,000*l.*; and secondarily, the more enlarged plan that we see on the yellow line—the extended breakwater?—Just so.

19,148. The great harbour you take no charge of?—We take no charge of. If it is constructed anywhere in the Bay, it must of necessity be of great advantage to the Tees. Our only wish would be to have the best site.

19,149. Before proceeding with the evidence it would be convenient for the Commissioners to have the several plans handed in. If there are any plans connected with Redcar, we should like to have them simply handed in?—My observations as to the large harbour on the south side of the Tees, apply to the portion shown by the red lines.

19,150. Mr. Fraser's?—To the harbour proposed to be constructed between the Tees mouth and Redcar, irrespective of that which will be put before you by Mr. Brookes.

19,151. That is Mr. Fraser's plan, which is already in evidence?—Yes.

Mr. William Alexander Brooks handed in the plan of the Commissioners.

Mr. JOHN DUNNING examined.

19,152. (*Chairman.*) Are you by profession an engineer?—Yes; an engineer and surveyor.

19,153. Where do you reside?—At Middlesborough.

19,154. Do you appear on behalf of any parties, or simply on behalf of yourself as a projector?—I appear on my own behalf. I had the honour of giving evidencee before the Select Committee of the House of Commons in London in the year 1857, and have prepared a plan for a harbour of refuge, which was handed to Captain Washington last evening, and which I now propose to put in. [*The plan was put in.*]

19,155. I find on this plan No. 1, there are sheltered in gales from the north, having a depth of above five fathoms of water, 475 acres; above three fathoms, 673 acres; below three fathoms, 96 acres; making in all 769 acres. I find also there are sheltered from the north-east winds 535 acres, with above five fathoms water; 855 with above three fathoms water; and 302 with below three fathoms water, making a total of 1,157 acres. I find also there are sheltered from the east winds 605 acres, with above five fathoms water; 1,075 acres, with above three fathoms water; and below three fathoms water 592 acres; total, 1,667 acres. That, I presume, is correct?—That is correct.

19,156. I see that the breakwater is divided into two portions, the outer portion, which is parallel to the shore, and the inner portion, which runs off nearly in a perpendicular direction from the shore?—Yes.

19,157. Will you state to me the cost of each separately; first, the cost of the outer pier; and secondly, the cost of the inside portion?—The cost of

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the outer breakwater is estimated to be 816,000*l.*; the cost of the other 84,000*l.*

19,158. Have you any written statement which you can lodge with us which we can consider hereafter as explaining your plan?—I have not any such statement, but I can prepare one.

19,159. Would you be good enough to prepare a written statement, showing what you suppose to be the advantage or necessity of this plan, and forward it to our secretary for consideration in London?—I shall be happy to do so.

(*Chairman.*) If it does not suit the convenience of the Commissioners to examine you as to your plan here to-day, it will always be in their power to call you up to London at a subsequent period for that purpose.

Mr. William Alexander Brooks examined.

Mr. W. A. Brooks.

19,160. (*Chairman.*) Are you an engineer?—Yes.

19,161. And reside at Newcastle?—Yes. I am engineer to the Tyne Improvement Commissioners. I was engineer for a long time for the River Tees. Most of the large works there were executed by me. Besides the plan I have handed in, I have another plan, as to which I do not intend to go into any details to-day. A copy of it was lodged with the Admiralty about two years ago. Here is another plan, an old plan of Runswick Bay, which I think will be valuable and interesting to you. There are some lines drawn upon it by myself a great many years ago. I have also an unfinished copy with soundings, and an outline of the coast, which is at the service of the Commissioners. [*The plans and sketches were handed in.*]

19,162. Mr. Brooks, you term the breakwater which I see on the plan before me, the Marske breakwater?—Yes. It is the plan of my old scheme of Redcar harbour, with a detached breakwater abreast of Marske, when I thought there was a call for a very large harbour.

19,163. I am dealing with this Marske breakwater which will shelter, with the wind at the east, 870 acres of good holding ground, having a depth of five fathoms and upwards at low water spring tides, and 1,000 acres having above four fathoms?—That is the fact.

19,164. The Redcar pier will shelter during all winds 330 acres, having a depth of from four to six fathoms at low water spring tides?—Yes.

19,165. The construction of the Redcar pier, 6,200 feet in length, will take place on a rock called the Salt Scar Rock, bare at low water, 2,500 feet in from 1 to 12 feet, and 6,000 feet in from two to seven fathoms at low water. That, you think, is correct?—It is correct, taken from the soundings by Mr. Calver. The smaller plan is all from the survey of Captain Hewitt from tracings furnished by the Admiralty a great many years ago.

19,166. Your breakwater is divided into two portions; the Redcar portion, and the Marske portion. What is the total cost of the Marske portion?—I am hardly prepared to give that without looking at the papers.

19,167. What is the cost of the Redcar portion?—I should make the same observations with respect to that portion.

19,168. Will you, at your convenience, draw up a statement for the Commissioners to be forwarded to our secretary in London, showing the cost and the advantage and necessity, in your opinion, of the proposed breakwater, and all the other requisite information connected with them?—Certainly.

19,169. Do you wish to lodge the large plan which you have handed in?—I would rather keep it, because there is already a copy at the Admiralty.

19,170. Then that is not lodged. Do I understand that the plans containing the soundings are lodged for our use?—You can keep them if you please. One is an unfinished copy, but the other is a finished plan.

19,171. (*Chairman.*) We will keep these to refer to, but will not put them in evidence. Are there any other plans coming in to us?

(*Mr. John Anderson.*) This is the plan for a large harbour at Redcar [*handing in a plan*].

Mr. John Anderson re-examined.

Mr. John Anderson.

19,172. (*Chairman.*) Mr. Anderson, have you any details, plans, or estimates to lodge with us respecting these breakwaters?—Yes, I have.

19,173. (*Sir F. Smith.*) Are the figures in this plan in pencil?—Yes.

19,174. (*Chairman.*) Everything must be put in in ink. Are your estimates prepared for this plan?—Yes.

19,175. Can you hand them in at once?—They are not in a state to be handed in at once. They could be got ready to-day.

19,176. I think it would be better for you to take a little more time for consideration; that you should do as the other gentlemen will do, and forward to us, at your convenience, to London, well, considered estimates, if you are prepared to do so?—Certainly. I will.

19,177. You say that your plan is divided into two parts; a breakwater running from the Heugh at Hartlepool?—That is not my plan.

19,178. It is on the plan which you have handed in?—It was on the chart when I bought it.

19,179. We cannot accept plans in this manner. A great deal of time has been occupied. We cannot take in plans in this crude, unprepared state?—I will remove that.

19,180. I think it would be better not to receive any plan from you at present, but for you to forward to us, in London, prepared plans and estimates at your convenience?—I shall be most happy to do so.

19,181. With a statement of the supposed advantage and necessity of what you are going to propose?—Yes.

[*The plan, and also a section which had been handed in, were returned to the witness.*]

Mr. John Fraser re-examined.

Mr. J. Fraser.

19,182. (*Chairman.*) Mr. Fraser, I understand you want to correct what appears to be an inaccuracy of your statement yesterday, respecting the price of rubble?—I fear it will be thought that I said that the rubble would only cost 3*d.* per ton for getting. I meant to say that it would cost 8*d.* It is 8*d.* instead of 3*d.*; 5*d.* for the expense of loading and the incline, and 3*d.* for simply raising the rubble, which would make 8*d.*

19,183. (*Mr. Coode.*) It is desirable that Mr. Dunning and those gentlemen who are about to forward plans and statements to London should comply with the memorandum which will be handed to them by our secretary. That memorandum has reference to the scales on which the plans and sections should be drawn, and also to the calculation of the areas. The object of this is that we may have them all on the same scale, and that the areas should be compared with one standard as regards depth. (*To witness.*) Will those corrections which you have now made affect the total amount of the estimate?—No, the total of 1*s.* 9*d.* still remains as the price.

19,184. (*Mr. Coode.*) The total will remain as you stated yesterday?—Yes.

19,185. (*Chairman.*) You are going to remain during the rest of the proceedings?—Yes.

(*Mr. Dodds.*) If it would be agreeable to the Commissioners, Mr. Fraser will be willing to send

a written report which was addressed to the Tees Conservancy Commissioners, and which will substantiate the evidence he intended to give yesterday. Perhaps there would be no objection on the part of the Commissioners to allow that to accompany his plan? (*Chairman.*) None. Let it be forwarded.

Mr. BROOKS re-examined.

19,186. (*Mr. Lindsay.*) You stated that you are the engineer to the River Tyne Commissioners. I do not remember seeing you there when we were examining the witnesses at Shields. Why were you not there? Were you not summoned by the River Commissioners to give evidence?—That was the fact.

19,187. Were you not in attendance at all?—I was not in attendance.

19,188. A plan has been laid before the Commissioners for the extension of the piers which are in the course of construction at the mouth of the Tyne, so as to carry those piers out to about 30 feet at low water, with the view of converting the mouth of the river Tyne, and the Tyne itself, into a harbour of refuge. Do you know anything of that plan, and if so, could you state to me your opinion respecting it?—I have seen a rough copy of it, a very rough copy, but it has not been formally brought before me to give my opinion upon, as a finished plan by Mr. Walker. I should like to hear his evidence upon his own plan before I give any opinion upon it.

19,189. Mr. Walker was unfortunately unable to attend before us, on account of a great family bereavement, the loss of a daughter; we had not his evidence, but we had the whole subject brought fully before us. As you were not there, I had no opportunity of seeing you. I may not have another opportunity of seeing you again, and should like to ask you if you have formed any opinion about that plan, and if you have, if you will give it me?—If you will favour me with a sight of the plan, I will give you an opinion upon it.

19,190. You have not studied it sufficiently to be able to give an opinion upon it?—I think I can, if you will put the plan before me.

19,191. I don't think we have the plan with us in this room?—It would hardly be justice to Mr. Walker for me to give an opinion upon his plan, not having heard his own description of it. It would be unfair to a brother professional man.

19,192. For reasons which have been suggested to me, I will not ask your opinion with regard to that particular plan; but while you are in the witness box, I should like to ask your opinion with regard to the advantage of constructing harbours, so called, of refuge, at the mouths of tidal rivers?—There are some rivers, that are capable of very great improvement. There is no doubt of that. But there are other rivers,—if you put the question generally as to the rivers on the coast, I should say there are one or two capable of improvement, such as the Tyne,—but there are others that I know of, where there has been an expenditure of a quarter of a million, or 300,000*l.* or 400,000*l.*, upon them, and they have been made no better. We know that in the river Wear there has been a large expenditure. They have spent 20,000*l.* a year for many years, and have only two feet of water on the bar. Now I certainly should not like to commit myself as a professional man, and say that I would recommend a large expenditure of public money upon such a work as that. With regard to the Tyne, it is different. There is over eight feet at low water. I feel satisfied that it can be greatly increased in value as a refuge harbour, although not so as to make it equal to the Humber or the Thames.

19,193. What I want to know is this; speaking generally, so far as the Tyne is concerned, and not alluding to any particular plan, say that they do carry out piers to a depth of 30 feet at low water at the mouth of the river, suppose at the Tyne or any other large river, do you think they would be able to maintain that depth?—I have no such opinion. It may be matter of experiment, but I don't know whether it has been tried. I have no certainty that if you carry out the piers to 30 feet water you will necessarily maintain it. If that were so, you might do the same at Whitby, or the Wear, or any other stream. If going into the sea procured deep water, any stream could get it.

19,194. You have doubts in your own mind of being able to maintain the depth, even if the piers were carried out to 30 feet at low water?—I have no doubt upon the subject; that is, I don't think it possible to make and maintain 30 feet of water. I don't think you destroy the cause of the existence of the bar by merely extending the piers.

19,195. It has been suggested if you carry the piers out, so as to meet what is called the ocean tide, running directly north, south, east, or west, whatever the line of the coast, that these bars might be destroyed. I am asking for your opinion upon the subject, as it is a matter on which I am entirely ignorant; would the carrying out of the piers sufficiently far into the sea to meet the ocean tide tend to remove the sand which otherwise collects at the ends of piers not carried so far out to sea?—If the piers were carried out beyond the bar, so that there was a very much stronger tide, say such as that running in the Bristol Channel, where we know it makes four or five knots an hour, I think you would have a very reasonable hope of greatly improving the bar, or getting rid of it. But the tide does not run with that speed on this coast. The general rate of spring tides in the strength of the tide at half and three-quarters flood, is only about one knot an hour. I don't find that by going out you get any greatly increased strength of the tide; I know that it does not increase.

19,196. Then you think that the carrying out of the piers to the distance I have named would not produce any change in the accumulation of the sand which takes place and forms a bar somewhere about the end of the piers, if they are much nearer the shore?—I think the piers as originally planned go into an equally strong tide and get the same benefit by that length as if you went out further. You get into the true stream of the tide; further in there is, of course, more eddy, because the points overlap and produce an eddy on the flood tide. By carrying out the piers according to the plan which is now being acted upon, you get into the true tide. I think with the river improvement we should get perhaps 16 feet of water. With the sixteen feet flow of the tide that would make the Tyne a very good harbour of refuge.

19,197. Do you think that when these piers are carried out as now suggested, to get 16 feet at low water, that you can maintain that depth?—With the river improvements which are intended to destroy the cause of the existence of the bar, I look upon it that the improvement of the bar is more likely to be effected by internal river improvements; I regard the piers more as giving shelter to vessels going in and out. I know that eminent engineer, Mr. Robert Stephenson, entertains the same views. We must remove the cause of the obstruction which now exists.

19,198. Tell me the force of the tide in the Tyne. At what rate does it run out?—It varies in different places. At Shields Harbour it runs about two knots an hour.

19,199. Have you ever known the ebb tide in an ordinary spring tide run at the rate of five knots?—No.

19,200. It was so given to us in evidence.—It runs very sharp through the Narrows, about three and a half or four knots an hour. With a great land flood in some parts of the harbour that would be the rate; but on the bar the velocity is very different

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indeed. The velocity there in these land floods would not be more than a knot and a half per hour.

19,201. If a witness stated to us that the tide ran out at the rate of five knots an hour, and that he has known the freshets from the Tyne to run five knots, making together 10 knots an hour, would you think that an exaggerated statement ?—He would not say the tide ran five knots and the freshets five, making 10. I think that must have been a misconception.

19,202. He did state that, so far as I understood him ?—I don't think he meant that, whoever he was.

19,203. Then you think the greatest speed at which the stream runs out with a freshet would be five knots an hour ?—I don't think it would run so much as that. We had the flood measured in a narrow part of the river abreast of Newcastle, by Mr. Calver, with a very capital section for it, and the rate he made was only four knots. I don't believe that you would find a greater velocity than that in any other part of the river.

19,204. At the ordinary spring tides what do you think is the greatest velocity on the bar ?—The tidal observations which we have show only one knot per hour.

19,205. During spring tides ?—During spring tides.

19,206. In neap tides ?—In neap tides, at the end of the proposed extension, it runs out one mile in an hour and a half.

19,207. In neap tides ?—Yes ; that is, going well out to sea, going into 30 feet at low water.

19,208. Do you think the running out of the tide from the Tyne would, as a usual rule, offer obstructions in the way of a ship entering the river when it was blowing a strong easterly gale, and seeking refuge during the ebb tide ?—I have just said that the rate being only one knot an hour, would not offer a serious obstruction, yet it would be better without it.

19,209. But in the case of freshets, would it offer an obstruction ?—There would be a greater obstruction ; there would be a heavier sea from the running of the tide against the wind.

19,210. Are freshets of common occurrence in the Tyne ?—Not those very heavy ones. Perhaps there are six or seven in a year, but years vary very much.

19,211. (*Capt. Washington.*) I believe you have had a good deal of experience in dealing with tidal rivers ?—I have, for the last 30 years.

19,212. You were, I believe, resident engineer in the Tees during nearly all the time that the works above Cargo Fleet were going on ; after that, you left the Tees, and went to the Tyne ?—Yes, for 16 years.

19,213. Did you, about that time, make it your business to examine the different harbours of England ? —There are very few on the English coast that I have not examined.

19,214. Did you, about 20 years ago, publish a work on the subject ?—I did.

19,215. And before writing that work, I suppose you studied the subject ?—I had had considerable experience before I wrote that work.

19,216. Do you consider that any tidal river in this country has ever been treated in the best engineering way, and with abundant means at the disposal of the engineer ?—I don't think any one has. I know of no river where we may say the experiment has yet been fairly tried.

19,217. Do you not consider it desirable that that experiment should be fairly tried ?—I think it is.

19,218. Do you know any river in the United Kingdom which offers a better opportunity or a better field for trying it than the river Tyne ?—I know no river so capable. It is a good river in its course, and at the mouth there is not any danger of the entrance shifting after works have been carried out. In some cases, perhaps, after you had constructed works, the river would make a new sea reach. In some rivers you might carry out piers, and then at the end of them you would perhaps have a new sea reach formed by the banks expanding right and left.

19,219. Is Mr. Walker chief engineer of the Tyne ?—No, he is chief engineer of the pier. I am engineer of the Tyne. Mr. Walker is simply engineer of the piers. It is well known that Mr. Walker merely adopted one of my designs for the Tyne piers; the piers are in form precisely the same as those which he copied from my plan, with the exception that the pier heads are several hundred feet nearer to each other than in my design, so that, in fact, they are so close that I am satisfied that if built according to his design the bar would be formed seaward of the pier heads [and I wish that this opinion of mine may be recorded in evidence].

19,220. He is engineer of the experiment now being carried out ?—Yes.

19,221. In his absence I would not ask an engineering question ; but do you think it desirable that the experiment should be tried on a proper scale ?—What experiment ?

19,222. The experiment of improving the entrance of tidal rivers ?—I think it ought to be.

19,223. (*Capt. Sulivan.*) Will you explain why, if the Tyne with eight feet and its current can be deepened to a certain amount, by piers being carried out, and by narrowing the channel and confining it at the mouth, the Wear, with its $2\frac{1}{2}$ feet and its smaller current, could not, by similar means, be deepened in a relative proportion ; the methods being something similar, and the piers of the Wear answering to the Narrows of the Tyne : why should not a relative advantage be gained by carrying out piers from the Wear, the same as from the Tyne ? —I must do justice to the Wear as well as to the Tyne. I must tell you that the Wear generally has had four feet at low water on the bar ; and if proper treatment is pursued, you have a right to expect that the river Wear also would be improved.

19,224. I understand you to say that the works at the Wear had all failed, and that you could do nothing to the Wear to improve it ?—Not to make it a harbour of refuge, the river being so small, but it is still capable of improvement.

19,225. From what you know of tidal rivers, could you conscientiously recommend any outlay of public money, with a certainty of producing the desired results, if it included within the works a tidal river and its bar ?—Yes ; but not to make a perfect harbour of refuge, but to give an easy refuge. I could not perhaps recommend the expenditure of a million of money, but I should recommend a moderate sum to be advanced ; not a very large sum, like a million of money, or the capital which would be required to make a complete harbour of refuge with 30 feet at low water.

19,226. I believe they expect to get 15 feet at the Tyne at low water, by means of their piers ?—I expect to get it rather by natural improvements. I look upon the cause of the formation of the bar differently from some people.

19,227. Do you believe that the piers being extended outside the entrance will be the cause of getting the 15 feet, or would other works up the river be necessary ?—Other works in the river in connection with it, but mainly from internal improvements in the navigation.

19,228. (*Capt. Vetch.*) You have been long acquainted with the river Tees ?—Yes.

19,229. Can you tell us anything of the shifting of the channel near the floating light ?—I don't think there is a very great shifting there ; the shifting is more in what we call the sea reach, which you will see, from the Admiralty chart of the Tees, runs west of north.

19,230. Has the light-ship never been altered ?—I once made a survey of the mouth, and it then run about north-east, but I have seen it west of north. It was so in Captain Hewett's time.

19,231. Have you got lights on the Bran Sand ?—Yes.

19,232. Have they been altered ?—Yes, they have frequently been shifted ; they were changed during my time.

19,233. First to the east and then to the west ?—Yes.

19,234. How much did that amount to in your time ?—I think from west of north to north-east.

19,235. What distance ?—About an angle of 50 degrees.

19,236. That is to say, the bar has shifted in that direction ?—The plan which I have put in is Captain Hewett's survey of the river. If you refer to that you will see that the channel comes west of north, but in the plan of a recent survey I think it is shown as north-east.

19,237. Can you tell me if the channel at the inner leading light moves from eastward to westward ?—I believe it varies, but not to a great extent.

19,238. A hundred yards ?—It may be so, but I have taken no measurement, and should not like to give any more direct statement.

19,239. (*Mr. Coode.*) Did you hear the evidence given by Mr. Fowler with reference to the proposed improvements within the Tees ?—Yes.

19,240. Do you believe that the measures proposed by him will be attended with the results which he anticipates ?—His pier terminates upon the South Gare Sand, where there is only about three feet at low water. I think it went out to a much greater depth at first. It shows dry there.

19,241. I should like to have your opinion as to the probable result of the pier as proposed by him ?—I think it will be beneficial to the river ; I think it would give the current a more easterly outset. There would still be sand banks right and left of it, further out, in fact, than his pier head, but the river would be in a better state. It would be an easier course in from the sea.

19,242. Do you think the channel would be permanent as far as regards position ?—I think they would have the effect of making it permanent. I should say that is very near what was the plan of Mr. Lister, the pilot, many years ago. They all come to the same point.

19,243. Do you, or do you not, think that the channel would be permanent as regards position ?—I think it would at all events be a great deal more permanent than it is at present. I don't say it would be permanent, keeping merely north-east and south-west.

19,244. Would it be very much better than it is at present ?—Yes.

19,245. What is your idea regarding the depth of water that would be obtained ?—I think it would improve the depth of the channel.

19,246. To what extent ?—They have now about seven feet six inches on the bar at low water spring tides by the Admiralty chart. I should think they would maintain 11 or 12 feet.

19,247. Permanently maintain that ?—I think it would have that effect. It would concentrate the power of that great body of water upon the bar, a great deal of which is now wasted.

19,248. In giving that answer are you assuming a guide wall to be constructed inside the small piers, as shown upon the chart put in ?—If there were no guide walls, still there would be, as it now stands, a great body of water falling on the north side of the estuary, and, with the entire body from the south side, it would take a more easterly outset. It would give you perhaps a stronger outset to the sea than if you were to enclose the channel as it now lies with guide walls.

19,249. You see on this plan which Mr. Fowler has put in, one guide wall within the estuary of the Tees ?—It is on a convex shore. Now a convex line of wall is not a guide wall. To be a guide wall it should be a concave one. I think the river would still have full power to meander away to the north.

19,250. Assuming these works to be constructed, do you think that the channel within the bar would be permanent ?—No, I think it would vary, and vary considerably.

19,251. Would it vary in position ?—I think the effect of that guide wall would be to throw the channel more away to the north, but that would rather be an advantage, because if you had the channel more away to the north, and towards Seaton Snook, there would be a better chance of a more easterly outset.

19,252. With the guide wall and the north pier you think there would still be a variation of the channel ?—With the guide wall as shown on the plan, yes, sir.

19,253. To any extent ?—Yes, to a considerable extent. I think it would send the channel more away towards Seaton Snook, but I think that is rather an advantage.

19,254. Having sent it there, would it then remain ?—It might be made permanent. It would be more permanent then. You get upon hard ground, on the clay bank. I know there is such a bank there. I have tried the ground on the north side, and know there is a clay bank there. That would render it more permanent.

19,255. You think the channel would not be liable to return to the guide wall. I understand your answer to be to the effect that the channel would be driven away from the guide wall ?—Yes. It would make a channel more to the north. Then I think it would be more permanent ; but it might drive it over the shallow ground. I think I heard some observation about there being only three or four feet on the clay. That would have to be deepened. If it drove the current over the clay ground that clay ground must be dredged out.

19,256. You have some doubt whether the channel would remain permanent by along the guide wall ?—The channel, I am sure, would go away to the north from the guide wall. It would not be there.

19,257. Having left the guide wall, would it or would it not be more subject to variation, according to the state of the winds and the floods ?—There is a considerable space for it to range about, and so it would be liable to vary.

19,258. Would it or would it not, be more liable to variation ?—It would be more liable to variation ; but I don't look upon that as a guiding wall, a wall having a convex form.

19,259. I ask your opinion upon this plan, as you now see it ?—If there was a concave wall on the opposite side it would be a good wall and a permanent one.

19,260. The water would still be free to distribute itself over a large area, and the result would, in your opinion, be somewhat doubtful ?—Certainly.

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19,261. (*Chairman.*) You reside at Middlesborough and are a Commissioner for the Tees Conservancy, and a shipowner ?—Yes.

19,262. I understand you have some statistical information which you which to lay before us. Will you now be good enough to give it in ?—This is a matter to which I have given some consideration. I am not quite aware whether you wished our chairman yesterday to give you any statement as to the expenditure which had taken place on the river during the time of the late conservators, when the matter was in the hands of a joint stock company, and since it came into our own. If you wish to have that information, we will prepare it, so that you may have a full statement as to the expenditure which has taken place in the river, with all the improvements that have been made by means of groins and guide walls. We can prepare a statement of that kind, if you wish to have it.

19,263. Will you forward such a statement to our secretary at your convenience ? — We will, The explanation given by our clerk yesterday is

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that which we wish to have brought before you. Now, with reference to the plans which have been submitted, the plan which was first submitted by Lister has, as Mr. Dodds, our clerk, explained, had the approbation of the Commissioners ever since they came into office. They have devoted their attention to making it well known, and endeavouring to see it carried out, if they can. It is a very modest plan, the sum is so small. You would hardly think that for so small a sum so great a good can be obtained; but the Commissioners are fully convinced, that if the money of the Government is expended on the different ports, a large amount of property and of life will be saved. I speak advisedly on that point, having given some little attention to the subject. I have calculated from the Admiralty register the wrecks for the two years 1852 and 1854. If you will allow me, I will put these papers in. (*The paper was put in.*) This is a list of ships registered at the ports of Stockton, Hartlepool, Sunderland, and in the Tyne, giving the names of them and distinguishing between those which were proceeding to those ports, as belonging to them, and those which were passing, as merely being bound for them; also showing those which were seeking refuge. And where there is any wrecked, as to where they were proceeding. The first return is for 1852, showing at Sunderland five ships seeking refuge, and 15 belonging to the place; at the Tyne, 17 belonging to the port and 22 seeking refuge; at Hartlepool, 15 seeking refuge, and four belonging to the port. The next return is for the year 1854. That was a year of great casualties, and there were several heavy gales. This return shows 40 vessels at the Tyne, either bound for or belonging to it, and 22 that were seeking refuge, of which there is no account as to where they were proceeding. At Hartlepool, there were 36 seeking refuge, and 12 bound to or belonging to the port; at Sunderland, there were 24 as belonging to or bound for the port, and 14 seeking refuge; at Stockton-on-Tees, there was one seeking refuge, and two bound for or belonging to the port. We think that this statement shows that if the larger number of ships were wrecked or stranded at these places that these are the sites which really require improvement.

19,264. Before you proceed further, will you state why you selected the years 1852 and 1854?—I happen to have the registers myself, and I had no others; but, if you wish it, I can calculate the others for five or seven years.

19,265. That is all; I only wished to know the reason.—We have always been persuaded that the Tees would have been more used, and would have been considered a place of refuge and safety if it had been better known. Those of us who are old enough, remember, that before Hartlepool was a port, colliers, when they had to bring up before making the ports in the north, did generally run for the Tees, and generally got in with safety and without much casualty. I produce a list of vessels wrecked and stranded at the Tees mouth, from the 1st of March 1839 to the 9th of February 1858, showing that when we had 10,000 ships into our port, two vessels were wrecked; that in 1849, we had 9,192 vessels entering our port, and that one vessel was wrecked and one stranded, and so on during the whole period. Our port, you will observe, has undergone a most extraordinary change within the last few years. In the years 1854 and 1855 we were what we may call almost in a state of collapse. We were passing from a large coal trade into an entirely new one, the iron trade. The coals which we were formerly in the habit of exporting began to be used in our furnaces. Our iron is now being exported, and the quantity is gradually increasing every year; so that in the course of time our new trade will almost be equal in extent to the old one. I now beg to put in a statement, showing the number of losses which have occurred in the Tees over the time I have mentioned. (*The statement was put in.*) I would further beg your attention to a chart which was, I believe, submitted to the Harbour of Refuge Commission of the House of Commons in the year 1857. It was prepared by Mr. Calver, and, I believe laid before the Committee, and is No. 2 in the Blue Book. From that I can show, that of all the casualties which occurred on the coast between the Humber and Warkworth, there has been the least damage in proportion to the number of ships entering and departing from the Tees of any port on the coast. The statement which I have prepared, abstracting it from that chart, shows that the average annual traffic to the Humber in shipping is 22,000, and they had 16 vessels wrecked. In the Tees, with 6,355 vessels, our wrecks were only $2\frac{2}{5}$ per annum. (*The statement was handed in.*) A great deal of evidence was submitted to you the other day at Hartlepool, as to the gales which have prevailed, and the losses resulting from them. I have prepared a statement showing the number of gales which have prevailed in the Tees Bay in each wind from the year 1843 to the year 1857, with the direction and force of the winds, also the reading of the barometer and thermometer from a certain time. The register of winds begins in 1843, but the register of the thermometer, I believe, not till 1856. I had these prepared from the tidal register which is kept at the Middlesborough Dock Lock, and that which is regularly kept on board the light-vessel, lying at the fifth buoy in the river. It is perhaps too voluminous for me to put in, but it shows the number of gales which prevailed on all parts of the coast every year from the year 1844, and these gales are generally of the force of eight up to, perhaps, 11. A question was asked yesterday as to the prevailing winds. I have a prepared statement here, showing what winds have prevailed each month during each of the last 15 years. I have also a statement of the statistics of the iron trade at the present moment. I may remark that the nautical gentlemen fully acquainted with our port are fully persuaded that had the works which we suggested, and which, as our clerk intimated, is so much approved of by various engineers, been constructed some years ago, the whole loss which has occurred in Hartlepool Bay, or the greater part of it, might have been saved by finding refuge in the river Tees. A witness who was examined yesterday, Mr. Lister, has given a great deal of thought and care to the soundings, but he is not one of those who can explain his views so clearly as he should; but he is fully persuaded, from his own soundings and the bearings of the bar at present, that were that work constructed there would not be less water than 24 feet at low water, spring tides. That is his decided opinion, and I believe it to be the opinion of many others who have thought carefully upon the point. Bringing a great weight of water permanently upon one particular place, and guiding it by the walls which the Conservancy Commissioners have constructed within the harbour, so that the whole weight of water would be carried over that one particular place, coming from a river of perhaps the largest extent of any upon the coast, except the Humber, there can, I think, be no doubt that we could obtain about the depth of water I have mentioned. I don't know that there is anything further with which I need detain the Commissioners. We are exceedingly anxious that what we recommend should be done.

19,266. With reference to your account of the winds, are you able to state, or have you reason to suppose that the winds which are noted at the light vessel are the same as the winds which blow outside at sea?—The light vessel is stationed at so short a distance from the bar that there can hardly be any difference whatever. It is not more than three quarters of a mile or a mile from the bar to where the light vessel is stationed.

19,267. Are you able to offer an opinion as to whether the winds up at the top of the bay are the same as those blowing out in the offing?—I believe so, generally. But we will produce the master of the light vessel, who will state to you from what quarter

the heaviest gales rise, and the course which they generally take.

19,268. (*Sir F. Smith.*) Have you examined this return of the winds carefully ?—Yes.

19,269. Is it not the fact that the great majority of the gales of wind occur from east-north-east to north-east?—So far as I can ascertain from examination, they begin, perhaps, from the south-east, and so proceed and get round to the points I have mentioned. Our light-master will state how that matter stands. He has noticed many times that they rise at south-east, proceed quite round, and almost invariably, in a day or two, come back to the same point.

19,270. The return scarcely shows any westerly winds ?—I did not insert the westerly gales, inasmuch as they are not the destructive winds. I have simply extracted these to show the gales of wind which have arisen during these years, and which have generally been so destructive on our coast. These generally have been from east or east-south-east.

19,271. You have purposely omitted the westerly winds ?—I did so. But if you wish it, I can give you a copy of the entire register.

19,272. (*Mr. Lindsay.*) Now that the question, so far as this district is immediately concerned, is fairly before us, which was not the case yesterday, I want to ask one or two questions : is it the general opinion of those interested in the shipping at Stockton and Middlesborough, that the improvement of the existing harbours, those to which you refer, would do more to save life and property than the construction of any one great harbour in any one site along this coast ?—So far as our own vicinage goes, I believe that those whom I have conferred with are undoubtedly of opinion that if our harbours were improved it would be the means of saving a larger amount of life and property than the construction of any one larger harbour, inasmuch as the documents which I have put clearly show that the vessels which have been wrecked at these ports could not have got back to this large harbour of refuge. But there is one element that I might perhaps notice in replying to the question, and that is, that we do not raise any question individually as to any protection which may be needed between this and Flamborough Head, because we do know that there has been a great destruction of property on that part of the coast. We do not raise any question about it. But we say, that if it be needful that some harbour on that part should be constructed, it might really be a useful harbour for laden ships.

19,273. I ask this question because, from your connection with shipping, you have perhaps more opportunity than any other gentleman who may be called, of seeing shipowners and shipmasters, and conversing with them on this subject. Do you think the primary object should be the improvement of the existing harbours ?—I do.

19,274. Do you think that the improvement of the existing harbours, so as to admit the usual description of vessels trading along the coast at all times of the tide, and the construction of a harbour somewhere near Flamborough Head—say off Filey Bay—that these two works would meet all that the shipping frequenting these places require ?—I do think so, It is, in fact, the opinion of the nautical men, of those connected with shipping with whom I have conversed, that by adopting this course you would have several places in which ships might obtain refuge in case of not rounding from Flamborough Head, presuming that you should recommend the construction of one ; seeing that you have Bridlington Bay, which is a very valuable place, and which can be used by shipping without cost. From Bridlington Bay down to the Tyne you would have places spread over all this distance where ships might easily obtain refuge, and to which they would approach and be near, while they might have much difficulty in getting back to a great harbour at any one site.

19,275. Tell me a little about your own proposed improvements ?—The plan which I brought before the Committee of the House of Commons in 1857, is this plan which I see upon the walls.

19,276. What depth of water will you have at the end of the proposed pier at low water ? I refer now to your 76,000*l.* plan ?—Mr. Bald reported that we should have 16 feet, and I believe Mr. Calver is of the same opinion. Mr. Calver, in his report of May 31, 1855, says, with reference to this plan—" In conclusion, I would beg to record " my opinion, that were a north pier formed at the " mouth of the Tees to the extent indicated in the " Parliamentary plan of the Tees Commissioners of " 1852, and now recommended by Mr. Rendel, it " would be followed by the most beneficial results ; it " would give certainty to the position of, and depth " over the bar of, an important river possessing at " present a large trade, which promises to become " greatly increased in future years ; it would render " the entrance of the Tees available for refuge " purposes, and thus confer a great boon upon the " whole coasting trade, and it would render unneces- " sary a large outlay at a neighbouring site to secure " a similar advantage, and where there are also phy- " sical drawbacks, which do not exist in the present " case." I do not know that I can say anything further.

19,277. Your harbour, if made in accordance with the plan laid before the Select Committee of the House of Commons, and at the cost of about 76,000*l.*, would afford shelter at all times of the tide to the usual class of vessels frequenting this coast ?—We are of that opinion.

19,278. What depth of water would you have at the entrance if you extended these piers to the extent Mr. Fowler proposed in his plan yesterday ?—I believe a depth of somewhere about 30 feet. I am not quite certain. Perhaps 24 feet.

19,279. The first plan would cost 76,000*l.* The extension of these piers, to get 24 feet of water, would cost 260,000*l.* if carried out upon the Abernethy plan ; and if carried out in the usual method of constructing breakwaters, would cost about 460,000*l.* Do you think, considering the class of vessels which frequent this coast, and considering that the limited plan would admit these vessels at all times of the tide, do you think it would be advisable to incur so very great an expenditure as the difference between 76,000*l.* and 460,000*l.*?—We are content to take the smaller scheme, sir, because we have been advised, for a number of years past, by Mr. Rendel, Mr. Bald, Mr. Calver, and other engineers, that we should still obtain a very large increase of depth of water, and it would answer all the purposes of the trade of the district.

19,280. Then, looking to the vessels which would be caught in the bight of this bay in easterly gales, and to the safety of the vessels belonging to your own port, you think that the more limited plan would meet the necessities of the case ?—I do ; and I believe this, that vessels of any size may then arrive and depart from our port up to 20 or 21 feet or more water.

19,281. We don't look to the departure. Commercial questions have merely a secondary consideration with us. It is a question of saving life. Say the Government should arrive at a different opinion from that which you entertain, and that they should think it fit that one great harbour would be better than the improvement of the existing harbours. Say there was only to be one harbour of refuge on this coast between Flamborough Head and the Farn Islands, at what particular part of the coast do you think such a harbour would do most to save life and property ?—If we had to choose in this respect, there could not be two opinions in the mind of any one on this coast, that the Tees Bay is the site where that great harbour should be fixed.

19,282. In looking at the great harbour laid down on that plan of 1847, and which very much resembles the plan handed in by Mr. Fraser last night, for a harbour of refuge at Redcar, do you think that a harbour at that particular site, or a harbour

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on the other side of the bay, under Hartlepool Heugh, presuming that the area of water was the same, and the depth the same, do you think that a harbour at that site or one near Hartlepool would do most to save life and property?—I can scarcely answer the question. It is almost an engineering question as much as anything else.

19,283. I am speaking of the matter as connected with shipping?—I should say that you will maintain a greater depth of water on this side of the bay than you would be able to do on the other,—that if these piers are constructed sufficiently high and expensive enough, they will also protect you from the heavy north-east gales. We cannot disguise from ourselves the fact that the Heugh and the high land there are the best shelters that can possibly be made from north-east or north gales, but still we do think that if you do decide upon a point of that kind instead of confining it to the locality immediately under the Heugh, a breakwater laid in the full face of the bay would be better.

19,284. What do you mean by the full face of the bay?—Extending right across the bay, that is, in the most direct line from the Heugh leading to Redcar, something like two and a half miles long. You enclose the whole bay and then obtain your whole object.

19,285. What I want your opinion about is this. Do you think the site of this particular breakwater would do more good if it were at Redcar than if it were at Hartlepool?—It is a difficult question to answer, seeing that vessels could obtain an anchorage and safety in the one equally as well as in the other.

19,286. You are not a sailor?—No.

19,287. Then I will not go into that matter minutely. Now, say that Redcar were put out of the question altogether, and the matter rested between Hartlepool Bay and Filey Bay,—that there was only to be one harbour, and that it rested between these two points;—which site do you think would be the best?—If you put all the others out of sight, I should certainly say that Hartlepool would be the better site, inasmuch as you have down here at the Tees no refuge, and it is really needful for a large class of light vessels which have not the means of getting refuge in any other places so well.

19,288. They are caught in the bight of the bay?—Yes; they are caught in the bight of the bay, and cannot help themselves.

19,289. (*Capt. Washington.*) In your very useful statement of the gales of wind which occurred between the year 1843 and the year 1857, are you aware that in the title you have not said they are only those which blow upon the coast?—I am aware that I have not said so, but I ought to have done.

19,290. Perhaps you will alter it?—Yes.

19,291. You mentioned that you were prepared to put in accounts respecting the River Tees?—Yes.

19,292. Can you tell the Commissioners in round numbers what is the revenue of the Tees Commissioners?—I have a statement as regards the income and expenditure since we came into power.

19,293. Will you mention it?—The first year we came into office we had an income of 8,600*l.* That was derived from the lease of the tolls. The tolls were leased at that time.

19,294. I do not wish for details, only the total amount for last year?—The total income for last year was 6,266*l.*

19,295. Of that sum, how much was available for improvements?—We can only spend a certain sum per annum out of it for maintenance. Our improvements must be made by borrowing a further capital, which we have been doing since we came into office. We have expended in improvements, in the purchase of a powerful dredger and other matters, somewhere about 18,000*l.*

19,296. I think you say you have expended somewhere about 18,000*l.* in improvements?—Thereabouts.

19,297. You have a steam dredger?—Yes.

19,298. One or more?—One; a very powerful one.

19,299. Are you at present carrying out further improvements within the River Tees?—We are constructing guide walls down. We are going on with the work in leading down to the eastward of the eighth buoy scarp, on which we are expending somewhere about 1,600*l.* or 2,000*l.*

19,300. When will this work be finished?—About the middle of next month.

19,301. (*Capt. Sulivan.*) You said that if you get 16 feet of water at the mouth of the Tees, it would be available as a harbour of refuge for most of the vessels trading on the coast, and caught in the bay?—I don't know that; I won't go so far as that. I think I stated that some of the engineers said we should have 16 feet; some more, and some less. But this I believe: that if the work were constructed, it would then become a harbour of refuge for vessels trading on this coast, because we are fully persuaded we shall have a greater depth of water than that.

19,302. If your hopes are realized respecting this bay, and if the hopes respecting the Tyne are realized, and they get 15 feet at low water into their harbour, would you then say that a harbour for laden vessels near Flamborough Head would be better than another one down in the bight of this bay?—I stated my reasons why I thought it would be better if works were constructed at the entrances of the three large rivers. You would thus provide a refuge for the large amount of vessels that are generally in these localities, and in danger of the gales, and which generally suffer. I stated that in that case I thought sufficient refuge would be provided for them, but that some refuge ought to be provided for vessels that have made the Head so far, and are caught in the gales off the Head, and cannot get round.

19,303. Then am I to understand, leaving out the Wear, supposing that cannot be made deep enough for refuge, that if your depth and the Tyne depth were obtained, so as to have a refuge here for those embayed, and a refuge at the Tyne, principally for light vessels, that you would propose next to have a refuge for laden vessels nearer the Head?—I would say so. I don't indicate the locality, because I think there are one or two points which require grave consideration.

19,304. You said something of Bridlington Bay?—Yes.

19,305. Bridlington Bay is, I think, now a good refuge for light vessels to the north, is it not?—It it so.

19,306. But on the wrong side of the Head to be a good refuge for the vessels caught off Flamborough Head bound south?—If they could get round the Head with a north-east gale, they must be protected; but they don't want to go in there.

19,307. It is the south-east and the east gales off Flamborough Head, the south-east more especially, that prevent the laden vessels from going on their voyage, is it not?—Yes.

19,308. Then for those vessels would a harbour on the north of the Head be better than on the south?—A harbour between here and the Head would be the means of preserving much property on that part of the coast, inasmuch as we know that laden ships are there; and we know from the register, which is annually published, that a number of laden ships are lost in these parts.

19,309. Is it the case that a much greater loss of property takes place in laden vessels when wrecked, than in light ships?—That is about the most dangerous part of the coast for vessels going ashore, inasmuch as I am not aware that there is a beach of any kind, except one or two little bits, that they can get to.

19,310. But, supposing laden ships to be driven back and wrecked where the light ships are; is it the case that a greater loss of life takes place on the average in laden ships, in consequence of their not going so far up the beach?—I have not given suffi-

cient attention to the subject to answer that question; I can scarcely say.

19,311. Supposing it were considered that these tidal ports could not be improved, and that for a moment you exclude these ports from your consideration; I think you said that the preference between Hartlepool and Redcar as a harbour of refuge was very much an engineering question?—I think it is. On both sides it is a matter that might fairly be left for the consideration of either nautical men or engineers. I don't pretend to decide, but, as I have said, if we are to have the chance of one harbour only, the Tees Bay is the site that ought to be chosen.

19,312. When you say it is an engineering question, do you mean that the one of these sites at which the greatest depth of water and the largest amount of accommodation could be provided for an equal sum would be the best position in which to place a harbour?—No doubt about it.

19,313. I think you said that if 24 feet water were obtained here, you would have no doubt then of nearly all vessels being able to take refuge?—I have no doubt whatever that if a much less depth of water was obtained, that all light vessels, and even laden ones as well, might obtain shelter, because they have only to wait a little while for the flood to bring them in. Many vessels come into the bay, and great numbers do come in in those gales, and are preserved.

19,314. Would you consider that, for the coasting trade, a harbour of refuge which would take vessels in at low water through a channel of five fathoms water, ample depth for the calls of the trade we have in view?—Yes.

19,315. Supposing you had the choice of constructing a large harbour, say extended to seven fathoms, in this bay, or a harbour here extending to five fathoms, and another extending to five fathoms further south for laden ships, which would you prefer, the two moderate ones, or the larger one?—I think I could answer you as the lad did when he was offered two apples, and asked whether he would have one or two. I think this is a question which may be answered in the same way.

19,316. That the two would be decidedly preferable—that two would be better than one, though smaller?—Though smaller, I think a five-fathom harbour would not be a bad one now.

Mr. Robert Coulson examined.

19,317. (*Chairman.*) You reside at Coatham?—Yes, close to Redcar.

19,318. You are receiver of wrecks, and have for a upwards of 30 years been the receiver of the droits of the Admiralty?—I am.

19,319. You have been present during this inquiry?—I have.

19,320. Will you now proceed to offer to the Commissioners any statement you have to make relative to it, from information which you may have received, and from your official knowledge as receiver of the droits of the Admiralty?—I have kept a record of wrecks and stranded vessels, which record I should wish to put in. (*The record was handed in.*)

19,321. State the authority from which you get it?—The authority is the statement I have received from the parties at the time the wrecks take place. For instance, when a vessel is wrecked I take an account of the state of the wind, and examine the master as to why and wherefore he came into this situation.

19,322. In what capacity?—As the receiver of wrecks. Since my appointment to that office, and previous to it as Lloyd's agent, having to report to Lloyd's the accident and the wind from time to time, and having kept a record, I put that in as information.

19,323. As holding these offices?—Yes; I will read the heading of my book: "Date. Description "of vessel. Vessel's name. Burthen. Master's "name. Port where from. Where bound to. De- "scription of cargo. Wind. State of the weather. "Time of the tide. Where stranded or wrecked. "When got off. Whether wrecked or not. Lives "lost. Lives saved by Redcar life-boat. Estimated "loss on vessel. Estimated loss on cargo. Re- "marks."

19,324. Is the book which you hold in your hand the book from which the document you have handed in has been abstracted?—Just so.

19,325. Will you forward to our secretary, at your convenience, an abstract showing the heading of your book?—I will do so.

19,326. And describe the way in which it is kept?—I will do so.

19,327. And by whom?—Yes. I have also prepared another abstract from my book of laden and light vessels, where from and where to, and put that in. (*The abstract was handed in.*) I have a district from Starther to the river Tees, about 19 miles.

19,328. We have now two returns; have you any more?—I beg to hand in another; a return of the opinions of masters of vessels, as given to the receiver of wrecks at Redcar in filling up the wreck return. (*Return handed in.*) 97 might have been avoided, had there been an accessible harbour in the vicinity. This return contains the answer to the query as to where they would place a harbour of refuge.

19,329. This refers to Redcar?—Wholly.

19,330. Then please to take back the book. Anything connected with Redcar keep for a future occasion. Have you any further statement to hand in respecting the Tees case?—No, not any.

19,331. (*Sir F. Smith.*) You state, Mr. Coulson, in the return you have given in relative to the wind, when the wrecks occurred, that the number of wrecks with east, south-east, and north-east winds amounts to 168?—Yes.

19,332. While those with westerly winds amount to 96?—Very few, you perceive, from the west.

19,333. Ninety-six, taking the wind from south-south-west to north-north-west?—Yes, 96.

19,334. What I want to know is this; whether we shall have anything before us showing under what circumstances the wrecks took place with west winds?—I could explain by referring to the book.

19,335. There is nothing before us at present to show how they occurred?—They very frequently occur in vessels coming from the north or south getting on the rocks that come close into the coast.

19,336. On what rocks?—The Redcar rocks.

19,337. (*Mr. Lindsay.*) Then a harbour of refuge on this coast would not have saved any one of these 96 ships?—I should think it would.

19,338. How do you make that out; because a west wind is right off the land?—They would not have gone on the rocks; they would not have been there, if the rocks had been risen up with piles.

19,339. But if they got on to the rocks, they might as likely have got on to the pier in thick weather?—Not quite so soon as that.

19,340. You don't think it would be advisable to cover rocks with piers at the public expense, so that they might be better seen in fogs and thick weather?—Not without you can make them available for the purposes of vessels coming in.

19,341. As a refuge, the construction of a harbour would not, in fact, have saved any one of these 96 vessels; I suppose that is clear?—I think differently from that.

19,342. Tell me how it would have saved them?—If there had been a harbour of refuge there, they certainly would have availed themselves of the place, or have seen the light in the night time.

19,343. Would not a light have been better for them than a refuge harbour?—A light, unquestionably,

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would have been of service, if it had been placed there for some years gone by. No mistake about it.

19,344. You think a light somewhere there would have been of service, and have saved, at least, a portion of these 96 vessels?—If a light had been there, no question a number of these vessels would have been saved.

19,345. A lighthouse, which would be like a beacon at night, and a beacon by day?—Just so.

19,346. A refuge harbour, in the proper sense of the word, would not have saved any of these vessels?—I think it would.

19,347. Tell me how?—If a refuge harbour had been just at the place, or near it, there would have been lights, and I think the vessels would have been saved.

19,348. But putting a light without a refuge harbour, would not that answer perfectly as well?—I don't think it would answer equally well. It would answer, no question, to a certain extent.

19,349. Were you brought up to the sea?—No.

19,350. Then I will ask some sailor how a harbour of refuge would have saved these 96 ships which were lost during these westerly winds.

19,351. (*Capt. Washington.*) In the year 1851, were there 16 vessels lost with north-east winds?—There were.

19,352. Can you, briefly, give any account of that gale?—There were 16 vessels came ashore here in the gale of the 25th September 1851. This is a minute made at the time: "Great storm and "high tide, which came on to blow on the 25th Sep- "tember 1851, about 3 o'clock, p.m., from the north- "north-east, when the following vessels were driven "ashore. Some of them were total wrecks, and "others got off at considerable expense, and much "damage. The gale came on very suddenly, when "the vessels were close in the Tees Bay, and could "not get off. Total of the gale, 16 vessels on shore, "8 wrecks."

19,353. Whereabouts were the vessels on shore?—Just close at hand here, close to Redcar. One was a steam tug; she could not get to the Tees, and went on the Brand Sand. Another was a galliot, near the Tees, on the Brand Sand. The *Cleveland*, galliot, went on shore on Coatham Sand. The *William and Mary*, from Lynn to Hartlepool, went on shore. The *Two Sisters*, the *Whitfield Grange*, the *Meridian*, and a Prussian called the *Apollo*. All these vessels were embayed here. It was not possible they could get out, they were actually driven ashore, forced ashore by that gale.

19,354. The whole of these wrecks occurred to the eastward of the Tees entrance?—Yes; from the Tees Bay to Skinningrave.

19,355. What is the extent of the district?—It is a district of about 19 miles.

19,356. Between the Tees mouth and Starther?—Yes; somewhere there or thereabouts.

19,357. It appears that, in the year 1849, there was a disastrous gale from the north-east, when 11 vessels were wrecked. Can you tell the Commissioners, very briefly, any special feature of that gale?—In 1849, in the autumn, there was a great gale and a great number of wrecks. One vessel, the *Albion*, of Newcastle, a laden vessel, just cleared the rocks at Redcar, and did not go on shore there, she cast off and went right on to the South Gare, and was lost, with all hands.

19,358. With the wind at north-east, she could not have got off the shore?—The wind was at north-east. The captain tried all he could to keep the vessel off, but without effect. She was heavily laden with lead and other general cargo. I found her at the bottom, hard driven, and got up about 1,000*l.* worth of lead. The cargo was insured at Lloyd's.

19,359. Is there any other special feature of that gale?—The *Frankfort* was on the Redcar Rocks, and the crew were saved.

19,360. In the year 1856, I observe that nine vessels were lost with a south-west wind?—Yes.

19,361. Was it a fog, or what circumstance led to the wrecks?—A very heavy gale.

19,362. Where were the vessels lost? On the Redcar Rocks?—Yes; chiefly on the rocks here.

19,363. Was it foggy weather, or what led to nine wrecks in an off-shore gale?—The gale of wind.

19,364. But it was an off-shore gale?—It was a south-west wind when they went on shore.

19,365. Is not a south-west gale off shore?—Yes.

19,366. How could nine vessels so contrive as to get upon a weather shore and be wrecked?—That is very frequently the case. Vessels coming close on shore with a south-west gale, we frequently have them on the rocks.

19,367. Were all these vessels insured?—I cannot say that. Sometimes the master cannot give us that information, or will not.

19,368. In the heading you have read, you have exactly followed the Admiralty series of queries issued about the year 1847?—Yes, in 1847.

19,369. But why have you omitted the column of insurance, which is inserted in the Admiralty directions?—For this reason: I very frequently could not get the information. A number of masters either will not or cannot tell what their vessels are insured for. Perhaps some are not insured at all.

19,370. Have you had occasion to look at the Admiralty wreck register published? If so, I think you will find from that printed register that you might fill up that insurance column, if you wished to do so. Of these vessels I see that 189 were light?—So it appears.

19,371. Then were 27 laden vessels from ports south of Flamborough Head?—Yes.

19,372. Ninety-two laden vessels bound to ports south of Flamborough Head?—Yes.

19,373. Of these 189 light vessels, and about 157 laden vessels, 116 were total wrecks and 168 lives were lost?—Just so.

19,374. Would a refuge harbour in the Tees Bay have saved the greater portion of these vessels?—I am of opinion that it would.

19,375. (*Capt. Sulivan.*) The greater portion of the wrecks with on-shore gales occur with gales to the north of east?—Yes.

19,376. Is it the case that with gales to the south of east a very much larger portion are lost in the neighbourhood of Hartlepool?—I am not conversant with the number there.

19,377. In the year 1857, including that very heavy gale of which we have heard, you have only five vessels with east-north-east gales. Is it the case that very much the larger number were lost in Hartlepool Bay?—They will make for a port.

19,378. I don't say from what cause, but your return shows that the larger proportion of vessels are lost in that bay with east-north-east winds, which happen to be the on-shore winds on your part of the coast. With the wind from the southward of eastward, would not a much larger portion be lost on the other part of the bay?—I presume it would.

19,379. Your return of wrecks is deficient in one thing. You give us the number of laden and light vessels all very distinctly, but when you come to the vessels which are total wrecks, you have not divided them into laden and light. If you could have so divided the returns, and particularized whether the lives lost were lost in laden vessels or in light vessels, it would have been much more valuable. Can you amend that list, by dividing the two columns to which I have referred, or give another small return, dividing these columns with respect to laden and light vessels, both as to total wrecks and the loss of life?—I will do so. I can soon do it.

19,380. (*Mr. Coode.*) You are aware that there was a very destructive gale in January 1857?—Yes.

19,381. And that very many lives were lost on this district of the coast?—Not in my own district.

19,382. But along this line of coast?—Yes, I have been given to understand so.

19,383. That the loss of life in that gale of 1857

was more than usually large ?—Yes, on the other side of the water.

19,384. Will you refer to your list; the account showing the vessels wrecked and stranded in each year. In the year 1857 you have not a single life lost in your district. Is that so, or not ?—No, not one.

19,385. How do you account for that, when so many lives were lost north and south ?—They had made for the other ports, and the wind had been such that they got into the ports and got to them.

19,386. (*Chairman.*) In the gale of September 1851 did 16 vessels come ashore on Coatham Sands, between Redcar and the Tees ?—Yes.

19,387. You are answering from your official record ?—Just so.

19,388. Five between Redcar and Marske ?—Yes.

19,389. Two near Saltburn ?—Yes.

19,390. Three near Skinningrave ?—Yes.

19,391. How did the gale come on ?—The wind was north-north-east the whole of the time.

19,392. Could these vessels, or any of them, have been saved by a harbour of refuge near Hartlepool ?—I could not answer that, I am sure.

Mr. Thomas Brown examined.

19,393. (*Chairman.*) You are a resident of Middlesborough ?—Yes.

19,394. You are a shipowner, and formerly followed the sea ?—Yes, all my lifetime.

19,395. How many years were you at sea ?—I should say 26.

19,396. Of this time how many years were you in command of vessels ?—Fifteen.

19,397. In what trade were the vessels employed generally when you commanded ?—The first nine years I traded to Sunderland, with the exception of a voyage or two to the Baltic, and afterwards I was in the American and Baltic trade in the winter, and the coasting trade to London; seldom anywhere else.

19,398. Are the ships you at present own belonging to Middlesborough ?—To Stockton, and some of them to Whitby. My brother-in-law and father lived here. They traded out of this place generally, and sometimes out of West Hartlepool.

19,399. (*Mr. Lindsay.*) I will ask you some questions, as you and I used to be sailors. Looking to the whole range of the coast as shown in the chart published in the Report of the Select Committee of 1857—looking to the whole range of coast, Mr. Brown, say between Flamborough Head and the Farn Islands, and considering the description of vessels which go along the coast, and considering the course which those vessels usually take—whether do you think the improvement of the existing harbours, that is, the Tyne, the Weir, and the Tees, either at Hartlepool or the Tees, or both—whether do you think the improvement of these harbours, so as to admit the usual description of vessels frequenting the coast, would do more to save life and property than the construction of any one harbour, however large, within the limits which I have named ?—Most decidedly so.

19,400. Which would do most ?—I think the improvement of all the small harbours.

19,401. You are decidedly of that opinion ?—Quite of that opinion.

19,402. Now you have seen the plan which has been proposed for the improvement of the Tees ?—I have.

19,403. In which we are told that there will be 16 feet at low water. Now, speaking to you as a sailor, and supposing that yours was one of 20 ships bearing down on this bay, with an easterly gale of wind, and obliged to run for shelter, and that you all run for that point, each of you, of course, trying to get in soonest for refuge, would you have any hesitation to be one of 20 running in a gale of wind for the mouth of the Tees ?—None whatever. I would make it sooner than any other place.

19,404. Say 50 ships were running for it at one time in the usual way, each trying to get in first, would you then have any hesitation in running ?—Even now as it is I should not.

19,405. Where could you cast anchor, or how would you act running for refuge with a laden ship, supposing the improvement which I am speaking of, the smaller improvement proposed at the Tees, were carried out, if there were 50 of you running for it, where would you anchor, or would you anchor at all ?—About the fifth buoy, and in the buoy hold there.

19,406. How many ships would anchor there ?—I have seen 30.

19,407. Could 30 enter there safely ?—With the improvement twice that number.

19,408. Could 60 ?—Yes, 60. There are moorings laid down where 60 could anchor.

19,409. I speak now as being obliged to drop anchor in a gale of wind ?—It would depend on the size of the vessels.

19,410. I am speaking of the usual kind ?—I should say 60 very well.

19,411. Sixty could drop anchor there without much fear of damaging each other ?—I think so.

19,412. You would not be prepared to say a larger number ?—No, not all at once at anchor.

19,413. Is there any place above the fifth buoy where in such a gale you could run ?—Yes, at the eighth buoy.

19,414. That is further up ?—Yes.

19,415. How much ?—About three quarters of a mile.

19,416. How many could anchor there ?—I should say I have seen 25 there. It is always smooth there.

19,417. Could 25 ride there with safety ?—Quite well.

19,418. Is there any place further up ?—If the improvement is carried down to six or eight feet, they would run right up if the tide was going. If not, they would no doubt get under weigh, trip their anchors, and go further up as the tide would allow.

19,419. Say the tide was an ebb tide ?—Then more ships could take refuge.

19,420. During an easterly gale of wind and an ebb tide would you have any hesitation in running for Tees mouth ?—No, none whatever. I have done so before in very heavy weather.

19,421. Would you think it any greater danger in running for it if the tide were running out than it would be with a flood tide ?—With a deep laden or very small vessel there might be more danger of the sea striking her because she could not get so fast from it.

19,422. With what strength does the tide run out ?—Three to four and a half miles an hour. With heavy weather and gales on shore, it is generally checked, and there is very little tide at all. I have seen as much as six feet of water stopped, checked by the hard blowing.

19,423. Have you known it run after freshets with greater force than four and a half miles an hour ?—That is the most, I should say. I never measured it. I fancy from other harbours that would be about it.

19,424. Having heard your opinion about the improvement of existing harbours, which is valuable from your experience on the coast, tell me now, Mr. Brown, if the Government should decide upon having only one harbour between the limits I have named, Flamborough Head and the Farn Island, what point do you think would best serve to save life and property ?—Decidedly in the Tees Bay.

19,425. What side in the Tees Bay ?—On the western side.

19,426. That is to say —— ?—From Hartlepool Heugh to opposite the Tees.

19,427. Do you mean a breakwater between Hartlepool Heugh and the Long Scar, lying opposite West

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Hartlepool ?—In a direction towards the south-east by east, keeping the line of six or seven fathoms.

19,428. Do you think a harbour there would be a better place than that which was proposed by Mr. Fraser ?—I think it decidedly better if you would make it long enough.

19,429. I am speaking of enclosing Hartlepool Bay between the Heugh on the one side and Long Scar on the other, Hartlepool Bay proper. Do you think that the harbour, if constructed between the two points mentioned, would do more to save life and property than a harbour such as that proposed by Mr. Fraser for Redcar ?—I do not know that it would do much more to save life, because I think one would be as good as the other.

19,430. Looking to the prevailing winds on the coast, which I understand range from south-east to east-north-east or thereabouts—looking at the saving of life—you think that one site would be equally as good as the other ?—For the saving of life only.

19,431. But taking into consideration life and property, and taking into consideration the facilities to commerce, which is a very secondary consideration compared to that of saving life; taking into consideration first, the saving of life as all important ; secondly, the saving of property, the saving of ships, which is next in importance ; and, thirdly, the facilities to commerce, which, compared with the other two, is of minor importance, which site should you prefer ?—The west side still.

19,432. Give me your reasons ?—You ought to begin at Hartlepool Heugh, in five or six fathoms, carrying the breakwater in an easterly direction, make an opening to the north end, then start again in some seven fathoms, coming in south and by east direction, curving the sternmost part, and making it two and three quarter miles long. I think the distance would bring the Tees mouth about south-east and by east.

19,433. You are talking of a plan much larger than any that has yet been proposed. I want you to banish the Tees mouth altogether for the present, and say the breakwater was to be so limited that it would not enclose any part of the Tees mouth in its proper sense, but extend between the Heugh and the Long Scar. I want your opinion on that point ?—I think it would be too small. The tide of the Tees would help to fill it up if it were too small. I think, through the ebb tide coming out of the Tees, the direction being entirely as the tide sets, if the harbour was open at both ends the tide coming from the Tees would help to keep it clean ; the ebb tide coming out of the Tees would help to keep it clean. But if it was made close, I think the tide setting in would bring a sediment down and help to fill a small place up. But I think the tide out of the Tees, when other improvements are made in the river, coming down would force the sea water out into the harbour, and so would help to preserve it from filling up. Even now, I do not think so much sediment goes out of the Tees as some people would imagine.

19,434. Considering the Tees, and the trade of the river Tees, as one point to be considered, as well as the trade and shipping of Sunderland and the shipping and trade of the Tyne and the other ports, and putting out of the question the breakwater at the Tees mouth, say there was completed at West Hartlepool a breakwater extending out to sea to give an area of four fathoms and upwards, equal in extent to a harbour constructed at Redcar, such as that proposed by Mr. Fraser, tell me, all considered, which you think would do most good ?—I think still the west side.

19,435. You still think Hartlepool would be the best site ?—It is the best site.

19,436. Tell me what you think of Filey as the site for a harbour ?—I think it very good, but I think it too far south if there were not another anywhere else.

19,437. But would the harbour at Filey not be the means of saving the lives of a great many who are lost in laden ships ?—It might be the means of saving some ; but, unless on the 4th of January last, I never heard of many being lost on the coast.

19,438. Then are the losses on the coast from Whitby to Flamborough Head small in comparison with the losses between Whitby and Hartlepool ?—From what has come under my notice there have been less.

19,439. Of laden ships ?—Yes.

19,440. Then if you think Filey too far south, can you tell me where further north a harbour could be constructed ?—Runswick is a better place.

19,441. Do you think a harbour at Runswick would do more to save life and property than a harbour at Filey ?—I think it would.

19,442. How ?—Because there are many wrecks so far south, and consequently they would bear up. I can give an instance. I remember, about five years ago, riding with about 270 sail of laden vessels with the wind from south-east. The weather was not bad, or they would have gone into Runswick Bay. Had it been winter, no doubt half of them would have gone into Runswick Bay, had such a harbour been made. If there had been a gale coming on many would have been wrecked. The larger vessels seldom run for harbours except when hard pressed ; in fact, I never run for one in my life.

19,443. If you think Runswick Bay is the best site, is Runswick Bay suitable for the construction of a harbour of refuge ?—I think it is, so far as its capabilities for holding ships are concerned.

19,444. Do you know that there are any parties who intend to bring Runswick Bay formally under our notice ?—I believe there is a party at Whitby who will give you a plan. He has sent me one [*handing up a plan*]. I think a little improvement might be made in the piers, as shown there.

19,445. Is this a copy of a plan that will be brought under our consideration ?—It is a lithographed plan projected on the Ordnance maps.

19,446. I should like to ask you some questions, as a sailor, about it. What description of shore is it ?—A rocky shore, but part a fine sandy beach.

19,447. What part of the bay ?—It is in the middle of the bay. From Runswick town south, about one third round the Kettleness is all sand.

19,448. What extent ?—About a mile and a half.

19,449. Are there no rocks between the sandy beach and deep water ?—There are some stones at low water, but they would be required to build the breakwater.

19,450. The sandy beach is close to Runswick village ?—Yes, round by the south.

19,451. Do you know what area of water there is of three fathoms and upwards ?—I do not know what water there is, but I should think 400 acres. I have not seen any particulars.

19,452. If the harbour is to be made south, speaking as a sailor, what size do you think ought to be given ? I say what size, meaning what number of ships of the usual class frequenting the coast do you think the harbour ought to be able to contain to ride safely at anchor during the most dangerous winds ?—I should think 200.

19,453. You think a harbour sufficiently large to afford anchorage for 200 would meet the wants of the trade ?—I think so.

19,454. Were you ever in the Baltic ?—Yes.

19,455. Do you know anything of the east coast of Scotland ?—I have been all round the land.

19,456. Looking at the coast, say from Aberdeen to the Pentland Firth, do you think a harbour of refuge is necessary there ?—From what I read and hear I think it highly necessary.

19,457. Do you think it would be a great convenience to ships passing along the coast ?—Not so much as a benefit to fishermen, especially in the herring season.

19,458. Your opinion is that a harbour is not so much wanted for the saving of the lives in and the property of passing ships as for fishermen ?—I think not.

19,459. Say there were no fishermen along the coast, would you consider a harbour of refuge necessary ?—No, I don't know that it would be.

19,460. Looking to the coast, at what point do you think, if a harbour is to be made, and only one—at what point would it be most desirable to place it ?—If for passing ships, at Peterhead ; if for fishing vessels, at Wick.

19,461. Now, supposing the case to be as it is at present, of fishing and passing trade, and looking at the passing trade, and looking at the fishing trade, and taking into consideration the trade going to the Baltic and to Archangel ?—It is not wanted for them.

19,462. All things considered, say that it rested between Wick and Peterhead ; which point should you prefer then ?—I should prefer Wick.

19,463. Why ?—Because I think it the more dangerous place.

19,464. Would the same gales of wind that carried you into Wick carry you through the Pentland Firth and to Longhope ?—Yes.

19,465. Is there good anchorage there ?—Very good.

19,466. Then why do you prefer Wick ?—I don't prefer Wick in a ship. I think you said both the passing trade and the fishing together. I think there is less danger in ships. It is seldom that it is wanted at all for ships, because there is the Moray Firth to go round to, or, if not, when you get to Kinnaird's Head, if you don't go one way, you can go the other, if you have any offing at all. My offing when off Peterhead was five miles off ; when I could not get one way I got the other. It is no great distance to get round Kinnaird's Head, or round Buchan Ness, or through the Pentland Firth.

19,467. Would you have any hesitation in running through the Pentland Firth in an easterly gale ?—None whatever.

19,468. With a flood tide and an easterly gale ?—I once tried it with a flax-laden ship bound for Liverpool. I had great difficulty in keeping her straight and making her steer ; she was making about nine knots sail, and stood as still as possible. The wind from Duncansby Head and from the east drove out against the Skerries so strongly, it was blowing so hard, that we could not do more than keep her steady ; as she held her own we kept her holding on, until the moment the tide slacked, when she went through the firth like a shot.

19,469. What size was she ?—A brig, of 300 tons register.

19,470. After having had this experience, would you, if caught there in a similar sized vessel with a strong easterly gale and flood tide, and thought it advisable to seek shelter in Long Hope—would you have any hesitation in running for the Pentland Firth again ?—None whatever. I should try to stop the ship getting into the flood tide if possible, particularly if she were deep laden.

19,471. How would you do it ?—I should not run down directly. You generally can see the lights, and can't drive so fast, but you might wait an hour or two. If you can drive to it at the last moment, you can then wait and take the chance and go through, if you can't keep her any further to windward.

19,472. In fact, you would dodge it ?—As long as I could. If the tide had done flowing I could get through ; if not, I must take my chance.

19,473. All things considered, and looking at the passing trade of ships obliged to go through Pentland Firth on their course, and the ships that are obliged to seek shelter at Longhope and off the shores of the Orkneys, do you think a harbour necessary at Wick ?—I don't think one necessary for ships at all.

19,474. (*Capt. Sulivan.*) You said you thought Runswick a good place for a harbour ?—I think it is.

19,475. Were you then including in your ideas another harbour in the Tees Bay besides ?—No.

19,476. Let us suppose that the Tees was so improved that you could run in for it at any time of the tide and in a gale of wind, why would you then prefer Runswick ?—Because I think there wants a harbour of refuge for the south there or at Filey Bay ; but as Filey is the extreme point, I think Runswick would be a better place than Filey.

19,477. Would a vessel in an east or east-north-east gale off Runswick be able to fetch a harbour of refuge in the bay ?—If the wind did not fetch to the northward.

19,478. How with an east-north-east gale ?—With an east-north-east gale she would come down, if she were a ship that would sail anything like.

19,479. If she were the other side of Runswick, a little further south, there would be more danger in weathering the land and getting back to Hartlepool ?—I don't see it. From Whitby Rock the bend of the land is the same ; the point is about the extreme east.

19,480. Vessels caught off Whitby Rock would fetch anywhere into Tees Bay ?—Yes ; but they would fetch Runswick better.

19,481. Yes ; but suppose they were the south side of the turning point, then, from there to Flamborough Head, Filey Bay would be a better place ?—I should say it would, if the wind was east-north-east ; but if it were east, Runswick would still be better.

19,482. If you had two harbours of refuge on 100 miles of this coast, would you have them 20 miles apart ?—I would rather have them both at the quarters.

19,483. You would rather not have the two close together ?—No.

19,484. If this place was deepened to what you said, that is, 16 feet, or from that to 24 feet, would all light colliers be able to run for it at all times ?—No doubt of it.

19,485. If 16 feet water, would you venture in an easterly gale to try to get over the bar ?—Sixteen feet at low water ?

19,486. At low water ; would you venture to run over it if there were 16 feet on the bar, and you were caught in such a gale that you could not keep off the shore, say at dead low water, what draft of vessel would you attempt to take over the bar ?—If the wind were east-north-east there would be three or four feet water, or 'perhaps five feet in an excessive gale, like that of the 4th of January 1857, and a vessel drawing 16 feet water would go over.

19,487. First, leaving any rise of tide by wind out of consideration, how much do you consider that your keel ought to be clear of ground to take the bar in an easterly gale ?—It ought to be clear, that is sufficient. I should not want more than that. I should think there would be four feet more in a gale.

19,488. Leaving that out of consideration —— ?—It could not but happen that the tide must be checked.

19,489. Supposing the bar you have to run over with 16 feet of water, what draft of vessel would you venture to take over, allowing for the lift of the sea ?—If there was six-feet sea, I should not take more than a 10 feet ship.

19,490. I say under your bottom, what between the keel and the bottom ? Would six feet be enough for you taking any of these bars from what you know of the sea in gales of wind ?—Most decidedly.

19,491. If there was six feet on this bar at low water, would you run for it with a ship drawing 10 feet ?—Yes, I should run for it with more.

19,492. Would you then with 11 or 12 ?—With less than that.

19,493. In a gale ?—Yes.

19,494. If you draw 15 feet in a laden ship when a gale was blowing on shore and raising the water, would you run for it if there was 16 feet on the bar at low water in ordinary times ?—I think I should.

19,495. Do you know the Tyne well ? Does the water rise at all in proportion in the Tyne with easterly gales ?—I don't know that it would rise so much as here, but it may rise from two to three feet. It can't rise so much, in my opinion.

19,496. If this port was improved to 16 feet, and the Tyne to 15 feet, would you consider that most

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colliers could run for them with a gale of wind dead on shore at nearly every time of the tide ?—I am quite certain they would without much danger, with very little risk of loss.

19,497. Have you ever experienced a freshet and ebb tide from the Tyne in such a gale ?—I never did ; but I have stood seeing the vessels come in.

19,498. Would you fear it ?—Most decidedly, if there was not plenty of wind.

19,499. But speaking of a gale ?—With a gale, not at all.

19,500. You said you had known a four knot current ?—Yes, from three to four and a half.

19,501. Is that usual—No.

19,502. If there was a freshet in the harbour with an easterly gale so strong as to make vessels run for shelter, how much would it retard this tide ?—If not more than an ordinary tide it would draw it up to six or seven feet.

19,503. With a freshet, to what extent would it check the stream ?—Quite as much as to make it only an ordinary tide.

19,504. What is that ?—About three knots.

19,505. If the harbours of Tyne and Tees were improved so as to take the vessels that you say, then, for loaded ships bound south, where would you put a harbour of refuge ?—I should like to have it, if I could, by the south of Whitby ; but you can't get it there. In my opinion, Filey is too far south, and there is no other place to make it but Runswick Bay.

19,506. And for vessels caught off Flamborough Head, where would you put in ?—I should say Runswick Bay, but that is in the bay.

19,507. I am speaking of south of Whitby ?—It is no use having it at Flamborough Head, that is further south still.

19,508. How about Filey ?—Filey would make a good place for all vessels south of there.

19,509. For vessels caught off Flamborough Head in south-east gales ?—Yes ; but there are more, in my opinion, caught from the north.

19,510. You were asked on which side you would rather have a refuge harbour at Redcar or Hartlepool. Which would you rather run for with a number of loaded ships seeking refuge, a harbour where there was no trade to interfere with the place, a purely refuge harbour, or a harbour where you would have vessels to a large number engaged in the trade of the place ?—I think of one side as much as the other ; one side is as good as the other.

19,511. I asked you which you would prefer to run for as a harbour of refuge ?—One as well as the other.

19,512. Why ?—Because I don't see much difference.

19,513. Which would you prefer, a harbour which was purely for refuge, and where only ships that went into it for refuge or to save being driven back would enter, and where there was no trade to the port, or a harbour of the same size where there would be a large trade in addition to the refuge ?—I should rather have it where the trade was.

19,514. And for the convenience of the trade of the port ?—Yes, both.

19,515. For your own ships running in would you prefer a harbour where a number of vessels engaged in trade would reduce the space provided for refuge ? —I don't think it will reduce the space. If one harbour of refuge is made there will be two or three harbours more, and all will get in, and it will improve the harbour of refuge as well as themselves.

19,516. I am not talking of the trade of the port. I ask you, if there is a harbour, say of 500 acres of good anchoring ground, would you rather, for the passing trade, run for such a harbour if you knew it would only be frequented by vessels seeking refuge and having nothing else to interfere with them, taking up their place, or would you rather run for one, knowing there would be a large trade likely to fill it up ?—If that was the case I should run for the one where there was no trade, because I should be afraid of obstruction.

19,517. (*Capt. Vetch.*) I think you are well acquainted with the north-east coast of Scotland and the Pentland Firth ?—Yes.

19,518. Are you aware that the harbour of Wick is in a creek or cove ?—Yes, I was once ashore there.

19,519. Are you aware that in the creek there sometimes are 1,400 fishing boats going out or coming in ?—I saw as many as I could count, and I gave up counting ; they were coming out as I was passing.

19,520. Manned generally by four men each ?—I know it.

19,521. And they are exposed to gales, and have no very sheltered place to run to. Do you know about 900 vessels arrive at and sail from that port ; and, considering that this Commission has chiefly in view the saving of life and property, do you consider Wick a fit place at present to afford protection to life and property ?—I don't think it is at present.

19,522. Therefore you think it would be desirable to make it so ?—I think so.

19,523. Coming down from the north-east coast of England from Blyth to Whitby is there a considerable embayment ?—Yes.

19,524. Suppose the weather is favourable, and that vessels leave the ports of Tynemouth, Sunderland, and Hartlepool, and take their voyage to the south, the vessels putting to sea about the same time with a favourable wind, and that these several fleets sailing from these several points reached near Flamborough Head, and were there taken by adverse winds, where do you conceive most of the shipping would require shelter between ; these points down near Flamborough Head, or further back near Hartlepool ?—They would not all get so far as Flamborough Head, because one does not sail so fast as another; some would be at Whitby and some very near Filey, starting from this together.

19,525. Where would the greatest number find shelter ?—I don't think there would be any for them till there was a place made.

19,526. Now where would you make a shelter for them ?—The largest ships seldom or never except in such gales as that of the 4th of January 1857, bear up at all. It is the smaller vsesels, and those that are old and get leaky, and whose crews are small.

19,527. There is no shelter at present ?—No.

19,528. And where would you provide a shelter to give the greatest benefit to the greatest number of ships ?—If we could always make sure of vessels being at Flamborough Head, Filey would be the best place, because they would not have to come back. If they were to the leeward of Filey they must come down here and make for the place where we could make it best, wherever that may be.

19,529. I understand you have not exactly made up your mind where you would propose to place a sheltered harbour to receive the greatest number of vessels that might be driven back ?—If it is only to be a very small one, I should say Runswick Bay, but we can't make a large one in Runswick without going into sea very largely, and at a very great cost.

19,530. Where else could you make a large one ?—No place but Tees Bay.

19,531. (*Chairman.*) You knew Yarmouth Roads very well formerly ?—Yes ; I have been there frequently.

19,532. What is the largest number of vessels in the roads and its vicinity ?—I have seen 1,000. I never counted them, but I dare say there are full that.

19,533. I think you just stated that you consider this harbour of refuge not much required for the larger description of vessels. Taking that into account, what is the largest number of vessels a harbour of refuge should be calculated to provide for ?—I should say 200.

19,534. You still think that would be sufficient ?—It is a chance if more than that get to bear up to one place at once.

19,535. Don't gales that cause vessels to bear up frequently last on and off for a week?—Yes, they do, particularly in February.

19,536. And is it the case that the sea, the result of these gales, frequently prevents vessels getting out when they have a chance of doing so?—No doubt.

19,537. With these considerations, would you still think that under these circumstances which might occasion a considerable accumulation of vessels that a harbour for 200 would be sufficient?—I was asked what I thought the smallest number that would be safe, and I thought 200 would be.

19,538. You put 200 as the smallest number?—Yes.

19,539. You described an occasion on which you passed through Pentland Firth; do you recollect the sail you were under? Were you under close-reefed topsails?—No; when we were caught by the wind we had made Buchan Ness, the wind from the eastward. We had close-reefed and two-reefed courses. As soon as we put the ship before the wind we let two reefs out of the maintopsail and loosed it, and set the maintop-gallant sail, thinking she would drive astern.

19,540. When you were holding on against the tide in the way you mentioned, what sail were you under?—Single reefed maintopsails and the maintop-gallant sail sheeted home, and not hoisted up for fear of blowing the mast down, and a reef set of the foresail. The foretopsail was close reefed, and we nearly had a man overboard in letting out a reef of it; some of the men nearly lost their footing.

19,541. It was blowing hard?—Terrific. It was in the month of November.

19,542. Was the sea very bad?—The sea was not very bad to us, for we were hemp laden, with a little tallow in the bottom for stiffening, and she rode a long way out of the water; we had about 100 casks of tallow for stiffening, and a little iron.

19,543. Therefore your vessel was very high?—Yes; high out of the water.

19,544. You know the description of the sea; I want you to tell me if it was bad?—Very bad; it tumbled up and about her just as if was on a sand breaking on all sides.

19,545. Supposing a heavily laden vessel had been there, how would she have come off?—I think she would have been swept on all sides.

19,546. Can you tell me how far this bad sea extended from the entrance of the firth; when did you get into it?—We did not get into it until we were close to the point which comes up by Duncansby Head and takes you out for the Skerries. Just as we turned the head the wind headed, she sheered over to the Skerries, and was going astern in a very little time.

19,547. Do you limit the bad sea to three or four miles from the entrance to the firth?—Yes; I should.

19,548. When you ran into this sea, I think you said you did not know the firth?—I never was there before.

19,549. You did not advert to the possibility of your being caught in this ebb weather tide?—I thought that she was so light and the wind blowing so hard, that she would run over the tide. I was quite disappointed when I got there and she only held on.

19,550. You are well acquainted with the general class of coasting vessels, are you not?—Yes.

19,551. In such a case, supposing the master had, to incur this danger, a flood tide running out to the south, would there be any difficulty in bringing his ship to the wind, or heaving to so as to wait for the other tide?—I think not.

19,552. From your knowledge of coasting vessels, you think it could be done with safety in a heavy gale?—Not with safety, but it would be safer than running in.

19,553. You are disposed to think that heavy laden vessels can't round to with safety?—Not with safety.

19,554. And therefore it would be a choice between running into the firth under very dangerous circumstances, or, on the other hand, of heaving to in a bad sea, which you say is not a safe thing?—Not at all.

19,555. How about shortening sail for a time, and waiting for a tide?—Twenty or thirty miles before you arrived you would have calculated what time it would be high water, and then make for Duncansby Head. There is no danger in going through the firth with an ebb tide.

19,556. So that in all cases in which a prudent master could shorten sail in time, to wait the right time of tide, he would then run through without any danger?—I don't see any danger if it is clear weather.

19,557. You say there is no danger if there is clear weather. Is there any danger in the firth when the weather is not clear?—Most decidedly. We don't know where we are going to, and the tide comes so strong that you are wrong in a crack. I once drove through it in a calm; the weather was thick, and we very near ran upon the island of Stroma. The vessel breasted to it. We could not let go the anchor, and seemed to be in great danger of going ashore. However, as soon as we came actually to the land, the weight of the tide ran so strong that it would not let her go to the land; she turned off and we came out all right.

19,558. From your knowledge of the firth does the tide run fair?—Very fair.

19,559. How far do the eddies extend from off the shore?—The eddies generally extend out into the sea, and not near the shore.

19,560. Then, so far as your knowledge goes, there is a fair tide right through?—Yes; but it wheels about and makes an eddy and then breaks.

19,561. Do you call that a fair tide?—It sets fair. It is the strength of it breaks the water.

19,562. Is it most dangerous to go through in a calm or in a gale of wind?—I think in a calm with the tide running nine knots that a ship can't be brought up with the anchor, the cable would break.

19,563. (*Capt. Washington.*) From the early part of your answers respecting the Pentland Firth to Mr. Lindsay, it is difficult to gather whether, as an experienced seaman, you would recommend vessels to go boldly through it, or whether they should avoid it if possible?—I would never avoid it if it was clear weather.

19,564. You would recommend other vessels not to avoid it?—I think it well for going round by the Orkneys.

19,565. Nothing was said about going round by the Orkneys?—I alluded to it myself.

19,566. You said you would recommend vessels going through Pentland Firth?—It is question whether they are ships.

19,567. You would not recommend them to hesitate?—Not at all, if they were so confined by the wind, or even if the wind was south-west or west. The tide would take you through in a tide, and when you got through, if the wind was west, you would tack away to the northward and leave the tide.

19,568. You mentioned, that vessels sometimes got into difficulties?—It was a vessel that I was in myself that got into the difficulty.

19,569. Do you know of any case besides that?—I do not.

19,570. Are you aware, from public report, that vessels do founder there?—I have known a vessel or two drive to the St. James's Point in a calm.

19,571. Did not you mention about vessels getting their decks swept?—I think vessels might get their decks swept.

19,572. You don't recommend vessels to run through?—I don't recommend them to attempt to run through against the tide when it is running strong against them, but, with a fair tide, there is no danger whatever, in my opinion; the land is so high, and there are no shallows in the firth.

19,573. Did you see in the papers, that, within only 10 days ago, a vessel had her decks swept, and

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eight of her crew washed overboard and drowned?—No; I did not see it.

19,574. I am sorry to say it is a fact. I wish to give you the opportunity of saying distinctly whether you wish it to go forth to all sailors that you recommend the passage of the firth?—I do, under the circumstances I have mentioned.

19,575. (*Capt. Sulivan.*) I understand you to say that vessels bound west might go through Pentland Firth; do you mean to say you would recommend them to touch it when able in gales from the east, and when the tide was running east?—No; not when the tide is running to the east; I spoke against that proceeding.

19,576. Then, at one time of the tide, the half tide, it is a dangerous passage?—There is no question it is.

19,577. You were asked, if vessels running before the wind, and in a bad sea, could regulate the time by shortening sail?—I think I understood the question to say, running with the wind.

19,578. You were asked whether, if a vessel could not round to, could she 30 or 40 miles off regulate speed by shortening sail?—I think I did not say it would be dangerous to heave to there.

19,579. If a vessel were running for Pentland Firth in a heavy south-east gale, scudding in a heavy sea, would she have to carry such sail as she could to keep her before the dangerous sea in order to prevent being pooped?—Before she comes to the firth the sea is the same as the other parts of the sea.

19,580. Generally speaking, with deeply laden colliers and others running before a heavy sea, is it necessary to carry as much canvas as possible to prevent the sea breaking over them?—Yes.

19,581. In a case like that, would you consider it safe to shorten sail with a heavy flowing sea, and go slowly down the place before the wind?—I should heave to, for if you run with sail she would get there too soon.

19,582. The sail would be already shortened if there was a heavy gale, with the exception, perhaps, of a reef in the topsail to heave to?—I should heave to.

19,583. In such a case as this, with heavy south-east gales, the flood tide, and, perhaps, night coming on, if the vessels were caught there, bound to the westward, would Whitby be a good place to go in, if there were a harbour there?—I should say it would.

19,584. Have you heard that there are above 1,000 vessels take refuge in the Scrabster Roads on the other side of Pentland? Should that you think if there was a similar harbour at Wick on the east side that that also would be used by a large number?—There is no doubt of it.

19,585. (*Chairman.*) Supposing you had a harbour of refuge established at Wick, and you were going to make a passage to the westward, and under the circumstances of your having a heavy gale from the south-south-east, would you prefer taking the harbour of refuge at Wick and running the chance of delaying your passage, or would you run round the Orkneys if you feared to go through Pentland Firth?—That would depend upon the circumstances of the ship. I should like to proceed if I thought there was no danger; if the weather was not so bad that a ship could not live, I should go on. If I thought there was danger of losing the ship and men, I should put into Wick.

19,586. So long as you could keep the ship at sea and make the passage, you would prefer going round by the Orkneys to taking refuge at Wick?—I think I should prefer taking the harbour of refuge and going through when the weather was fine, to going round by the Orkneys.

19,587. You would prefer a harbour of refuge at Wick to going round by the Orkneys?—Decidedly.

19,588. Supposing you had a harbour of refuge at Wick, would or would you not make the passage through the firth if you could possibly do so?—Certainly, I should.

19,589. Would you, or would you not, be afraid of losing a fair wind?—I should.

19,590. Would you lose a fair wind by going into Wick?—No question I should.

19,591. (*Mr. Lindsay.*) Say that a harbour of refuge was made at Wick, and you were caught with an easterly gale of wind at night, and were in a position to find it necessary to go into a harbour of refuge, and assuming that you were from Tees and bound for North America, whether would you run for shelter to Wick, or go through the Pentland Firth to seek shelter at Longhope?—I should not want to seek shelter if I was going to America.

19,592. I am speaking of a case where there is necessity for going in. Considering your position as bound from here to America, and caught off the Pentland Firth, say that you could either go into Wick or through the Pentland Firth to Longhope, and found a harbour of refuge desirable for some cause or other, which would you take?—Wick, if the tide ran towards the east; Longhope, if it ran towards the west. Any person can go into Longhope if it is a fair tide.

19,593. (*Capt. Vetch.*) Supposing you were coming to the east through the Pentland, and got disabled, would you not find it very convenient to have a place at Wick to put into?—I think Stromness would answer my purpose just as well.

19,594. Supposing you had just got through Pentland Firth, and had arrived in the North Sea?—That is another question. I should not like to go back, and would go to Wick if it were available for me.

Mr. Henry Hestead examined.

Mr. Henry Hestead.

19,595. (*Chairman.*) You reside in Middlesborough?—I do.

19,596. You are a pilot by profession?—I can hardly say so; I have only been so for a few months.

19,597. You have been for a few months. Previous to that time did you follow the sea?—Yes.

19,598. How many years?—Thirty.

19,599. How many in command of vessels?—Fifteen.

19,600. In what trade were they chiefly employed?—The Stockton and Leeds trade.

19,601. (*Mr. Lindsay.*) Were you in a collier or in one of the traders?—One of the traders.

19,602. You know the object of this Commission, to place harbours of refuge along the coast, with the object of saving life and property. Tell me whether would one great harbour in any one site, or the improvement of existing harbours to take the usual vessels at all times of the tide, would do more to save life and property?—Gentlemen, you will have to excuse me; I am not a learned man.

19,603. Say what you think?—But I am of opinion myself, that, representing things as they are at present, many places, if there were improvements made at the Tees, as well as other improvements, a great many would be saved that are now frequently lost; and, of course, if that there was a refuge harbour in the neighbourhood of where we are now, there is no doubt but what it would be the means of preventing a deal of property, as well as lives, being sacrificed.

19,604. (*Mr. Coode.*) Where, in your opinion, would be the best site for a refuge harbour?—The Tees.

19,605. You would prefer the improvement of the Tees to the construction of a harbour elsewhere?—Yes.

19,606. Why so?—Because it is the most leewardest point. The point where most ships are taken in gales of wind.

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Mr. THOMAS POUNDER examined.

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19,607. (*Chairman.*) You are a resident at Seaton Carew ?—I live at the High Light at Seaton.

19,608. How long have you been light-keeper there ?—About 20 years.

19,609. Were you a seafaring man?—I began my life, as a fisherman, when about 16 years of age, at Hartlepool, and I followed that occupation for 30 years at Hartlepool, my native place.

19,610. Were you ever at sea as a sailor ?—I was, a very little time.

19,611. You don't know much about this coast as a sailor ; all along this coast, between this and London ?—I have been to London, but I don't know much about it, because I was only a voyage or two there ; but I have been at Hartlepool almost all my life, and understand about the Tees Bay, and likewise Hartlepool Roads, well.

19,612. Do you consider Hartlepool would be a good place to make a harbour of refuge ?—I wish we had plenty of places of refuge, the more would do more good. Every harbour should be improved, but I think my opinion is, that the Tees is a preferable place to Hartlepool.

19,613. Tell me why you think that ?—I think that if there was a breakwater constructed upon the North Gare, near the Snook, it would soon make a deep channel at low water, and a good deep-water berth from the sixth buoy to the Snook, which we generally call the Low Hole. I remember when there was a great deal of water in the Low Hole, and I fully believe that there will be no lasting sand or any other kind of bar formed out of the contemplated pier, because I think that the ebb tide from the south to the Tees would be so strong as to carry it towards the shore or outside by Hartlepool.

Mr. ROBERT CHILTON examined.

Mr. Robert Chilton.

19,614. (*Chairman.*) You have charge of the Tees floating light ?—I have.

19,615. How many years have you had charge of the light-vessel ?—14 or 15 years.

19,616. Before that did you follow the sea ?—Yes, sir.

19,617. For how many years ?—I went first in the month of August 1822.

19,618. Were you in command of vessels any time ? —No, I was not.

19,619. You keep a register of winds, do you not? —Yes, I keep a log.

19,620. In which the winds are registered ?—Yes.

19,621. From your observation do you think that the winds which are registered in your log are the true winds out in the offing when it is blowing hard ? —In the winter season I believe they are, but not so in the summer. In a heavy gale of wind I find there is very little difference. There may be a quarter or half a point.

19,622. Therefore in heavy gales of wind during the winter there is no difference ?—In summer time there is a difference—baffling winds sometimes.

19,623. In a gale of wind in summer is there or is there not any difference, in your opinion ?—There is not.

19,624. (*Capt. Sulivan.*) Do you keep any register of soundings at low water ?—Not a regular one, but I generally do keep soundings.

19,625. Can you speak as to any increased depth of water caused by easterly gales ?—No ; with our vessel we lie in about 20 feet.

19,626. At dead low water ?—At dead low water. When we first moored here as a light vessel we had the harbour anchor in 27 feet ; that was in 1837. Five years afterwards the buoy in the channel anchorage was dry. I visited them this morning.

19,627. I wish to know from your observation whether a heavy gale blowing on shore causes the water to rise in the mouth of the Tees, so that a vessel can venture to run for it better than she could at ordinary times ?—With a northerly gale we always have a great deal of water.

19,628. North-east the same ?—Yes, from north-east and north, and on the north-west.

19,629. Would a gale like the east-north-east gale of January bring you higher water on the bar ?—Not a bit.

19,630. (*Capt. Vetch.*) Will you tell me from your own observation whether the sand sometimes extends more to the eastward, and then returns to the westward, or whether it is pretty stationary ?—I don't hear what you say rightly.

19,631. Where are the guiding lights fixed ?—The leading lights ?

19,632. On the north or south shore ?—On the Bran Sand.

19,633. Yes ; are you aware whether the sand sometimes extends more into the channel at one time, and whether at other times it recedes more to the south-east again ?—I am not.

19,634. Does it remain quite fixed ?—I believe it remains a fixture.

19,635. It does not shift its position ?—It shifts more down to the north side.

19,636. Further out ?—Sometimes out and sometimes in. At present it is going in. For the last year it has been going out, and they appear to be very near the channel.

19,637. By the fourth buoy did you visit ?—Yes.

19,638. The sand is going back ?—During the last summer it has been coming over towards the channel,

19,639. Could you undertake to say what is the greatest change you have ever known to take place ? —In what respect ?

19,640. In respect to the shifting of the channel. How far have you known it to move eastwards or westwards ?—Is it the shifting of the sand you mean ?

19,641. I am speaking of the channel near the Bran Sand ?—The Bran Sand is nearly a fixture.

19,642. Are you sure there are never any alterations there ?—The change is on the opposite side.

19,643. On the Seaton south-west side does the sand ever advance towards the channel ?—It both advances and recedes. It has been receding all last year.

19,644. Can you tell me the greatest amount it recedes ?—I took up an anchor and cable that we left 14 years ago, that we were obliged to leave, on account of the sand approaching the sea. This summer I took the anchor and cable up dry, which when they were put down were in 27 feet at low water.

19,645. Then the shift must have gone on to a great extent ?—It takes about four or five years, I believe.

19,646. (*Mr. Coode.*) Have you paid attention to the set of the tide outside the Tees mouth ?—Into the bay ?

19,647. Yes.—I have not paid particular attention to it, but it sets towards the northward in a north-north-east after it leaves the Tees ; after that it goes more to the north and north and by east.

19,648. Does the whole of the ebb set in the same direction ?—The ebb comes from the southward, and turns out again from the Tees.

19,649. After joining the ebb as it comes from the Tees ?—After joining the ebb from the Tees in a north-north-east or north and by east direction.

19,650. That is the best information you can give on the point ?—Yes, it is.

19,651. And you never had occasion to measure the strength of the tide ?—I have not.

19,652. In times of flood or freshets does it bring much matter from the country ?—Yes.

19,653. Is it much discoloured ?—I have taken a bucket of water and let it settle for two hours, and the sediment covered the bottom of the bucket.

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Mr. Robert Chilton.

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Mr. Coode.

19,654. To what extent ?—One eighth or one sixteenth.

19,655. Is that a common occurrence ?—It is only in heavy freshets.

19,656. What material was it ?—Mud.

19,657. Did it come from the sea ?—No, from upwards. This was in heavy freshets.

19,658. You are quite sure it was not sea sand ?—Not sea sand ; a muddy substance.

19,659. Do you ever trace the current, when so changed, to see how far up the bay it is discoloured ?—It goes out into the bay, and passes by the Heugh.

19,660. Have you ever seen it pass the Heugh in the discoloured state ?—Many times.

19,661. You don't think the matter is deposited in Hartlepool Bay ?—No, it is drained from the land, I suppose.

19,662. You are quite sure you see it pass on round the Heugh ?—Yes ; at least I will not be positive to say I was on the Heugh and saw it pass, but it passes to the north.

19,663. You can't say how far ?—No, I can't say how far.

19,664. (*Capt. Vetch.*) Did you observe the state of the water this morning at the Bran Sand ?—I did not come from there this morning ; I was summoned to appear here, and have been here since yesterday.

19,665. You will be surprised to learn that when I went down this morning I could not see three inches into the water, it was so thick ?—What part was that ?

19,666. The channel opposite the leading lights.—Was you within the South Gare ?

19,667. I was on the shore of the Channel between the two leading lights. The water was there so turbid that I could not see to a greater depth than three inches. I ask you if you would be surprised to find that that is the case ?—We have had heavy rains lately, and I don't doubt that there is a freshet down.

19,668. (*Chairman.*) You have prepared a short statement ?—I have a statement of the wind.

19,669. Is that statement of the wind in the form of a table ?—No, not in the form of a table.

19,670. Is it remarks upon the shifts of the wind ?—Yes.

19,671. Will you read it to us ?—Yes.

The witness read the following statement :—

" The most destructive gales in the Tees Bay, or on this part of the coast, is when the wind is from the east-north-east and east, and east-south-east.

" Highest seas on the coast are when the wind is from the north and north-east ; and when it blows heavy gales from the north-east the sea rises more perpendicular before it breaks than it does when the wind is from the east, or from that to south-east. I have frequently observed, during a gale from the east, that the wave rolls in quick succession, and drives a deal of broken water before it. Not so with the wave from the northerly gale, it rises almost to a perpendicular, and then breaks with an overlap and with a fearful force.

" The heaviest gales, to the best of my knowledge, on this coast, are from the south-west and west-south-west.

" South-east gales.—I have frequently noticed that they generally spring up after a calm, or light variable winds, and increase gradually to a gale, and during the gale to vary from that to east-north-east, especially if attended with rain or snow, which they frequently are. I have known south-east gales to last one or two days, that is to say, the height of it, and continue to blow afterwards with strong blustering winds for a week or ten days, varying between south-east and east-north-east.

" North-east gales.—I have frequently observed, for the last nineteen years, that when the wind prevails from the south-west, and with wild unsettled weather, that it suddenly changes to the north, and from that to the north-east, generally with a heavy gale ; after it moderates, falls back to the north, and from that to north-west ; ultimately to the south-west again.

" The height of those sudden gales last from 12 to 24 hours.

" With a breakwater on the north side of the Tees, all vessels lying in the Tees would be sheltered from the north and north-east winds. The Bran Sands shelters from the south-east, and a short pier on the Bran Sands would shelter vessels from all winds and seas. I have always found the floating side the best, when the winds are from the south-east there is a slight swell on at high tide, but nothing to injure any vessel riding in any respect.

" (Signed) R. Chilton.

" Tees Floating Light, Sept. 26, 1858."

Mr. John Rig Burdon examined.

Mr. J. R. Burdon.

19,672. (*Chairman.*) You reside at Stockton, and follow the sea ?—Yes.

19,673. How long have you been at sea ?—Forty-six years.

19,674. How long in command of vessels ?—Twenty-nine years.

19,675. In what trade chiefly employed ?—In the coasting trade.

19,676. (*Mr. Lindsay.*) From your long experience of the coasting trade, tell me what you think of a harbour of refuge along this coast—first as to the necessity, and where you consider it ought to be ?—No other place but Tees Bay for a general harbour of refuge, to my thinking.

19,677. What part of the Tees Bay ?—I would have it right across ; at least not right across, but leaving a sufficient entrance for ships from the north and south, protecting Tees altogether past Hartlepool, Tees, and all the lights.

19,678. Are you in favour of a harbour that goes right across from Redcar to the Heugh ?—I am in favour of a breakwater going south to Long Scar Buoy to, perhaps, a little way from Hartlepool Heugh to the northward, but leaving sufficient entrance, perhaps 1,500 or 2,000 feet at each end. Then it would be a grand harbour.

19,679. Supposing the Government should not be disposed to make so grand a harbour as that, but limited the expenditure to sufficient to make a smaller harbour than that which you propose, whether do you think the harbour made in Hartlepool Bay, with a breakwater extending outside of the Heugh, between that and Long Scar,—do you think a harbour made in that situation, or one over at Redcar, somewhat the same as that suggested by Mr. Fraser, which do you think best ?—My impression is, that if we can't get a grand one let us have one where there is no trade. If a fleet of ships is at sea and must take refuge, let us go to a place where there is use or trade.

19,680. Therefore do I understand you would rather have it at Redcar than at Hartlepool Bay ?—I would.

19,681. Can you tell me any other reasons why you think a harbour at Redcar such as I have mentioned would be better than one of a similar size at Hartlepool ?—My impression is this, that if you have a refuge harbour at a port where there is a great trade there would be a great accumulation of vessels ; there would first be the light ships accumulating at east-south-east, and all those sorts of winds, and then there would be the laden ships bearing up that can't keep at sea, and also the ships coming to the port for purposes of trade. The light ships when they go into the harbour of refuge must bring up at the tide time. The line ships accumulating from the south must come to the same place, and therefore there would be a double accumulation, and great danger of damage occurring to the vessels which are taken to the harbour.

19,682. The most dangerous winds, I believe, are those ranging from east-south-east to north-east ?—I think they are.

19,683. Do you think a harbour of refuge at Redcar, or one in Hartlepool Bay, would be easier reached in these winds, or would there be any difference?—If the wind be at east-south-east it can be reached easier; and, of course, it can be reached easier.

19,684. So far as regards site there is not much difference, in your opinion?—No.

19,685. Tell me what you think of a harbour further south than this? Do you think a harbour wanted on this side Flamborough Head? Do you think it would do much good?—I think a harbour further south would be of some use; but not so great use as the harbour in the Tees Bay, right in the bight. When ships are caught between Flamborough Head and the Farn Islands with a heavy gale from the east they must drive on. They can't fetch the Head, and can't fetch Filey Bay, if there was a refuge there. Filey Bay, though, is a nice little harbour of refuge, and would be very handy for ships placed in that locality.

19,686. During your long experience of the coast have you known many vessels beat about Flamborough Head, detained by baffling winds?—I have.

19,687. What is the greatest number you have seen at one time?—I have counted 600 sail with a telescope. That was with a northerly wind. As soon as the wind is southerly you must be out of it.

19,688. Say that the wind was dead south, and beginning to blow very hard, and that you were one of these vessels, what would you do then?—Get under weigh and make the best of it.

19,689. What would you do if there came a sudden change of wind so that you could not weather the land on either tack?—I should take a sandy beach for it.

19,690. If you could not get a sandy beach?—South of Bridlington, all the way to the Humber there is nothing but sand.

19,691. Say you could not weather Flamborough Head, if the wind was strong from the south?—I should lay in Bridlington Bay if I could not get round Flamborough Head. I could always get a safe beach on the larboard tack.

19,692. Have you seen many vessels bound north off Flamborough Head?—Many.

19,693. Not able to get round the head?—Many hundreds.

19,694. Say that these vessels were caught with a heavy easterly gale, and could not weather Flamborough Head, what would you do then?—I should try to get to the northward as fast as I could.

19,695. If the wind came east-north-east, whence we are told it occasionally blows strongest, if you were close in on the head, and caught with the wind, could you fetch a port down here?—With the wind east-north-east I could, certainly, go round the head, if I had the least offing in the world.

19,696. Say you were so close in that you had not sufficient offing to weather the head?—Then I should be obliged to go into Filey Bay. There is no other alternative.

19,697. Looking at all the consequences now, and saying that it is decided to have a harbour of refuge further south than Redcar, what point along the coast between Redcar and Flamborough Head—at what place do you think a harbour of refuge would be best, all things considered?—There are only two places I should have the least opinion of,—Filey Bay and Runswick Wyke or Bay.

19,698. After your 27 years' experience as a master on this coast, I want to know if the money was left in your hands to make a harbour of refuge to save the lives of the sailors, and to save ships, and to afford facilities to them; and that you were bound to spend it on one of these two points, would you spend it at Runswick Bay or Filey Bay?—I should spend it at Filey Bay; but in preference to either of these places I would take the Tees.

19,699. I quite understand you said that before. I want to ask you, as an old sailor, do you know the navigation of the Tees at Stockton and Middlesborough well?—I have gone many times up and down; but I am not in the habit of seeing it at low water. My occupation is to take a ship up or down at high water, and therefore I don't know much about it at low water.

Mr. JOHN HUDSON examined.

19,700. (*Chairman.*) You reside at Stockton, and followed the sea formerly?—Yes.

19,701. How long were you at sea?—Thirty-seven years.

19,702. Of that period how long were you in command of vessels?—Twenty-seven.

19,703. In what trade were the vessels chiefly employed?—In the coasting trade.

19,704. Between here and London?—Twenty years between here and London; previous to that in the Baltic trade.

19,705. You have heard the evidence of the witnesses examined both yesterday and to-day. Give me your opinion, which would be the best to improve the three ports, Tees, Tyne, and Weir, or to make a single harbour of refuge somewhere else?—I think a harbour of refuge, if sufficiently large, would be better than the improvement of the ports.

19,706. Where would you be disposed to put it?—In the Tees Bay; that is, at the deepest bight.

19,707. Are your reasons the same as those of the previous witnesses?—My reasons are these, that the tide drives the vessels into this bay, especially with a north-east wind. A ship curves to the northward with the wind from east-north-east, has the tide upon the beam, and it fetches her right into the bay.

19,708. You consider one reason why we should have it here is the great drift into the bay?—Yes; there is no doubt of it.

19,709. (*Mr. Lindsay.*) Do you know much of the navigation of the Tees?—I have been trading out of it a long time.

19,710. Do you know the smaller plan which is proposed by the Tees Commissioners?—Yes.

19,711. You are aware that they expect to obtain 16 feet at low water?—Yes.

19,712. Say that you were off the coast, and caught by an easterly gale of wind, and were one of 50 ships that ran for shelter, and that all these ships were running for the harbour so constructed, would you think you were placing the ship in great peril in running for it or not?—Certainly not, if the wind was blowing in. I have come in in all weathers, in the worst gales that ever blew.

19,713. Speaking of laden ships, would you find a safe anchorage for 50 within these limits?—I have not been in the Tees lately, but there used to be room certainly for 50 sail.

19,714. You cannot speak on the point?—I have not been at sea for nearly two years now.

19,715. Putting the Tees out of consideration altogether, and saying that such a harbour was to be placed south, do you think a harbour at Runswick or Filey would be of most service?—I think I could tell a better place than either.

19,716. But between these two?—I should prefer Filey Bay to Runswick.

19,717. Tell me your reasons?—With the wind how?

19,718. Of course it can only be with the wind on shore that a harbour is wanted, unless the ship springs a leak, or something of the kind?—The reason I prefer Filey Bay is, that there is not so much water as at Runswick. A little way out of Runswick there is 20 or 25 fathoms. In Filey Bay you can go into any water you like, five fathoms, or three feet, if you like.

19,719. Say a harbour could be made at Runswick to afford shelter for 200 vessels, and that a similar one

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could be made at Filey, which do you think would be the most good ?—I think Filey.

19,720. You consider that as a site Filey is better than Runswick ?—Yes.

19,721. Say it rested between Hartlepool Bay—I mean between the Heugh and the Long Scar, with a breakwater outside—say it rested between Hartlepool and Filey, and there was only to be one harbour, which point would you consider the better, all things considered, laden ships, light ships, and all things considered ?—I should decidedly prefer Hartlepool Bay.

19,722. Say that it rested between Hartlepool Bay, and a harbour to be constructed at Redcar, that proposed by Mr. Fraser; which would you prefer ?—I should prefer the plan at Redcar.

19,723. Why ?—In Hartlepool Bay the water is shallow, and we always know that in shallow water the sea is rougher than in deeper water. Here you have plenty of water, and there is a fair set of tide each way, which in Hartlepool Roads there is not. The flood tide comes in a south and south-west direction right towards the Redcar Rocks, which causes the ships to come in here. In Hartlepool Bay a ship will never go to the northward to enter upon the flood, because the water coming out meets the south tide and takes a curve to the northward, upon the flood the tide takes a southerly direction from the back of the Heugh.

19,724. Is there any other reason besides ?—I think at Redcar there would be no fear of silting up. It is good holding ground. You can go into what water you like between the Redcar Rocks and the Tees.

19,725. What is the nature of the ground ?—A kind of stiff sand.

19,726. Is it good holding ground ?—Very. A ship will ride there until she pulls her windlass out.

19,727. Is sand as good holding ground as clay ?—Sometimes better than clay. Some clay is hard, and you cannot get the anchor into it. Look at Yarmouth Roads, that is sand.

19,728. Is the holding ground better at Redcar than in Hartlepool Bay ?—I will not say that the Tees Bay is generally good ground all over.

Mr. Alexander Petterey examined.

Mr. A. Petterey.

19,729. (*Chairman.*) You belong to Middlesborough ?—Yes.

19,730. And are master of the Tees Conservancy dredger ?—Yes.

19,731. By whom are you employed at the present time ?—By the Tees Commissioners.

19,732. Are you employed dredging for them at present ?—Yes.

19,733. Have you at any time been let by them to any other company ?—Yes ; the West Hartlepool Company.

19,734. Were you the master of the dredger during the four and a half months she was employed at West Hartlepool ?—Yes.

19,735. Was that during the present year ?—Yes, from April to September.

19,736. When the weather was moderate and fine, where were you generally employed dredging ?—Outside the piers.

19,737. When not working there where were you dredging ?—Inside the piers and on the slope.

19,738. Have you any information to give when so employed ?—There was a considerable accumulation of sand on the bar when there was any swell on.

19,739. How far does the bar extend without the piers ?—I should say nearly 200 yards.

19,740. Have you ever seen any vessels lying on it ?—I have seen steam tugs.

19,741. (*Sir F. Smith.*) How long have you been employed by the Tees Commissioners ?—I have been 10 years under the Navigation Company and the Tees Commissioners.

19,742. Was the time you have just mentioned the only one in which you were employed at Hartlepool ?—Yes, that was the only time at West Hartlepool.

19,743. Do you know of any other machines being employed dredging besides yours ?—They had one of their own.

19,744. Was that dredge employed at the same time that yours was ?—No.

19,745. Do you know the reason of that ?—She was under repairs at the time we were there.

19,746. You merely went to supply her place ?—She could not take up the material we were taking up ; she has not power enough.

19,747. How much more power have you than she has ?—Three times as much.

19,748. What were you taking up ?—Principally clay.

19,749. No sand on the top of it ?—Yes.

19,750. What depth of sand ?—Eighteen inches.

19,751. At what part of the bar was that ?—A hundred yards out from the piers.

19,752. What was the general extent of the bar in both directions ?—I don't know how far it would extend. Across longwise we would go 200 yards out from the piers before we deepened two feet.

19,753. How much did you deepen altogether ?—Three feet at a time, or every time we went across we made it three feet deeper.

19,754. You made it three feet deeper over the bar ?—Yes.

19,755. Was that the only time you were employed ?—I went over it a vast number of times.

19,756. But you only were employed once on that ground ?—A good few days on that ground.

19,757. Did you go only once from Tees to West Hartlepool to clear away their bar ?—Only once.

19,758. How long were you employed ?—Between four and five months.

19,759. Continually employed ?—Yes, continually.

19,760. Can you tell me what length of time had elapsed between the time you were sent and the time the other dredger was employed in the same place ?—I believe she worked up to the day we went.

19,761. How long was she employed there ?—I believe she works when the water permits constantly.

19,762. And does so now ?—I think so. I have not been there since we left, but I expect she was going to start the day we came away.

19,763. Are you of opinion that a dredger must be constantly employed on the bar ?—Yes, to keep good water on it.

19,764. From year's end to year's end ?—Yes.

19,765. The weather will not permit constant working on the bar, but as far as the weather will permit from year's end to year's end a dredger must be employed on the bar ?—Yes.

19,766. You are quite confident of that ?—Yes.

19,767. Can you give us any information as to the cause of the increase of the bar ?—The swell brings sand on to it.

19,768. From whence ?—From the same direction where the sand comes.

19,769. It is brought in by the swell ?—Yes.

19,770. You don't think it is taken up by the tide from the Tees' mouth ?—I think there is more comes from Old Hartlepool. When they are sluicing it a great deal comes to West Hartlepool.

19,771. You think so ?—I have seen it.

19,772. No doubt ?—No doubt. I have always found that the West Hartlepool bar rises when they have been sluicing out the old harbour, and the water comes round quite thick.

19,773. Where are you employed by the Tees Conservancy ?—Just before Cargo fleet.

19,774. This will be the third or fourth time you have been upon the Cragpool scarp ; how much have you lowered that ?—We take a three feet cut every time.

19,775. How often do you take these cuts?—Probably two every day.

19,776. How often in the course of the year are you in the habit of lowering the scarp three feet?—We have never gone over the same ground twice. We always go over fresh ground.

19,777. You think you will not have occasion to go over the same ground twice?—No.

19,778. Why do you think so?—Because I think there will be plenty of water.

19,779. And you will keep it?—Yes.

19,780. There will be no fresh accumulation on the spots you have cleared?—I think not.

19,781. (*Mr. Lindsay.*) I understand you to say, you have been employed by the Tees dredging at West Hartlepool Harbour?—Yes.

19,782. What was the nature of the soil that you lifted there; was it altogether sand?—Mostly clay.

19,783. What proportion of sand would there be?—One tenth to nine tenths, or one third to two thirds. We were dredging in some parts where there was bare clay, but on the bar there would be about 18 inches of sand upon the top of the clay.

19,784. If you were dredging in some places where there was bare clay it shows there were no silting?—That is not on the bar.

19,785. I am speaking of the bar?—There is no bare clay on the bar.

19,786. What proportion of clay and sand, or was it all sand that you took from the bar, 18 inches of sand to 18 inches of clay?—There was 18 inches of sand on the top of the clay.

19,787. (*Capt. Washington.*) Besides dredging on the bar, I think you said you dredged in the channel?—Yes.

19,788. What was the nature of the soil?—Mostly silt, and sand.

19,789. In the channel?—Yes.

19,790. Inside?—Yes.

19,791. Are you speaking of West Hartlepool or the old harbour?—West Hartlepool.

19,792. Were you ever dredging in the old harbour?—In the dock or mouth, but never in the harbour.

19,793. What was the nature of the soil you dredged?—It was all silt in the dock.

19,794. Do you know what depth there was?—About four feet.

19,795. Were you ever there but once?—No.

19,796. What is the dredge they keep at West Hartlepool, is she a powerful one?—The one they have at present is not very powerful, but it will be made more powerful.

19,797. At present it is not so powerful as that in the Tees?—No; but with the improvements they expect it to be very powerful, because she will have two ladders, and 50 horse engines, I expect.

19,798. What is the power of that in the Tees?—Twenty-five horse power, I believe.

19,799. You are constantly employed in favourable weather?—Yes.

19,800. Do you know how much you can dredge up in a day?—That depends upon the material.

19,801. The usual material?—I don't know what you call the usual material. You can dredge more gravel than anything else, such as clay or sand.

19,802. Do you dredge most gravel or most clay?—Most clay; I think, upon an average, about 48 tons, the time we were in West Hartlepool.

19,803. You kept an account there?—Yes.

19,804. You don't keep an account in the Tees?—Yes; I do.

19,805. About what quantity did you dredge?—Not quite so much as at the other place; we are not quite so long in the Tees.

19,806. In gravel, how much can you dredge up?—Three hundred tons more a day.

19,807. Suppose it was all sand and silt, how much could you dredge up?—I could not dredge up so much of it as gravel, it is not so heavy. We could go over as much ground, but it would not weigh so much.

19,808. Is there any great difficulty in dredging from the Hartlepool Bar?—There is a vast of rough stones; that is the only difficulty.

19,809. A number of loose stones?—Yes.

19,810. Loose stones?—Not all loose; a vast of them are fixed in the clay.

19,811. Not rocks?—No; round wind boulders, from a quarter to half a ton weight.

19,812. Where do you think they come from?—I can't say. I think they have been there originally.

19,813. If ever you go back to dredge the bar, do you think you will find them again?—I know we have left a good few there.

Well, I hope you will be employed to remove them.

19,814. (*Capt. Sulivan.*) When you first went to West Hartlepool, had you any larger accumulation of sand to work through to get to clay than you found afterwards; that is to say, did it afterwrds accumulate with the action of the sea?—Much about the same.

19,815. When you first went there what water was the spot you were working at?—Do you mean at low water?

19,816. What water at low water was there when you were working?—Perhaps three feet.

19,817. What depth did that give at high water?—Nineteen feet at high water.

19,818. Do you know what the height of the water is on the dock sill at high water?—No.

19,819. Were you working away to the level of the dock sill?—I believe they wished us to make it as near level with the dock sill as you possibly could.

19,820. You say you cut down three feet at a time. You mean by that, that, before shifting the vessel, you work down three feet?—Yes.

19,821. How often did you ever go over the same ground again after you had taken the three feet from it?—Upon the bar we went over it again, perhaps, a week after.

19,822. How high would it be again?—It would be level across.

19,823. The same height as when you worked at it before?—Our old workings would be level across with the original bar.

19,824. How many times had you to work on that bar during the $4\frac{1}{2}$ months?—I can't say, I am sure.

19,825. Did you go on an average once a week?—We have been on it for weeks together, when the weather was fine.

19,826. When you had taken it down to three feet on the bar did you go on deepening it any more?—No; we did not cut it any deeper, we only took the sand away when it filled up.

19,827. You would remain there continuing to take up sand?—Not on one particular spot.

19,828. But over the bar?—Yes.

19,829. How soon do you think three feet of sand accumulated after you had taken that quantity away?—That depended on the weather. If there was a sea on, it would be level across, perhaps, in two days.

19,830. Do you mean to say, that after you left dredging on account of the weather, you came back in two or three days, and found it level across?—Yes.

19,831. Does that happen often in the year?—There was not much bad weather there in the time we were there.

19,832. Was that in the summer?—Yes; from April to September.

19,833. It was in the summer season, you tell us, that all accumulation of sand was occurring?—Yes.

19,834. Would it be much greater in the winter?—I should think so, owing to the heavier swell.

19,835. Where you were taking up 18 inches of sand and 18 inches of clay together, was that away from the place where the sea brought in the sand? There was no accumulation of clay on the bar when you went there?—No, no clay comes there.

19,836. Then where were you taking the 18 inches of sand, and the 18 inches of clay under it?—It was when we were on fresh ground; when we got on the

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bar we found three feet of sand, and no clay at all.

19,837. You never went deeper than three feet ?—No.

19,838. You kept working out to the depth of three feet ?—Yes.

19,839. Could you give an idea how many times you took away three feet of the bar in four months ?—I can't say.

19,840. Once a week, on the average ?—No.

19,841. Twice a month ?—More than that.

19,842. Three times a month ?—Yes ; more than that comes to, once a week.

19,843. On the average once a week, do you think you did it ?—I don't think it would be on the average once a week.

19,844. Three times a month ?—Yes.

19,845. From 12 to 14 times during the time you were there, did you remove that amount of sand ?—I can't say.

19,846. You told me you perhaps removed three feet of sand on an average three times a month ; that is, you had to dredge over the same place and take three feet of sand, where you had previously removed that quantity, on an average three times a month ?—It would be more than three times a month.

19,847. Now, saying 12 times in four months, is that over the mark, or under ?—I should say we were six weeks on the bar.

19,848. How many days did it take you to take it down three feet ?—It was not all brought down to three feet when we came away.

19,849. In working at the same spot where you at first dredged over, you say you found it filled up with sand. How many days elapsed between your going over the ground which you dredged ?—In a few days we passed over the same ground.

19,850. Did you each time take three feet of sand ?—Yes, after the first time going over.

19,851. Did you take any notice of the beach on either side of the channel above where you were working, to see whether, when these accumulations of sand came on the bar, there was also an additional quantity of sand thrown up on the beach ?—Outside the bar ?

19,852. Yes.—No, I did not take any notice of the bar outside the piers.

19,853. The low-water line was a little outside you ?—Yes.

19,854. From the low-water line up to the pier heads on either side of the channel, had you any accumulation of sand when gales threw up sand on the bar ?—I did not take any notice of it. I have got a log, and can give a copy of any particulars you require. There is an account of each day's working.

19,855. Will you procure a copy, and let us have it ?

(*Mr. Dodds.*) I will take care to supply it.

19,856. (*Capt. Vetch.*) I wish to ask, when you speak of the bar and channel which you dredged, if you refer to West Hartlepool ?

(*Witness.*) Yes.

19,857. Inside or outside ?—Inside and outside the pier of the west harbour.

19,858. (*Mr. Coode.*) What was the greatest depth at low water that you dredged in ?—Seven feet, and we made it 10 feet.

19,859. You had seven feet when you commenced, and 10 feet when you left off ?—Yes.

19,860. How long had the West Hartlepool dredger ceased working when you went there ?—She ceased from the time we went until we came away.

19,861. Was she dredging at the time you arrived ?—Yes, she had dredged the day before we arrived.

19,862. Was she ready to take your place when you left ?—Yes.

19,863. Do you know that of your own knowledge ?—Yes.

19,864. I think you said you dredged within the dock at one time ?—At Old Hartlepool.

19,865. What material was it you took out ?—Silt.

19,866. Have you any idea where it came from ?—It would be continually settling in the water, I think.

19,867. What colour is it ?—A dark colour. Perhaps there would be a good deal of coal dust.

19,868. Do you think it all coal dust ?—I should not say quite.

19,869. Did you preserve any of it ?—No.

19,870. You said something about the hours you worked. Did you make extra time at Hartlepool ?—Yes.

19,871. During what hours did you work ?—We worked according to tide, at six hours at a time, for a tide's work.

19,872. Under whose directions ?—Mr. Caseman's.

19,873. How far from the pier did you take the dredger towards the south-east ?—A hundred yards out.

19,874. Is that the greatest distance you went at any time ?—Yes.

19,875. Was it generally a sea sand ?—No.

19,876. What was it ?—Part clay and stones.

19,877. You told one of the Commissioners that you took part sand and part clay at the first cut. After that was it all sand ?—Yes.

19,878. Such as you see along the beach ?—Yes.

19,879. Did you notice whether the water in the bay, when you were dredging, was thick at any time, or was it always clear ?—It was not very clear when they were sluicing at Old Hartlepool.

19,880. Do you think that generally much of the material you dredged in the channel came from the West Hartlepool shore ?—A good deal when they were sluicing at Old Hartlepool the water all round the north pier head was quite thick.

19,881. Did they sluice daily ?—No.

19,882. At what intervals ?—I believe only at the spring ebbs. Once a fortnight or month.

19,883. How is the small dredge employed that they have at West Hartlepool now ?—I can't say where she is employed. I have not seen her since we came away.

19,884. Is she much employed in the dock ?—She is always employed outside in the harbour. I don't think they have had a dredger in the docks since they were made.

19,885. You dredged in the dock ?—At Old Hartlepool, two or three years since.

19,886. Does your log record the places you were working in ?—Yes.

19,887. (*Capt. Sulivan.*) When you cut this channel through, you left 18 inches of sand on the part beyond the cut right and left ?—Yes.

19,888. May it not have been the case that the channel filled up in a great measure from the shift of the bank right and left ?—It could not. We still find the 18 inches of sand on the clay whenever we go on to fresh ground.

19,889. Right and left ?—Yes. The 18 inches were there.

19,890. (*Mr. Coode.*) You did not find more than 18 inches after a swell ?—I know there would not be above two feet ; from 18 inches to two feet.

19,891. There might have been an increase after a swell ?—I never found any more than two feet at any time.

19,892. You never found more than two feet at any time ?—No.

Mr. Andrew Ditchburn examined.

Mr. A. Ditchburn.

19,893. (*Chairman*). You reside at Redcar ?—Yes.

19,894. You are a pilot by profession ?—Yes.

19,895. How long have you been so ?—About 20 years.

19,896. Previous to that how were you employed?—I was brought up a sailor from the first up to 1837. I was bound to the sea when 12 years of age, in 1806, and I remained there till 1837, when I was made a pilot.

19,897. (*Mr. Lindsay.*) Do you know the anchorage in Hartlepool Bay?—Yes. I used to know it in former days, before the new harbour was commenced. I know nothing of that. Old Hartlepool I remember very well, and good anchorage there was.

19,898. A good holding ground?—Yes.

19,899. What is the bottom?—Sand and clay it was before the present Victoria Dock was made.

19,900. You don't know much about it since that time?—Only as a pilot. The anchorage is good.

19,901. A pilot to this place?—Yes, but to Tees and Hartlepool.

19,902. Do you know the plan for the improvement of the Tees?—I have not seen any one but that on the wall. [The plan of 1847 for a harbour of refuge at Redcar.] I have often, in my younger days, when going to sea on a dark and stormy night, said that I should like to have had such a place as that for refuge to come to when returning from the Baltic.

19,903. Would you have any hesitation in running for that place if you were one of 50 or 60 ships obliged to seek refuge?—No, I would not.

19,904. Where would you anchor?—I would come along and bring up in what water I liked.

19,905. At what part of the proposed harbour would you anchor?—Inside, in six or seven fathoms of water.

19,906. I am speaking of the Tees, the place proposed for a pier at the entrance of the Tees?—I beg your pardon, I have never seen it. I know the Tees perfectly well as it now is.

19,907. Is there a good anchorage ground within the mouth of the river Tees?—There is from what we call the fourth buoy to the floating light hard clay.

19,908. How many ships could find good anchorage there?—Well, a great number of small vessels can anchor, but I think there is not a berth for more than four large ships when they are lying together, such ships as hold 42 keels of coals and draw 18 feet of water, as a ship of that description will do; such a ship as that requires a vast of room to turn.

19,909. You think there is not space at the fifth buoy for more than four large vessels to ride at anchor. How many ships of 12 or 13 feet water could anchor there?—I should say it would hold 30 or 40.

19,910. You think the anchorage at the fifth buoy, giving room to swing, would hold four 40 keel ships and about 30 smaller vessels?—I am satisfied that the ground just below the floating light would, and better clay cannot be found; if you will let go the anchor and heave it up again it shows up to the very stock all hard clay.

19,911. I am speaking more of the space?—There is plenty of water down below the fourth buoy; but the stream is very strong, and I do not think there would be above four berths for large ships as I speak of.

19,912. How many for ships drawing 12 feet up to 15 feet?—Well, 15 feet is a vast of water.

19,913. Say, then, from 12 to 13 feet?—There is quite plenty of room for 30 vessels at least. I am quite of opinion that there is some little more room at the other end, and the fifth buoy is getting something better.

19,814. From your knowledge of this particular part, say that it rested between making a harbour of refuge at Hartlepool Bay, between the Heugh and the Long Scars, with a breakwater outside, on the one hand, and such a place as that at Redcar, which do you think would do the most good—where would you rather have it?—If I was at sea in a dark stormy night, with the wind east-north-east, I should make for this.

19,915. With the wind east-south-east?—Well, I should do the same. I would not venture my life or ship into Hartlepool.

19,916. With a breakwater?—If there is a breakwater or anything done ——. I can't speak but as it is.

19,917. I am supposing a breakwater as proposed there, and another breakwater made here, which would you rather have to run to in an easterly gale?—I should not have a great deal of choice; if possible I should come to this.

19,918. Why?—Because I think there is more room, and if it was thick and hazy there is good soundings to make out, and deep water. It is broken water at Hartlepool Heugh.

Mr. Robert Stoker examined.

19,919. (*Chairman.*) You reside at Stockton?—Yes.

19,920. You have followed the sea?—I have.

19,921. For how many years were you at sea?—Thirty years.

19,922. How many in command of vessels?—Somewhere better than 13 years.

19,923. In what trade were the vessels which you commanded chiefly employed?—In the coasting trade, between Stockton and London.

19,924. (*Mr. Lindsay.*) Were they traders?—The goods trade.

19,925. Now tell me whether you think, looking at the number of wrecks along the coast, and all things considered, whether you think the improvement of the existing harbours, so as to make them accessible at all times of tide, would do more to save life and property than one great harbour?—I think the improvement of the three tidal harbours would be better than a colossal harbour.

19,926. Say there was only to be one harbour, looking at the whole range of coast from Flamborough Head to the Farn Islands; tell me on what site you think that harbour ought to be made?—The Tees Bay.

19,927. What part?—I think the south part.

19,928. Here at Redcar?—Yes; off Redcar, between the Redcar Rocks and the Tees mouth.

19,929. You would prefer such a harbour as that to a somewhat similar breakwater carried outside off Hartlepool?—Yes.

19,930. Why?—I do not know, speaking for that properly; it would depend upon the wind altogether.

19,931. I want you to consider the prevailing and most dangerous winds from the south-east to east-north-east. All things considered, tell me why you would prefer a harbour of refuge at Redcar to one in Hartlepool Bay?—There is more water, and it is good holding ground, and not so apt to silt up.

19,932. Any other reason?—I cannot say any other.

19,933. What do you think of a harbour further south? Do you think we require one further south?—I think there ought to be one somewhere near Flamborough Head. There are frequently a great accumulation of vessels about the head.

19,934. On this side of Flamborough Head?—Yes.

19,935. Do you think Filey Bay would be a good place?—It is the most eligible one of all.

19,936. Do you think it would be of more value than Runswick Bay?—Decidedly.

19,937. Again, saying there was only one harbour to be made, and it rested between Filey Bay and Hartlepool Bay, which of these two would you prefer?—I should say Hartlepool, in preference to Filey; it would be the means of saving more life and more property.

19,938. Then your opinion is, that Redcar would be the best site for one great harbour, Hartlepool the next, and Filey the next?—Yes.

19,939. (*Capt. Sulivan.*) If you had your choice between this one great harbour at Redcar, or rather a smaller one at Redcar, and another smaller one at

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Filey, which should you choose ?—I should choose the one at Redcar in preference to one at Filey.

19,940. Suppose you had to decide between one large one—say to seven fathoms water, at Redcar ; and, on the other hand, two of five fathoms water, one at Redcar, and the other at Filey ; which would do most to save life and property ?—I think one large one.

19,941. Why ?—Because the vessels all drive down Tees Bay with an east wind all round to Sunderland, or Shields Bay, to get to the northward, and are frequently caught short off Sunderland, when they are obliged to bear up, and come in here.

19,942. That would show that the greatest number of vessels would come into Tees Bay ?—Yes.

19,943. But you also said that one was desirable off Flamborough Head ?—Yes, because loaded vessels often dodge under the head, and are caught.

19,944. For those vessels, would it or would it not be better to have it at Filey, and another here, though neither had more than five fathoms water ? —I should prefer the southern harbour.

19,945. That is Filey harbour ?—Yes.

19,946. For the safety of all the colliery trade, and putting aside the local trade, for all the passing trade, and the coasting trade, should you consider a harbour, having five fathoms water at dead low water, which they could enter day and night, sufficient ?—I should think it was.

19,947. If you could have two such harbours, one in Tees Bay and another at Filey, would that be better than one harbour in Tees Bay, though with deeper water ?—I think that it would.

19,948. (*Mr. Coode.*) Have you often seen fleets of loaded vessels dodging about Flamborough Head, and trying to get to the south ?—Yes, they generally wait for a flood tide to set them round.

19,949. Is that a matter which often occurs ?—Yes, very frequently.

19,950. What is the largest number you have seen ? —I have seen 500 sail.

19,951. How often ?—A great many times.

19,952. Have you ever dodged there yourself ?— Frequently.

19,953. What is the longest time you have been detained there ?—Perhaps 24 hours.

19,954. Have you ever been driven back from there ?—I have been driven back, and have taken Shields Bar.

19,955. Has that happened more than once ?—Only once.

19,956. Have you ever been driven back, and taken any other port ?—Never.

19,957. Have you ever been driven back, and still kept the sea ?—Yes.

19,958. Can you give us any idea of the number of times you have been driven back ?—No.

19,959. (*Chairman.*) Of course you know Yarmouth Roads very well ?—Yes.

19,960. What is the largest number of vessels which you have ever seen there at one time ?—About 800 sail.

19,961. Supposing we had one harbour of refuge, what number of vessels would you say it should contain—what would be a sufficient provision ?—One colossal harbour.

19,962. One large harbour ?—I should say 1,000 sail ; it could not be less.

19,963. You would be disposed to say not less than 1,000 sail ?—You often see the coast completely covered with fleets of vessels, and very frequently the chief of them are caught.

19,964. Do I understand you to say that you consider Filey Bay would be advantageous chiefly as a convenience to trade, to prevent the vessels having to run back, and losing time ; or that you view it in the light of saving life ?—Taking it both ways.

19,965. Would you say that a harbour at Filey Bay would be as useful to save life, as it would be down in the bay here ?—Quite. I always fancy more vessels accumulate about here than there, all endeavouring to get home—light vessels.

19,966. Do I understand you to say that the harbour at Filey Bay would be as necessary for saving life as a harbour down in the bay here ?—No ; I cannot say it would. I think this would be preferable in case of saving life.

19,967. (*Sir F. Smith.*) Supposing a grant of two millions of money were made for harbours of refuge for the saving of life and property on this coast, and that for one million you could make a very good harbour of five fathoms waters here, and another with the same amount of money, and the same amount of accommodation at Filey ; would you not think that very much better than employing the whole of the two millions here to get deeper water, and more space ? —I think it would be better to employ the money upon two harbours than one.

19,968. We have been told that a great many wrecks are taking place here with south-west winds. Can you easily account for that in any way ?—I cannot ; I think there is a great deal of mismanagement in that.

19,969. Do you imagine vessels coming for the Tees at night often hug the iron-bound coast too much ?—That is very frequently the case.

19,970. Will you tell me, whether or not, you have a good light to make Redcar ?—No ; you cannot see any. There is a very good light on Hartlepool Heugh. That is nearly the only guide until we get abreast of Redcar, and then we get the Seaton light.

19,971. In thick weather, can you see the Hartlepool Light ?—No ; then we take to the lead.

19,972. Would a light near Redcar be of use ?—I think a light on Redcar Rocks would be of great use.

19,973. You have nothing to guide you, but the gas lights on shore ?—Nothing.

19,974. (*Mr. Lindsay.*) I understand you to say, that two millions could be spent to greater advantage in saving life and property in the construction of one harbour at the expense of a million at Filey, and another harbour at the expense of another million in Tees Bay, than expending it all on one place ; was that your opinion ?—Yes.

19,975. Now suppose the Government should give two millions of money for the saving of life and property on this coast, whether, do you think, that which you have recommended, or the expenditure of a million at Filey, and the other million in the improvement of the harbours down in the bight of this bay, so as to make them accessible at all times of the tide ; which distribution of the money do you think would tend most to save life and property ?—The Tees Bay.

19,976. You think that two millions spent in two harbours, one in Tees Bay and one at Filey, would do more to save life and property than the spending of one million at Filey, and the other million in the improvement of the existing harbours in the bight of the bay ?—If you take half a million off Filey, and put it to the Tees, it would be better.

19,977. Perhaps you have not clearly understood the question, because you commenced by saying that the improvement of the existing harbours would do more to save life and property than one harbour ?— Yes.

19,978. Having expressed that opinion, do you think that the expenditure of one million in Tees Bay, and one million at Filey, would do more to save life and property than an expenditure of one million at Filey, and another million distributed over the Tees Bay, the Wear, and the Tyne, in making these harbours accessible at all times of the tide ?—I think they had better be made accessible than the money expended at Filey.

19,979. (*Capt. Sulivan.*) What kind of a buoy is this off Redcar Rocks—the Salt Scar Buoy ?—A large red buoy ; it was so the last time I was there.

19,980. Is there any beacon on it ?—I have not seen it for a length of time.

19,981. Because nine vessels ran ashore on that

rock with a gale off the land?—It has long been complained of as wanting a lighthouse, or something of that description.

19,982. Has anything been said about getting a beacon or a beacon buoy?—I cannot say I have ever heard anything said about it; it is only of late years that a buoy has been on the rocks.

19,983. If a good beacon buoy, or a beacon, had been placed at the end of the Scar, do you suppose it would have saved these wrecks?—I think a good beacon would be very useful.

19,984. Or a large beacon buoy?—Yes; that might be useful.

Mr. John Anderson recalled.

19,985. (*Chairman.*) Can the bed of freestone in the Cleveland Hills, immediately adjacent to the south side of the Tees, be worked against the face of the hill, to a thickness of ninety feet, or thirty yards?—It can.

19,986. Does this give fifty tons per square yard, or 232,000 tons per acre?—It does.

19,987. How many miles in length are the Eston Hills, immediately on the south side of the Eston Blast Furnaces?—About two miles.

19,988. Will a breadth of 100 yards in that length contain near 7,000,000 of tons?—Yes; there is any extent of stone there.

19,989. Are the Upleatham Hills about a mile in length, and will the same breadth contain about 8,500,000 tons?—It will.

19,990. Has a line of railway been laid down to both hills, up the ironstone works?—Yes.

19,991. (*Sir F. Smith.*) Did you expect these questions were to be put to you?—Yes.

19,992. You made your calculations, and were prepared with answers?—Yes.

19,993. Not off-handed answering?—Oh dear no.

19,994. (*Mr. Lindsay.*) Do you know this district well?—Yes.

19,995. Are there good stone quarries in the neighbourhood of Hartlepool?—No freestone quarry; none nearer than twenty miles.

19,996. Is there no stone nearer than twenty miles suitable for the construction of piers and breakwaters for a harbour of refuge?—There is limestone found in the neighbourhood of Hartlepool, but in my opinion not suitable for a breakwater; that is, at Hartlepool.

19,997. Why is it not adapted for these works?—It works in too small pieces, not large enough blocks; and for the first fifteen or twenty feet it is very soft indeed. It would not stand the action of the water. I know Hartlepool Rocks have diminished in my time a great deal with the action of the sea.

19,998. (*Capt. Vetch.*) The stone which you speak of as occurring about five miles from this, could not that be conveyed to Hartlepool?—To take it by railway it will be twenty miles.

19,999. If taken across the river?—Still twenty miles.

20,000. Five miles from Redcar, and twenty miles from Hartlepool?—Yes, very little less than twenty miles.

20,001. (*Mr. Coode.*) Have you heard anything of the quarry said to have been discovered within two miles of Hartlepool within the last fortnight or three weeks?—I have not heard of that. I made one of the greatest railway cuttings made in the county of Durham, and found no such thing there within three miles of Hartlepool.

20,002. Is there a place named Pensher near this?—That is twenty miles off.

20,003. You do not know of any discovery said to have been made within two miles of Hartlepool within the last fortnight or three weeks?—No; I do not think it is possible.

20,004. Have you been in the district during the whole of the last fortnight or three weeks?—Yes.

20,005. Is it likely you would have heard of such a thing if it had occurred?—I think so. We have stone at Middlesborough, and we are nearer Middlesborough than Hartlepool is.

20,006. But at a greater depth?—It is a hundred feet from the surface, so it is impossible to work it.

20,007. (*Sir F. Smith.*) You stated there was some stone near Hartlepool, but you thought that it was not suited for the purpose?—It is what Hartlepool stands on; it stands on limestone.

20,008. You mean round the Heugh?—Yes; and New Hartlepool stands on limestone also.

20,009. You would quarry it there?—Yes, if it is to be got, I would quarry it there.

20,010. But judging from the wasting away of the headland, you think that it is not suited for the purpose of harbour constructions?—It is not suited for the purpose; the headland is wasting away very much.

20,011. A great deal?—I have no doubt in twenty-five years it has disappeared a great deal.

20,012. Has it not once been in contemplation to strengthen it by artificial means?—I believe so.

20,013. By Mr. Rendel?—By Mr. Rendel.

(*Chairman.*) This finishes your witnesses, I believe, Mr. Dodds?

(*Mr. Dodds.*) It does.

(*Chairman.*) Mr. Oxley, I understand you manage the case for Redcar; have you any wish to make a statement?

(*Mr. C. C. Oxley.*) I am afraid we are not in so good a position, having no professional person employed; but I wish to offer a few remarks, having lived here permanently for the last 22 years, and known a good deal about it before, having been on the Committee of the Life-boat, and during the whole of that time the place is well known to me. You have it in evidence that the population is increasing, and the mineral wealth is increasing most wonderfully; but that I do not look at; I merely look at it as a place for the saving of life, which I have seen lost in many instances during the last 22 years, being frequently on the shore, and always anxious to assist to the best of my endeavours at any wreck. I have seen vessels dragged past the mouth of our rocks when, if there had been a harbour, they could have come in; and with a telescope we have seen them go on shore and several founder, which, if there had been a harbour here, they need not have done. To my mind, taking merely a common sense view of the matter, this must be a good situation for a harbour of refuge, as there is high land about it, as these sketches will show, which is easily made out. It has very frequently happened here that a great many ships have come upon the rocks in the day-time, and at night may have also struck in the fogs here, of which, I believe, we have no report; but I have no doubt that there are a great many which have struck upon the rocks here, and after doing so have gone away, and we have heard no more of them. I have seen the places where they have struck, even with a small harbour, and I only go upon the means of saving life. If there had been a small harbour here it would have been the means, during the time I have known Redcar intimately, of saving an immense quantity of property and many lives that have been lost upon the rocks of Redcar, and on the other side of Seaton and Hartlepool after dragging past. I saw the *Albion* in a fearful storm in October, 1849; I was out with the life-boat; I did not go in her, but was endeavouring to do what I could. That ship came completely past. I believe evidence will be given that she could not by any means have got to Hartlepool, or anywhere, and she did founder upon the Gare. I thought from the track she made, coming so closely past, she might have come here, if the place had been properly known, and the crew might have saved their lives. I believe that two Committees of the House of Commons in

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1829 and 1839 have both recommended harbours here. I have known Mr. Brooks for many years; he lived here for five years during my residence, and he certainly was the father, if I may so call it, of the projectors of harbours of refuge on the north-east coast, for I have no doubt he projected the first, which was Redcar. Captain Hewitt testified in favour of Redcar Harbour. Mr. John Colson and his father, an engineer, kept a correct list for many years, putting down exactly where the wrecks happened and the circumstances attending them. This is an abstract of that account which I will hand to the Commissioners. I have a return which shows an account of wrecks and stranded vessels between Staithes and the Tees Bay from 1801 to 1808. It appears that there have been wrecked on the Redcar Rocks 45 vessels and 194 stranded, making 239. I believe there were many more which have touched on the edge of the rocks, and then gone away. On the Cotham Sand 9 vessels wrecked, 21 stranded; total, 30. The South Gare, 33 wrecked and 54 stranded; total, 87. On the Marske Sand, 10 vessels wrecked and 14 stranded; total, 24. On the North Gare, 18 wrecked and 11 stranded; total, 29. On Redcar Beach, 38 wrecked and 21 stranded; total, 59. From Saltburn to Staithes, 36 wrecked and 17 stranded; total, 53. Total of vessels wrecked, 189; total of vessels stranded, 322; total of vessels wrecked and stranded, 511. There have been 281 lives lost, and 173 lives saved by the Redcar life-boat.

20,014. (*Capt. Sulivan.*) Do you put in any plan which you suggest as the best for a harbour of refuge off Redcar?—No; we have always looked upon Mr. Brooks' plan as the best, but I do not go upon plans; I do not understand them. What I should like would be to see the best harbour in the best place. I have always gone a good deal about the coast to Scarborough, Whitby, and a good way along, and always used to go out in boats, and I have always thought that there were more wrecks here than at any other part of the coast that I am acquainted with.

20,015. (*Mr. Coode.*) Does the statement of wrecks contain the number of lives lost?—It is Mr. Colson's. He will hand it in to you.

Lieutenant PACE, R.N. examined.

Lieut. Pace, R.N.

20,016. (*Chairman.*) You are a lieutenant in Her Majesty's Navy, and in command of the coast guard?—I am.

20,017. Will you offer any statement you have to make relative to the advantage or necessity of a harbour of refuge on this district of the coast?—I should be very happy to do so. In the first place, the period of my service in this neighbourhood has altogether been about 10 years, three of that I have been in this district. The plan which is before me, and which I have seen as Mr. Brooks', on a former occasion, was so limited, that my opinion was that there could be no chance of succeeding in making a harbour of refuge on the Scars of Redcar; but lately I have been favoured with a view of an extension, which, in my humble opinion, will be all that a harbour of refuge would be required to be. It would contain about 120 ships, with sufficient water to enable them to swim, and to be in plenty of depth at low water. The other plan which is before me, is one enlarged towards Marske; and, as I say, must be still more eligible for that extension, being a much larger place for refuge. I am of opinion, and so far my experience bears me out, that a harbour of refuge is much wanted, and so far as my knowledge goes, seeing the disasters and loss of life, I should decidedly prefer what I have seen of Mr. Brooks' plan to those others which I have seen for a harbour of refuge at Redcar. The opinion I am giving is almost totally a local one, because I have no particular knowledge to the southward of Huntcliffe, or to the northward of Hartlepool or Souter Point. The damage that has been sustained in my time makes it positive that it should be somewhere. The wrecks which you have already identified will form an indication of what is suffered by the shipping on this coast. You are well acquainted with the gale of January 1857. I believe it is before the Commissioners from Captain Mackensie, that the Bark *Emma*, and the vessel called the *Marie Louise*, drove over the rocks, and, being protected, the crews were enabled to land in their own boats, save their clothes, and come on shore dry. I should state that, in my opinion, I know of no place which is more suitable for a harbour of refuge than this, which is completely embayed from the wind at east-north-east, the prevailing wind being from south-east and north-east. I have seen many ships which cannot attempt to get into Hartlepool; if they get at all to the leeward of the Huntcliffe, or between that and the Salt Scar, if the wind is east-north-east, and the ship will lay north, and pull north and by west, a laden collier or a light ship will drive very fast to leeward, perhaps go as much to leeward as she goes ahead with all the sails which they can carry in such a gale. I was witness to the gale of 1857, and have witnessed others. At Saltburn, I think in September 1851, there were not less than nine vessels ashore between Saltburn and the Redcar Points, one, which turned out to be a French vessel, could not run, and was drawn upon the Saltburn Beach. They came as far as they could, and made signals of distress. I went with a lifeboat and crew, and had the opportunity of throwing a line so correctly, that the first went over the bowsprit and the second over the arm of the master; he made a hawser fast, and the men came on shore, and offered a hand. There were nine vessels on shore at that time, which was, I think, on the 13th of September, on a Sunday. It was a beautiful morning, with the wind south-west. The wind varied constantly during the afternoon, and at 5 o'clock it blew a gale, the sea and wind raging so suddenly, drove these ships, of course, very quickly upon the lee shore. They had not an offing, and the wind having backed to north-east gave them a worse position than they had before, and they were obliged, and did drive on shore, seven or nine of them, between Saltburn and Redcar Point. That a harbour was necessary on such an occasion must be pretty well acknowledged. I am of opinion that there is no place that could be offered so safe, and so secure, so advantageous to the mariner shipwrecked, to life, and to property, and more especially to life, than would be one placed in this immediate vicinity. There can be no question that this is about the best spot that can be selected upon the coast. You are well aware that this is the very bight of the bay. Ships coming in from the north with the wind east and by east-north-east cannot, with all exertions, reach Hartlepool or the other entrance of the Tees; consequently, the refuge which this would offer would be, I think, all that would be required. It would certainly be a great benefit, much more to life than to property, because we generally find that when the ships come ashore that most of them are light, and light ships drive on and find a place somewhere upon the beach; but heavy ships come on the Scars, and of course, run more risk, and therefore have more occasion for a harbour of refuge. The opinions which I have given are perfectly distinct, because I have stated that which, in my humble opinion, honestly and justly I believe. I hope the opinion which I have given will be taken into favourable consideration, Redcar Rock being the best spot, in my humble opinion, that could be laid down for a harbour of refuge in this vicinity.

20,018. Would you be disposed to say that one of the greatest dangers to which vessels are exposed in the winter arises from the sudden changes of wind?—Undoubtedly it is the sudden changes of wind; the sudden springing up of gales.

20,019. Are they frequent?—No, not frequent. I have never seen one so sudden as that in 1851.

20,020. Your experience is ten years?—Ten years on this coast.

20,021. (*Mr. Lindsay.*) These gales of wind to which you refer, do they usually begin to the southward of east, and back round to the northward of east ?—They do.

20,022. And when do they blow hardest ?—The heaviest gales that I have seen have been from the north-west and east-south-east.

20,023. Do you think it blows harder at east-south-east than east-north-east ?—I think about equal. The hardest gale is two points on each side of east. The most serious winds for ships, and of course for mariners, are from south-east to north-east.

20,024. You said you did not approve of Mr. Brooks' original plan, but you approved of the amended plan ?—Yes.

20,025. To what plan do you refer ?—To that which is close by Marske ; it is an extension of the smaller plan.

20,026. Do you mean the harbour between the rocks ?—From the rocks towards Marske.

20,027. You prefer a harbour extending from the East Scar to somewhere opposite Marske ?—In that direction, so far as the space of ground is carried out.

20,028. Why do you think a harbour in that direction would be of more value than one with the south-east piers running out on the West Scar, and the other pier towards the Tees Bay ?—I think the one in the Marske direction would have deeper water, and better holding ground.

20,029. It is on that account only you prefer it ?—And would hold a sufficient number of vessels in case of emergency and distress.

20,030. Why do you prefer a harbour at this particular point to one in Hartlepool Bay ?—I have given my opinion as to the locality ; if I was to go further, I should be going into that of which I have no knowledge.

20,031. As to a harbour between Redcar and Hartlepool, you tell me you know the latter ?—What I meant was, I know the district, but do not know any part of the soundings inside Hartlepool.

20,032. You are not prepared to offer an opinion whether a harbour at Redcar would be better, all things considered, than a harbour in Hartlepool Bay ?—The only answer I can give is, that I have seen a stress of weather on the bar, even with westerly winds, when a ship would be obliged to put to sea ; that sea has been very high. The harbour proposed by Mr. Brooks at Redcar would be a place of refuge, even with westerly winds ; ships could get in with the wind west-north-west and west, and would be enabled to bring up, and need not go any further.

20,033. Do you think a harbour necessary during west-north-west winds ?—No, not with west-north-west, because that is a wind off shore.

20,034. A harbour of refuge is generally wanted the most where there is the most danger ?—Quite so.

20,035. Whether do you think, with the most dangerous winds, which are easterly winds, whether do you think the harbour at Redcar or the one at Hartlepool would be the most advantage to the passing trade ?—I think that Hartlepool, provided that provision which is about to be made for a breakwater, would be better for the trade in respect of merchandise ; but as to the safety of life and protection of property for the light ships, and those bound to the south, Redcar would be a refuge both for those returning and those coming to the south. As an opinion, mine is but an opinion, and a candid one ; and I cannot offer any judgment as to the entrance of the Tees or Hartlepool Harbour. I do not wish to go beyond that of which I have knowledge.

20,036. As between these two points, do you give the preference for saving life and property to Redcar over Hartlepool Bay ?—Decidedly.

20,037. (*Chairman.*) Nothing further occurs to you to offer to us ?—Nothing, except to observe that it has been a very unpleasant part of my duty, especially when at night work, when I have seen shipping go off. I have known ships come south, and have seen them in the dusk of the evening, when they have been passing here, and I have known that there was no protection for them against the Salt Scars, not even a light for night, or a beacon by day ; and my opinion is this, that were there a light on the eastern part of those Scars, a revolving light of any colour you like, provided that this harbour is not brought into operation, which I trust it may,—there is only one thing to be done, that if there be a good feeling towards the sailors, there will be either a lighthouse or a light on the eastern part of Redcar,—a revolving light, or anything you like. If not that, let there be some beacon, a proper buoy placed on the north-east part of the Salt Scars, to show both fishermen and mariners that there is something to look at, because at present you could hardly see the buoy above the surface of the water ; and I do not consider it a guide for any vessel bound either north or south of Saltburn or Hartlepool. I am anxious to save my countrymen and ships, and I therefore wish to see a lighthouse upon the eastern part of Redcar, or upon the Salt Scars ; but I think one on the eastern part would be least exposed, and would, I think, answer every purpose, and would be better perhaps for the man who attends it, because there ought to be a cannon on one of the Salt Scars, a guide buoy with a flag, or something like the buoy going into the Tees mouth.

20,038. I see that Hartlepool lights are from five to six miles away ?—Six miles from the Redcar Buoy.

20,039. Can you tell me what is the nearest light to the south ?—There is no light to the south or east of Redcar.

20,040. I mean along the coast ; what is the nearest light ?—Whitby, and the western part is Hartlepool. The reason I suggest a light is this, which I forgot to mention, of ships coming from the southward, which I have generally known, hug the coast very much upon a southerly wind. That is the reason, in my opinion, that many ships are lost there in a south-westerly wind. My opinion is, they go so close to keep the ship in smooth water, and when it comes on a dense fog, they put up the helm, thinking they are outside the Scar, instead of inside, and run upon the Scars.

20,041. How would the Scars light be easier seen than Hartlepool ?—Because of the coast, they cannot see Hartlepool lights. That would be a guide both for fishermen and mariners.

(*Chairman.*) I will not enter upon the subject of lights and buoys in the absence of Capt. Washington, who takes a special interest in lighthouses and buoys, but only make one observation as respects lights—that you must be aware, as well as I am, that there is an objection to a great multiplication of lights on the coast. I do not mean to say that in this case it is a suitable objection, but still it is a consideration. I do not wish to enter more into the subject in the absence of Capt. Washington.

Mr. JOHN COLSON examined.

20,042. (*Chairman.*) Are you a resident at Redcar ?—Yes.

20,043. And you are a shipowner and agent for Lloyd's ?—Yes.

20,044. Have you any observation to offer to the Commissioners as to the advantage or necessity for a harbour of refuge at this particular point of the coast ?—I have a list of wrecks, from 1801 to the present time, which has been kept by myself and my father. I find that on the Redcar Rocks 45 vessels have been wrecked, and 194 stranded; making 239. On the Coatham Sand nine vessels wrecked, 21 stranded ; total 30. The South Gare, 33 wrecked and stranded ; total 87. On the Marske Sand, 10 vessels wrecked, and 14 stranded ; total 24. On the North Gare, 18 wrecked, and 11 stranded ; total 29. On

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Chairman.

Redcar Beach, 38 wrecked and 21 stranded; total 59. From Saltburn to Staithes, 36 wrecked and 17 stranded; total 53. Total of vessels wrecked 189; and total of vessels stranded, 322. Total of vessels wrecked and stranded, 511. There have been 281 lives lost, and 273 lives saved by the Redcar life boat. [*The witness put in this return.*]

20,045. Have you anything further to offer to the Commissioners?—I am of opinion that Redcar is the best place for a harbour of refuge, for the following reasons: there are more light vessels lost than laden vessels; and I prefer Redcar for the site for a harbour of refuge in preference to Hartlepool for this reason, the light vessels coming from London must pass Redcar before they can get to Hartlepool. Therefore if they could get into Redcar much sooner than they could to Hartlepool. If a harbour was formed at Redcar according to Mr. Brooks' plan, his original plan a little enlarged, it would be the means of saving many valuable lives. It would also be a protection to the fishermen of the place. At Hartlepool there is a harbour already formed. We have got no protection here for fishermen. There are about 50 fishing cobles at Redcar,—five herring cobles and 19 pilots. I think these men ought to be protected from stormy weather as well as sailors. If a harbour was formed upon the rocks, at least between the rocks, one off the pier heads, upon the Salt Scar, we should not have any vessels lost on the rocks at Redcar; but if a harbour were formed at Hartlepool, the Redcar Rocks would still be where they are. I have seen many vessels lost on this coast during my lifetime. On the 14th of November, I witnessed the *Susan*, of Stockton, wrecked, and nine lives lost. I also witnessed one lost off Marske, the *John*, of Saltcoats, and all hands lost. On the 26th of March 1808, there was a vessel lost on the rocks, and 17 of the crew perished. In 1812, there was one lost on the rocks and four of the crew perished. I consider that a harbour at Redcar can be formed for one half the cost that it can at any other place, because it is already nearly formed by nature.

20,046. (*Sir F. Smith.*) You think a harbour can be made here at one half the cost it can be made anywhere else?—I do.

20,047. On what do you found that opinion?—There is stone in the immediate neighbourhood, at a distance of only four miles, in abundance.

20,048. You mean to say that a harbour of the same capacity can be formed cheaper, than anywhere else?—It can.

20,049. In this immediate neighbourhood?—Yes.

20,050. Would that apply to Filey as well as to this neighbourhood?—I do not know.

20,051. You do not know anything about Filey?—I do not.

20,052. Do you think that a harbour to satisfy the wants of the coast could not be formed in Hartlepool at the same cost as at Redcar?—Nothing of the kind.

20,053. To what extent north and south does your knowledge of the coast extend?—Only this coast.

20,054. Do you know anything of Runswick Bay?—I do not know Runswick Bay.

20,055. You only know from Redcar to Hartlepool?—To Staithes and Hartlepool.

20,056. You think there are no advantages or conveniences at Hartlepool which would enable them to make an equally large harbour for the same sum of money you would have to expend at Redcar?—There are not the advantages that there are here, because we have good rocks for foundation.

20,057. Thereby saving so much of construction?—Immensely so.

20,058. And a great difference in the cost?—Oh, a great difference.

20,059. How high are the rocks above the level of the sand generally?—They are generally bare, the top part of them about half tide.

20,060. You mean to say that if these rocks did not exist, the cost of forming the harbour here would be much greater?—It would be cheaper even then than at Hartlepool.

20,061. I ask, whether if the rocks did not exist there would be a great difference of price; am I to attribute the saving of money chiefly to your having the rocks here?—Chiefly to our having rocks here, and stone.

20,062. Supposing you were to enclose a rather larger space, and to extend your pier beyond the line of your rocks, would the cost then be much increased?—It would be increased, but not to a very great extent.

20,063. Then the rocks do not do so much as you expect?—Yes, they must; it depends on the height. You must have a great mass of rubble, whether it is formed upon the rock or on the sand.

20,064. The only difference can be the amount of the actual mass that the rock is above the sand?—Yes.

20,065. That is not a very great height, is it? How much are the rocks above the level surface of the sand?—I told you the rocks were bare at half tide.

20,066. And you would save so much?—Yes.

20,067. You think there would be no tendency to silt into your harbour of refuge?—I do not think there would.

20,068. Does none of the sand coming out of the Tees come in the direction of your proposed harbour of refuge?—It goes from here, down to the Tees.

20,069. Then you have some sand which does move here?—Very little.

20,070. When you say, very little, to what extent is the movement?—I should think not a variation of six inches.

20,071. Whatever does move goes away from you towards the Tees?—Yes.

20,072. And none comes back to you?—No.

20,073. Where do you get it, if none comes back to you?—There are sand hills in the immediate neighbourhood.

20,074. I want to know where your sand comes from. You say it goes from here to the Tees, and none returns to you?—I cannot tell where it comes from.

20,075. But I want you to tell me—you are giving evidence—you tell me you cannot tell me a point you ought to know. If there is a movement of sand in this direction—you say it goes from here towards the north, and does not return—I want to know where the sand comes from that moves from here to the north; you have an iron-bound coast not far from here?—I cannot say.

20,076. You have an iron-bound coast; close to, what length of beach have you got to accumulate sand?—About five miles.

20,077. Then it comes along that five miles distance?—Yes.

20,078. Is it gradually decreasing along that five miles?—It is.

20,079. To your knowledge?—To my knowledge.

20,080. What length of time have you known it?—All my life.

20,081. If it has been coming from that quarter during the whole of your life, I think there would be great exhaustion in that time; how it is supplied?—I do not know.

20,082. You have not observed?—No.

20,083. (*Mr. Lindsay.*) Were you ever at sea?—Never at sea.

20,084. Have you had any conversation as Lloyd's agent with any of the masters of ships frequenting this bay?—I have.

20,085. What is their opinion with regard to running down to a bight of the bay in a gale of wind?—Their opinion is, that if a harbour was formed at Redcar, they could take it at all times of tide, and in any gale.

20,086. Would they be able to take it with greater facility, do you think, than what they would if a

suitable harbour of refuge was constructed in Hartlepool Bay ?—I think they would.

20,087. With greater facility, you think ?—I think so. We will suppose a vessel comes from London, and is caught in a gale from the east-north-east ; she can take the Redcar Harbour very easily indeed.

20,088. But could not a vessel take Hartlepool with such a gale ?—Yes ; if she is not too far in shore.

20,089. Have you had any conversation with the masters of ships with regard to the silting up or otherwise of Hartlepool Bay ?—I have heard it has silted up about three feet.

20,090. Who told you so ?—Different masters with whom I have conversed.

20,091. During what period has it silted up three feet ?—During a period of about twenty years.

20,092. We have nautical evidence a good deal bearing on that point ; have you any other nautical witness ?—I have no nautical witnesses.

20,093. (*Capt. Sulivan.*) You gave a list of wrecks, divided into six divisions. I have not the least idea to what extent they go along the coast, from the Tees mouth, or further ?—From the Tees mouth, for a distance of eighteen miles in the direction of Whitby.

20,094. What point ?—Staithes.

20,095. The same limit that was given in the other list ?—Yes.

20,096. (*Mr. Coode.*) When you said that more light vessels were lost than loaded, did you mean to apply it to the coast generally, or to the district you allude to ?—To the district I allude to.

20,097. Not to the coast generally ?—No ; not to the coast generally.

20,098. Can you give us the proportions of lives lost in laden vessels as compared with those lost in light ones ?—I should be happy to do so, but I did not understand you would require it. We can send it to your secretary in London.

20,099. If you have the means of doing so, it would be an advantage ?—I shall be very happy to do so.

20,100. From your own knowledge of wrecks, does the greatest loss of life take place in loaded ships ?—Oh, decidedly.

20,101. If the return showed that ten lives were lost in loaded vessels to one in light, would that surprise you, or would it be in accordance with what you have seen ?—I think it would be in accordance with my experience.

Mr. Robert Dodson examined.

Mr. R. Dodson.

20,102. (*Chairman.*) How long have you followed the sea ?—Nineteen or 20 years.

20,103. What port have you sailed out of ?—Out of the Tees, the Tyne, and Hartlepool.

20,104. In what trade have the vessels you have sailed in been employed ?—The coal trade and the Baltic trade.

20,105. You have been present all to-day ?—Yes.

20,106. And therefore know the object of our inquiry ?—Yes, part of it.

20,107. You know what we wish to find out. Will you give me your opinion, in the first place, whether one harbour somewhere in this neighbourhood would be better for saving life than the improvement of the Tyne, the Tees, and the Wear, so as to take vessels of 16 feet of water at low tide ?—Well, a harbour of refuge is very much required. In respect to improving the northern ports, I know very little about them; but a harbour of refuge is very much wanted in this bight of the east coast.

20,108. Will you give me your reasons for saying it is very much wanted ?—Because when dangerous winds prevail here it is a complete bight. There is no possibility of a ship beating out, whether light or laden. We have got no harbour here that can be taken except at high water, and not then at all times.

20,109. During the 19 or 20 years you have been knocking about on the coast, have you ever been in great risk for want of a place of this kind ?—Yes.

20,110. Do you recollect any particular instance that you could tell us of ?—Oh yes, I can.

20,111. Tell us one.—The last one was on the passage from Cronstadt to Stockton, timber laden, with a gale of wind from east-north-east or north-east ; I cannot tell to half a point or a point of the wind. We were bound to Stockton, and rather than go into Stockton we took Hartlepool for refuge, for fear of our lives, expecting to get in, but we were mistaken ; we were cast on one side, and got on shore to leeward of the port. That is where West Hartlepool is now—on the Stranton Sand.

20,112. In that case were any lives lost ?—Not from our vessel, but there were some lives lost belonging to others a few days before. We lost no lives, as it happened ; we were timber laden, and went well on the beach. It was high water at the time.

20,113. Do you recollect what year that was in ?—I could have told you if I had known I was going to be asked the question. I could have told it by my discharge; but some gentleman here may know. The *Celia*, of London, was lost in the same gale about three or four days afterwards ; it was the last day of the gale. I remember at about 8 o'clock it was as fine weather as now. That gale continued about eight days or more.

Mr. Colson (having referred to his journal) said: The gale occurred on the 2d November 1844.

20,114. Can you give any other instance ?—I was once served myself the same trick in coming from Hamburgh in a ship with a general cargo, wind south-east or east, or thereabouts. We were bound for Hull, and ran into Hartlepool for refuge.

20,115. That is a long way aside, is it not ?—Yes. The sea struck us on the starboard quarter. She ran broadside on outside the north pier, and broadside into the harbour. We lost command of her, and she got on the Heugh and knocked off part of her bottom—part of her keel. She beat broadside into the harbour, and damaged 50 tons of bark, 100 tons of oil-cake, and other parts of the cargo.

20,116. Were any lives lost ?—No ; we beat broadside into the harbour.

20,117. (*Sir F. Smith.*) Are you a native of this neighbourhood ?—Yes.

20,118. Was it by night or by day that this accident happened ?—By day, both times.

20,119. Was it very thick weather ?—The last time it was very rainy weather. We could not see far.

20,120. You could not see the Heugh until you were upon it ?—No, not before we were three miles distant, or perhaps four ; it was very heavy weather indeed.

20,121. If there had been a harbour of refuge at Redcar it would not have helped you much. Would it have been of any use to you on either occasion ?—If I had had my way, I would have come to Redcar as it was, before I would have gone to Hartlepool.

20,122. Why did you not have your own way ?—Because I was not in charge of the ship ; I was only before the mast.

20,123. I understood you were a master ?—No, I never was a master.

20,124. I am very sorry you were not a master then. You are the master of a vessel now, are you not ?—No, I am a fisherman.

20,125. But you know this coast very well. Being a fisherman, perhaps you know it better than if constantly engaged in going long voyages ?—Better by half.

20,126. Then you know the Tees very well ?—Oh, very well.

20,127. You are aware that we have got before us a project for the improvement of the Tees ?—Yes, I am aware of it.

20,128. You know pretty well what it is ?—Yes, I do.

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20,129. Perhaps as an experienced seaman, you will tell us what you think of that project ?—I will, as far as I am able. In regard to the improvement of the Tees, I think it is an impossibility.

20,130. You think that is impossible ?—I do.

20,131. I am sorry to hear it ?—And so am I.

20,132. You think it will be quite useless to spend any money upon that ? — There is a great doubt about it.

20,133. You have observed it very carefully ?—Yes.

20,134. And considered how it might be done ? There are two or three improvements proposed. You think them all bad, do you ?—I do not know about that. As regards the Tees, it might be made a little better than it is ; but you can never make it to be accounted a harbour of refuge ; not a complete harbour of refuge, to be taken with very little danger.

20,135. Why not ? What should prevent your making it a harbour of refuge ?—You know there is a shoal water bay with a loose sandy bottom to start on, and all the piers must be extended to a very great distance to sea before you get them far enough for a ship to go in clear of broken water, because in this bay the sea breaks so far from land that it is dangerous to any ship coming in to take either the Tees or Hartlepool. They have to go through broken water for a considerable distance.

20,136. That extends all over the bay ?—Yes, here northward ; but to the south you get better water.

20,137. Does not the broken water extend a little south too ? — Northward from here is the worst place.

20,138. Would there not be a heavy break of sea in front of the proposed harbour at Redcar ?—You will observe, that when we have a storm, so far as we can see out in a northern direction from here, there is nothing almost but broken water. When you look in an easterly direction from here, there is always the Gare, which is not smooth, but not broken.

20,139. Why then have so many vessels been wrecked on this coast with a south-east wind ?—I can give you some idea on that point too. You know, when a vessel is going down along the land here for the Tees or Hartlepool, with a light wind, she hugs the land all she can for smooth water, and to cheat the tide. When she gets to Huntcliff, with the wind south, the flood-tide draws her in. When the captain thinks he is in a line with the rocks, he tries to edge off, but is perhaps mistaken, and gets on. Many vessels get on in that way.

20,140. Have you any remedy for that ?—I should propose the building of a wall or pier on those rocks, so that people could see it ; or else the erection of some light, or something to warn vessels off,—a lighthouse, or anything of that kind which you might think proper.

20,141. At present there is no light ?—They have lights to guide them on Seaton Shore, provided they can see them in the night time, but in the day time neither light nor lighthouse are of use.

20,142. What is the remedy in the day time ?—There is nothing but building upon the rock above high water, so that people can see it.

20,143. Would buoys and beacons be of no use ?—They would be of use, no doubt.

20,144. Is there any shifting of sand in this bay ? —I cannot tell of any shifting of sand that there is here. We have none under water, but plenty of sand above water, driven about in gales of wind from the west. We have no shifting of sand under water. It blows off our banks, but it never comes back again. That is the only shifting of sand that we have about here, as far as I know.

20,145. It is blown off the banks, and gets into the water ?—Yes.

20,146. Where does it take to ?—It goes away ; I do not think it ever comes back again. I cannot tell where it may go after it goes into the water. I think it remains there.

20,147. Does it go north or south ?—Neither ; it remains there.

20,148. Remains there ?—I think so.

20,149. It is deposited immediately ?—The tide does not take it either one way or the other. We have not tide sufficient.

20,150. Do you think any of thesand washed out of the Tees goes anywhere ?—There is none goes from here to the Tees, and there is none come from the Tees here.

20,151. If we have been told that there is a shifting of sand towards Hartlepool, you would not believe that ?—I would believe that, because I know there is.

20,152. You are of opinion that there is no shifting of sand towards Hartlepool ?—Not from Redcar.

20,153. Nor from any other part of the coast ?—There is, from the Tees towards Hartlepool ; there must be.

20,154. You told me just now, no. I am to understand you that you said all along that there was sand coming out of the Tees which washed towards Hartlepool ?—Yes.

20,155. Is the effect such that the washing of sand out of the Tees has deepened the water in the Tees ? —No, I think not.

20,156. That is not the fact ?—I do not think it has deepened the water at all in the Tees.

20,157. If it has washed out, what supplies its place ?—There is such a great quantity of sand along the Tees, on both sides of it, and in the country too.

20,158. Therefore, I presume that is the reason why you think the navigation of the Tees cannot be essentially improved so as to render it a harbour of refuge ?—I think there is too much sand, and too much broken water in the bay with north-east gales.

20,159. Do you think the sand comes in from the bay to the Tees in any quantity ?—I cannot say that. I do not think there is, but I cannot say. No doubt, in heavy gales of wind and a flood tide, it will wash out of the bay towards the shore ; but no doubt it comes back on the ebb, because it is all alive, and it must go with the tide.

20,160. The sand is all alive ?—Yes.

20,161. Is there any quantity of the "Bran" Sand ? —It is seldom covered with water ; it is dry sand.

20,162. Is it not occasionally covered ?—Yes, in spring floods it is.

20,163. Does any alteration take place then ?—I do not think there is with the tide. I think the "Bran" Sand remains pretty stationary. The "Gares" move to and fro, and are changing their shape. You cannot go twice a month and find them in the same position in winter time.

20,164. (*Capt. Vetch.*) You know the "Bran" Sand very well, no doubt ?—Yes.

20,165. There is one part higher than the rest, which is uncovered at all times of the tide. There is one portion of the "Bran" Sand which is not covered with the tide ?—Yes, there is one point not always covered ; it is in the spring tides, but not in the neaps.

20,166. Do you not think when the wind blows from the eastward that the surface of that sand is blown into the channel ?—I cannot say that it is.

20,167. When I was there this morning it seemed as if it had been blowing down. There were streaks towards the channel. The North and South Gare, I think you say, are quicksands ?—Yes.

20,168. Do you think it possible for any artificial structure to remain fixed there ; do you think you could construct a lighthouse there which would be likely to remain ?—Oh no, I do not think you could.

20,169. Then you think it would be throwing away money to attempt it ?—I do.

20,170. If you were told that it could be fixed, and that the water could be deepened to 16 feet at low water, you would hardly believe it ?—No ; I do not think you could get any water to remain for any length of time.

20,171. You would rather build a pier on the rock than on the sand ?—A rock for your life ; there is no variation there.

Mr. Joseph Webb Gerr examined.

20,172. (*Chairman.*) How long have you followed the sea ?—33 years.

20,173. How long in command of vessels ?—13, 14, or 15 years.

20,174. Are you still afloat ?—No, I am retired.

20,175. In what sized vessels were you employed ?—I have had them from 130 to 350 tons.

20,176. In what trade were you engaged ?—During the earlier part of the time in trading from Newcastle to London, say 13 years ; in the middle part of the time was engaged in the Baltic, the American, West Indian, and other trades ; and for the last 10 years in going from the Tees to London.

20,177. You have been present during this inquiry ?—During part of it.

20,178. Will you give me your opinion which is the best course to take for the purpose of saving life ; to have one large harbour established here, or on any other point of the coast, or to endeavour to improve the three ports of the Tyne, the Tees, and the Wear, so as to enable vessels drawing 16 feet to go into them at low water ?—One large harbour.

20,179. Will you state your reasons for holding that opinion ?—As a refuge harbour I distinctly want one which any shipmaster acquainted or unacquainted with the cost should be able to take by night or day, at high or low water, free from all obstacles in every sense of the word.

20,180. Where would you put this harbour ?—I know no better place than the site here before you, Redcar.

20,181. Give me your reasons ?—These rocks will be seen to run out into thorough deep water. The last witness stated that the water breaks over these rocks right across to Hartlepool in a heavy gale of wind, which is a fact of consequence. If a harbour were made in the bight of the bay in shoal water, even though it was sufficiently large to hold all the neighbouring ships, still a laden ship coming through that broken water would be liable to be swamped before she could reach the entrance. Here you have Redcar in the front, and by extending the rocks a little further out you have deep water with the sea never breaking before it, properly speaking, in the heaviest gales ; so that any vessel coming either north or south or east would run in and have no broken water to encounter, and could therefore take it with the greatest convenience and security.

20,182. Then you confirm the statement of the previous witness, that in heavy gales from the east, the water to the north of this is broken, while that east is comparatively smooth ?—Comparatively smooth to the eastward of the rocks. They fall in here from these rocks just at the upper end, and fall into about 12 fathoms ; consequently the water does not break as it does in six or seven fathoms.

20,183. As respects running for a harbour at Redcar, do you think there is anything in the nature of the approach to it, or in the land above it, which would make it preferable to any other place ?—I am not aware that you could make it preferable to run to.

20,184. Is there anything in the soundings or the lay of the land which you consider gives it an advantage over any other place ?—I do not know that there is anything in that shape. There is one advantage over Hartlepool, which is, that provided a ship should happen to miss the entrance, and drift behind the north or south pier, she would be certain of the safety of the lives of the crew, and almost certain of safety as to property, because she would be sheltered, and there is a finer anchorage.

20,185. Then you are disposed to say that in addition to the advantage to be derived from the harbour of refuge, there is this—that if a vessel is driven round the piers, the crew and perhaps the property in the ship would be saved ?—Both.

20,186. But as respects the land-fall, there is nothing here which makes it better than any other place on the coast ?—No ; I do not know anything of that sort.

20,187. What, in the rough, is the largest number of vessels that you have seen at anchor in Yarmouth Roads ?—I think I have seen from 400 to 500 sail.

20,188. For what number of vessels ought this harbour of refuge which you propose should be constructed, or for what number, if the harbour of refuge is constructed anywhere, ought it to provide a sufficient space ?—For 400 or 500 sail at the same time. I am of opinion that at no one time would the harbour at Redcar ever have reason to expect 400 or 500 sail. At Yarmouth Roads the circumstances are different. An accumulation of ships takes place at that point, by their being there for two or three weeks fighting north-west winds. But when once they leave the roads they never accumulate together, either in the Humber or in Bridlington Bay, or in any other place. They get divided.

20,189. Therefore the accumulation of vessels in Yarmouth Roads is not a fair test of what would take place down here ?—It is not.

20,190. Then would you be disposed to say that a harbour of refuge which would hold half of those which are accumulated sometimes in Yarmouth Roads, would be amply sufficient ?—I really think it would.

20,191. As respects Filey Bay, you have heard what has been said as to its being a good place to bring up the vessels which accumulate about the Head ; what do you say about that ?—It is decidedly too far south for any general purposes. It may answer the purpose of laden ships to take shelter in it in south-east winds, but for light ships I doubt very much whether it would be any benefit to them at all, or any convenience whatever, because to ships bound from Flamborough a wind from the east-south-east is a fair wind ; but, unfortunately, it always prevails more to the eastward, and as they go along the Yorkshire coast it goes from east-south-east to east by south and east, and they get upon the Tees. As they go on it gets a little farther, just another point or so to the northward, and drives the vessel round there, where they have Hartlepool to run to ; or otherwise in easterly gales in the winter months we stretch out to sea, instead of running along the coast. They get taken into the bight, and then they cannot get to Hartlepool at all ; the Tees they can get to, but it is not a proper place, particularly at any height of a gale, when it is very dangerous. Consequently they try here and there until they can get no farther, and they get either on the rocks or on the Gares. If they get on the Gares their lives are almost certain to be saved ; if on the rocks they have the security of the life boat, if the men can possibly get out to them.

20,192. (*Sir F. Smith.*) Will you do me the favour to tell me whether I am right in understanding you that there is no place between the Farn Islands and Flamborough Head at which a construction of a harbour of refuge would be more likely to save life and property than at Redcar ?—There is no place so likely to save life and property as at Redcar.

20,193. Between the Farn Islands and Flamborough Head ?—Between the Farn Islands and Flamborough Head.

20,194. There is no other place ?—Not so likely.

20,195. You have navigated this coast for a long while ?—I have.

20,196. Has it ever happened to you to be in very great peril, or have you ever been wrecked ?—Never.

20,197. Have you ever been in great peril of being wrecked ?—Never.

20,198. You have navigated this coast for a long while without having needed a harbour of refuge ?—I have too often wanted it, but have never been in such peril as to be lost for want of it.

20,199. It is a question in some degree of peril, I should imagine, if you want a harbour of refuge, is it not so ?—We have only the common peril of the sea. If I am in a good ship, and have the sea to encounter,

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I would rather take a harbour, in order to save the wear and tear of property, as well as the distress of the men.

20,200. The view you take of a harbour of refuge is that of a harbour to save the wear and tear of your ship and the fatigue of your men ?—I consider it is meant to save both life and property, as well as the wear and tear and fatigue of the men. Both these things are highly necessary.

20,201. But you tell me, as having navigated this coast for a long while, that you have never been in peril of your life beyond the ordinary perils of the sea ?—Not beyond the ordinary perils of the sea.

20,202. Then surely a harbour of refuge was not immediately necessary for you ?—I might have been no more fortunate than my brother sailors, but it has not happened to me.

20,203. The object of the Legislature is to endeavour to save the great loss of life which has taken place on this coast. The Legislature think that the construction of harbours of refuge is a matter in which the public funds may to a certain extent be properly applied. You have had great experience, and your opinion will have great weight with us in coming to a right decision on this matter. If you have been in a position to require a harbour of refuge frequently, as you say, I should be glad to know on what part of the coast you were when you required it ?—The last time I most required it was from Flamborough Head.

20,204. Coming from Flamborough Head ?—I was there with a laden ship in a calm, and I was driven round the Head by the flood tide.

20,205. If at that moment you could by enchantment have conjured up a harbour of refuge at the very spot most likely to have saved you, where would you have had it ?—At Redcar.

20,206. What, when you were at Flamborough Head ?—Yes.

20,207. Have you never been in a position requiring a harbour of refuge in which some place other than Redcar would have suited you ?—In many instances. If there had been a harbour of refuge at Filey I have been in a position to take it, with 14 or 15 more ships.

20,208. And you would have saved running from Filey down to Redcar ?—I should.

20,209. Has it ever happened to you to be further north, and to require a harbour of refuge ?—I drove further north with that vessel. Now, so far as a harbour of refuge goes in the north, the more harbours there are the better ; but I want the most needful one done first.

20,210. I will take the most needful, which is Redcar, according to your opinion?—Which is Redcar.

20,211. Which is the next in importance ?—If you like to try Hartlepool, that is near enough. As for any other place, I cannot speak. As for the present tidal harbours, to attempt to make them harbours of refuge will, I think, be great folly, for those very reasons which cause our difficulty in the Tees. Both Sunderland and Newcastle are tidal harbours, bar harbours; and the consequence is when laden ships run for either of them with gales of wind the tide is over-topping them, and sweeping their decks before they reach the bar, and it very possibly swamps them, or gives them such a stroke that they run on a sand or rock.

20,212. What is the general draught of the coasting vessels ?—From 16 feet down to 10 or 12.

20,213. Sixteen feet being the maximum ?—Yes. These are the heaviest ships going.

20,214. Supposing the bar at the Tyne could, as a matter of certainty, have 18 feet of water over it, would not that appear to be an expenditure worthy of being incurred ?—Yes, it would be serviceable to Newcastle vessels alone, or otherwise to a stranger also if he got there, because he has lights to lead him in ; but, as I said, it is a tidal harbour, and a pilotage harbour, which a stranger does not like to take. If a stranger is thinking of going into a port he wants to see on the chart that the place is open and free of sand-banks. If he finds there are any dangers anywhere, he will keep out of it.

20,215. Is it dangerous for a stranger to run into the Tyne by his chart by daylight ?—It is with a heavy gale of wind.

20,216. Is not Tynemouth Head a good point to make ?—It is to be made. Yes, it is a point for vessels bound from the Baltic upon these shores.

20,217. Then you would be rather disposed to lay out money for the improvement of the harbours ?—If it is thought proper to improve the rivers or harbours we shall have no objection to all the improvements which can be made; but as for a harbour of refuge for the general object, I should say a good harbour, made free from all doubts or fears upon all these matters, would be the thing we really want made.

20,218. We are to assume that it can be so made at the Tyne. If it could be made at a moderate expenditure, would you think it worth such an expenditure? —It will be worth all the expense; the Tyne will.

20,219. But not to vessels seeking refuge ?—I should say not.

20,220. For a vessel in distress off the Tyne ?—In any heavy gales of wind—in heavy easterly gales—not for laden vessels ; light vessels might run in with great confidence.

20,221. You would apply the public funds only to Redcar and Filey ?—To Redcar ; and to Redcar and Filey if there was money enough for both.

20,222. But if you had a certain limit, say 2,000,000*l.*, —and if for 1,000,000*l.* you could get five fathoms of water at Redcar, and for the same sum the same depth of water at Filey, would you apply the 2,000,000*l.* in that way, or lay out both in getting deeper water in a larger harbour at Redcar ?—I have studied something about that, and can hardly come to a decision. I conceive from the plan before me (Mr. Brooks') this is an extensive harbour, to be made to answer all purposes, both for merchantmen and the Royal Navy ; but there is also a smaller harbour formed on the plan. I think that would make a sufficient harbour at present for coasting vessels.

20,223. I think you said that if you could get accommodation for 200 ships at Redcar you would be satisfied ? —From 200 to 300 sail. I think we average about one-half of what may be in the Roads. Some persons said they had seen a thousand sail in the Roads, but I never counted that number. I think 450 or 500 will be as many as are generally collected there.

20,224. (*Mr. Lindsay.*) If you had plenty of water in the Tyne, would you have any objection to run for it in an easterly gale with a flood tide ?—It would depend on the trim of the ship. If it was a laden ship and I could keep the sea, I should.

20,225. With abundance of water and a flood of tide what greater danger would you have in running for it than in taking any other place ?—The breakers I have to meet before I can get to the entrance.

20,226. What breakers would you have to meet ?— 18 feet is only 18 feet, and when the sea comes out of ten or twelve fathoms to a bank of 18 feet, the breakers are outside of it.

20,227. Say it was deepened to 30 feet of low water at spring tide ?—I should then object to it.

20,228. Why ?—Because it is not exactly free, as I before said, for a vessel to run to. In the next place, there are pilots and steamboats, and a man can get in, but can't get out at his pleasure, or without extreme expense in doing so.

20,229. You are speaking in regard to expense ?— Yes.

20,230. But you would have no objection, leaving expense out of the question, to run for it if deepened to the extent I have named ?—I should have my doubts about it, with a laden ship, for the reasons already mentioned. A light ship could run for it with all the confidence in the world.

20,231. Do many laden ships run back to the Tyne for refuge ?—There may be a few those, very well acquainted with it, who do run back ; but I think it is

not a general practice. But then I have been out of practice myself for the last ten years.

20,232. What is the force of the tide at the Tyne during the spring tides ?—I have known it in freshets to run inside four knots, and through the Narrows. I should think the ordinary run would perhaps be two or two and a half.

20,233. Would an easterly gale blowing in have the effect of setting back the tide ?—It would to a certain extent.

20,234. Would a two-knot tide and an easterly gale blowing in, cause much sea ?—The tide would not cause the sea ; the sea would be outside the tide.

20,235. You said that in these easterly gales of wind the whole sheet between Redcar and the Heugh was broken water ?—It is.

20,236. Speaking to you as an old sailor, do you think it is dangerous for a ship to run through that sheet of broken water if there is plenty of water under her ?—There is plenty of water under her.

20,237. But is it dangerous for a laden ship to run through that sheet of broken water ?—Yes.

20,238. Tell me why it is more dangerous for a ship to run through that sheet of water in a gale of wind than it is in the open sea, where there is no broken water ?—Where there is no broken water there is no danger; but where there is broken water every seaman must know that the danger is great.

20,239. Does the danger arise from the sea, or from the banks in the neighbourhood ?—From the sea.

20,240. Is it because the sea is in a more confused state, and not so regular as it is outside ?—Certainly.

20,241. Have you known many ships to founder in running for this bay through the broken water ?—I only know of one, and in that case I stood upon Hartlepool pier, and saw the accident. It was a sloop running for the Tees.

20,242. She foundered in broken water ?—She went down in a moment.

20,243. What depth of water would she have under her ?—Three or four or four or five fathoms. She had not got to the Fairway Buoy.

20,244. And you thought it was the troubled sea which caused the ship to founder ?—I am of that opinion, and that was the general opinion on Hartlepool pier.

20,245. That is one of the reasons why you would prefer Redcar as a site to Hartlepool Bay ?—I did not speak of Hartlepool Bay ; I spoke of the river Tees.

20,246. I will ask now whether you would prefer Redcar as a site to Hartlepool Bay ?—I should decidedly give the preference to Redcar before any other that I am acquainted with.

20,247. Why should you prefer Redcar to Hartlepool Bay ?—The reason is what I have before stated. In Redcar there is deep water before it altogether. If the proposed pier is made in Hartlepool Bay, I should have doubts whether it will not silt up with sand. Supposing that pier was made east-north-east, the wind runs right through it, and must drive in an extraordinary sea, which may break the outermost vessels from their anchors and drive them one on another, until they all get in a mass together on the Long Scar.

20,248. Would the land over Redcar be easier made out in thickish weather than that at Hartlepool ?—I should think pretty much the same. The land above Redcar is nearer than the hills here ; but in almost any weather these hills could be seen at any distance from the shore.

20,249. Say that a harbour of refuge was made here, and the weather was thickish, so that ships could not make out the land for many miles, as it often is in south-easterly gales, do you think the land about the entrance to this harbour would be easier made than that over the entrance to any harbour at Hartlepool ?—I think the land at Hartlepool would be decidedly easier made out than that here ; but at the same time vessels from the Baltic in all cases, if going southward, always make for the Yorkshire high land. If going northward, they make for Tynemouth. These are recognized points ; and in the same way, as soon as a vessel saw the Yorkshire coast, it would be a guide to Redcar. She would get hold of that, and might then easily come in.

20,250. You make the Yorkshire land at Huntley Foot ?—Yes ; I then come along the land, by the lead, if you cannot see anything.

20,251. (*Capt. Sulivan.*) Are you decidedly of opinion that we run a great risk in making any attempt to improve the tidal rivers ?—I think so.

20,252. That is, for a refuge harbour ?—I cannot call them refuge harbours, whatever moneys you may lay out upon them.

20,253. You said that a harbour at Redcar and another one near Flamborough Head would both be useful for the passing trade ?—They would.

20,254. Would it be the case that one at Redcar would be more especially useful for light vessels coming into the bay from the southward, and the one at Flamborough Head would be more es pecially for the loaded vessels caught off Flamborough Head ?—The Filey one would be highly useful for loaded vessels caught off Flamborough Head.

20,255. If two such harbours were made, though not on any grand scale, would it give all the accommodation and reasonable safety for life and property that the trade of this coast would require ?—I think so.

Mr. THOMAS THOMPSON examined.

20,256. (*Chairman.*) You live at Redcar ?—Yes.

20,257. You have been a fisherman all your life, I believe ?—Yes.

20,258. What have you got to say about harbours of refuge. Where should you like to have such a harbour ?—I should like to have it where it would save most life and property.

20,259. Where would that be ?—At Redcar.

20,260. Why should you like to have it at Redcar ?—Because there I think it would save most life and property. I have no personal advantage in it.

20,261. Why do you think more life and property would be saved by having it at Redcar than by having it at any other place ?—From what I have seen I think so. I have seen a vast of shipwrecks, and a vast go by which might have been saved. It has made my heart ache to think what such a harbour might have saved here.

20,262. That is the result of your long experience ?—Yes. I have been in and out of here for 70 years.

20,263. (*Mr. Lindsay.*) You and I had a crack on the beach this morning ?—Yes, I was down on the beach this morning.

20,264. You have been 70 years a fisherman ?—Yes, 70 years.

20,265. Have you often been about Hartlepool Bay ?—Yes, very often.

20,266. You said you would like to have a harbour of refuge where it would best save life and property ?—Yes.

20,267. And it did you great credit to say so. You think that if placed about Redcar it would have the best chance of saving life and property ?—Yes, it would, from what I have seen ; I speak from experience.

20,268. Tell me why you think a harbour at Redcar would be likely to save more life and property than if a harbour of the same size were made down at Hartlepool Bay between the Heugh and the Long Scar and with a breakwater outside ?—The harbour they talk of at Redcar would run out into plenty of water and would give good anchorage. I have never known any variation in the water in my time ; there never has been, and never will be, I expect. It lies well into the open sea. We don't want it inland. We want a place you can get at ; that is, a place you

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can get at at any time. If a ship will live at sea, she will be able to come into a harbour at Redcar any time of day or night, or at any time of tide.

20,269. Would not the same be the case if a harbour were made at Hartlepool?—I have been constantly looking out. It is a body of broken sea all the way before you come to Hartlepool. It is a foul sea from the Salt Scar to the Heugh.

20,270. Have you ever seen ships founder in that broken water?—Yes, a good many. One of the Newcastle colliers went past this harbour mouth.

20,271. Did she founder?—She brought up in the bay, and there she went down at her anchors, and all hands were lost.

20,272. Do you think there is greater danger in a ship running through broken water than in a heavy sea outside?—I do. It is a great shoal.

20,273. Is it because a ship might strike?—No, there is plenty of sea; there is no danger of that. I have been coming down here for refuge when the sea has been running mountains high. Two ships came ashore. I myself knew the best water, for I found it out for my own safeguard in going in and out long before it was talked of as a harbour.

20,274. Do you think these ships struck the bottom?—I saw one upset, upset with ease, bottom up.

20,275. Was she light or loaded?—She was light.

20,276. Did she strike the bottom?—No; the sea upset her, she had broke her masts.

20,277. Do you think that any of these ships which foundered struck the bottom before they foundered, or was it the sea which made them founder?—The Newcastle trader that brought up in the roads.

20,278. You told me about her. Cannot you tell me about any other ship that foundered?—At sea?

20,279. Out in this broken water?—I do remember one just now, one they called the *Scotia*, lying in Hartlepool Roads. She broke away, drove on the Gares, and all hands were lost.

20,280. Drove on to the banks?—Yes; I could name a vast of ships that have been lost on the rocks. They are all gone. We must look for better means to preserve the place if we can.

20,281. (*Capt. Sulivan.*) Have you ever known any difference in the depth of water between the Redcar Rocks?—Never in my time, nor in any man's I could ever hear tell of. Never any variation in the water since I can remember, which is between 70 and 80 years.

Mr. Addison Brown examined.

Mr. Addison Brown.

20,282. (*Chairman.*) Mr. Brown, you reside at Middlesborough?—No; at Coatham at present.

20,283. How long have you followed the sea?—Twenty-one years.

20,284. Are you still afloat?—When I choose to go. I have left the sea about three years altogether.

20,285. How long have you commanded vessels?—I commanded vessels of all sizes for nearly 15 years.

20,286. In what trade have the vessels you commanded been chiefly employed?—For the first three or four years I was in the coasting trade from Stockton to London. Since that, I have made voyages and have commanded ships across the sea to the Baltic, to America, and to China. The general trade, I might call it.

20,287. Give us your opinion as to a harbour of refuge?—I wish to offer a few remarks. My experience of the coast in that way is not so great. I have never happened with a misfortune on this coast, and I cannot, therefore, speak from anything that has happened to myself, but from what I have seen and heard from others. I wish to say a few words about a harbour of refuge. I think we want one at Redcar; according to my ideas, which is a very good place for one.

20,288. Why do you prefer Redcar to any other place?—In the first place, in this way, that it will take all the vessels coming down from Flamborough Head, all the light colliers. When they come out of Bridlington Bay, having been sheltered with the wind from the north, or the north-north-west, they come down in this direction. They get a distance down before it comes bad weather, because a man would not come out in the bad weather, and by the time they get that distance, probably it comes on a gale of wind from east-north-east. They put the ship under small canvas, say double-reefed topsails, and shove away to the northward. By having a prudent offing, as a prudent shipmaster will, he will weather Whitby Rock, and come down the coast. The ship is lying at north, with the wind east-north-east. He weathers Whitby Rock, and still the ship is not making over a north-west course. There are very heavy colliers, and under double-reefed topsails they will make three or four points lee way, and some a little more. The captain comes about; he can, perhaps, fetch in about Redcar, and when he gets there, the result is, he cannot get round Redcar Roads for a harbour of refuge at Hartlepool. If he gets round the rocks, he gets right into the bight. The ship is still making a north-west course, and what is the use of his looking for a harbour north, when he is only making a north-west course?

20,289. For which class of ships is a harbour required most, light or laden ships?—I think it is required for both, if it is put in a proper place.

20,290. To which class of vessels, if either, would it be of most use?—To both alike. It depends on where it is placed. If you tell me where it is placed, I will give an answer.

20,291. Place it at Redcar?—It will suit the one as well as the other. Vessels coming from the north won't come out of Sunderland, the Tyne or the Tees, except they can get an offing and have some sort of weather. Even if they have to shorten sail on account of a gale half an hour after they get out, which is very early, a vessel heading up with a wind east-north-east will lay south-east, and I will be bound she will fetch Redcar. It must be useful for them. That is why I think the situation of Redcar is preferable.

20,292. (*Mr. Lindsay.*) As you are aware, the proportion of loss of life in laden vessels is as ten to one compared with light vessels. Now, looking always to the saving of life, do you think a harbour at Filey or one at Redcar would do most to save life?—I think myself at Redcar, in both cases.

20,293. Is it or is it not the case that a great number of vessels get off Flamborough Head, and cannot get to the southward?—I think there is a vast there with the wind from south-south-east to south and south-south-west; but there is not a man can tell me, no prudent shipmaster will tell me, he has laid under the Head with a wind east-south-east. With such a wind he ought to put the vessel to sea, and then as the gale increased he would be a long way to sea before the heaviest of the gale came on, and before there was danger of coming in contact with the Durham coast he would have gone down to the Firth of Forth. Before he got there, a vast of changes in the weather might have taken place.

20,294. Say a gale came on very strong from the east, such as that of January 1857, and you had been caught to the west of Flamborough Head, and could not weather the Head, what would you have done?—If there had been a harbour of refuge under my lee it would have been very useful; but these are extraordinary cases.

20,295. Speaking of such a case as that which I have put, as an extraordinary one, did I understand you to say that under such circumstances a harbour at Filey would do more to save life than one at Redcar?—No.

20,296. In such a gale as that could you have fetched Redcar?—Yes, if I got my ship off to sea when I saw the gale coming on. However quickly

it slipped in upon us, we should surely have two hours or something like that. You are putting the wind at east-south-east, and if the ship were in good trim, had good canvas and things in proper order, and if she were handled in a ship-shape way, she would go away to sea. If she goes ten miles to the north-east, making perhaps a point leeway, she is making a very outside course. She is both coming down the coast and likewise going to sea, which, if the gale increases, makes your Foot with any wind you like, bearing probably about west-north-west, and gives two points more leeway to come to it.

20,297. Unfortunately, in such gales we find ships cannot get to sea. We have a return which states that in that gale in one morning 27 vessels were lost between Flamborough Head and Whitby Point, and that the crews of seven of those were lost. These were ships caught somewhere in the position which you describe, and evidently could not weather away the Yorkshire land. What good would a harbour of refuge be to any one of the ships which were lost between the points I have named ?—I quite grant you what you say, Mr. Lindsay ; but have you talked to any captains wrecked in that storm, and did they say that a harbour of refuge at Filey would have been of much benefit ? It might have been to one or two perhaps ; but do all of them say that they could have saved their vessels if there had been a harbour at Filey ?

20,298. We have not had an opportunity, Mr. Brown, of examining any of those that were wrecked on that coast ; but I am asking you as a sailor. Of course the masters of those ships would use their utmost endeavours to weather away the land on either side. Of course they could not weather away Flamborough Head, and it was in their attempt to weather away the Yorkshire land to the north of Whitby that they were wrecked along that iron-bound coast. Now I suppose that under such circumstances as these you will agree with me that a harbour of refuge at Redcar or Hartlepool Bay, or any point to the northward of Whitby, would not have saved any of these ships ?—I remember hearing that gale spoken about by some captains who were in it. I make use of the name of one of them, who had a son living here, a man of the name of Laverack, of Staithes. I heard him say the vessels were so close under the cliffs about Scarborough and Robin Hood's Bay, and the wind shifted so quickly that it did not enable them to get the ships placed under any command at all, and some of them actually blew on shore before the sails were double reefed or single reefed. I heard that myself. Therefore, what would have been the use of a harbour of refuge at Filey under such circumstances ? These ships caught off Scarborough could not have fetched a harbour at Filey, according to what I heard.

20,299. Nor have got into a harbour at Redcar ?—No.

20,300. Was the proportion of loss which took place between Flamborough Head and Whitby on that fearful morning larger than it usually is in easterly gales on that coast ?—Oh yes.

20,301. And that arose, in your opinion, from the ships being caught so close in upon the Yorkshire land, and the gale having come on so suddenly ?—Yes.

20,302. Say that it rested between Redcar and Hartlepool Bay for the construction of a harbour of refuge, would you still prefer Redcar to Hartlepool Bay ?—Yes ; I have given you one reason, and I will now give you another. In the first place, say a ship was coming across the North Sea from the Baltic, and on account of something happening, such as having sprung a leak or something of that sort, and required a refuge and must make for some port, if there is a harbour of refuge at Hartlepool, and it is dirty thick weather, with the wind east-north-east, in such weather as that she could come down to Redcar easily enough, but she durst not try Hartlepool, because there the land is so low she could not make anything of it ; but she would draw close in to Huntley Foot, taking care not to be too much to the southward ; will try to see Rosebery Topping, and the bearings of that will indicate where the harbour lies. If the captain uses his lead before he gets the length of the harbour, I'll be bound to say there will be some beacon or other on the pier, and of course that will enable him to fetch it. If he goes to Hartlepool there is the danger, if he gets to the southward, with the wind east-north-east and the ship making a north-west course, that he goes upon Seaton Sands.

20,303. But in bearing up for a harbour of refuge, say caught by a gale veering round to the southward, would you not, if the weather was thick, still consider it advisable to make the high land at Huntley Foot, and could you not take your departure from there and run for Hartlepool ?—Yes ; you could very easily, if the wind was so far south that you could get off again.

20,304. With the wind east-north-east and blowing a gale ?—Then you cannot go down and make that and then go to Hartlepool.

20,305. The gale would be too scant to fetch into Hartlepool ; is that your answer ?—If the wind was east-north-east I should never attempt to go in there to make land for a harbour at Hartlepool ; if I did, I should never get out.

20,306. You don't think you could weather Redcar rocks or the sands of the Tees ?—If I did weather Redcar rocks, if I ran on until Huntley Foot fetched off by the ship, and she was making four points leeway, if she heads she brings me to Coatham, or might get across the Tees ; but if I saw that, I would not let her do it, but run her upon the sand at Coatham, whether she was light or laden.

20,307. Do you think the construction of one large harbour of refuge on any part of the coast, or an improvement of the existing harbours so as to make them easy of access at all times of the tide, would do most to save life and property ?—What do you call a large harbour ?

20,308. The making of the harbour at Redcar on which your mind is set, and for which you have given very sensible reasons ; the making of a harbour at Redcar to hold 500 sail of vessels at anchor I should call a large harbour. Do you think that the construction of such a harbour as that at Redcar, or the improvement of the existing harbours, so as to give them 16 or 18 feet of water, if it were possible, at low water spring tides, would do most to save life and property ?—I consider a harbour for 500 sail only a little harbour for such vessels as draw only 16 feet.

20,309. Now, say there was made at Redcar a harbour capable of containing 500 ships—that that was one point ; and the next was the improvement of the Tyne, the Wear, and the Tees, so as to make them harbours with 16 feet of water into them at low water spring tides, so as to admit the usual description of vessels going along the coast at all times of the tide ; do you think that the one harbour at Redcar, or the improvement of those harbours to that extent, would do most to save life and property ?—I think one harbour, with the wind from east of north or north-east by east.

20,310. With all winds ?—For the general trade and the coasting trade, right up and down, and wherever they came. They could round Tynemouth headland, where I think the greatest destruction takes place. This would be a great benefit.

20,311. You think one harbour would do more to save life and property than the improvement of the other harbours ?—I think so.

Mr. William Potts examined.

20,312. (*Chairman.*) You are resident at Redcar ?—Yes.

20,313. And are a fisherman ?—Yes.

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Chairman.

20,314. How long have you been employed in that way ?—Well, on to 40 years from first starting.

20,315. Always in this neighbourhood ?—Yes ; always in this neighbourhood.

20,316. Have you thought at all about this question of harbours of refuge ?—Yes, I have given a little thought to it.

20,317. Just be good enough to give me your opinion on the subject ?—My opinion is this : I think that Redcar is laid out almost by nature in a form to make some kind of refuge of it. If it was made even on a small scale, it would be still a very necessary place. Many vessels have gone past the place dismasted or disabled, and all hands have afterwards been drowned ; vessels which I think, if I had been in them, I could myself have saved most of them. I have seen vessels go past which might have taken harbour here when they could not fetch down to Hartlepool. I once saw a vessel belonging to Shields go past ; she was called the *Anne*, and was a timber-laden vessel. In taking the Tees bar she got on the North Gare end. If there had been a place of refuge here she would have come in. We got the life-boat down, and took the crew off at dark, but they would have been lost if we not seen them. In another case, a ship ran on shore near Seaton, but the crew escaped and were landed there next morning. If there had been a refuge the ship might have been saved from grounding. That was in the year 1829.

20,318. You have never been at sea, have you, in any of the ships in the coasting trade ?—No, but I have been at sea all my life together, out in the fishing boats.

Mr. W. Alexander Brooks re-examined.

Mr. W. A. Brooks.

20,319. (*Chairman.*) Are you prepared with any well-considered pla n for aharbour of refuge at Redcar ?—I am.

20,320. And are you prepared with any detailed estimates for carrying out that plan ?—Yes ; and I will give it in, fairly copied, before the Commissioners leave.

20,321. I see that Mr. Anderson is also to be examined ; will he be prepared to back your prices ?—I don't know.

20,322. Will you now proceed to state to the Commissioners what your plan is ?—It consists of two works. The most northerly is a pier on Salt Scar rocks, which is a natural mole that extends into the sea more than 10,000 feet in length, and it is also several hundred feet in breadth. It is in fact a breakwater, sheltering the space between that rock and another range of rock to the south called the East Scar. That is the northern work ; it has a return to the southward. Then about 3,500 feet to the southward there is a second work, which consists of a breakwater lying abreast of the shore between Marske and Saltburn. The first will shelter about 330 acres, having above four fathoms at low water ; and the Marske breakwater will shelter 1,000 acres having above four fathoms at low water, and 870 acres having above five fathoms at low water. The length of the southern breakwater will be about 9,200 feet. That I believe is all good holding ground. There is one great advantage in the formation of a harbour on this coast, arising from the clearness and purity of the water. If these works were made there would be no sands for many miles to the southward which would be likely to bring in sand by the occasion of on-shore gales of wind and south-east gales. I have often noticed the great difference between the purity of the water on the south side of Tees Bay and that of the water on the north side. In the former you may see the shells at low water ; I have seen sea urchins in 30 feet at low water. When the water gets mixed with the discharge from the Tees it is much discoloured. I believe there is no danger of any loss of depth of water in the harbour which I have proposed by any silting up ; that is one great reason why I select this site on the south side in preference to the one on the north side. In addition to this, there is an inexhaustible supply of stone to be had within a very short distance, and which you can run down by gravitation. Another great advantage is the high land in the vicinity, which will enable the harbour to be made much more readily than on any other part of the coast to the north. Burleigh Moor, immediately to the back of Marske, is, according to the Trigonometrical Survey of the Ordnance Department, 598 feet above the level of the sea, about one mile south-west of the shore, and its west end in a line with Roseberry Topping, which has an elevation of 1,000 feet, would lead directly for the north end of the breakwater ; and there is also the high range of Guisborough and Ayecliff Moor, which is about the same height of 1,000 feet. The outline is so bold that it is readily seen by observers a long way off at sea. I believe a small harbour might be made in this locality, at a moderate outlay, which would be the means of saving a great many lives. I don't think it is absolutely necessary to go to the full extent of this work as shown in my large plan unless it is considered desirable to accommodate many hundreds of ships. I believe if even the Salt Scar pier were carried out, without going so far to the south as is shown on the plan, it would afford shelter during all gales from the north round to the north-east.

20,323. Have you finished your statement ?—I think so. These are the principal points.

20,324. Will you tell me in round numbers what would be the total cost of the northern breakwater ?—574,000*l.*

20,325. Do I understand that the sheltered area will be in a line from the pier head perpendicularly to the coast ?—It will be nearly perpendicular to the coast.

20,326. What would the southern portion of the breakwater cost ?—About 1,000,000*l.* of money.

20,327. So that the total cost would be about 1,500,000*l.*?—Yes.

20,328. The area of the southern portion is that bounded by the lines running out perpendicularly from the coast ?—Yes.

20,329. I see that there are two patches of two-and-half and three fathoms, which lay about a couple of cables' lengths from the pier head. Could you get rid of these ?—These I have designed to cover with military works to defend the entrance, and include that in my estimate.

20,330. If it were considered better, instead of putting an obstruction in the way of the entrance of vessels by making military works there, if it were considered better to remove the patches, so as to enlarge the fair way, would that be possible ?—It would ; but it would be very expensive, and I think it would be enough to beacon them, because the space between those patches is so small. There would be more than two cables' length between them and the entrance.

20,331. Here is another patch of three-and-half fathoms which lies about half way, a little within the pier head. Would it be possible to get rid of that ?—In the same manner. From the four fathom line of that patch to the breakwater is 1,700 feet, so it would not be in the way.

20,332. If my compasses and the scale are right, you make that patch only two cables' length from the pier head ?—I have a scale of three nautical miles here, the nautical mile being divided into 10 cables. [*Plan handed in.*]

20,333. I see in this sketch, which you have handed in to me, that the three-and-half fathom patch is three cables' length from the northern pier head, and a little more from the southern one. Still, I must repeat the question whether they could be removed, because when you are spending 1,500,000*l.* for a harbour it would not be tolerated that you should have a three-

and-half fathom patch directly in the centre of the posts. Could it be removed ?—It could.

20,334. You say that from the southern extremity of the southern breakwater to the shore low-water mark is about a mile and two cables. That would be open, you see, to all winds from the south-east ?—Yes, round along the shore.

20,335. Would it not be a considerable objection to having that south entrance ?—There is a line drawn on that chart from Elwick Hill, in the county of Durham, which shows that Huntley Foot is outside the breakwater, so that the wind to which they would be exposed would only be along shore.

20,336. What is the distance of Huntley Foot ?—I think about 12 miles.

20,337. Would there not, with the wind blowing for 12 miles along the shore, be a considerable sea, with gales from the south-east and south-south-east, to which the anchorage is exposed ?—The wind would fetch in, but the sea tumbles in more directly. It is always the case that when you are unaffected by the shore the waves run in lines with the wind ; but when the waves are affected by the contour lines of the shore the wind comes more directly in. I have not pretended to make that design a smooth harbour. It is a roadstead or breakwater, and the water might be made smoother by extending it a little more to the south-west.

20,338. You suppose it would be sufficiently smooth to insure the safety of the vessels which anchored there ?—That is my opinion.

20,339. (*Sir F. Smith.*) I understand you that your estimate is not quite completed in full details ?—I should like to look at it again.

20,340. Have you any section to give in ?—I will put in a section by-and-by.

20,341. It is impossible to examine your project with no section and no estimate ?—I can give particulars so as to satisfy you that they are complete.

20,342. Are you prepared to give in to us a statement of your construction ?—Yes.

20,343. And the manner of construction ?—Yes.

20,344. And the material ?—I can do that at once.

20,345. Do it briefly ?—All the material below the level of 15 feet below low water spring tides, would have a slope internal and external of one-and-half to one.

20,346. Do you think that slope is sufficient for the external portion ?—This is only from 15 feet below the level of low water to the base. Afterwards the slope is materially increased. Thus, from 15 feet below low-water mark to nine feet below the same level, the external slopes are four to one. From nine feet below to low water at spring tides four-and-half to one. From low water, to half tide, or eight feet above low water, six to one. From half tide to 18 inches below high water seven to one ; and from 18 inches below high water to two feet above high water spring tides, ordinary spring tides, 10 to one. There, I believe there will be the greatest exposure.

20,347. Is the whole structure to be in rubble work ?—Yes ; on account of the great cheapness of material, and the great facility of obtaining an abundant supply.

20,348. What would be the total width of the bases of the southern breakwater ?—In seven fathoms of water 399 feet.

20,349. The distance from the shore is about a mile and a half, is it not ?—Yes.

20,350. How do you propose to transport your material from the quarry to the line of the breakwater ?—It will have to be barged across to the line of the Marske breakwater, carried across in barges, being shipped from Redcar pier, and the barges will discharge it on the site of the breakwater.

20,351. How do you get it to the barges ?—By a railway from the quarries down to Redcar, and going on the Salt Scar Pier, and there tipping it into the barges, just as we are now doing in the Tyne. We are there shipping stone at the Narrows and carrying it in barges of about 140 or 200 tons burden, the sides of which open and discharge the cargo in about half a minute.

20,352. In the Tyne you carry it from the shore ?—Yes ; but it is transported across to the northern pier, taken down the river, and carried across the bar to sea.

20,353. How long do you expect it will take to complete the southern breakwater, without reference to the northern one at all ?—If I propose to ship material from the Salt Scar it must have reference to the Salt Scar.

20,354. I am assuming that you had the northern one first. Having completed the northern one, how long would it take to make the southern one ?—I should say to complete it about 15 or 20 years, to put in the vast amount of material I have put on the section. There are 20,000 cubic feet for one foot forward. That is a much larger proportion than has ever been used in any case that I am aware of. One-half of that amount would produce shelter to a useful extent.

20,355. We are dealing with your project as a complete project. I want to know, without any lengthened statement, how long it would take, supposing the northern pier completed, before the southern breakwater would be finished. Supposing the northern part of the scheme to be completed, how long would it take from the completion of the northern, so that you can work upon that as a stage, before you could complete the southern ?—20 years, if I am not to commence till the northern one is completed.

20,356. I don't object to your commencing, but I understood you to say that you would use the northern pier as a gangway for the other ?—Yes ; but you could get sufficiently far advanced with that work to commence with the other within a year.

20,357. You would construct the southe n part entirely by barges ?—All by barges, so that both might be going on together.

20,358. They might ; so that in twenty years from the time you commence the whole could be finished ?—Yes.

20,359. May I ask why you require this very large enclosure ?—Originally my plan was upon a very much smaller scale ; but I have brought out this large plan, hearing that the Government were determined to have a very extensive work. I thought the Government would not be satisfied without having some extensive harbour.

20,360. How many vessels do you contemplate finding refuge for ?—That is more a question for a seaman to answer.

20,361. But you are the projector of a work for the purpose of sheltering vessels, and the extent of accommodation is one of the elements for consideration ?—I believe it will shelter 300 vessels ; the two together will shelter 300 vessels, so as to give them plenty of room.

20,362. Each would contain 150 vessels ?—About that number.

20,363. You say the southern breakwater is in $9\frac{1}{2}$ fathoms water ; it varies from 7 to $9\frac{1}{2}$?—Yes.

20,364. How many tons of material will there be in this southern structure ?—Nearly 11,000,000 tons, allowing nothing for voids.

20,365. 11,000,000 of tons of stone put into the work. How many millions do you expect to put in per annum ?—About 1,500 tons a day.

20,366. The statement you intend to give in will include all that information ?—I think I had a memorandum showing 20 years altogether. I think I said 1,500 tons a day.

20,367. You can get the material of large size ?—Of any size.

20,368. How do you propose to set the upper course of the work ?—It is to be all rubble.

20,369. It is not so shown in this drawing which you have placed before us ?—That is not a finished drawing.

20,370. It will be desirable to have your project a

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little more complete before we can form any judgment upon it. At present it is in a very crude state.

20,371. (*Mr. Coode.*) Were you the original projector of a breakwater for Redcar in the year 1832?—The first plan projected was mine.

20,372. Is your estimate for the work now in any degree different from the work projected at that time?—It is a very different work.

20,373. I mean as regards the cost per ton of the material?—I almost forget, but there is not much difference.

20,374. At what rate per ton have you calculated on obtaining the rough material to put into the breakwater?—At 2*s.* per ton.

20,375. Where do you propose to obtain it?—From the Up Leatham quarries.

20,376. How far from the work?—About three miles, at an elevation of 600 feet to the top of the hill, 530 or 540 feet from the bottom of the quarry.

20,377. Is it a durable material that you propose to use?—It is sandstone.

20,378. Hard?—Moderately hard.

20,379. Have you ever seen sandstone of the same kind exposed to the action of the sea?—It has not been much used in this neighbourhood. They have a sandstone not much better at Whitby. It is about the same as the Whitby stone, I believe. I give very long slopes.

20,380. You don't use masonry or pitching in any part?—Giving these long slopes, and putting large blocks will not require it. With 7 and 10 to 1 where it is exposed, I think the stones will be perfectly at rest.

20,381. You imagine you can put in 1,500 tons a day by means of boats?—Yes, for a certain number of days in the year easily.

20,382. Have you in your estimate made an allowance for interruptions?—I have.

20,383. The estimate for the whole is 1,674,137*l.* The total number of feet in length is 14,400 on the Salt Scar, and for the south breakwater 9,000 feet; total 23,400 feet?—Yes.

20,384. Somewhere about four miles?—About that.

20,385. Do you imagine this work can be executed for 1,674,137*l.*?—I believe so. You will recollect that a great portion of it, that on the half-tide rock, the Salt Scar, is exceedingly light work. The Salt Scar extends 6,000 feet from the shore to the low-water line, and then there is a great length with from three to nine feet at low water. It is only that which enables so gigantic a work to be executed so cheaply. If you take Mr. Calver's survey and work from his soundings, you will find that the quantities that I have given would be very much in excess with the usual slopes given by engineers, very much larger than your own; about one third more, you will find.

20,386. You have allowed slopes of $4\frac{1}{2}$ to to 1 from nine feet under low water up to low water?—Yes. At Kingstown Harbour the general slope is 5 to 1 only up to high water.

20,387. Yours is $4\frac{1}{2}$ to 1 from low to nine feet below?—Yes. And then, if you recollect, in gales of wind when this will be exposed to severe action there will be from two or three feet more water at low water, so you may call that 12 feet at low water.

20,388. Assuming that the slope becomes 5 to 1 instead of 4 to 1, will not that affect the section all the way to the bottom?—I have got so large a body of material. There is the allowance for voids. If you take off a quarter or one-fifth from that quantity, you will still have a breakwater of the size shown in the section.

20,389. You calculate this in the solid?—Yes, without any allowance for voids, so you might fairly take off a large amount from the estimate.

20,390. Will you be good enough to send a section upon a scale according to the memorandum you will receive from our secretary, and in the manner there set forth?—Yes.

20,391. Then we shall be able more readily to compare the different plans?—The plan put in is two inches to the nautical mile.

20,392. (*Chairman.*) Suppose it blowing very heavily from the south-east dead on shore, would there be any lift of the sea under this enormous breakwater?—I think not more than two or three feet—say three feet.

20,393. If you look to your plan you will see at the end of the East Scar there is a kind of projecting point, with three and a half fathoms on it?—That is quite inside.

20,394. I understand that is not included in the area?—No, none of it.

20,395. I am aware that is not included in your sheltered area; but at the same time I think if you look at it, it renders the sheltered area of the most inconvenient description; because, will you tell me, with a gale blowing dead on shore, where would a vessel fetch after she rounded the pier? We understand that light colliers make four points lee-way?—If a vessel made the pier head, she would find herself in smooth water, round to, and bring up.

20,396. If she brought up in safety close to the pier head, the place would soon be choked?—A vessel can clear the pier head, and choose her position.

20,397. From the pier head to the extremity of this patch she would have to be within seven points of the wind. Now we have been told that light colliers make four points lee-way—that is 10 points of the wind; and so a vessel would go right on this patch?—If she rounded to for the pier head, she would find herself in smooth water, and be under the lee of the pier.

20,398. Do you consider, rounding to under the lee of the pier as well as she could, that she would weather the patch with an east-north-east wind?—I think not; she had better run for shelter under the lee of the breakwater.

20,399. To my mind this patch is an insuperable objection to the northern part of your plan. It is a kind of projection which cuts the sheltered area into two. It is for you to consider, but it appears to me you would give a far better harbour by running the pier out along the East Scar, and throwing the whole thing bodily southward, because your weather area is very good. You have a capital depth of water, six and a half or seven fathoms; you have capital water there, but on the northern side I think you will have a very bad harbour indeed?—One design was to carry out a pier upon that East Scar.

20,400. Perhaps you will be good enough to consider that at your leisure, and forward that to our secretary. Also forward to him a statement of the expense of removing these two patches of two and a half and three fathoms on which you intended to put forts, so as to have nothing less than four fathoms at the entrance?—I will.

20,401. (*Sir F. Smith.*) You stated, in reply to a question put by Mr. Coode, that you could dispense with a great proportion of the materials shown in your projects?—Yes, the quantity is unusually large.

20,402. But surely, in forming the project you have not taken the maximum but the minimum?—No, I have taken the maximum, and kept on the safe side.

20,403. I think it would be better if you would give us the minimum which you, as a professional man, can stake your reputation upon as being sufficient. You don't want more than is ample to give security for shipping, so as to swell the estimate up to an amount which renders the project inadmissible?—I see what you mean.

20,404. When you have determined what is the least amount which you as a professional man of great experience think sufficient, that is your project?—The estimate would be considerably reduced by making the pier on the East Scar, but it would not give so much ground.

Mr. Robert Reed examined.

20,405. (*Chairman.*) Where is your residence?—In Middlesborough.

20,406. You follow the sea?—Yes.

20,407. For what number of years have you been at sea?—For 30 years.

20,408. How many years have you been in command of vessels?—Twelve years.

20,409. In what trade have the vessels you commanded been chiefly employed?—Chiefly in the coasting, Baltic, and American trade, and occasionally the American.

20,410. In knocking about the coast, have you often, or on any occasion, been in want of a harbour of refuge?—Yes; on several occasions.

20,411. Will you state to the Commissioners what was the last occasion and the circumstances attending it?—The last occasion was on the 28th October 1852. I was from Carthagena half laden with lead; came round Flamborough Head, with the wind about east and by south, east-south-east. As I cleared towards the head, I began to ask myself a few questions, whether it would not be prudent to put the ship's head to the southward, and get the Humber under my lee. I fully expected that as I went north, the wind would draw more ahead, as I have invariably found to be the case. As soon as we get to Whitby Rock, the wind seems to head us. I consulted with a brother of mine, who was mate, and who was an older man than me, and had always been mate in the coasting trade, scarcely ever leaving it, and he thought the wind was not so heavy at that time, and being east and by south, and having the ship well ballasted, there was no danger. I pressed on as much canvas as I could do, having a very fair offing at that time, perhaps four or five miles, when I came round the head. By the time I got down to Whitby Rock the wind got to east and by north, and from that to east-north-east as I came down. I carried as much canvas as I possibly could. We had at first brought the vessel under close reefed topsails, mainstaysail, foresail, and double reefed trysails. I found that being well ballasted and well down in the water, for a collier vessel, we managed to keep a pretty good offing, so much so, that had there been a harbour of refuge either at Hartlepool or here, I could have suited my own convenience as to running for them. I found on calculating the tides that if I kept on my course for the Tyne, to which I was bound, there was a great doubt in the way, whether I should weather Souter Point or not. Another consideration was, that it would be dark. I thought I had the Tees under my lee, and at that time, being acquainted with the Tees, having been in it several times previous to this on similar occasions, I deemed it prudent to run for the Tees in preference to Hartlepool; I did so, and came into the Tees. At the same time there were several vessels followed me towards the Tees, and when they got near and saw so much broken water, I think they turned frightened; they hauled up to the north, and went to West Hartlepool. In that gale 18 vessels went on shore, at the two Hartlepools. Some were stranded, and some were wholly lost. Others received a good deal of damage, and I believe there were several lives lost at the same time.

20,412. Was there any other occasion on which you found the necessity for a harbour of refuge?—Yes, one in particular. I was coming down two years before, in 1850; I had run down along the coast at what I might consider a good offing, and having the wind a long way southward, varying from south and by west to south and by east. I run down as far as Huntley Foot; I was bound to the Tees; but when I came to calculate the tides, there was a doubt whether I could save my tide in. Therefore I shortened sail, double reefed topsails, with the intention of keeping the ship to windward, to wait for the flowing tide; but before I got my topsails reefed, the wind flew in from east-north-east, and I haled round the Redcar Rocks, and had very little to spare indeed; so much so, that I made all preparations for letting go my anchor. Had there been a harbour of refuge at Hartlepool, I could not possibly have fetched it. I went into Tees Bay, When I was clear of the rocks coming in, I saw Seaton Lights distinctly. I reached into Tees Bay, and made all preparation for letting go the anchor, took in spare canvas, and kept the main staysail, the topmast staysail, and the trysail; after that set close-reefed topsails, and having a very active little crew, I brought the ship's head to the wind, and let go the best bower anchor, and giving her 75 fathoms of chain, she rode, contrary to my expectations. I had some thoughts of cutting her masts down.

20,413. You had only one anchor down?—Yes. I found at daylight I was not five times my own length from the Fairway Buoy in the Tees. As soon as ever it was light, which happened about six o'clock in the morning, I slipped and run into the Tees.

20,414. Without giving the details of any more of these risks which you have run for want of a harbour of refuge, could you mention a dozen more instances of a similar kind?—Not so many as that.

20,415. How many would you say?—I think only three during my experience. They all happened to be within eight or ten years. All these happened since I have been master.

20,416. Of course in the coasting trade you are well up to the tides?—Yes.

20,417. You understand them well, and calculate them very closely?—Yes.

20,418. Then it is upon a close calculation of the tides that the safety of vessels frequently depends?—Certainly.

20,419. And you also make your passages by the tides very much, don't you?—It is one principal consideration to take advantage of the tides.

20,420. Therefore they are thoroughly well understood in the coasting trades?—Yes.

20,421. (*Mr. Lindsay.*) In the last case you have mentioned you could not have taken a harbour at Hartlepool?—I could not.

20,422. But in the first case you could have made either Hartlepool or Redcar?—I could.

20,423. Now if it rested between these two places, should you give a decided preference to Redcar?—I should.

20,424. Why should you so much prefer Redcar?—Because I observed on the second occasion when I was caught there that for three miles off Heugh it was nothing but a mass of broken water. I observed that time, when running into the Tees, that the vessels bound to Hartlepool, as soon as ever they hauled it, going round the Stone Buoy, were almost capsized. They became helpless, and drove right to leeward of their port. On both these occasions it was comparatively safe towards Redcar Rocks.

20,425. Then it is the case that going through that broken water you have not the same command over a vessel that you would have at sea?—No.

20,426. However heavy the sea would be outside?—Certainly not.

20,427. On account of the troubled sea?—Completely so. Sometimes the sea is as smooth as it can be, and the next moment nothing but breakers; heavy water breaking right over you. In running to the Tees a sea broke over my quarter, and very nearly broke the ribs of the man at the wheel. I believe it went right over the maintopsail yardarms.

20,428. Your objection to Hartlepool is on account of the large amount of broken water outside?—That is the principal objection.

20,429. (*Capt. Sulivan.*) On the occasion of your coming from Carthagena you say you had a doubt about weathering the Head, and thought at first of keeping the Humber under your lee?—I had no doubt. I did not say I had a doubt about weathering the Head.

20,430. But to head to the north is the question?

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Capt. Sulivan.

—No ; no doubt about that, so long as the wind kept east by south; but I know by experience, having been caught several times, that the wind always heads you as you draw northwards.

20,431. In that case, when you were off the Head, if there had been a harbour of refuge at Filey, could you have gone into it ?—Yes.

20,432. (*Mr. Coode.*) You spoke of the broken water at the Stone Buoy at Hartlepool ; how far out do you think that broken water extends ?—I should say it was breaking three miles out of Hartlepool Heugh.

20,433. Was it breaking more heavily three miles off Hartlepool Heugh than it was three miles off Redcar ?—Yes.

20,434. You are quite clear about that ?—Quite certain about it.

20,435. How far outside of Hartlepool Heugh would a vessel first meet with this dangerous heavy sea ; you don't mean to say she would meet with the broken water to a dangerous extent at that distance of three miles ?—A small vessel would.

20,436. How far would she be from the rocks off Redcar before she would meet with broken water of the same character ?—Not half a mile, I should think.

20,437. Are you speaking of a single occasion, or is this a matter which often occurs ?—I have seen it on two occasions. On one occasion I went into the Tees in the dark, and could not see the state of the water.

(*Chairman.*) Is there any other person whatever present who wishes to tender any evidence on this occasion ?

No answer.

(*Mr. C. C. Oxley.*) On behalf of Mr. Colson, I put in a copy of the answers given by masters of vessels in favour of having a harbour of refuge at Redcar, which have been given to him when taking their depositions as Receiver of Wrecks.

Sittings at Redcar closed.

WHITBY.

Friday, 22d October 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.
Mr. Lindsay.
Captain Washington.

Captain Sulivan.
Captain Vetch.
Mr. Coode.

Mr. Evans, Secretary.

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(*Mr. Flintoft.*) I beg to tender a memorial signed by 320 masters and 28 mates of vessels employed in the Baltic, coal, and coasting trade, recommending the construction of a harbour of refuge at Whitby. (*This memorial was accordingly handed in.*)

Mr. Thomas Elliot Harrison examined.

Mr. T. E. Harrison.

20,438. (*Chairman.*) You are a civil engineer ?—I am.

20,439. In what way are you connected with the port of Whitby ?—I am professionally employed by the magistrates and inhabitants of Whitby to advise them upon this subject.

20,440. What plan is it now your intention to bring before us ?—I have prepared plans which I will now hand up, and on which I wish to offer you some explanation. (*The plans in question were here handed in.*)

20,441. I understand that there are two plans, one of a larger and the other of a smaller description ; is that the case ?—The plan is all one, but the part which the promoters of this scheme propose to lay before you, for your mature consideration, is a portion only of this entire plan.

20,442. Will you now proceed with any statement you may wish to make ?—In laying this plan before you, I wish to state that I have been instructed to prepare what would be a complete plan of a harbour of refuge. That is shown upon this plan, and is embraced by the three breakwaters. That scheme is one which on the assumption that a grand national harbour of refuge is a thing required, would embrace the whole of the requisites for it, inasmuch as it might be entered at all times of tide, and in all winds, with abundant depth of water, and having a good anchorage ground. The average contained within that plan within the two-fathom line is about 1,000 acres ; within the four-fathom line, 725 acres ; and within five to eight fathoms, it comprises an area of 600 acres. The cost of completing that work if finished in its entirety would be 1,750,000*l*. Of course, as to the question of a large harbour of refuge, you must consider that this plan is only laid before you as showing what are the capabilities of the bay for such a purpose. I may state that I am not here to advocate the construction of that harbour, inasmuch as if such harbour were requisite, there would no doubt be other considerations, besides those of a purely engineering character, on which I offer no opinion. My opinion of the plan is simply on the assumption that such a harbour is requisite. If that be the case, here is a plan by which the thing could be done. I will now proceed to that portion of the plan which the magistrates and inhabitants of this place do advocate ; that is, the construction of a breakwater running out from the Whitby Rock, as shown in the right-hand corner of the plan ; for that purpose the Whitby Rock, which is shown there, affords natural facilities to a great extent ; the rock is covered at all times of tide, but at low water of spring tides has on it a depth of water varying from two to five feet generally, and at the end up to 10 and 12 feet ; at that point it suddenly dips into deep water. The length of that breakwater would be about 3,800 feet, and the cost as I have estimated it would be 300,000*l*. I would point out, that if this work were constructed, it would still form part of the entire scheme, if that were ever carried out, and at the same time it forms an integral work in itself. It would afford a shelter in winds from the south-east of about 350 acres ; in winds from the east of 200 acres, and in winds from the north-east to the extent of 70 acres. With regard to the question of the shelter that it would afford, you will have evidence given before you by parties here who are well acquainted with the facts of the case, and who will lay before you the fact that the shelter is principally required when the gales come in from the south-east to east. These are the cases in which loaded vessels on

their passage southwards are caught here unable to weather Flamborough Head, and are driven back; upon that point, evidence will be given in full detail to you. In such cases there is at present no shelter whatever between Flamborough Head and Hartlepool, For these particular winds there is no shelter at all. Whitby is at present used to a considerable extent as a harbour of refuge; the number of vessels entering it for refuge purposes amounts to between 600 and 700 in the year. Upon that also you will have the facts given to you. Whitby harbour is one of exceedingly difficult access, upon that I think there can be no doubt; I therefore call your attention to the effect which this breakwater would have in facilitating the entrance into the existing Whitby Harbour; I think it would have the effect practically of deepening the bar, or rather the water upon the bar, to the extent of at least two feet, and what is now a harbour of difficult and dangerous entrance, would, under the shelter of the proposed breakwater, become one which vessels would then enter easily. I think that is a point which deserves a great deal of consideration. I think also that, in cases in which vessels might miss the harbour and be driven upon the bar, they would then be driven there with perfect safety as to life, and with a great amount of security as to property, that is in cases in which they could not enter the harbour; there is another advantage which they have here, which is the fact that there are steam-boats in this place which would always be able to assist any crippled vessels in the bay into the harbour itself. I should wish the Commissioners to take this view of it, that the plan would be in itself,—that this particular breakwater would be in itself—an integral scheme to the extent to which I have referred, and that it would also form a part of the more extended scheme, supposing that at any future period it was carried out. Supposing the whole scheme were to be carried out, or supposing that it were desired to carry out half of the long breakwater, that in itself, so far as it went, would still form a complete scheme, or rather, so far as it went, it would form a shelter of itself. And, therefore, this plan as proposed has, I think, this advantage, that every step which might be taken in its execution would be a step available for the time being in itself, and a step in the direction of the ultimate completion of the entire scheme, which if carried out would, I believe, be superior to any national harbour of refuge that could be formed on the east coast. I think that these are mainly the grounds upon which the Committee of magistrates and merchants of this place rest their claims. Having laid these claims before you, I shall be glad to answer, so far as I can, any questions upon the subject, merely stating that, as to nautical facts, you will have witnesses called who will give evidence much better than I can.

20,443. (*Sir F. Smith.*) I think it will clear the ground for us a little if you will answer some questions, that we may have recorded on our minutes exactly what is marked upon the plan. If I understand you correctly you have a larger project, which consists of a breakwater of 3,800 feet, commencing at the Whitby Rock and proceeding in a northerly direction?—Yes.

20,444. You have a space of 1,200 feet, you then have a long breakwater of 8,000 feet extending in a north-westerly direction; you have a second opening of 1,200 feet, and then a final portion of 2,750 feet to complete the enclosure at Sand's End Ness?—Yes.

20,445. What is the whole area enclosed? The whole area within the line of two fathoms and a half amounts to, as nearly as possible, 1,000 acres, and within the line of four fathoms to 725 acres?—Yes.

20,446. Then you may have in from five to eight fathoms an area of 600 acres; have you subdivided it?—No, I have not.

20,447. And you estimate the entire cost of the work at 1,750,000*l.*?—That is so.

20,448. Will you be so good as to explain to the Commissioners the style of the construction of the breakwater; what is the principle upon which it is to be constructed?—The facilities for getting stone at Whitby are exceedingly great. Immediately at Sand's End Ness there is a great abundance of stone fit for the purpose of constructing such a breakwater. This lies above the alum shale; it is about 20 or 30 feet in depth, and extends to a great distance. That would be within 400 yards of the commencement of the breakwater, and would be run down to it by an inclined plane.

20,449. You speak of the western portion of the breakwater?—Yes.

20,450. Where will you get the material for the eastern part?—With regard to that there is the stone from which Whitby Abbey is built, and which is found immediately above the breakwater. The extent to which that stone can be got I consider to be uncertain, inasmuch as the whole face of it is not visible; and in consequence of that I made a calculation for a southern breakwater on the assumption that the stone was to be brought to the spot by railway.

20,451. From what distance?—From a distance of about 10 miles by railway. There is good stone there to any extent.

20,452. What is the character of the rock of which you propose to construct your breakwater?—It is generally freestone, all of that stone which is at Sand's End Ness. There is a bed lying below that stone upon the top of the alum shale which is as hard as flint.

20,453. Is the freestone of a durable character?—Yes.

20,454. Has it been exposed in this neighbourhood to the action of the sea?—The piers here are built of that stone, and they will give you evidence of its quality.

20,455. How long have they been exposed to the action of the sea?—I believe more than 50 years—I am told 200 years.

20,456. Are they much acted upon?—No.

20,457. Therefore you have no doubt as to the durability of works constructed with that stone?—None at all.

20,458. What is the section of this work?—I have estimated it on two plans.

20,459. Have you a section to show us?—I have not; but I will explain it at once. In taking the estimate of the plan I have adopted the plan which was published in the Report of the Select Committee of the House of Commons as prepared by Mr. Coode, in which there are two modes stated; one by a perpendicular wall, and the other by a breakwater. At the rate at which the stone could be obtained here I don't think there would be any very great difference in the cost of the two plans when you come to the deep water. I have taken the plan which would be the most expensive; that is the one with perpendicular walls.

20,460. For the sake of the regularity of our proceedings it is desirable that you should give in detail the statement of how you propose to construct it without reference to other plans?—I can hand in a plan.

20,461. Will you describe the process, beginning with the 3,800 feet pier or breakwater?—The only mode, as regards that part which would have to be formed by deposit, would be to take out the stone in barges, and there deposit it in the water.

20,462. I thought you proposed to bring it by railway?—By railway down to the harbour, and from the harbour to take it then by barges and deposit it, so far as the bottom part of the breakwater goes.

20,463. You don't propose to use staging for the purpose?—I think that I could not conveniently get staging to the land for it unless the stones were got from the cliff above, which I consider to be doubtful. In that case I should put a staging across.

20,464. What is the greatest depth of water upon the souther pier or breakwater?—The extreme depth would be about eight fathoms.

20,465. Describe what the cross section would be in eight fathoms?—I have assumed that up to a level of 12 feet at low water spring tides the external

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slope would be 1¼ to 1, and the internal slope I have taken at the same.

20,466. In what sized blocks do you propose to obtain the materials ?—I think the stone of the district would afford blocks up to 10 tons weight, which would make a perfect breakwater.

20,467. From that level what is the next process ?—From that level I should proceed to build upon it when consolidated,—to build the walls with ashlar face-work and mason work, and filling in the interior with rubble work.

20,468. Will the walls be vertical ?—Vertical walls.

20,469. And what height from 12 feet below low-water mark ?—The rise of the spring tide is about 17 feet, and I propose to carry them about eight feet above the level of the spring tide, high water.

20,470. Have you a parapet, or merely a mass ?—As a detached breakwater I don't consider a parapet would be a necessary work.

20,471. What would be the width on the top ?—Thirty feet wide.

20,472. Is the wall to be faced stone work, or do you fill the interior with concrete blocks ?—I propose to build the wall with mason work. Ashlar stone is delivered here at about 7*d.* a foot. At the same time, it is possible concrete blocks might be found cheaper.

20,473. Do you propose to use the same stone for the rubble as for the face work ?—Yes.

20,474. At what price can you get the rubble work done here ?—The rubble work would be at a different price for the southern breakwater and the northern.

20,475. Take the southern ?—That would be delivered on the spot for the work at 4*s.* per ton.

20,476. Delivered upon the breakwater ?—Yes, I am assuming that for that the railway company would be prepared, as I have no doubt they would for so large a quantity, to carry it down for 1*s.* a ton.

20,477. What would be the cost per cubic foot of the finished work ?—I have estimated the face work of that breakwater at 2*s.* a foot.

20,478. Is it proposed to construct the western-most breakwater in the same way ?—In that case the stone is in the cliff above it. That I should propose to construct by staging, because it is brought immediately down to it. If the whole scheme were carried out after completing the first portion of the breakwater, I should make a temporary gangway across the 1,200 feet opening, and so complete the rest of the breakwater.

20,479. Do you propose to make the centre 8,000 feet breakwater of the material taken from Sand's End Ness. Would it not be more economical to get that at the southern part also in barges ?—It is possible that it might be, but there is this difficulty, that there is no convenient place existing at which the barges could lie at all tides and get it. It is rather exposed. If the whole scheme were being carried out, then as soon as a portion of that breakwater was made it might be got more cheaply from the Sand's End Ness. But assuming this smaller part only to be made, I believe it would come more cheaply from the railway.

20,480. I think you said the shelter was merely from the south-east and east ?—It would afford partial shelter to the axtent of 70 acres from the north-east.

20,481. After having constructed the southern break-water, anything towards the west would be increasing the amount of shelter, and going towards the completion of the general plan ?—It would be so.

20,482. Are you inclined to think that the plan you now submit to us is more suitable for a general national haabour than any other plan at any other spot you have heard of along this coast ?—Looking at it in an engineering point of view I am decidedly of that opinion. As a matter of policy I do not offer an opinion upon it.

20,483. Your plan specifies that the whole enclosed space would be good anchorage grounds with the exception of the Upgang Rock ?—It is so. Upon that point you will have the evidence of the nautical witnesses.

20,484. You do not hold yourself responsible for that ?—No ; except to this extent, that I have made particular inquiries about it, and all the information I have obtained goes to that ; and moreover that it is constantly used as an anchorage ground, vessels even riding out gales there.

20,485. You have no doubt that the fact is as stated in the plan ?—From all the inquiries I have made about it, not the smallest doubt.

20,486. You say at present there is no shelter between Hartlepool and Flamborough Head ?—None that I am aware of.

20,487. You do not admit that the Tees afford any shelter ?—I look upon Hartlepool and the Tees (the Tees Bay) as being one.

20,488. Do you think this harbour is necessary for local or for national purposes ?—Purely national. I am not aware of any local purpose to which it would be at all subservient.

20,489. Except to make the entrance to Whitby Port more easy with the wind at north-east ?—Yes, which I also consider to be a national object, inasmuch as it would afford facilities for vessels taking refuge in that harbour.

20,490. Have you any bar between the piers ?—Not more than two feet six inches depth of water at low water spring tides.

20,491. What is the rise of the tide here ?—It rises 13 feet in neap tides, and 17 or 18 feet in spring tides.

20,492. Inside the bar what is the depth of water ?—A great deal of the harbour is practically dry at low water.

20,493. No dredging operations could make it a good harbour ?—Certainly not ; but I believe by dredging operations it might be greatly improved, and the bar might be considerably deepened.

20,494. You would not undertake to form a harbour for vessels of 16 feet draught of water at all times of tide without very costly operations ?—Certainly not.

20,495. Looking at this as you appear to do, merely as a national harbour to prevent loss of life and property, would you not believe that a well constructed and spacious harbour at Filey would answer all purposes along this coast ?—I do not think it would. Take the case of vessels which are off the coast in gales from the south-east. No vessels which are caught to the north of Filey could make Filey at all unless they had very extended offings. Therefore the utility of Filey would be merely confined to the distance between Filey and Flamborough Head ; and therefore, Whitby from its geographical position would be accessible to more vessels than Filey. Again, Whitby is as nearly as possible centrally situated between Flamborough Head and the Tees Bay.

20,496. Do you imagine that if there were a good harbour of refuge at Filey, and one at Hartlepool, Whitby would be serviceable to any vessels ?—Yes.

20,497. You think it would still be required if there were a good harbour at Hartlepool and another good one at Filey Bay ?—I think, as regards geographical position, Whitby is better situated for a harbour than Filey.

20,498. So that, if you had the disposal of the public funds, you would rather recommend their being applied to a harbour at Whitby than to one at Filey or Hartlepool ?—Yes ; I would make the observation with regard to that, that what I am proposing here now is upon the principle of improving the existing harbours, which is clearly the view that I take. With regard to Filey it must be an entire work. There is no part of the work at Filey that would be available unless the whole were completed ; that involves the question of a large outlay.

20,499. Is it not a fact that some hundreds of vessels are often found under the Flamborough Head,

the great proportion of which might take advantage of Filey ?—Of course.

20,500. If they are obliged to go into a harbour, would it not often take them much out of the course to come to Whitby ?—Those vessels which are at Flamborough Head it would.

20,501. Have you of late years had many wrecks off Whitby ?—Upon that you will have the information of witnesses who will give the exact facts. The fact is, that there have been ; but you will get the exact particulars from other witnesses.

20,502. Because in advocating this particular locality for a harbour of refuge, I suppose you base it upon some knowledge of these facts ?—Yes ; but I do not think it always is to be taken as a fact that the occurrence of a wreck is an indication that the harbour ought to be upon the spot where it takes place, because you will have evidence here as to vessels which have been off Whitby itself, and have been known to be wrecked before they were able to reach any of the northern ports, and which unquestionably would have been saved had there been a harbour here. That is a point on which you will have evidence as to the fact.

20,503. That would be an argument of general application, would it not ?—Yes.

20,504. So that, although it may be some guide to know where wrecks have happened, it is not a guide to be always fully relied upon ?—Clearly not.

20,505. What time would it take to form the southern portion of your plan ?—I think the southern portion might be formed in about three or four years. It would depend entirely upon the provision of the funds.

20,506. Supposing the funds were given with a liberal hand ?—I think I could undertake to do it in four years.

20,507. How long do you estimate it would take to complete the whole scheme ?—I should not like to say that the whole scheme could be done in less than, perhaps, seven or eight years ; although there are great facilities in procuring the stone here, which might be done to almost any extent.

20,508. What proportion does the southern breakwater bear to the whole scheme in mass ?—In mass it would not be more than one fifth part, hardly so much.

20,509. If you took three years for that, would it not probably take rather more than the time you say for the whole ?—I think the facilities for getting stone for the whole mass of the work are so much greater than they would be for that.

20,510. In point of fact, if you had the whole funds you might begin at both ends ?—At both ends.

20,511. (*Mr. Lindsay.*) By the plan which you have handed up, I find that, between the Whitby Rock and the Upgang Rock, there is a considerable space of apparently good anchorage ground. Have you ever considered a much more limited plan of a harbour of refuge for Whitby, without having any view to its extension ; that is to say, by running out piers, one from Whitby Rock, turning more in shore than the present harbour, and another out from the Upgang Rock ?—I have.

20,512. What do you think of a harbour, such as that, which would give close upon 300 acres of three fathoms and upwards ?—I think if called upon, I should rather spend the money that it would cost to make a breakwater running out from the Upgang Rock in extending the central breakwater. I think myself, the times in which the harbour would be useful would be in gales coming from the south-east and east. If the wind got round to north-east vessels would go to sea. It is hardly with such a wind you so much want protection. At the same time it is quite possible that a harbour of 400 acres might be made here by carrying out a breakwater from the Upgang Rock.

20,513. I ask your opinion, because you said you thought the improvement of the existing harbour would do more to save life and property than the construction of any one great harbour on almost any part of the east-coast ?—At any part of the east coast.

20,514. Well, with that object in view, I should have liked if you had, while handing in the large plan, at the same time given us an estimate for a smaller harbour, such as that which I have pointed out, because I am afraid Government will not be disposed to make many such harbours as you suggest upon this coast ?—I am not recommending that the Government should carry out the entire scheme.

20,515. Have you a separate estimate of the cost of the different breakwaters ? Have you an estimate of the cost of this pier, which runs from the Whitby Rock, 3,200 feet in length ?—Yes.

20,516. What would the cost of it be ?—300,000*l.*

20,517. Then a pier, such as I have suggested, run out from the Upgang Rock, would that be about the same cost ?—I think about the same cost.

20,518. You said the pier from Whitby Rock would cost about 308,000*l.* ?—306,000*l.*

20,519. Then for somewhere about 606,000*l.* you could get a harbour full 300 acres of three fathoms and upwards ?—Yes ; but I do not know that I should recommend that plan. I should not recommend that plan. The facts are, I dare say, as you have sketched them, and in all probability the cost would be as you state.

20,520. The principle which you laid down was, that you thought the improvement of the existing harbours along this coast, would do more to save life and property than the construction of any one great harbour on any particular site ?—That is my opinion.

20,521. You do not mean to tell us that your great plan would be an improvement of an existing harbour ?—Clearly not.

20,522. Do you go upon the principle that the great plan is an improvement of an existing harbur ?—Clearly not.

20,523. You make that as a national harbour ?—As a national harbour. I think I cannot have explained myself sufficiently, but my advocacy before you is, for the purposes of saving life and property, distinctly confined to the construction of the breakwater upon the Whitby Rock.

20,524. From Whitby Rock ?—Yes.

20,525. What objection would you have to running out another breakwater from the Upgang Rock, and there making a small harbour at a cost of 606,000*l.* ?—There is no doubt you might do it, but I do not think you would be justified in laying out money in that particular way.

20,526. Why not ?—I think if you had money to be laid out, it would be better expended in extending the breakwater more in the direction of the existing one.

20,527. But would a breakwater extended more in the direction of the great breakwater of 8,000 feet, as completely shelter the southernmost anchorage ground as a pier running out from the Upgang Rock would do ?—No, it would not ; but you must look, I think, for the case for which you require protection for life and property. Now, that would be a protection almost entirely in the cases of gales of wind from the north ; and I think that the great bulk of vessels would with a northerly wind run for Flamborough Head.

20,528. Would a limited harbour, such as that which I have shadowed forth, not tend more to save life and property on a limited scale, and to the extent of the anchorage, than would the large plan ?—The large plan is one which I merely lay before you to show what, as a great national work, might be done. But if you come to the question of saving life and property, I do not advocate it for that purpose, but as a great national harbour. I do not think that running a pier out and enclosing the bay from the north wind would be an outlay of money solely for the purpose of saving life and property, which I think would be justified.

20,529. Tell me why the small harbour would not

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save life and property to the extent of the anchorage as much as yours?—It would in the case of gales from the north.

20,530. But by the limited scale you can enclose the harbour from all winds as much as by a larger one?—Yes.

20,531. You cannot protect it more by the larger work unless you complete that plan?—You can make a harbour in there which can be sheltered from all winds.

20,532. By completing the small plan, cannot you give more shelter in all winds than you can do by expending the same money on a part of the larger plan?—I hardly think that you could. I think you would then protect a large amount of anchorage direct from the wind from the north-east by making that breakwater. If it were a mere question of a limited expansion, of course I should limit the area of that 1,200 feet for the opening.

20,533. If you limited the 1,200 feet entrance in the large plan, you could also limit the entrance of the smaller plan?—I am proposing to limit it in the smaller plan.

20,534. If you limit it in the small plan, you would get still more shelter than in the larger one?—So far as relates to breakwater walls, no doubt.

20,535. I am anxious to learn from your experience what your opinion would be as to the construction of a small harbour at this place; what your objections, as an engineer, would be to the construction of a smaller harbour altogether at this place, setting aside for a moment the very large plan, which would cost in round numbers two millions sterling? I should like to know your objections to a smaller harbour, such as that which I have suggested?—If you ask me in an engineering point of view, I do not see any difficulty in your making the smaller harbour. If you are going to do it, Upgang Rock is placed there by nature to assist you in doing it. But I am exceedingly doubtful whether you would find that it would be a matter of necessity to do it, looking to the question of saving life and property.

20,536. With your knowledge of the case, would the smaller harbour run out from the Upgang Rock be in any way liable to silt up? Are there any difficulties connected with it which would not apply to the larger harbour?—No, I do not think there would. I should leave ample room for the tide to pass through it.

20,537. In an engineering point of view, you see no objection to the construction of a harbour at this place in the way I have described?—No doubt a harbour in that way might be constructed.

20,538. It is more in a nautical point of view that you think objections may be raised? No objections in an engineering point of view?—No; I think it is all a question of money.

20,539. Is the plan laid on the table, your own design?—It is. But although I have prepared these plans, the idea as I have transferred it to paper is one of long standing with those who employ me. Therefore, though I am the medium of bringing it before you, I do not claim it to be an original design of my own, I am merely the medium of conveying it to you.

20,540. You said, I think, that the present harbour might be greatly improved by dredging?—I do not think there is any efficient mode of improving it except by dredging.

20,541. Are the piers sufficiently deeply founded to admit of dredging between them?—They are not; but I should have no hesitation in undertaking to underset the piers at the point, so as to enable the deepening to be effected.

20,542. Do you know the greatest draught of water the harbour will admit?—The depth at the bar is only two feet six inches. If you take the greatest rise of the tide at 18 feet, you get it at 20 feet 6 inches.

20,543. Once within the piers, what space is there for ships? For what number of vessels are there places?—That I can hardly tell you.

20,544. Can you give a rough estimate of the expense of deepening the passage so as to get eight feet of water over the bar at low water and deepening the harbour six feet within?—I cannot.

20,545. Would it be necessary to remove the rock? I think that the stratum there is alum shale, which I think might be lifted by a good dredging machine.

20,546. Alum shale is easily lifted, is it not?—Yes, assuming that to be alum shale.

20,547. All the Whitby Rock is alum shale, I believe?—It is.

20,548. Does the river Esk bring down much deposit?—Not in the ordinary state, and even in a state of flood not so much as other rivers. It passes through a great deal of uncultivated land. I have looked to that point, and I believe that the tide which sets strongly past the mouth of the present piers would carry anything that might be deposited there out to the south.

20,549. That tide sets to the southward?—Yes.

20,550. Are the freshets very heavy?—At times they are exceedingly.

20,551. Do you know how far up the tide flows?—I think within two miles.

20,552. Is that a natural termination of the tide or an artificial one?—It is an artificial one.

20,553. Do you know how much farther it would go?—No; there is a mill-dam which stops the flow of the tide.

20,554. Do you consider it a good measure for the improvement of the harbour to stop the upward flow of the tide?—No, I should not.

20,555. Do you know the slope of the bed of the river?—I have had a section, but I do not recollect.

20,556. Is it very rapid?—It is rapid.

20,557. More rapid probably than the Tyne or the Wear?—Yes.

20,558. Is there any bar of sand or silt formed outside the pier heads?—Very little, it does not lie much upon the rock.

20,559. The rock is swept clean at the time of the freshets, of course?—Yes.

20,560. (*Capt. Sulivan.*) Do you know if the tide flows above the mill-dam?—It is stopped at the mill-dam.

20,561. It is used as a mill-dam by the back water being kept up?—It is.

20,562. Do you know what distance above that it flowed before the mill-dam was made?—I cannot tell you.

20,563. (*Capt. Vetch.*) The position of Whitby is rather salient, and the track of vessels between Flamborough Head and all the northern ports seems close to Whitby. Do you consider a salient point of the coast the best for a harbour of refuge?—I have given my opinion that in this particular case it is desirable to improve the existing harbours, but I do not think there is any point at which you can place a harbour that would be available in all times. I think that for some purposes a salient point, but for others I should say the bight of a bay, is the best.

20,564. I presume this harbour which you have designed is entirely intended to save the lives and property of the passing trade?—I wished to separate the large plan as an entire plan (taking that as a harbour for some national purpose) from the smaller design of the breakwater, which I look upon as one for the purpose of saving life and property.

20,565. By national purposes, what do you mean?—Some objects which might be dictated by policy, of which I am no judge.

20,566. To hold a fleet of men-of-war you mean?—That would be one of the objects.

20,567. The chief object of the Commissioners is to establish a harbour or harbours for the saving of life and property. In that view of the case, I presume you would consider the harbour contained between the south-east breakwater, proposed by you, and the Upgang Rock would be a very sufficient area?—Abundant for that purpose.

20,568. I find within that distance that it is about a mile in length deep water ?—Yes.

20,569. And about 4,500 feet in width which would contain about 600 acres altogether ?—I think hardly 600 acres south of the Upgang Rock. I do not think you would find that it would exceed 400 acres of really available space.

20,570. But that would be quite sufficient for saving life and property from vessels passing such a port as this ?—I think it would.

20,571. Have you estimated the amount which it would cost to construct such a harbour as this ?—No; I have not.

20,572. The first part of the breakwater near the shore is chiefly shallow water ?—Yes; that is from two and a half to about 10 feet.

20,573. That is included in the 2,600 feet ?—Yes.

20,574. That would not be costly; there is another piece which is in 33 feet soundings ?—Yes.

20,575. That would be more costly; what would be the total cost of the pier ?—300,000*l.*

20,576. Is it to be a breakwater with a parapet ?—I propose that it should have a platform but no parapet.

20,577. It would be simply a breakwater ?—Purely a breakwater.

20,578. The bottom is good anchorage all over it, except just at the Upgang Rock ?—It is.

20,579. Are you aware that many vessels seek shelter in the bay ?—Great numbers.

20,580. There is some amount of shelter for small vessels at present ?—Yes; vessels constantly run under the shelter of Whitby Rock, not in the bay.

20,581. You would not recommend the harbour as shown upon this plan (*referring to the large plan*) ?—No, I don't at all. I have put it more as a plan showing you what might be done.

20,582. (*Mr. Coode.*) In your statement you said there were 1,000 acres having two fathoms water, and in your reply to Mr. Lindsay you said 1,000 acres of two and a half fathoms ?—If I said two fathoms it ought to be two and a half.

20,583. I see in this design which you have put in, there are only two soundings along the 8,000 feet breakwater; for about two thirds of the length there are no soundings; can you supply additional soundings for the outer breakwater ?—I have received instructions upon that point from the committee, and was to have had these additional soundings taken; but unfortunately, in consequence of the weather, we have not been able to obtain them; I believe I may state that in no part along there does the depth of water exceed eight fathoms.

20,584. You have tried it generally along the line of the work ?—There were some soundings taken, but I have not them recorded in a manner to put them down upon the plan; I propose to sound, as my instructions are to obtain additional soundings not only there, but also immediately round the Upgang Rock, and likewise to take some more soundings closer in shore, and to add them to the chart within a fortnight's time.

20,585. So far as your present knowledge goes, you believe the depth does not exceed eight fathoms ?—Yes.

20,586. Were the soundings in the chart taken under you superintendence ?—Not the whole of them. There are a good many of them taken near the Whitby Rock, which were taken by Mr. Comry; I had several checked, and finding that his soundings and my own agreed, I have adopted them. A great many, however, half of those on the plans, have been taken by my own assistant.

20,587. Are your soundings referred to the same datum as Mr. Comry's ?—To the same datum.

20,588. You said there was a good bed of stone at Sands' End Ness; do you mean one bed or a series ?—It may be stated to be one bed.

20,589. What is the thickness of the stone, such as is fit for harbour work ?—You may get it up to 10 tons in weight without difficulty.

20,590. What is the thickness of the stone ?—Up to five and six feet; four feet, five feet, and six feet.

20,591. Is there only that one bed of stone ?—It is 26 feet in thickness, but the thickness of the beds of stone in the mass will not exceed about six feet.

20,592. I want to know the total thickness of the beds united ?—20 to 30 feet.

20,593. Overlaid by how much soft matter ?—Not more than five or six feet.

20,594. Do you think that the whole of that is fit for harbour purposes ?—Fit for the purposes of the substratum of a breakwater.

20,595. Have you ever seen any of this stone exposed to the action of the sea ?—I can't tell you that that exact bed is exposed to the action of the sea; I mentioned also that underlying that, is a bed of stone which I can't describe; in character it is as hard as flint.

20,596. Is that met with immediately under the 25 feet ?—No; there is a bed of shale intervening, which would have to be excavated for the purpose of getting at it.

20,597. Of what thickness ?—Not above four feet.

20,598. What kind of construction would the "hearting" be which is above the rubble base and below low water; I don't know whether your explanation referred to all throughout the whole thickness, or simply to the face wall ?—The mason wall I calculated to be solid ashler, the interior between the two face walls I intend to be rubble.

20,599. Would that rubble be tipped in ?—Yes.

20,600. What price per foot do you put for the ashlar below low water ?—I have taken an average of 2*s.* per foot for the whole of it. If you take the ordinary case in the shallower part, it will cost 1*s.* 6*d.* per foot, which would be equivalent to 3*s.* per foot, below low water, so I have averaged it all at 2*s.*

20,601. Would you adopt the same kind of construction throughout ?—I do not know that I should. I think in constructing the pier a great deal might depend upon the cost of the stone. I think it not unlikely that the stone from Sand's End Ness might be got a good deal cheaper than I calculated. If that were so it might materially vary the construction of the breakwater. All that I have considered was to get an estimate of the cost.

20,602. What kind of construction have you calculated your estimate upon ?—In my estimate I have calculated that the bottom of the pier was built up to within a level of 12 or 14 feet from low water, and then perpendicular piers were placed upon it; but I am not at all certain that, if on experience it was found that, instead of the cost of the stone being 3*s.* per ton, it could be set into the work for 2*s.*, I might not vary it.

20,603. You might adopt rough rubble throughout ?—I think that is quite likely.

20,604. What time have you allowed yourself for the construction of the breakwater 8,000 feet long ?—I think that might be done in seven or eight years. I do not know that there is any limit to the quantity of stone which might be worked there. The face of the quarry is exposed by the working of the alum works to a great extent, and large quantities of the stone might be worked.

20,605. Did I understand that you had decided to adopt a staging throughout, or that you had some doubt about constructing the large work by means of staging ?—With regard to the larger work, the stone comes so conveniently in that I have no doubt that would be the better plan. With regard to the southern breakwater, what I stated was, that in making the northern breakwater, you would have found shelter for the craft, and it was possible that could be formed by conveying stone from that point in boats.

20,606. Have you allowed a sufficient amount for boating it in the estimate that you have made ?—I think so. I think it is principally a question of plant. As to the cost per ton and per foot for this work, I am so far confirmed in my views of it by the contractor, who is now executing works in docks for me,

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and who has had extensive experience, and had Government works to carry out in the Channel Islands, I think at Jersey, he said, he would undertake without hesitation to execute the work at the price at which I have put it.

20,607. You think that, in an engineering point of view, this would be more adapted for a national harbour than any other; will you state why?—I think that it offers a larger area of deep water; it is unobjectionable as to its capability of entrance at all times of tide and in all winds, and on these grounds I think it is superior to any plan that I have seen.

20,608. What is the nature of the holding ground?—The inquiries which I have made state it to be clay. You will have the evidence of pilots upon it.

20,609. Can you give us the rate of the flood tide you spoke of as setting strongly past the harbour?—I cannot, I have been out in a boat, and I should take it to be about 2½ to 3 knots an hour.

20,610. Is that at ordinary tides or springs?—I should think perhaps that that would be at spring tide. On that point you will have the evidence of the harbour-master.

(*Chairman.*) Where did this letter come from?

(*Secretary.*) It came by post.

(*Chairman.*) I see it is dated from Whitby. Be good enough to read it, and the memorial which accompanies it.

The Secretary here read the letter referred to, which was addressed to the Royal Commissioners and signed "George J. Watson Forsyth, Filey Bay," and which enclosed the petition of fishermen, masters, and mariners of the town of Robin Hood Bay, praying for the establishment of a harbour of refuge. The Secretary also read the memorial.

Mr. Gideon Smales examined.

Mr. Gideon Smales.

20,611. (*Chairman.*) Do you reside at Whitby?—I do.

20,612. You are a shipowner and chairman of the committee which has taken charge of this business?—A committee was appointed at a public meeting of the town, and I was appointed the chairman of that committee. I have been a shipowner for nearly 40 years, residing in this town, and am at present the owner of 26 ships, the greater part of which are employed in the coal trade. I have frequently turned my attention to the necessity of a harbour of refuge on the coast, as being a shipowner and having witnessed many wrecks; and, after carefully considering the evidence which was laid before the House of Commons and published in the last report of the Select Committee, it seems to me, from my individual experience and opinion, that there is not on this coast a more suitable place for a general harbour of refuge than Whitby; first, on account of its geographical position, being a promontory, with bold and high land. It would consequently be seen at all times; and it is not subject to the fogs which constantly occur in the bays on the coast. It would as well be a place of easy access for loaded ships having to bear up. If the large plan were adopted, no doubt from the depth of water, this would be a place more suitable than any which could be found on the coast. But even if the smaller scheme be adopted, it would afford very good shelter for a considerable number of vessels. Vessels frequently ride under Whitby Rock, and on extreme occasions have been known to ride out gales, not under Whitby rock, but in the anchorage ground, between the Upgang Rock and the proposed breakwater. No doubt the many fleets of large vessels which we see passing down here, would take advantage of the shelter in our bay, instead of running down into Hartlepool Bay, and other northern ports. We consider that we see more ships passing this port than, perhaps, any other on the coast, both light and loaded. Loaded ships almost always when they come out of their ports reach this place before the wind fouls; and both light and loaded ships invariably haul in for the land off Whitby. Consequently, we see probably more ships passing here than any port on the coast. We think, consequently, it is the most eligible situation for a place of shelter. Independently of that, many of the disabled ships which bear up for Hartlepool or the northern ports are first seen off here; and no doubt, if there were a harbour of refuge here, they would come in, instead of going further north. As a large shipowner, when I see these great fleets come down with south-east winds, I can almost always calculate that serious mischief must occur; for we know invariably that when fleets do run down into Hartlepool Bay, their damage is very considerable; and many times I have been most anxious for my own ships, on account of the consequences which must ensue. With respect to loaded ships bearing up, I can only say, my opinion of the northern ports is so indifferent, that I give one general order to all my captains never to bear up, with a loaded vessel, for any of them. I should consider the risk was so great. In nine cases out of ten almost the vessels would be lost. If we had an efficient harbour of refuge off Whitby these evils would be remedied, and no doubt there would be ample opportunity for vessels getting shelter there. I have very rarely had a case of a loaded ship taking refuge in any of the northern ports. When the ships have got out, I have had many vessels which were caught in severe gales from the east and south-east off the coast; but very seldom did any of them take refuge in any one of the northern ports. The only ship that ever I lost north of Whitby was in taking Hartlepool harbour. She was a light ship. I never lost a loaded ship north of Whitby. I consider that the loss of property on the coast is decidedly more in light ships than in loaded ones. Filey has been mentioned as being a likely place to form a shelter. I went over to Filey for the purpose of refreshing my memory of the place only very lately, and I certainly—though I have many ships often beating about Flamborough Head that would be very glad to take shelter—cannot say so much as that Filey Bay could be made available for purposes of that kind. The space with any depth of water seemed to be so very small, that I could not say there was sufficient room for any number of vessels to avail themselves of it. Besides, the difficulty of getting in with many winds is very great indeed. Here we have a natural advantage, our rock is formed by nature for a shelter from the very winds that we want most shelter from on this coast, whereas at Filey their natural shelter is on the opposite side, entirely from the north wind. If this breakwater were made no doubt the harbour of Whitby would be very much improved; independently of the roadstead for vessels riding, it is a harbour of refuge now to a very considerable extent, and would be very much more so if this breakwater were made. The ships that have entered the port of Whitby for refuge alone in the years 1855, 1856, and 1857 were, in 1855, 655; in 1856, 611; and in 1857, 585. The number of vessels light and loaded that have entered the port during the same years were, in 1855, 1,758; in 1856, 1,755; and in 1857, 1,877. I likewise have an account of vessels which have been wrecked in the immediate neighbourhood, and which sum up to a great many, with their names. These papers I will hand in. (*The Returns in question were here handed in.*) The port of Whitby itself I trust deserves some consideration from the Royal Commissioners, inasmuch as it possesses upwards of 70,000 tons of shipping belonging to it; we trust it will therefore claim your consideration. At present ships of considerable draught of water can come into the harbour; only about three weeks ago a ship of my own came in, loaded with 450 loads of timber from America, and drawing 14½ feet or rather more; she came in in one tide, and lay above the bridge in safety. A short time before another ship which drew 15½ feet of water came in with perfect safety. I agree that the harbour is capable of great

improvement; and we think that with a breakwater as proposed to be erected on the rock, and with an improved channel, it would become a very valuable harbour of refuge, even when the wind got as far as north-east, and from that to north, the beach would be so very small. In fact, I have no hesitation in saying it would be almost as good as Scarborough harbour is. If the works were carried out the beach would become so very small that there would be no fear of any loss of life or property. The object of these remarks is purely to facilitate the trade of the coast; I do not think the trade of the town would benefit at all, for, unfortunately, we have not a very extensive trade. But my principle desire is save life and property.

20,613. Have you any more remarks?—I think not.

20,614. Did you ever follow the sea?—I never did.

20,615. (*Mr. Lindsay.*) I should like to have your opinion on two or three points. Considering the number of vessels employed in the trade of the coast, and say that it rested between the construction of one great harbour of refuge and the improvement of the existing harbours (by which I allude to the harbours in the bight of Tees Bay, the improvement of the harbour of the Tees, of the Wear, and of the Tyne, if it were possible, so as to admit the usual description of vessels trading along the coast at all times of the tide), do you think that one great harbour, or the improvement of the existing harbours, would do more to save life and property?—Decidedly the improvement of the existing harbours.

20,616. And if Whitby was not one of the existing harbours to be improved, would you still think that was so?—I certainly should contend that Whitby has as great a claim as any other harbour on the coast.

20,617. But say it was confined, because I am afraid the House of Commons will limit the proposed means—say it was confined to the improvement of the harbours I have named and to the extent which I have named, or to the construction of one great harbour, what then would be your opinion? Should you prefer one great harbour, or the improvement of the harbours which I have named?—Of course one great harbour would depend upon the position of that harbour.

20,618. Whether do you think one great harbour, such as that which Mr. Harrison has laid before us this day, and which would contain a very large number of vessels; whether do you think the expenditure of 1,750,000*l.* here in the construction of such a harbour, or the distribution of that sum over the existing harbours would do more to save life and property?—I think, so far as some of the harbours are concerned, that they have means of improving themselves, which we have not here. I consider that from the funds which they have the Tyne, the Wear, and also Hartlepool are in a very different position from what we are, inasmuch as the funds which the trustees of the piers here have are very small indeed, consequently we can make no great improvements; but these other harbours are, I contend, in a position to make great improvements, therefore they have not so great a claim on the government for an advance of money as we have.

20,619. Putting aside the means which they have at their disposal, I invite your opinion as one largely engaged in the trade. I should like to have your opinion as to the construction of one great harbour, or the improvement of the existing ones; not considering the funds which the local harbours have at their disposal?—I should prefer the distributing of the money amongst many harbours.

20,620. You do?—Yes, I do.

20,621. In recommending Whitby as the site for a harbour of refuge, would you tell me why you prefer it to Filey as a site?—So far as light ships are concerned, I think Filey would be of very little use. The light ships come round Flamborough Head. We generally find when any large fleets are coming along the coast, that they get down on this side of Flamborough Head before the weather gets very bad. Indeed, they go out of the ports in the south with favourable weather, and generally reach something like Flamborough Head before the weather gets bad. When they get there and a gale comes on, Filey would be of no use for those ships taking shelter. But if we had a shelter here a great many would take it and not run to Hartlepool, Sunderland, and the Tyne.

20,622. Looking to the loaded ships?—There is no question many vessels are caught off Flamborough Head and Speeton Cliffs, contending with adverse winds. Of these, some would probably take Filey, but I think very few, because I do not think there is sufficient accommodation for any number of ships to go into the place.

20,623. But presuming we could for the same cost give the same extent of water, the same area of water at Filey as you could do at Whitby, tell me now whether you think under such circumstances as these Filey would do more to save life and property in loaded ships than Whitby?—No, I do not.

20,624. Why so?—I think that Whitby as a promontory is more likely to be available for ships running to. There is a great number of small vessels that would take Filey; but I think our bay would become quite as secure and would be more available for them running to than Filey.

20,625. But I think you said that loaded ships are very often caught with gales of wind off Flamborough Head; that they often have gales from the south. Would Filey not be a point to which they could run in a shorter time than to Whitby?—They would certainly reach it in a shorter time, but when vessels beat about the head it is generally in winds from the south-south-west and south-south-east. If the wind was to get far from the east they would not remain. I think they would stand out to sea, take the chance of its not getting more easterly, and not take Filey.

20,626. You know a harbour of refuge is meant mainly for vessels to take when in distress or when caught on a lee shore. I am speaking of vessels caught in such a gale as that to which reference has been made, the gale of the 4th of January 1857, when the gale came from the south-east going to east-north-east; when unfortunately the vessels could not weather off this coast. Do you think that then Whitby as a site would have tended more to save life and property than Filey Bay?—I do indeed. But from my remembrance of that gale I think the wind was not farther than east-south-east. I think the worst of the weather was from east-south-east.

20,627. I say from south-east to east-north-east because it was given in evidence by various shipmasters that they could not weather away this particular land; and hence, there were a great many wrecks between Flamborough Head and Whitby, and all the way to Hartlepool. Speaking of such a gale when they could not weather the coast either to the north or south, why do you think Whitby would be the means of saving more lives than Filey?—They could not get round. Of course, if there were a harbour here they would take it.

20,628. Therefore, for loaded ships, do I understand you to say there is not much difference in site between Whitby and Filey?—Under such circumstances as these Filey would not save as many ships as Whitby. I think Whitby is decidedly preferable to Filey.

20,629. How do you think that Whitby would be the means of saving more ships than a harbour at Filey?—Whatever rocks we have here are formed by nature for making smooth water, whereas at Filey everything is artificial, and from the plan of the breakwater which I have seen proposed to be erected there, there is no shelter whatever from the east-south-east and south-east until you get to a considerable distance in shore, and the danger would be to vessels coming round that point. Where they really could get into a place of safety would be only to a small extent. Looking at the plan showing the depths of water, it appears to me that the area where there is much depth of water is very small, and before they could get round with the wind from east-south-east and get shelter, there must be serious damage; it would be nearly as bad as running into one of the northern coal ports.

WHITBY.

Mr. Gideon Smales.

22 Oct. 1858.

Mr. Lindsay.

20,630. You object rather to the limited extent of the anchorage which could be obtained there than to the position ?—As well as to the position, I do not think the position is a proper one.

20,631. Why do you think that as a position Whitby would save more loaded ships than Filey ?—I think Filey is too near to Bridlington Bay ; ships would always go to that Bay. It is not an unusual case that vessels are caught with heavy gales from the north or north-east and take Bridlington Bay instead of running across the deeps, but I do not think if a harbour were made at Filey they would even take that place ; they would decidedly give the preference to Bridlington Bay.

20,632. Is it not the case that when ships weather Flamborough Head to the southward they can reach the Humber ?—But they do not do that unless the wind is fair from the eastward.

20,633. But if loaded ships can weather Flamborough Head they can almost invariably reach the Humber, can they not ?—I should doubt that. We have many instances of loaded ships taking refuge in Bridlington Bay in north-easterly gales.

20,634. I am speaking now of vessels which cannot weather away Flamborough Head in easterly gales and caught to the northward of Flamborough Head, and I want you to tell me why you think that Whitby would be the means of saving more of such ships than Filey ?—I say that ships are more generally caught off Whitby than there. The ships that would be near to Flamborough Head are generally ships that have been beating about there with the wind from the south for some time. The loaded ships that are generally caught after leaving the loading ports are, I think, more in our position than at the Head. There would be a greater number of loaded ships caught off Whitby than off the Head.

20,635. You are in favour of Whitby because, in your opinion, the loaded ships are oftener caught in gales of wind further north than Flamborough ?—I am.

20,636. And that being the case, they could easier reach Whitby during an easterly gale than Filey ?—Yes ; but upon that you will have an opportunity of questioning several nautical gentlemen, who, no doubt, will be better able to explain the point than I can.

20,637. Say that only one great harbour was to be constructed along the whole range of coast from Flamborough Head to the Farn Islands, and that it rested between Filey as a position and Hartlepool Bay as a position, which would you prefer as a position putting all other things out of sight ?—I should decidedly prefer Hartlepool, that is, provided works were carried out so as to make it a place of safety.

20,638. If it rested between Whitby and Hartlepool ?—Probably you may think I am giving an interested opinion, but I have already expressed my opinion to be in favour of a promontory, being a salient point I do think is the best position. I am not an advocate for ships running to leeward in a bight, I dread it exceedingly ; I have to a great extent ordered my ships not to do it. I should prefer, if it is possible, and as they are good ships, that they should go to sea, rather go to the Firth of Forth, than take one of these harbours.

20,639. Say it rested between Redcar as a position, on the one hand, and Hartlepool on the other, and presuming that a harbour equal in extent could be obtained for the same cost as it could be at Hartlepool, which of those sites should you prefer ?—I think the ships would more generally take Hartlepool on account of its being a place to which many of them are bound, and a place of great trade. For these reasons naturally a great number of ships would go there in preference to Redcar, but as to the capabilities of Redcar I cannot speak ; I do not know anything of them.

20,640. I think you said you lost a ship in Hartlepool Bay ?—It was in taking Hartlepool Harbour in a very heavy gale from east-south-east ; she was struck by a sea in running over the bar, and thrown behind the pier.

20,641. Old Hartlepool or West Hartlepool ?—West Hartlepool. It was a very heavy gale of wind.

20,642. You say that within the last three years, close upon 2,000 vessels have came into Whitby for refuge ?—Yes, the returns are taken from the Custom House.

20,643. What description of vessels ? — Various descriptions of vessels.

20,644. The vessels that are going along the coast; loaded vessels ?—Not so many as light. Frequently with gales we have a considerable number of vessels, holding as many as 15 and 16 keels of coals, take shelter here.

20,645. What is the largest vessel that can find shelter in Whitby at high spring tides in a gale of wind ?—As it is, I should not think that, in a very heavy gale of wind, a ship drawing more than from 14 to 15 feet of water could take Whitby Harbour.

20,646. Take the same amount of money which Mr. Harrison has named as the cost of the large harbour here, and which would be in round numbers two millions sterling, if instead of spending it all on this one site, there were about 500,000*l.* or 600,000*l.* to be spent here to make a limited harbour such as I have described to Mr. Harrison, giving about 300 acres of three fathoms and upwards, and if a similar harbour could be made at Filey for a somewhat similar sum, making in all 1,200,000*l.*, and if the remaining 800,000*l.* was appropriated amongst the harbours in the bight of the bay, the Tees, the Tyne, and the Wear, on the condition that the parties interested in those harbours should subscribe a given sum to improve and deepen them, so as to admit vessels at all times of tide, do you think the distribution of the public money in such a manner as that would do more to save life and property than the expenditure of two millions upon the plan which Mr. Harrison has laid before us ?—I have already told you that I approve of the distribution of the money amongst the harbours, and that I would recommend it.

20,647. You think that the expenditure of the public money in that way would do more to save life and property than the outlay of two millions of public money here at Whitby on one large harbour ?—I do, decidedly.

20,648. (*Capt. Washington.*) Would it be an advantage to the trade of the port to dredge the present harbour to a depth of eight feet over the bar ?—Yes ; we have many small vessels wrecked at the entrance of the harbour, not having sufficient depth to come in.

20,649. Are there any funds at the disposal of the Harbour Commissioners for such a purpose ?—You will have an opportunity of examining one of the trustees of the piers on that subject.

20,650. Don't you know in round numbers ?—I think 3,000*l.* or 4,000*l.* a year.

20,651. It would be a great benefit to you as a shipowner to have the present harbour made to that depth ?—I am a great advocate for the harbour being improved. I think the number of ships trading to the place would be very much increased if the entrance to the harbour was improved.

20,652. It appears there is no great engineering difficulty ?—I am not aware of any.

20,653. Simple dredging ? — In my opinion the channel decidedly wants directing as well. We have no works to direct the channel ; it is so circuitous that the power of the water running out is lost by the many circuits which it takes in the habour and the water, if properly directed, would, I think, take out any accumulation of sand that does come in.

20,654. I understood you to say that there were 70,000 tons of shipping belonging to the port of Whitby ?—Registered in the port.

20,655. At present vessels of 14 and 15 feet draught of water can come in ?—Yes, I had a vessel of that draught come in within the last month, and it passed through the bridge in one tide. There are upwards of 10,000 tons of shipping belonging to the port which are not registered at it.

20,656. How is that?—Many owners prefer registering from the port of London.

20,657. Ten thousand tons belonging to the port registered elsewhere?—Yes.

20,658. I think you said you could not give an opinion whether the Harbour Commissioners could contribute towards the improvements?—They would be very glad, I should think, so far as their means go—very glad.

20,659. Do they not receive some funds from passing vessels?—I believe the whole, or nearly the whole, of the funds is derived from a passing toll—a toll levied on coals shipped in the Tyne and the Wear.

20,660. Will that source of revenue continue?—The Act of Parliament is perpetual.

20,661. (*Capt. Sulivan.*) You are aware that at the Tyne they are endeavouring to get 15 feet of water by the erection of piers?—I am.

20,662. Will that, if successful give a valuable and secure harbour of refuge on the northern coast?—There is no doubt a large number of vessels would run there with more security with such an improvement. Accidents in the Tyne are very numerous now, owing to the critical navigation in entering the place.

20,663. You said, in answer to one question, that you would prefer Hartlepool to Redcar, because so many vessels would run there being bound to that port. But supposing the harbour to be built for the refuge of passing vessels for all ports, not to the trade of a particular port, would you still prefer Hartlepool to Redcar as a site, putting on one side the trade to Hartlepool, and looking to the best place for a vessel in distress, embayed with an easterly gale, to run to with safety,—a harbour that she could most safely enter and find refuge in?—I explained before that I was not acquainted with the nature of the conveniences which could be made at Redcar.

20,664. Putting on one side the engineering question, and supposing that at both places the same accommodation could be obtained at the same price, and considering it merely as a site?—I do not see that there would be much difference in that respect, the land round both places is alike. Probably the land about Hartlepool is higher than it is about Redcar. I do not think there would be much difference in that respect. I do not remember at the moment whether there is a great deal of difference in the line of embayment between Redcar and Hartlepool Heugh, therefore there would be no objection in that way.

20,665. Then the sites being so equal in that respect, would you be inclined to say that whichever place could get most accommodation, and the deepest water in the harbour would be the best site for a refuge?—I think a nautical man is more fit to give an answer to that question, inasmuch as I have no doubt it would be a difficult thing to get captains running to the old ports to take Redcar. I think, of the two places, they would go to Hartlepool not Redcar.

20,666. I ask which would be the best place for the construction of a harbour, setting aside the trade of Hartlepool?—I should decidedly say Hartlepool.

20,667. Can you give me any idea how many vessels would at one time require refuge in a gale?—I think it a very rare circumstance that more than 30 or 40 loaded vessels would require shelter at one time. I should more generally say about 30 sail of ships.

20,668. We have heard of some 60, 70, or 80 vessels being wrecked in the depth of the bight at once?—I never heard of so many as that.

20,669. If a harbour of refuge would take in good shelter from every wind 200 of the largest colliers that pass this coast, do you think that would meet the wants of the trade so far as life and property are concerned?—I think so.

20,670. We will put Whitby on one side for the present. Supposing you had your choice of one harbour at Hartlepool that would take 400 or 500 vessels, and would cost a very large sum, or one of half that size there for half the sum, taking from 200 to 300 vessels, and another near Flamborough Head taking the same number of ships, would you prefer the two smaller ones or the larger one in the depth of the bay,—each to take the deepest collier which passed the coast at all times of the tide and in all weather, by day or night?—That is a difficult question to answer. I think, decidedly, that Hartlepool would be preferable to either of the others.

20,671. Suppose you had one at Hartlepool, would you rather have a large one there or a smaller one there and another smaller one at Filey?—I think two are better than one at any time.

20,672. Though smaller?—Yes, I understand that. I think the two would have a greater chance of saving life and property than the one would.

20,673. (*Chairman.*) Will you state to me what wind you consider the most dangerous on this coast?—From south-east to east-north-east.

20,674. As a general rule how do the south-east gales commence?—They sometimes commence from the north, and indeed come on very suddenly; but I think the south-east wind does not; it frequently comes from south-east back to east-south-east, and from that to east. We generally find if ever the wind gets farther than that it becomes more moderate. If the wind backs from east-south-east and gets a point north, the weather is always better.

20,675. If a south-east gale backs round as far as north-east does it not blow hard generally? Will it not be a hard north-east gale?—No, we generally have the hard north-east gale when the wind shifts from north-west to north and north-east.

20,676. Are the changes of wind very sudden on this coast?—Very sudden indeed.

20,677. Do you have much swell on the coast without any wind at all?—We frequently have the swell before the wind. It comes often for a day before the wind, and then it shows that a gale is coming.

20,678. The masters of ships trading along this coast are well acquainted with all this. Are they careful about not going too near the shore in the fall of the year, and in the winter?—I am afraid not so much so as they ought to be. The ships generally come close into this place, both light and loaded. It is an almost invariable rule with ships, both light and loaded, to come within a very short distance from this coast.

20,679. Is the inducements to be in shore that they may be favoured by the tides and slants of wind in making their passage?—When the wind is not very fair they come in to catch the flood and ebb tides, as it may be; and if a large fleet comes out of the northern ports, they come very close in indeed, almost all the ships.

20,680. With respect to a general harbour of refuge on the coast, for what number of ships should you say it ought to be constructed?—One large harbour

20,681. Yes?—I think that from 200 to 300 sail is all it would ever be required to accommodate, though no doubt in the sort of a roadstead in Yarmouth Roads and Bridlington Bay, there is frequently a very large accumulation—very much more. But I think it would be very rarely, that in a single harbour of refuge that is now required, you would want to contain more than from 200 to 300 sail of ships.

20,682. In a former part of your evidence you said you gave instructions to your captains not to run into the bight of a bay. Do you give them any further instructions as to keeping the sea in bad weather, and attempting to make the passage, and not running into a harbour at all; or do you leave it entirely to their discretion?—My orders are, if possible, never to run back when loaded into the coal ports; to keep the sea if possible, and, if they cannot, to run for the Firth of Forth.

20,683. Will you state any cases that have come within your own knowledge of vessels which were off Whitby, and then wrecked in going north and endeavouring to reach the northern ports?—I think there are some persons now in the room who have kept an account of that, and who are able to give better evidence on that subject than I can.

BIBLIOTECA DEL C. N. A. M.

WHITBY.

Mr. Gideon Smales.

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Chairman.

20,684. Have you any decided opinion as to the improvements the proposed breakwater would effect in facilitating entrance into the harbour?—I decidedly consider that the entrance into our harbour would be always smooth; ships would come in even with the bar as it now is, drawing two or three feet more water than they now do.

20,685. (*Capt. Sulivan.*) You said there were 70,000 tons of shipping belonging to this port?—Yes.

20,686. Have you any number of vessels which do not trade from this port, but trade from other ports?—The trade of this place is very small; very few of the vessels trade here.

20,687. About what proportion of the 70,000 tons trade to this port?—I cannot say. The harbour master will give better information on that point. Of the ships that take refuge, I should say two thirds probably belong to other places, not to this.

Mr. Henry Robinson examined.

Mr. H. Robinson.

20,688. (*Chairman.*) You are a shipowner and reside at Whitby?—Yes.

20,689. How many years have you been at sea?—Twenty-four.

20,690. Of that period how many years in command of vessels?—Sixteen.

20,691. You are aware of the objects of this inquiry?—Yes.

20,692. State your opinion as to the advantage or necessity of any single national harbour of refuge on this coast; or whether you should consider it preferable, for the purpose of saving life, to improve the several existing ports along this coast?—I think it would be better to improve the ports along the coast for the present vessels that navigate these seas.

20,693. That being the case, give me your reasons for holding that opinion?—The vessels are in different localities between Flamborough Head and the Tyne; and of course if there were a harbour of refuge to the north and south, and here as well, it would be of much more benefit to them than it would be in one place.

20,694. State your opinion as to the position of Whitby as a harbour of refuge?—I believe it to be the best on the east coast between Flamborough Head and Tynemouth Castle.

20,695. What are your reasons?—There is more water to enter, and geographically speaking it is in the centre of the trade as nearly as can be. Loaded ships coming from the north invariably, in my opinion, get thus far before they are headed off with the easterly winds.

20,696. Do I understand you to say that loaded ships, after leaving the ports, as a rule, get down as far as Whitby?—Generally so.

20,697. Give me your opinion whether refuge is more required for light or for loaded ships?—With regard to life, for loaded ships.

20,698. Why is that?—They are less able to keep the sea.

20,699. Are you disposed to say, that if a light collier finds herself on a lee shore in this neighbourhood, she is more able to keep the sea than a loaded ship?—As regards life the light ship will go upon many sands, and not drown any one.

20,700. The safety, as respects life, in a light ship, is that she goes higher on the beach. Is that it?—That is one reason.

20,701. Do you know of cases in which vessels have been off Whitby, and been wrecked in endeavouring to reach the northern ports?—The *Amelia*, which was lost, with all hands, in the 5th of July gale was seen off here. The *Zephyrus*, bound here from London, was wrecked at Hartlepool. The *Stanley* was another; and there are others.

20,702. During the period that you were at sea, were you ever nearly wrecked yourself?—On this coast?

20,703. Yes?—I was principally in the foreign trade, and was never wrecked on this coast.

20,704. What is the largest number of vessels you have ever seen riding at anchor in the Bay with a gale from east-south-east?—We had about 70 here a very short time ago.

20,705. (*Mr. Lindsay.*) In what part of the Bay did they ride?—On the lee of Whitby Rock.

20,706. What kind of shelter had they?—They had broken water there and had a surf rolling in.

20,707. Are the Whitby Rocks covered at high water?—Oh yes.

20,708. Are they dry at low water?—Nearly so.

20,709. Is there not a very heavy swell from the east-south-east?—A heavy swell.

20,710. Have you known many ships to drive from their anchors in such gales?—I have not known them to drive, I have known them to slip and run.

20,711. In fact, these rocks form a refuge as it is, to a certain extent in this very dangerous wind?—Yes.

20,712. I understood you to say that you preferred the improvement of the existing harbours to the construction of a single harbour. If it rested between the construction of one great harbour at Filey or one at Hartlepool, all things considered, which would you prefer?—I think the northern port.

20,713. You think a harbour at Hartlepool would be of more value than one at Filey?—I think a harbour to the north of Whitby would be better than one to the south.

20,714. Do you think if only one harbour was to be made, that Whitby is the best site for it?—I do.

20,715. Tell me what are your reasons?—It is a promontory and it is a centre point from the Tyne to Flamborough Head. As Mr. Smales has stated, ships always come in here and pass nearer to Whitby than to any other port, and there is the greatest accumulation of ships off here.

20,716. In your experience the greatest number of ships are caught on this coast off Whitby?—Yes, I think if they can steer to Filey they will be far enough south, and if the wind varies, as it often does, they can go to the south.

20,717. They would prefer going to Filey to going south?—Yes, but the chances are they could go round the Head.

20,718. And would have the Humber on their lee?—Yes.

20,719. Leaving Whitby out of sight altogether, what is your opinion of Hartlepool as a site?—Too shallow water all round it in my opinion.

20,720. Do I understand you to mean by that that Hartlepool is not a good site for a harbour of refuge?—No, not on account of the shallow water.

20,721. Do you know Redcar as a site?—I have passed it.

20,722. You do not know sufficient about it to speak of it as compared with Hartlepool?—I believe the water is deeper; I should give it the preference over Hartlepool.

20,723. That is if the same expenditure would give the same area of water?—Yes, I should go to the place which had most water at the entrance. If it has more water than Hartlepool I would give it the preference.

20,724. What trade did you command vessels in?—I have commanded vessels to the north and south. I have been from Whitby with emigrants.

20,725. You have been in the Baltic or at Archangel?—I served my time in the Baltic, and commanded ships to Archangel.

20,726. What do you think about the necessity of a harbour of refuge on the east coast of Scotland, say between Aberdeen on the south and the Pentland Firth on the north?—I think the firths are so easy of access that it is not required.

20,727. You do not think that, looking to the saving of life and property, it is required?—I really do not

myself. I do not know that there is a trade passing and repassing that would require it.

20,728. Say that the Government should be of a different opinion, and should be resolved on constructing a harbour of refuge within those limits, and say it rested between three places, all things considered, the trade of the Baltic and that through the Pentland Firth to America, to which would you give the preference as a site, to Wick, Fraserburgh, or Peterhead? —I am not sufficiently conversant with these places to give an opinion; the situation of Wick looks to me very good.

20,729. You think, that if a harbour of refuge was to be made, you would give the preference to Wick from its position?—I think I should, but I am not inclined to give a positive opinion.

20,730. (*Capt. Washington.*) I think you said you commanded a ship for 16 years?—Yes.

20,731. Many years in the coasting trade?—One coasting voyage. I have passed this coast as master of a ship bound foreign.

20,732. How often?—Three times from the Tyne to the Mediterranean and other foreign ports.

20,733. Is that all?—That is all.

20,734. Were these your only voyages?—I have been from Whitby to America several times north about, and have come from the Baltic to Hull and Shields.

20,735. Returning late in the fall of the year, where did you generally make the land?—Flamborough Head if we could. I have known us make it down in Scotland.

20,736. How far north?—Buchan Ness, and down there.

20,737. Was that in a strong south-west wind?—Of course it would be a wind by which we could not get to the south.

20,738. Did you ever make the land further north than that?—No.

20,739. If the wind was fair you would steer for Flamborough Head?—If I were bound for London I should steer further south; but in the fall of the year perhaps it would show prudence to go to Flamborough Head, but I would go to the south in all seasons of the year.

20,740. You would endeavour to make Orford Ness?—I would endeavour to do so. If I were more familiar with the coast, I should perhaps come down to Flamborough Head.

20,741. Have you ever, when off Flamborough Head, seen a number of vessels congregated there?—I have seen many ships.

20,742. About what number?—Over 100.

20,743. Stopping there long?—I don't know; I passed them light; was coming down light at the time I am speaking of.

20,744. You have never been detained there yourself?—Never.

20,745. Would it be a great benefit to the trade of Whitby, to have the present harbour improved?—Oh yes; I think so.

20,746. Would it be of any use to light vessels running down on this coast?—Oh yes; I think if this breakwater were made, vessels coming round Whitby Road with a heavy gale might fetch into the pier heads; I believe such ships would come which have now been lost to the north.

20,747. What is chiefly wanted is protection from the east?—I think so.

20,748. Covering the entrance of the present harbour?—I think so.

20,749. (*Capt. Sulivan.*) If there were a harbour of refuge north of Whitby, and another south of Whitby, between this and Flamborough Head, would it be the case that the northern harbour would save most light vessels and the southern harbour most loaded vessels?—I think the northern harbour would be best in both cases.

20,750. I am supposing that there was one in each place; I don't ask which would be the best to have only one; I am supposing that you had one in the north. Would light vessels principally benefit by the northern one, and loaded by the southern one?—I don't know where they might be; I scarcely understand the question.

20,751. You said just now that loaded vessels suffered most?—In life.

20,752. If there were two harbours, one south of this and one north of this, deeper in the bay, would the loaded vessels most benefit by the southern harbour, and the light vessels by the northern harbour?—I think both loaded and light vessels would use the northern one; the light vessels would go back to Flamborough Head, and would not use a harbour of refuge unless they wanted to make a port of loading; that is the reason why many of them are lost, because they want to "hug" the land and make the voyages.

20,753. We have heard of many being wrecked, from their being driven into the bay?—I think they should not have gone into the bay.

20,754. But we have evidence that many could not get out?—They had run too far; they should not get themselves into danger.

20,755. Did you not say a harbour in Tees Bay would be a benefit to light vessels?—If I said so I did not think so.

20,756. Then what vessels do you think a harbour in Tees bay would be of use to?—None.

20,757. Did you not say it should be north of this?—Yes, if there is not to be one here.

20,758. And you said it would save the light vessels?—I think a northern harbour would be of most value to light ships.

20,759. I ask whether a northern harbour would be most valuable to light ships, and a southern to loaded ones?—I think the northern would be most valuable to both loaded and light ships.

20,760. If there were two?—No, if there were only one.

20,761. But if there were two, would the light vessels benefit most by the northern one, and the loaded by the southern harbour?—I think if there were two the northern one would be of most benefit to both.

20,762. You said there was an objection to Hartlepool on account of its being so shallow. Do you mean on account of the sea breaking?—Yes.

20,763. Does the sea break badly outside of Hartlepool?—I have heard so.

20,764. You don't know it of your own knowledge?—No.

20,765. Does the regular sea begin closer in towards Redcar?—I don't know that.

20,766. Would you think it a great object to have the harbour where the most regular sea could be carried up to the harbour's mouth?—Oh yes.

20,767. Even although there was not deeper water at the harbour's mouth, yet if there was deeper water outside, and the sea was quiet and regular, you would think that better than where breakers extended outside?—I think so.

20,768. When you spoke of vessels making Buchan Ness, did you allude to your own ship making it?—I have been on board a ship that has made Buchan Ness from the Baltic, with a very experienced captain.

20,769. In all other voyages, how far have you made the land north?—Flamborough Head most often; we were bound to the Humber.

20,770. Have you never been to the northward of Flamborough Head, except that one time?—Several times.

20,771. What was the farthest north next to that time?—I think Whitby; I believe I made the land once or twice down here.

20,772. Have you ever made it to the northward of the Firth of Forth, except that one time?—No.

20,773. (*Chairman.*) How many voyages have you made from the Baltic as master?—Two.

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20,774. (*Chairman.*) You are harbour-master at Whitby ?—Yes.

20,775. How many years have you held that situation ?—Seven years.

20,776. Previous to that did you follow the sea ?—Yes.

20,777. For how many years ?—Twenty-eight.

20,778. How many years were you in command of ships ?—Nearly 20.

20,779. In what trade were you chiefly employed ?—Chiefly in coasting.

20,780. Of what description of vessels were you in command ?—The first six years I was master of a vessel of nearly 300 tons and drawing 15 feet of water. Since then in one of my own ships drawing 14½ feet water.

20,781. Ships or brigs ?—Brigs.

20,782. For saving life would you prefer one large harbour, or that the several ports which now exist should be improved ?—The several ports to be improved.

20,783. Will you be good enough to give me your reasons for that ?—If there was a harbour at one of the Durham northern ports and a harbour at Whitby here I think it would be the means of saving a great many lives, more so than one large harbour.

20,784. Therefore you are in favour of one harbour to the south, somewhere about Whitby, and also of one somewhere to the north ?—Yes.

20,785. Explain what would be the use of a harbour of refuge at Whitby ?—It would be the means of saving a number of ships and a very great number of lives. I remember for several days, vessels coming close down here and going away again because there was no anchorage to take the northern ports and being wrecked. If the designed breakwater had been on the rock they would have come down to the rock and brought up in safety.

20,786. Why were these vessels down here ? Was there any necessity for their being so close in shore ?—There are frequently gales down here from the south-east. When they attempt to come to Whitby, when they draw the northern ports, they fall in with one third more sea than they have at Whitby.

20,787. How does the coast tend from Whitby to the north ?—Hartlepool Heugh bears north-west from Whitby buoy.

20,788. Then withthe wind at south-east why should vessels be so close to Whitby ?—They generally come close off Whitby, down along all the way. I remember the *Colony* lying in the roads five days and could not enter the harbour; she got up her anchor, and was wrecked in taking Shields The *Zephyrus*, bound to Whitby, could not attempt the harbour, she took Hartlepool—struck on the bar and was a wrecked.

20,789. Do I understand you to say that these were vessels making for the harbour of Whitby, or bound further north ?—The *Zephyrus* was bound for Whitby but the *Colony* for the south, laden here.

20,790. If you had a harbour further north where would you put it ?—I should think about Sunderland, if we had Whitby improved.

20,791. In fact the other horn of the bay ?—Yes, I approve of Sunderland.

20,792. What is your reason for choosing Sunderland ?—The land is much higher for vessels to make coming round down in a gale of wind, more so than Hartlepool. They make the back land about Hartlepool, and don't know where they are, or perhaps they slip to the north side of the Heugh.

20,793. With the wind how far to the eastward can a vessel, a light collier, fetch from the neighbourhood of Whitby to Sunderland ?—When the wind is about east and by north or east and by south.

20,794. What is the course from Whitby to Sunderland ?—About north-west and by north half north.

20,795. Therefore you require the wind to be to the eastward to enable a ship to fetch Sunderland ?—Some ships will fetch it a great deal better than others, some will go broadside to leeward almost, and some will make a straight headway. There is a deal of difference in colliers.

20,796. But taking into account that there is a great difference in ships, looking at the general run of light colliers, would they, when out at sea, fetch Sunderland under close-reefed topsails and foresail ?—Yes.

20,797. And that with the wind east-north-east ?—No ; to the east and by north. It depends whether the sea was athwart or ahead.

20,798. But does not the sea, as you get to the north, run into the bay ?—As you draw across the Tees you get it more favourably.

20,799. It comes round to the south ?—Yes, more favourably.

20,800. But the wind as you cross the Tees Bay with these gales on shore—does the wind come forward or aft ?—As you go to the northward it draws aft a little ; the wind from the south-east does.

20,801. You are quite sure of that ?—Yes, generally so.

20,802. Which do you consider the most dangerous wind upon this coast ?—From east and by south to east and by north.

20,803. Do these winds spring up suddenly ?—Sometimes they do.

20,804. But is that an ordinary occurrence ?—Not often. I think the wind rises out from the southward and westward, and then, perhaps, comes away to east before it begins to blow ; it frequently goes a little round before the force of the gale comes.

20,805. Having a vessel close in shore off Whitby with the wind from the south-east, would she have any chance of making an offing if she wished to do so before the wind went round to the east-north-east ?—That depends on circumstances. If the wind kept at south-east she would get an offing.

20,806. Do I understand you to say these on-shore gales begin at south-east, and generally go a little round, so that a prudent man would get off shore ?—At times they come very suddenly.

20,807. What is the greatest number of vessels you have seen riding in these roads with gales from the east-south-east ?—I have seen 75 sail, the wind blowing south-east and by east, about a fortnight ago.

20,808. Did they all hold on well ?—They all held on well until it came fine weather.

20,809. Was it blowing hard ?—It was blowing hard.

20,810. What cable had they out ?—Chain ; I should think 60 or 70 fathoms.

20,811. More than one anchor down ?—I do not know that any had more. They did not strike any mast or yard.

20,812. Was there much sea in the bay ?—A very rolling swell ; my ship rolled very heavily ; some of the outer vessels rolled very heavy.

20,813. From what direction did the sea come ?—It came round the rock and the sea broke heavy on the rock, which caused it not to break inside the rock.

20,814. Can you produce a statement of the number of vessels which have taken refuge at Whitby within the last three years ?—Yes. In 1855, 655 vessels entered the harbour for refuge ; in 1856, 611 ; in 1857, 585 ; and up to October this year, 358.

20,815. Does your statement show how many were light and how many were laden ?—It does not.

20,816. Could you give a statement to that effect ?—I cannot.

20,817. What is your authority for this statement ? Is it drawn from official records or taken by yourself ?—I keep an account of all vessels that come into the port for the trustees to see.

20,818. Will you sign that and hand it in to the secretary ?—Yes. (*Statement signed and handed in.*)

20,819. Do you corroborate the statements made by previous witnesses as to tonnage ?—Yes.

20,820. The returns already handed in are based

upon your returns to the Custom House; is that it?—Yes.

20,821. Will you state your opinion as to the improvement the proposed breakwater would effect to the entrance of Whitby Harbour?—As the rock is, when a vessel from the south with gales from the south-east hauls round the rock she will not lay so as to look at the harbour; they are steering for the piers, but they are not able to fetch the shore, and they come to. If the breakwater was on the rock, they would come round the end, come into smooth water, get the pilot on board, and proceed into the harbour with the greatest safety.

20,822. You say she would get a pilot on board, have the pilots great difficulty now in getting out in bad weather?—Yes, there is so much sea; they are unable to go out if it blows strong from the eastward.

20,823. Have you any statement of the wrecks at Whitby during the last six years, with particulars of the causes of those wrecks; if so, will you hand it in to the secretary, with any remarks you like to make?—I have those which were lost with all hands on the 4th January 1857.

20,824. Have you any further statement?—Yes. Here is a statement of all the vessels that have been stranded on the coast at Whitby during the last few years. (*The returns were handed in.*)

20,825. (*Sir F. Smith.*) How many years have you held your present situation?—Seven years.

20,826. Are you going to give a return for three years and three quarters?—Yes.

20,827. Can you give one for the whole period since you first became harbour-master?—I cannot.

20,828. You did not begin to keep an account then until 1855?—No.

20,829. What induced you to commence keeping such an account?—The trustees of piers and harbours wished me to do so.

20,830. You cannot tell me how many vessels were laden, and how many were not?—I cannot.

20,831. Can you tell us how many hours out of the 24 your port is accessible for vessels of the class which come in upon those occasions?—We have vessels come into the harbour sometimes six feet below high water.

20,832. For how many hours, either at neap or spring tides, can vessels, of the description you have taken record of, enter the harbour, or did they enter the harbour?—Sometimes at neap tides five hours each tide.

20,833. How many hours out of the 24?—That would be 10 or 12. It depends entirely on the weather.

20,834. Take the average?—From 10 to 12 hours.

20,835. That is for one half the day your harbour is accessible?—Yes.

20,836. How much do you think the harbour could be deepened by dredging?—I think about three or four feet.

20,837. For what expense could dredging be carried on?—I do not know what expense it would be.

20,838. If it were dredged out three or four feet, for how many hours then could you take in these vessels?—The smaller vessels would be able to come in at low water. It would always be accessible to them.

20,839. I am talking of the average of vessels that want to come in here, and not of any particular one. For how many hours would you offer accommodation to them then?—There would be 14 or 15 hours I should think.

20,840. That is for a great portion of the 24?—Yes.

20,841. For what number of vessels have you accommodation in your harbour?—We have accommodation in the upper harbour for about 300 sail, and in the lower harbour we have sufficient room I think for 80 and 90.

20,842. Do they all take the ground?—Yes.

20,843. Do I understand you to say that, if the public funds could be given out with a pretty liberal hand, you would prefer having a harbour of refuge here, and improvement of one of the harbours north of this? Is that what you propose?—If there was a large harbour here, and an improved harbour to the north, it would be the means of saving a great number of lives.

20,844. Do you think it would be the best means of applying the public funds?—I think it would.

20,845. You think it would save more lives than constructing a harbour at Filey, making a harbour here and improving one of the ports?—I should prefer a small harbour being improved.

20,846. To the improvement of the other?—Yes.

20,847. And the construction of a harbour at Filey?—That is to the north.

20,848. Is it the case that a great number of vessels are often off Flamborough Head?—Yes, with the wind from south-west or south-south-west.

20,849. Do you remember hearing of 500 lying there?—No.

20,850. You would not believe it if you did, perhaps?—No.

20,851. Well, if witnesses of high character and great experience, and several witnesses of that character told us they had seen upwards of 500 there very often, what would be your opinion?—I would not believe it. I have been on the coast too long myself. There is not room for them to be there. In Bridlington Bay I have seen 600, but not in Filey Bay.

20,852. What is the greatest number you have ever seen off Flamborough Head?—I have seen a great number lying in Bridlington Bay.

20,853. That is not an answer to my question. I want you distinctly to say what is the greatest number of vessels you have seen off Flamborough Head?—I think I can say about 250.

20,854. That is a considerable number, is it not?—Yes, it is.

20,855. Do you not think that for those vessels there are circumstances which would make Filey a very desirable harbour?—I think not. Vessels that are dodging about Flamborough Head generally come out of the wind south a little. If it got about east-south-east or east, as long as they can carry close-reefed topsails or reefed foresail, they will always go to the Humber.

20,856. You think a harbour would not be required there?—At times they might use it.

20,857. There are times when, perhaps, it might save life?—Yes.

20,858. (*Mr. Lindsay.*) Is Whitby a "bar harbour" in the strict sense of the term, with two feet water at low water?—We have 2½ feet at springs and six feet at neaps.

20,859. What is the rise of the tide?—At spring tides 16 or 17 feet. I have known it since I came to be harbour-master 22 feet over the bar.

20,860. Has the bar been silting up in your experience?—At times it does silt up a little, then we have a little land water comes and takes it away.

20,861. Where does this silt come from?—It comes along the sand a little; perhaps we have a little deposit from the river up above.

20,862. To what extent is the bar silted up?—It never silted up between the piers. It is always a little inside the piers.

20,863. Your shallowest water is within the piers?—Yes.

20,864. Since the alteration of the piers?—Yes.

20,865. Have you a dredger here?—We have not.

20,866. Have you any means of removing the silt?—We have two mud lighters at work, and they are taking out of the harbour each of them 30 or 35 tons a day, and as long as the weather is suitable to go on they work every day.

20,867. You said the harbour might be deepened by dredging to the extent of three or four feet?—Yes.

20,868. Do you think with a dredger you could maintain the increased depth?—The dredger would do very well to dredge the sand, but it is loose scar

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within the piers. It must be picked up or blown up. It is scar within the piers.

20,869. What depth of mud or sand is there over that?—Sometimes it is right down to the scar, and sometimes there is a deposit of sand over it.

20,870. To what depth could you dredge?—I dare say three or four feet.

20,871. Then by dredging you might have four feet more water than you have at present?—Yes.

20,872. And could admit vessels drawing four feet more water than you now do?—Yes.

20,873. Therefore, if a dredger was employed, Whitby could for a similar description of vessels be made a more available harbour of refuge than it now is?—Yes.

20,874. Do you think deepening the bar to that extent would be a means of saving more vessels?—I have no doubt for small vessels it would.

20,875. Because Mr. Smales says, that during the highest spring tides, he has known vessels drawing close upon 14 feet water come in here?—I have known vessels come in, and that with very strong seas, drawing from 14 to 15 feet water.

20,876. Then if it was deepened four feet more, you would be able at high water, and in easterly gales of wind, to admit, in fact, all the colliers going along this coast?—Yes.

20,877. Therefore by this comparatively simple means, Whitby could be made to a much greater extent a harbour of refuge than it now is?—Yes.

20,878. Can you tell me why the dredger has never been employed here?—I cannot say.

20,879. Is it for want of funds?—I think it must be.

20,880. Is there any charge made upon vessels coming in here for refuge?—The largest vessels that enter the port for refuge only have to pay 3*s.* 10*d.* harbour dues, bridge dues, and manorial dues.

20,881. What are your charges for vessels entering here with cargoes?—The same harbour dues.

20,882. Then you charge the same on vessels seeking refuge, as to vessels coming here for the purposes of commerce and trade?—Yes, the harbour dues.

20,883. What other dues are there?—There are dues on coals and dues on cargoes.

20,884. I am speaking of dues on ships. Is there any difference of charge made between vessels coming here for purposes of trade, and vessels coming here for refuge?—Vessels that are loaded I think pay double manorial dues.

20,885. Those are payable to the lord of the manor?—Yes.

20,886. What is the amount of them upon each ship?—Eightpence.

20,887. A vessel seeking refuge here pays 8*d.* to the lord of the manor?—Yes.

20,888. And a vessel entering with a cargo pays 1*s.* 4*d.*?—Yes.

20,889. As Hartlepool has been recommended by a Committee of the House of Commons as a suitable place for a harbour of refuge upon this coast, tell us what you think of it as a site for a harbour of refuge from your experience?—My opinion is the water is too shallow. I remember on the 4th January 1857 vessels drove past Whitby and wanted to make Hartlepool, and that a great number of them fell to the north of the Heugh. As soon as they made that they had to clap them on the wind, and to come south, and as soon as they got into broken water round the Heugh, several of them were lost with all hands, before they got them wore round. Several of them capsized with all hands.

20,890. You do not think they turned over by the breaking of the swell?—Yes, the sea broke so unmercifully upon them they became unmanageable.

20,891. They would not answer their helms and therefore foundered?—Yes, they turned over and foundered before they got to the shore.

20,892. You said a number drove to the north of the Heugh?—Before they made the land. In gales from the east upon this coast the land is generally capped.

20,893. Did they drive because they could not see where they were?—Yes.

20,894. Are there any other reasons why you object to Hartlepool as a site for a harbour of refuge?—Only the shallowness of the water.

20,895. As a site you have no objection to offer to it. I mean as to its position?—It is rather too far north; I think the same as Filey is too far south.

20,896. Well, but you recommend Sunderland which if further north?—Yes, if there was a harbour at Whitby.

20,897. Presuming there was a harbour at Whitby and another was to be made further north, I understand you to say Sunderland?—Yes.

20,898. You mean Hartlepool is too far north if there is to be only one harbour?—Yes.

20,899. Say that there is to be only one harbour along the coast, what number of vessels of the usual description ought it to contain to meet the exigencies of the trade?—300 sail I should think would be quite sufficient. It is very rare we have that quantity on the coast at a time.

20,900. Looking at the size of the usual description of vessels trading along this coast, what number of vessels could anchor with safety in an area of, say, 300 acres of four fathoms and upwards?—I do not understand acres, but if this is 300 acres in Whitby Roads we could hold about 200 sail.

20,901. You were a long time in the Baltic trade?—A very few voyages, chiefly in the coasting trade.

20,902. Putting Whitby out of site altogether you are not in favour, as I understand you, of a harbour far south, and not in favour of Hartlepool, but all things considered and putting Whitby out of the question for a moment, say it rested between Filey and Hartlepool, at which would you construct a harbour of refuge?—I do not know how to answer that question. A harbour of refuge would be of great service at Hartlepool and one at Filey. If it was so placed no doubt many vessels would enter there, and if a vessel missed Filey in heavy gales and had to come all the way to Hartlepool Roads before she could get shelter, we are aware, we who have been on the coast for many years, that there is a number suffer in that way in gales of wind.

20,903. Say that Filey could be made a harbour so as to shelter, say, 300 vessels in all gales of wind, but more particularly when the wind is drawing eastward?—I think it could not be made to hold them.

20,904. But say that it could by an expenditure of money be converted into a harbour to contain 300 sail of vessels in safety during easterly gales of wind, and supposing that a harbour could be made at Hartlepool, between the Heugh and the Long Scars, also to contain 300 vessels where they would have sufficient water to ride in, to which would you give the preference?—I think as Hartlepool is so very close to the coal ports and the vessels leave them, that Filey would be the best site.

20,905. Do you know sufficient of Tees Bay to tell me your opinion of Redcar? Say that a harbour could be made there to afford shelter from the prevailing gales, at the same cost as it would be to make one at Hartlepool Bay, do you think a harbour at Redcar or a harbour at Hartlepool would be of most value?—I think Redcar. If a mariner were off it, say with a heavy gale and the sea very heavy, he has Huntley Foot to look for. If he makes that he steers in for the bold land and is sure to make the breakwater, but in going to Hartlepool its low ground and he can make out nothing. As far as he goes it is shallow water, but at Redcar he carries deep water up to the breakwater.

20,906. (*Capt. Washington.*) Where are you speaking of, the harbour of refuge to be made at Redcar. On the Scars south or north?—One on the Salt Scar and the other I place a little to the north of Huntley Foot.

20,907. You suppose the harbour to be to the south of the Scars?—Yes.

20,908. How far does the Scar extend off the shore?

—I don't know the distance ; I have been there some hundreds of times ; I should think somewhere about a mile.

20,909. Have you often been along that coast ?—Yes.

20,910. Where did you chiefly trade from ?—Every port to the north from this, Sunderland, Hartlepool, West Hartlepool, and the Tees.

20,911. Have you often been in Hartlepool Bay ?—Yes.

20,912. In what part of the bay was it these vessels were capsized in January 1857 ?—I was not there to see them. I was only informed they got a little to the south of the stone buoy and there fell in with broken water.

20,913. That would be something like three fathoms water, I think ?—It would.

20,914. Of course you are aware, if a harbour was made the piers would most likely be carried out in seven or eight fathoms water ?—Most likely ; they must go into that water.

20,915. With that water, might not ships safely run for the piers with an entrance of seven or eight fathoms of water ?—The sea breaks very heavy down there, and vessels leaving the Yorkshire coast with a gale of wind blowing from the south-east running down into Hartlepool Roads will fall in with above one third more sea than they will off Whitby.

20,916. Then you think Whitby is the place at which shelter should be given ?—Yes, in my opinion, it is.

20,917. I observe the southern breakwater in that plan does not join the shore. Do you know anything of the design ? Were you consulted respecting it ?—Yes.

20,918. The southern breakwater does not join the shore. Do you know why that is ?—There is a passage called the Sledway, and that passage is worth preserving.

20,919. What is the depth of water there ?—We have on it now about three feet at low water. It is principally for the flood tide that comes along the beach and goes opposite the harbour's mouth, a sort of wash.

20,920. The flood tide sets away south-east, does it not ?—Yes.

20,921. Does it carry much stuff opposite the harbour's mouth ?—Yes, in north-east gales.

20,922. Would that breakwater enable you to make the entrance of the present harbour better ?—Oh yes, we should have it smooth on the bar.

20,923. The swell would be kept off ?—Yes.

20,924. What number of vessels is there room for in the harbour ?—Above the bridge about 300, and in the lower harbour 80 or 90 more.

20,925. They could be in comparative safety ?—Yes, if the breakwater was made they would be safe in the lower harbour, but as the harbour is now if a heavy sea comes on we are obliged to have them all above the bridge.

20,926. They will not all be in the outer harbour ?—No, they jump and tumble about a good deal.

20,927. I think you said vessels could lie in Whitby Bay with strong east-south-east winds ?—Yes.

20,928. How much further east ?—As it is at present, when it gets east-south-east the vessels must move into the roads.

20,929. Are they able to get their anchors ?—Yes, they go to sea and knock about at sea and endeavour to get their passage.

20,930. Are you speaking of loaded vessels ?—Of loaded vessels.

20,931. They keep the sea ?—Unless it be a vessel makes water, and then she runs for a northern port—Shields or Hartlepool.

20,932. You were asked about vessels lying under Flamborough Head and on the north side, I think you say you have seen 250 vessels ?—I think I have seen as many as 250 there.

20,933. That would be with the wind at what ?—The wind about south-west.

20,934. Blowing hard ?—South-south-west blowing hard. I have been dodging there with the wind as far as south ; when it comes to the eastward of south we must go out of there. The sea rolls round the head.

20,935. What would a ship do then ?—Go out to sea and endeavour for her passage ; if the wind easted we should get the Humber if it came on to blow. If it once gets to the east, carrying close-reefed topsails or reefed foresail, the ship will go to the Humber.

20,936. Would they be able to hold their own at sea ?—Sometimes they drive to the north, and sometimes they hold their ground. It depends upon the weather entirely.

20,937. Suppose it is rather a strong wind ?—A loaded ship carrying single-reefed or double-reefed topsails will always be gaining ground if she is a good vessel, but if she is stripped with the wind south-east or east-south-east, she must drive to the northward.

20,938. With the ebb tide ?—With the ebb tide she would go very fast to the northward. She would not bear up at once, but would struggle against the wind, perhaps she would be days before she would bear up for a port, and then there is no harbour to the north which vessels can take unless they go to the Leith Roads.

20,939. In those days would she have travelled to the north ?—Yes.

20,940. If it came on to blow still more easterly what would she do ?—If the wind eastered and came from south-east and there was a harbour of refuge at Whitby she would come in, or if there was an improved harbour down at the north, anywhere at one of the coal ports, she would go there.

20,941. She must run somewhere ?—She must go somewhere on the shore if she could not go to the firth.

20,942. Could she fetch back to Filey Bay ?—No.

20,943. Whitby she could come to ?—She could.

20,944. Even with only this eastern arm of the breakwater carried out, would Whitby then be a shelter for her ?—It would be a shelter for vessels as far as east-north-east for ships to ride under the breakwater.

20,945. With all south-east winds ?—Yes, with all south-east winds it would be a very good shelter.

20,946. With which winds, if they did not come into Whitby, they must go further noth ?—They must go further north.

20,947. Generally speaking, how far do light vessels going down keep off the shore with the wind off the shore ?—We have them very close now we have those lights at the south.

20,948. That is a great benefit, I suppose ?—They keep a vessel clear off Whitby Rocks, and they can come as near into the land as they please when they get to the north.

20,949. Before these lights were placed there, Whitby Rocks picked up a good many vessels ?—Yes.

20,950. Is there a good buoy upon it ?—Yes.

20,951. Easily to be seen ?—Yes.

20,952. Are there any other rocks or shoals in this neighbourhood which are not buoyed ?—Not in the track of ships, I do no remember any.

20,953. When light vessels come in here to load, what becomes of their ballast ?—Some of them heave it at sea before they come into the harbour, and others discharge it in port. There are two companies here in Whitby having lighters to take it out and lay it on the mud a certain distance from the shore.

20,954. How far do they heave it out at sea ?—Away to the northward of Loft Hole.

20,955. Is there not a fear that they throw it in the roadstead ?—No doubt sometimes they come too close in.

20,956. Cannot you prevent that ?—By an Act I believe we could lay down buoys, but there is no power at present.

20,957. It is no use building a breakwater if you are spoiling your roadstead with ballast ?—But if the

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breakwater was made, of course there would be proper ballast buoys laid down outside.

20,958. Does this ballast come into your own harbour ?—No ; it never comes in nearer than the piers.

20,959. Are there many boats fishing out of Whitby ? —About the neighbourhood, including Staithes, Runswick, and Robin Hood's Bay, we have about 240.

20,960. Would the breakwater be of any use to them ?—Yes, this breakwater would ; we have them come in here sometimes ; I have known 60 or 70 of them come in in one tide in the herring fishing.

20,961. Do they fish all the year round on this coast ?—The large boats go to the herring fishery in the summer season. They fish with large boats in the herring fishery; and in the latter part of the year they lay the large boats by, and fish with the small cobles, setting off every morning and returning during the day.

20,962. What number of pilots belong to the port ? —Eleven.

20,963. Are they under your orders ?—No.

20,964. Do they hold licences ?—Yes.

20,965. From whom ?—From the Trinity House of Newcastle.

20,966. Do you pay any dues to the Trinity House of Newcastle ?

(*Mr. Smales.*) There is the same charge here as there is at Sunderland and the northern ports.

20,967. (*Capt. Washington.*) Perhaps there will be somebody else who will speak to that. What money is paid to the Trinity House of Newcastle ?

(*Mr. Smales.*) The collector of customs receives the dues here. He is the only person who can speak to that point. I can state that upon a vessel of mine, which delivered a cargo from Quebec, the primage charge was near 6*l*.

20,968. You do not happen to know the whole amount paid annually ?

(*Mr. Smales.*) I do not. I could give you that to-morrow.

20,969. You said something like 600 vessels, on the average, take refuge here in the 12 months. Have give you that account from the Custom House, or do you it to them ?

(*Witness.*) I take my own account.

20,970. You do not distinguish whether the vessels were loaded or unloaded ?—No.

20,971. Could not the Custom House do that ?—I should think it could, but I do not know.

(*Mr. Smales.*) The only return they can give is the one I have handed in.

20,972. I think you said you were consulted about the present design for covering Whitby Bay by Mr. Harrison's breakwater ?—Yes.

20,973. Do you happen to know the depth of water in which the outer breakwater is laid down ?—The plan shows eight fathoms, seven, and six, and shoaling to five fathoms as you draw to the northward.

20,974. I see 60 feet at the outer end ?—I think that will be to the southward of the outer end.

20,975. Were you engaged in taking the soundings ? —I was in the boat with Mr. Harrison when they sounded all along.

20,976. Is there a life boat belonging to the port ? —There are two.

20,977. Where are they stationed ?—One on the pier, at the west pier ; the other in a shed at the Burgesses pier.

20,978. Are they often used ?—Yes.

20,979. Have they been the means of saving life ? —Yes.

20,980. Who manages them ?—Volunteers.

20,981. Are they under your charge ?—I have the management, I am always there to see that things go on right.

20,982. Are they in good repair ?—Yes.

20,983. Are there rockets and mortars for throwing ropes ?—The coast-guard have them.

20,984. (*Capt. Sulivan.*) You said that 1,800 vessels took refuge here ?—No, trading and refuge.

20,985. I think you said that 600 a year took refuge in three years, that is above 1800 ; is that refuge alone ? Those are the numbers you gave, are they vessels not bound to this port, but coming here for refuge ?—Yes.

20,986. These vessels pass the pier head and come inside ?—Yes.

20,987. What water have you over the bar inside from there to the bridge ?—I think it is nearly the same as on the bar. When we get above the middle buoy we have a little more inside than what we have at the middle buoy.

20,988. If you deepen the bar as you call it to give any refuge you would have to deepen it right up to the bridge ?—Yes.

20,989. You said that vessels would take the ground in the harbour ?—Yes.

20,990. The channel I think is very difficult to take, on account of its drawing towards the east side ? —Yes.

20,991. Have you never made any attempt to straighten it ?—We have not, but I think we are now going to commence, we commenced to do it last spring, but there came on rain and we were put off.

20,992. Is that channel caused by the stream being deflected over to that side by any projection on the west, or is it owing to any formation of the ground ? —I am sure I cannot say. I think that the current that comes down the harbour shows itself on the west side, which is above that place, and then it throws it over to the other side.

20,993. This projection which is shown upon the chart ?—Yes, I think it is.

20,994. You describe 250 vessels as anchoring under Flamborough Head ?—Not anchoring.

20,995. Well, off Flamborough Head ?—I have seen 250 vessels dodging to and fro there.

20,996. With the gale from the south-east they are forced to sea ?—If it got to the east of south they must go to sea.

20,997. Have you ever known vessels that were so situated having put back to the Firth of Forth ?— I have.

20,998. If we have been told by one person that he has been three times driven back to the Firth of Forth from Flamborough Head, would you doubt it ? —I have no doubt but what he may have been.

20,999. Would not all this have been saved if there had been a harbour at Filey ?—I don't know, I am sure, as to that.

21,000. Could these vessels, if they chose, when the gale came on from the south-east and forced them off from Flamborough Head, instead of risking being driven back, have gone to Filey ?—If they took it in time, but when the wind gets to the east of south they generally go to sea, expecting to go to the north and east, and then they get off, and can't fetch Filey when it comes on.

21,001. Do they go off because they have no shelter ?—They are afraid of losing their passage if they go into the harbour.

21,002. With south-west and south winds do they often anchor under the head ?—They do.

21,003. If there was protection equal to that which they now have with south-west winds, against south-east winds do you think they would risk being driven back or would they anchor ? — Some would take refuge in the harbour, and some would go to sea to see how the weather turned out ; if a gale comes on after they get out they can't get back.

21,004. Do you believe that any man knowing the chance of being driven back to the Firth of Forth if a gale came on from the south-east, would hesitate to run into Filey rather than be driven back ?—If he knew he was going to be driven back he would go in, but he can't know that.

21,005. If he knew the risk of it ?—Though he knew the risk of it, a man will not take the harbour when a breeze first comes on ; he will endeavour for a passage a little while before he will take shelter ; then the wind comes on heavy, a gale perhaps, and he can't fetch the harbour of refuge the next day. There is no doubt a great many masters on the coast,

who, the moment it comes a puff of wind, run into harbour directly ; others go to sea, and thrash about for weeks.

21,006. Do you believe a man who anchors under Flamborough Head, where it is naturally good anchoring ground, with the wind from the south-west, would neglect to use a harbour giving protection from south-east winds if it existed ?—Frequently with the wind south-west and south-south-west they will ride smoothly enough ; but if it once gets to the southward and eastward, they are unable to remain there, but if the wind goes to the east and towards the north they get their passage ; if however, they went into the harbour of refuge they could not get it.

21,007. If they took refuge in a harbour at Whitby from south-east and east gales, would there not be the same difficulty in getting out if the wind drew to east-north-east or north-east ?—All the same.

21,008. From Hartlepool or Redcar would there be more or less difficulty ?—I believe they would come out of Hartlepool better, with a wind from the north-east than from any other port.

21,009. Better than from Redcar ?—I don't know about Redcar, that lies away to the south, and perhaps they could come better out of that as they would not have so much broken water ; Hartlepool would be to windward and would give a better start.

21,010. I think Redcar would lie a little outside the pier at Hartlepool ?—Hartlepool pier lies a long way in the bight.

21,011. (*Capt. Vetch.*) I think you say you have been seven years harbour-master ; can you tell me, during that time, how many vessels have been stranded between the harbour's mouth and the Upgang Rock ? —I have known six vessels laid upon the sand all together.

21,012. In one gale ?—Yes.

21,013. Could you give a list of the whole numbers during the whole time you have been harbour-master here ?—Yes.

21,014. I suppose that the proposed harbour would save all these casualties ?—If this breakwater was made on the Whitby Rock, I have no doubt it would save them all.

21,015. Looking at the distance between the Upgang Rock and Sand's End Ness have you seen any wrecks ashore there ?—Yes.

21,016. How many ?—I think the most together was two, I might have seen three together.

21,017. Perhaps you can tell us how many wrecks took place in this district during the time you have been harbour-master here ?—Yes.

21,018. (*Mr. Coode.*) You have spoken of the material dredged in the harbour being taken outside ; can you tell us how much is taken out in the course of the year ?—I can't tell that but it can be given.

21,019. What material is it silt or sand ?—It is made up of silt and sand, a little of all sorts.

21,020. Muddy silt ?—Yes.

21,021. Where do you generally deposit it ? How far out ?—Outside the rock ; sometimes we take it a little to the southward of the high part of rock.

21,022. You mean Whitby Rock ?—Yes.

21,023. Do you discharge it at any particular time of tide ?—We always take it at half flood high water, or two thirds flood. It depends upon how the steam-boat is ready to take the boat off. We generally take it off at flood. There is always a strong flood going to the south when it is taken out, and the tide runs outside 2 or 2½ hours after high water.

21,024. What is the strongest rate of tide outside the harbour's mouth at spring tides ?—That depends on the weather. We have sometimes north-west and north-north-west gales. The tide will come past four or five knots, that is in gales of wind from the north-west and north-north-west. With the wind from the south-east we never have any flood come beyond the harbour's mouth.

21,025. What is the strength of the ebb tide during south-east gales ?—We have but very little ebb in Whitby Roads, perhaps 1½ knots, or something of that sort. It is the wind that heaves the vessels so far to leeward.

21,026. How far off the harbour's mouth does the strong flood extend ?—Perhaps outside of the rock you will find it strongest.

21,027. What would it be about a mile from the shore ?—On the rock buoy it would be about what I have said. About the rock edge the tide runs very strong at times.

21,028. Do you know of any deep sea fishing boats belonging to this place ?—Some go 30 or 40 miles from the land especially in the summer season. I believe they sometimes go 50 or 60 miles out—sometimes to the north and sometimes a little to the south. They go on to the Dogger.

21,029. Do they choose any particular points for fishing?—Sometimes they go into deep water, sometimes into shallow water.

21,030. You said you consider a harbour should have seven fathoms water. Have you seen the design for a harbour at Hartlepool ?—I have not.

21,031. You said you thought the harbour should be in from six to seven fathoms water ?—That is my opinion. I think it ought to be.

21,032. You spoke of some broken water in which vessels were lost inside the Heugh ?—Yes.

21,033. Do you think there is seven fathoms water in there ?—There are not seven fathoms there where the vessels were capsized.

21,034. The harbour would have to go beyond the Heugh to meet your views ?—Yes.

21,035. Supposing the harbour went far enough beyond the Heugh to be in seven fathoms water ?—If it went out into deeper water it would be better, but there is the great danger of Hartlepool Roads silting up.

21,036. Have they silted up ?—Very much since I first was there.

21,037. How do you know that ?—From my own experience.

21,038. Have you sounded there ?—Many a time.

21,039. When did you take the soundings ?—I have gone in about 18 years ago as master of a ship, when I used to let go my anchor in about six fathoms water, but I don't think that now on the same place there is more than 3½ or 4 fathoms water to be found.

21,040. How long ago is it since you found six fathoms there ?—Seventeen years, perhaps.

21,041. If you saw by the Admiralty charts that there was no material change in the water, should you believe it ?—I know by my own experience, by letting go anchors and soundings myself.

21,042. Had you any reference to the state of the tide at the time ?—There is a strong ebb tide goes out round the Heugh, but very little tide in Hartlepool Roads.

21,043. I am not speaking of the strength of the tide, but of the level of the water. Did you have any reference to the level of the tide at the time you sounded ?—We can't go so far in to bring up as we used to do, and so the place must have grown up.

21,044. When did you last bring up there ?—I went in the steamboat about a month ago. Where we used to anchor the steamboat got aground.

21,045. Do you give that answer deliberately, are you quite sure that you were in the same position ? —Yes ; where we used to let go the anchor, the steamboat came on the ground.

21,046. (*Chairman.*) Are you well acquainted with the vessels in the coal trade ?—Yes.

21,047. And have you known this place a considerable number of years ?—Yes.

21,048. Taking the vessels generally employed in the coal trade, are you disposed to say they are as good vessels as those of a similar description employed in the foreign trade ?—They have some good ships in the coal trade.

21,049. I am talking of the general run of ships in the coal trade, are they as good in general as ships engaged in the foreign trade ?—No, they are not.

21,050. Are ships in the coal trade generally well found—I mean well found in sails and running rigging,

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standing rigging, masts and yards, so as to enable them to work off a lee shore?—Some of them very indifferent, I am afraid, now as times are.

21,051. As respects the state of the hulls what are you disposed to say about that?—A great number of them as soon as they fall in with a gale of wind are sure to make a good deal of water.

21,052. Does the making a great deal of water arise from the circumstance of their being in bad condition, or from the circumstance of their being frequently on the ground, and, as vessels in that case are almost sure to do, straining when they get to sea again?—Chiefly from being in bad condition I should say.

21,053. Does the foundering of a laden collier at sea frequently happen?—It does.

21,054. Do you know from what circumstance that arises?—From the vessels being decayed a little, and when the sea breaks over them they make water and more, and before they get to the shore they sink. It is not long since we had a very large screw collier here. If we had a harbour of refuge down here, or this breakwater at Whitby, that screw collier would have come in, but she sank outside the rock.

21,055. She was very fully laden, I suppose?—She was loaded. The crew got on board a smack, I think—a part, not all.

21,056. From what you heard was she over laden?—I do not know; I made no inquiry of that.

21,057. I have been told that vessels in the coal trade have exceedingly good pumping gear, is that so?—They generally have. The captain looks out for that.

21,058. Does that arise from their being obliged to have frequent recourse to it?—No doubt of it.

21,059. Are colliers, generally speaking, sufficiently manned; I do not mean as to the abilities of the seamen, but as to their numbers?—Some are very well manned, others are quite the reverse.

21,060. Therefore in the winter, in the fall of the year, when there is a great deal of coarse weather, and these vessels are knocking about at sea, making a good deal of water, and what with pumping, and what with the work after four or five days of bad weather, are not the crews pretty well done up?—Yes.

21,061. Then, that being the case, would you be disposed to say if a harbour of refuge existed at Filey Bay, which would enable these vessels to anchor instead of thrashing about, would that be the direct means of saving life?—They would be very glad to get in after thrashing about and after many days pumping; no doubt they would be glad to get into any harbour.

21,062. And those who, when their people are done up—your good shipmaster who keeps the sea in order to endeavour to make his voyage with a crew up or down—does he not run considerable risk of their lives?—Yes, at times; but as long as the ship is good and everything holds on she is all right.

21,063. But I am speaking of cases where she is not good?—Then they are glad to get into any harbour, and sometimes they run upon the beach.

21,064. In that point of view would a harbour of refuge be of any use to the colliery trade, to get up so on their voyage and then to hold what they had made?—It would be of use. I have no doubt that a number of ships would take it at times.

21,065. And looking at the men who are good seamen, and who have the spirit which every good seaman has, of trying to keep out as long as possible at sea, and endeavouring to make their voyage, would it save them generally in these bad ships from very considerable risk of their lives?—In bad ships it would, certainly.

21,066. (*Sir F. Smith.*) I am anxious about the soundings in this proposed plan of Mr. Harrison's. As you talk about sounding in Hartlepool Bay, and that by a cable, I may ask did you take the soundings here in an exact line with the breakwater, because they are not so laid down here on the plan?—I have sounded for the breakwater. I often sound in Whitby Roads.

21,067. Are you quite certain of the exact depth of water in which it is proposed to form this breakwater?—About three weeks ago I went in the steamboat from Stone buoy to Sand's End Ness, and sounded all the line.

21,068. Was that in the exact line of the breakwater?—I think it was.

21,069. Then how is it that the soundings are marked some distance off, some thousand feet or so?—I do not know. Forty-seven feet touches the end of the breakwater.

21,070. I have only one sounding of 60 feet here?—There are none except the 47 feet along the line. The 60 feet is outside the breakwater.

21,071. That is not on the plan which is given to us; there is 60 feet and 47, and there is no other figure in the exact line of the breakwater?—This is the line that we run in the steamboat, where the marks are, where our soundings were.

21,072. That is not where the breakwater is to be. The breakwater is apparently to be in deeper water?—I do not know that there would be the least difference.

21,073. Have you the plan?—Yes.

21,074. Are there any soundings in the line of the breakwater except the 47 feet?—No, there are not.

21,075. Then these soundings do not give me any idea of what the depth of the water is to be at the breakwater, except the 47 feet?—It does not.

21,076. Then I will ask you whether the breakwater is to be in deeper water than is shown by these figures, or in shallower water?—I should think it would be about the same water as is shown in the chart.

21,077. Will you stake your reputation as harbour-master upon that fact?—I will go and sound it first.

21,078. You took these soundings?—I took the soundings on the line.

21,079. I ask you whether, in your opinion, the depth of water is the same, or more, or less upon the intended line than is shown here?—My opinion is, that it will be the same.

21,080. And yet as harbour-master of this port, having taken these soundings, you are not prepared to say positively?—I am prepared to say as far as I sounded. I did not sound where the breakwater is there.

21,081. You did not sound where the breakwater is to be?—I referred that to Mr. Harrison.

21,082. You being harbour-master, and saying that you took the soundings——I was along with Mr. Harrison, him and more gentlemen.

21,083. And the soundings were not taken on the line of the breakwater?—Only in one part.

21,084. Therefore, I want to know from you, whether you will stake your reputation on the soundings of the intended line of breakwater being exactly the same as those put upon this plan?—I think something about the same water, I am not quite sure.

21,085. You are not quite sure, and yet you have no doubt that in Hartlepool Bay there has been an alteration of nine feet?—I have been bringing up in Hartlepool Bay;—I never did here.

21,086. But you have been sounding here?

(*Mr. Harrison.*) The soundings are taken by my assistants. The harbour-master was present in the boat, but I do not look upon him as responsible for them.

21,087. (*Sir. F. Smith.*) They are not taken on the breakwater?

(*Mr. Harrison.*) I said I had already arranged to have soundings taken for you. From all the information I could get the depth of water is nearly the same. I have estimated the line of breakwater would be in eight fathoms, which is deeper than any shown here. I am going to have it laid before you carefully prepared. I quite feel, that in that respect, that is an imperfect plan.

21,088. (*Sir F. Smith.*) You must feel that when a man gives the dimensions of a distant port, and not of his own, one cannot place the same reliance upon his views as if he did know his own ?

(*Mr. Harrison.*) These soundings are taken by my assistants.

21,089. (*Capt. Washington to the Witness.*) You know the coast pretty well ?—Yes.

21,090. Do you know Runswick Bay ?—Yes.

21,091. Were you ever in it ?—Yes.

21,092. Is it a good bay ?—Well, it is a very nice little bay for the size of it.

21,093. Do you use it as a stopping place or what ? —At times we do ; vessels will ride in Runswick Bay.

21,094. Did you ever know a good many go there ? —I have known as much as a dozen sail riding there.

21,095. Do you think it would be useful to make a small harbour of refuge there ?—It would make a very nice little harbour for the size of it.

21,096. But it is small ?—Yes.

21,097. Is it good holding ground ?—Very good holding ground in the middle of the bay, but on each side there is a little rocky Scar.

21,098. (*Capt. Sulivan.*) Will you look at the chart—at the soundings laid down at the east of the breakwater, at the entrance of the harbour, I see there that you have very rapid changes—30 feet alongside 41 feet, and 55 feet inside of 41 feet ;—no regular depth over the whole of that space ?—That will be close up to the rock.

21,099. I am speaking of the whole space covered by the east breakwater. How can there be that irregularity of depth over the space proposed to be sheltered, if it is good holding ground ?—I think that will be on the rock.

21,100. On the east side of the space, in a line between the proposed eastern opening of your harbour—that is on the eastern part of Whitby Bay, which would be covered most securely by the proposed breakwater, and within which vessels would have to anchor, in order to avail themselves of the protection of the breakwater, if it is made ?—It is blue clay in, and very good holding ground.

21,101. Then what can make these sudden changes ? Look at the line running from the harbour directly upon the end of the east breakwater, it goes nine, 13, 20, 35, 33, and 55 ?—There are a great many large stones or loose pieces of rock. Perhaps the lead has happened to fall on one of these sometimes.

21,102. How can you call that a good anchorage ground which is rocky ?—We must keep clear of that in anchoring.

21,103. Yet the part of the bay which would be secure in east-north-east and easterly gales must be on that side of the bay ?—We must not come to the south of the pier to ride. We must come to the north.

21,104. I am speaking of a line directly from your harbour to the proposed entrance. Will you look at the line of the two 55's here ? That would be the best part for a vessel to anchor, if it was good holding ground ?—That is rocky altogether. I see 55, 55, 53, 35, 20 all in a row.

21,105. I want you to look at the side where there is 57 and 41 ?—Outside that there is 57 and two 41's.

21,106. The two 41's are outside the 57. That is about the best spot in the whole bay for vessels to anchor, if they are to have protection from the eastern breakwater. You will see 30 just to the west of this ?—Yes.

21,107. That is considerably outside the 46, 38, and 55 ; therefore, we must presume it is rocky ?—I am not aware it is rocky. I always found it good holding, and never remember a ship driving on the Whitby Rock.

21,108. That 30 is as far east as a ship could anchor to get good shelter from the breakwater. I want to know how all these differences of depth occur in that part of the bay, if you can depend on that holding ground ?—Vessels ride close down to the Upgang Rock.

21,109. They go so far south to ride ; but if the eastern pier is made, and a gale is blowing from the east or east-north-east, the whole of the west part towards the Upgang Rock will be perfectly exposed, and if there was no pier at all to get shelter from, vessels must anchor between the hard ground and the harbour, and it is in that corner that the soundings are so irregular ?—They vary, but I do not know how to explain it.

21,110. You cannot explain whether the irregularity is caused by the rocky bottom ?—I cannot, but I am aware that it is all good holding ground.

21,111. Do you not think, before any plan is decided on to be put forward as a plan to shelter that very corner of the bay for a harbour of refuge, or an auxiliary harbour of refuge, that care should be taken to ascertain whether these alterations are caused by a rocky bottom and what the bottom is ; do you not think that the bottom should be marked on the chart as well as the depth ? And would you not consider that that was very important to ascertain before any decision should be come to about that anchorage ? —I think it would.

21,112. (*Mr. Coode.*) You have said that vessels have anchored close down to the Upgang Rock ; if you look a little to the east of that, you will see 20 feet marked outside 30 feet ?—It varies.

21,113. So that if a vessel were anchored just to the east of the Upgang Rock, and it was blowing from the north-east, there would be a fall of 10 feet towards the south-west only 400 feet off ?—If the wind was in the north-east they would not anchor so far off as that.

21,114. Suppose the harbour were inclosed would it not happen that vessels anchoring there would have a hole of 10 feet within 400 feet of them ?—Where we have 30 and 38 on this chart is the best place for riding in Whitby Roads.

21,115. Supposing the harbour were made, would not a vessel be very much exposed to the wind from the east and south-east ?—No ; so long as they keep to the south of the Upgang Rock, they will have only a rolling swell. If the wind should veer to the east, they would be too much exposed, but so long as it keeps to the south-east, vessels would still ride.

21,116. (*Mr. Lindsay.*) You have been seven years harbour-master here ?—Yes.

21,117. Have you never satisfied yourself upon this very important question, what description of ground you have about here ?—Always when I have gone to sound in the bay I have found good blue clay.

21,118. I mean to the westward of Whitby Rocks, which in the easterly gales would be the best sheltered part of the whole of the proposed harbour. Do you mean to tell me you do not know whether there are rocks or stones there ?—I do not ; I have sounded, and if there are rocks there is sand or mud on them. I did not know that there were any to the north of the pier.

21,119. But speaking as two sailors talking together, and seeing such an irregular depth, jumping from 33 feet to 55, is not that a clear indication that there must be rocks ?—In sounding I have found seven, eight, or nine fathoms water, just about where the vessels ride.

21,120. Can you say positively there are not rocks in the bay where these soundings are marked ?—I never found any.

21,121. Have you ever known ships to lose their anchors there ?—I have known vessels ride there, and when the wind has got to the east, and the sea is coming in very heavy, I have known them slip their anchors.

21,122. Was it because they could not get their anchors ?—Yes.

21,123. It was on account of the suddenness of the gale ?—Perhaps they had been riding for days with the wind blowing down from the south-east. Perhaps it shifted a little and fetched out easterly. They have been rather afraid to ride and thought it better to go out to sea. I have seen several slip their cables, and many get their anchors and go out to sea.

21,124. (*Mr. Coode.*) Have you a chart of Whitby Roads ?—I have not one myself. I can get one in the morning.

Saturday, 23d October 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Sulivan.
Mr. Lindsay.	Captain Vetch.
Captain Washington.	Mr. Coode.
	Mr. Evans, Secretary.

Mr. George Barrick examined.

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Mr. G. Barrick.

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21,125. (*Chairman.*) You are a shipowner and ship builder, resident at Whitby ?—I am.

21,126. Were you ever at sea ?—Oh yes.

21,127. For what period ?—About 20 years.

21,128. For what period in command of ships ?—About 12 years ; from 11 to 12.

21,129. In what trade were the vessels chiefly employed which you commanded ?—All parts of the world, I think. I first began in a little collier, and I finished as a commander in the East India trade.

21,130. Generally speaking, were you employed as a commander in the foreign or in the coasting trade ?—Generally in the foreign trade.

21,131. Give me your opinion as to the best locality for a harbour of refuge in this district of the coast, and your reasons for preferring this or any other site ?—I consider that the geographical position of Whitby is the most eligible position for a harbour of refuge, inasmuch as it is a promontory on the North Sea, projecting from 10 to 12 miles further out than the bight of Tees Bay, consequently, ships—more particularly ships that get into difficulty off this coast, would be able to get into the breakwater at Whitby, when they would not be able to reach further north. I do not mean to deprecate the forming of a breakwater at Hartlepool. Mind, I do not wish to do that on any account, nor to say anything against any other port.

21,132. Then are you disposed to say, that for the purpose of saving life on this coast, it would be better to improve all the ports if possible, so as to take vessels drawing 16 feet at low water ?—Yes, if you can get 16 feet at low water, but I am afraid you would only be able to get it in one part, of this part, of the coast, and that is in the Tyne. I do not think it is possible to get as much as 16 feet on any other part of this coast.

21,133. Supposing you could get 16 feet at the Tyne, and say 10 or 12 feet at the Tees and Wear, would you then, in connection with some improvements here, consider that the most desirable system to adopt ?—I would, in order to assist all.

21,134. As a system ?—Yes.

21,135. How do you view this plan of a breakwater here—merely as a small portion of the contemplated improvements ? I mean that which runs off on the Whitby Rock ?—It would be a very great shelter to ships with the wind from the south-east, or perhaps, even as far southward as south-east by south, and about to east by north. It would make a pretty good anchorage. But the northern part of the roads with the wind at east and by north would be subject to a very heavy sea rolling in.

21,136. So that even if the breakwater on the Whitby Rock was constructed, the vessels would be in a very bad anchorage, and would be exposed to a very heavy sea if the wind backed round to the north, east and blew hard ?—Certainly.

21,137. Do you think that the anchorage ground is sufficiently good, that in such a place they would have a fair chance of holding on ?—I have seen them holding on.

21,138. The roads are good anchorage ground ?—The anchorage is most excellent, until you come to the Upgang rock ; it is formed of blue clay.

21,139. Have you ever seen a considerable number of vessels lying in that anchorage ground in a heavy gale from the north-east ?—Yes.

21,140. What number would you be disposed to say ?—From 60 to 70 sail. Not lying there with the wind to the northward of east ?—Certainly not, because they endeavour to get away as soon as the wind gets to the north of east. They endeavour to get away if possible. Some of them go away, and others, if the tides suit, run for the harbour, and go into the port.

21,141. Can you recollect, during your experience of the port, having seen any considerable number of vessels caught here in a heavy north-east gale ?—I have seen hem sometimes obliged to slip and get away, and some come upon the shore even.

21,142. Under such circumstances have you seen any considerable number ride out the gale? Can you recollect any particular instance ?—No, I cannot, not with the wind at north-east.

21,143. Would you be disposed to say, that with the wind at north-east the sea is so heavy that the chance of holding on would be very bad ?—Very bad indeed, but there have been instances.

21,144. They are few in number ?—Very few in number.

21,145. As respects the more extended plan, what would you be disposed to say, taking the whole thing ? That, of course, would make a capital place; and capital anchorage, there is no doubt of that. I consider, as far as regards that, that by taking it out a trifle further than it is on the plan, it would be one of the finest refuge harbours in the kingdom. For if you take the area of water that you now have where a fleet of 200 sail can ride, you will find that you will have twice the area in any other port on this coast before you could get that anchorage. The ground, I believe, is considered very good ground. I cannot speak so much for the north of the Upgang Rock as to the south, but to the south I know the ground is very good. As indeed you will notice, the ground is pretty steep until it comes near the beach.

21,146. Have you any knowledge whether the ground close up to Whitby Rock is broken ground? If the soundings are correct, the ground looks like rocks and broken ground ?—I can only say that at very low tides during the springs, it sometimes shows a great deal of broken ground there. I cannot say that I have ever sounded to the south to ascertain that.

21,147. For which class of vessels is the harbour of refuge most needed, for light or laden ships ?—Decidedly for laden ships, for if a light ship comes here and is likely to go ashore, if she runs for any part of the beach, except the iron-bound coast to the north, the lives of the crew will be saved ; but laden ships sometimes strike on the ground a considerable distance from the shore, and there is a difficulty in saving the crew. I am very glad, however, to say that I can vouch for the life boats of this place being of as much service as any in the kingdom, wherever the others may be. I have had a good deal of experience, and when there has been any danger, we have always found that there has been no want of men for that service. On the contrary, we have been obliged to get constables to keep the people out of the boats.

21,148. That is very creditable. As respects the light ships, your opinion is, that wherever there is a sandy beach, a light ship can run ashore, get high up and save the people ?—With a few exceptions. There are some places between Runswick and Staiths where it is quite iron bound, and of course there the crew would perish if the ship were run upon the shore.

21,149. But wherever there is a sandy beach all along this coast from Flamborough Head to the Farn Islands a light collier can generally save her crew ?—Yes, she can.

21,150. Can you state any cases in which vessels

have been off Whitby, and have been wrecked in going north and in endeavouring to reach the northern ports?—Yes; unfortunately I had a vessel of my own wrecked some five years ago, on the 4th January gale. A ship of mine got as far as the south cheek of Robin Hood's Bay; after contending with the wind for four or five days, the master attempted to take Shields, and went ashore and was wrecked there upon the Black Middens.

21,151. Was that a large ship?—A large ship.

21,152. Was she a collier?—She was, and a very fine ship.

21,153. She succeeded in reaching the cheek of Robin Hood's Bay?—Yes.

21,154. Then she knocked about in bad weather for several days?—Yes.

21,155. And then she ran back and tried to get into the Tyne?—Yes; and went on shore.

21,156. Where she was lost?—On the Black Middens; the starboard land going in.

21,157. Do you know at what time of the tide the master attempted to run in?—I almost forget, but I think about three-quarter flood.

21,158. I presume the last quarter of flood is the best time for a vessel to run in?—She was struck by a sea just as she came to the bar, which damaged her abaft and carried away the wheel; I believe that was the reason of her going on shore; it was from nothing else.

21,159. So that even if we do improve these ports along the coast there always will be considerable risk in a heavy gale, in respect to laden ships running into them from accident, such as that you have mentioned?—Speaking of Tynemouth, I myself recollect some 40 or 50 years ago, when I was a very young man in command of a coaster, being taken by a gale of wind off Flamborough Head in going down; I carried an immense press of sail and succeeded in getting to the offing of Tynemouth; I hove the ship to, until daylight at five o'clock in the morning, and as soon as it was daylight we took the opportunity of about three-quarters flood, let two reefs out of the main top sail and set the main top gallant sail; all the people took to the rigging except myself and the man at the helm, and we went into Shields without any injury. There were 13 ships went on the Herd Sand, and five on the Black Middens the same tide. We had the greatest difficulty in rounding the piers and were surrounded by broken water on every hand; therefore I consider, that if Tynemouth could be got to have 16 feet at low water there would not be that danger that there may be now.

21,160. From your account of the matter, even when there is plenty of water for a ship to run into these bar harbours, yet in a gale such as you have described, running in, is a matter of considerable risk, particularly if you run in between long piers, is that the case?—Yes.

21,161. When you shook out the reefs and set the main top gallant sail, and bore up for this harbour, and sent all the people into the rigging, you must have thought it a matter of risk and very great danger in taking the harbour?—Yes.

21,162. Is that a reason for giving up bar harbours, and endeavouring to establish a harbour somewhere on the coast where we shall have no tide running out?—It might be.

21,163. Would you be disposed to draw that inference from it? Because, if we had a harbour such as is drawn on this plan for Whitby, running into a harbour of this kind in a gale of wind would be a very different affair from what you have now described, in reference to running into Tynemouth, would it not?—It would. I wanted to succeed in gaining the port, and having a good ship well found and everything of that kind, and well manned, I found, that by making those exertions I should gain my point, which I did. I think that there was the greatest wreck on this coast, in that gale, that ever was known; one or two keels out of Sunderland or the Tyne, I can speak of as having come upon Whitby Sand.

21,164. Do you recollect any other instance of the same kind, that you can tell us from your own personal knowledge?—I cannot.

21,165. You are decidedly of opinion, from what you know of bar harbours, that it would be a very difficult affair, indeed, to make them safe harbours to run into in gales of wind?—Yes.

21,166. Will you give me your opinion as to the most dangerous wind on this district of the coast?—The winds from the south-east, east-north-east, and north-east. Indeed, I consider that we have the wind blowing hardest and heaviest when it is from the north, which is almost along the land.

21,167. When the wind gets round to the north and north-north-east, as a general rule the vessels can manage to get off the land?—Of course, as far as north-east.

21,168. Unless under very peculiar circumstances and being very close in?—Yes.

21,169. Do you think that the sudden shifts of wind which we heard about are common on this coast?—I think the most sudden shifts are, when the wind blows very strong from south-south-east and south, and from that to south-south-west, and it rains tremendously. Sometimes directly the rain is over the wind goes right round to the north-north-west, very suddenly indeed, so much so that you may see the ships standing almost over-end after they get a fair wind to go to the south.

21,170. That shift of wind is not dangerous because it comes off the shore?—Of course not.

21,171. But is it usual for gales on shore to spring up suddenly?—They come on generally moderately.

21,172. A man who has experience on the coast generally has fair warning?—Generally, I should say. The shifts which I have described, the wind flying from the southward to north-north-west and north-west, are the most sudden shifts.

21,173. I am now talking of a breeze suddenly springing up on shore. Are there generally indications in the weather, which would enable a man who is accustomed to the coast, to know a few hours before hand what is likely to come?—I think it generally is so. It gives a little warning.

21,174. Does the sea frequently come in before the wind?—I have known it do so from 12 to 18 hours before the wind came on; it has come in very strong.

21,175. Is that accompanied by calms and light winds?—By calms, light and variable winds.

21,176. So you would say that it might happen that if a vessel was close in shore, although the master might know that he was likely to have a breeze, he might find a little difficulty in getting off the shore owing to the want of wind?—Yes.

21,177. Should you be disposed to say that a man who kept a sharp look out, could generally get off before the gale came on?—He would generally get a little off.

21,178. I think you have already given your opinion, but I will ask you again as to the distribution of harbours, whether that would be better than having one?—I think it would.

21,179. Do you still retain the opinion that a distribution of harbours would be better than one?—Yes.

21,180. But these must not be bar harbours?—There are no others.

21,181. You have given very strong evidence as to the risk you run with a good ship and a good crew, running into the best bar harbour on the coast, the Tyne, at the most favourable time of the tide?—Yes; there is a great risk.

21,182. Well, taking that into account, do you still think that the distribution of bar harbours would be more useful, because bar harbours I fear they must be, than having one single good harbour somewhere on the coast, which should not be a bar harbour?—I do think, that dangerous as bar harbours may be, a distribution of assistance and help, by improving them, would be preferable to having one monster harbour.

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21,183. If an engineer could contrive outside these bar harbours to throw two projecting piers so as to make a little sheltered port for 20, 30, or 40 vessels to run into and find refuge on a pinch, would you consider that would meet the exigency of the case ?—Yes.

21,184. And that would diminish the danger of running in ?—Yes, because the sea would not be near so high and the steerage of the vessels would be much better going in.

21,185. (*Mr. Lindsay.*) Whether do you think that the expenditure of 2,000,000*l.*, which would be about the cost of the proposed harbour at Whitby, here, or the expenditure of half a million at Whitby, half a million at Filey, and half a million at Hartlepool, would do most to save life and property ?—A monster harbour would be most efficient, and most likely to save the most life and property.

21,186. You think the expenditure of two millions here ?—I think the expenditure is monstrous to look at, and it will take such a time to accomplish the work—10 or 12 years.

21,187. Do you think that the expenditure of two millions here would do more to save life and property than if divided between Filey and Hartlepool ?—I do not ; but I think that as a national concern, it is strongly to be recommended.

21,188. You think that as a national concern it is desirable to have the great harbour ?—Yes.

21,189. But looking to the saving of life and property, you think the distribution of the money between Filey and Hartlepool would be better ?—Yes.

21,190. (*Chairman.*) You said that the most dangerous winds were from north-east to south-east ?—From north to south-east, certainly from north-east to south-east.

21,191. Let us suppose the wind at east, and suppose a ship on this coast off Scarborough somewhere between Flamborough Head and Whitby which is nearly a straight line, with an east gale, she could not weather away Flamborough Head to the southward ?—No.

21,192. Nor could she weather away the North Cheek, or perhaps Whitby Rocks to the north ?—No.

21,193. Supposing a ship in this position, how would a harbour to the north of Whitby Rocks save such a ship ?—It could not be of any avail at all if she could not weather the North Cheek ; impossible.

21,194. Is not the difficulty upon this line of coast—does not the danger arise from ships not being able to weather Flamborough Head on the one side and Whitby Rock on the other ?—Yes, that is one of the dangers.

21,195. That is the real danger of this coast of which we are speaking now ?—Yes.

21,196. Therefore, for these ships a harbour as laid down before us, either on the large or the small scale, could do nothing to save them ?—No, sir, that is evident. If she could not weather the Head nor the North Cheek, she must inevitably go ashore between the two.

21,197. Is it the case that the danger arises from ships not being able to weather away Flamborough Head on the one side, and Whitby Rocks on the other ?—Yes.

21,198. That is the danger, is it not ?—Yes.

21,199. Therefore, one large harbour here at Whitby would not save ships caught upon the particular line of coast to which I have referred ?—No, it would not.

21,200. I think you have expressed an opinion that the distribution of public money in improving the existing harbours would do more to save life and property, than the construction of one harbour on any site of this coast ?—Yes, certainly.

21,201. Say, however, that the Government arrives at a different conclusion, and it rested between Filey Bay and Hartlepool (for those are the two great points that were brought before the Select Committee of the House of Commons), and that a harbour was to be made, and only one, looking at all the circumstances—the laden ships, and the light ships, and the prevailing winds—supposing that it rested with you to decide between these two points, would you spend the money upon Hartlepool or Filey ?—I should say Hartlepool, decidedly.

21,202. You would say Hartlepool ?—Oh dear, yes, certainly.

21,203. A great deal has been said about the shallow water about Hartlepool Bay. Do you think there is any real danger in running for Hartlepool Bay in a heavy gale of wind ? I mean greater danger than there would be in running for any other place ?—I have experienced it in regard to two vessels during the last five years, which attempted to take Hartlepool with the wind eastward. One canted her ballast and run ashore ; the other split her main topsail, and she went ashore too.

21,204. But in the case of the one shifting her ballast, was that caused by the heavy sea ?—By the heavy seas that take a vessel down in the bay. She suddenly changes from deep water into shallow water.

21,205. In the other case, when the vessel carried away her main topsail, that accident might have befallen her in any other place ?—Just the same.

21,206. Therefore, the latter case does not apply particularly to Hartlepool, any more than it does to any other place. But the other case does so, in your opinion ?—I think so.

21,207. What depth of water would the ship be in ?—From eight to nine feet only.

21,208. What depth of water would she have under her when she was outside the Heugh where she was struck ?—That would give her from five fathoms to six fathoms.

21,209. If the breakwater was run out there in six fathoms, would that in your opinion remove the danger, just look at the chart and say. (*Witness referred to the chart.*) You see the dotted line running 5, 5¼, and 5, that is called the five-fathom line. If the breakwater was run in that line, do you think the danger would be removed—the danger to which ships are subject from a cross and troubled sea ?—It would improve the navigation in taking the harbour very considerably. If this was carried out, there would not be so much of the direct water ; it would naturally obstruct the sea from coming in.

21,210. Do you think ships would be in danger in running for the harbour when they were outside of it, if the harbour was placed upon this site ?—No, I do not think they would.

21,211. Do you think the water would be so troubled outside of that line of the breakwater that it would make it dangerous for ships to pass through it ?—No ; there is not so great a suddenness in the depth of the water, as I expected. It runs off more gradually. It was only as it was explained to me.

21,212. Do you know Runswick Bay ?—I have never been that way, but it has always been considered to be a very nice little place ; something like a nice pond, and might be a very good shelter for small craft. I think it would be a very great acquisition for fishing vessels generally.

21,213. Speaking more particularly of them, you think it would not be a great acquisition for the passing trade ?—Not very great. If you notice, it is rather indented into the land.

21,214. (*Capt. Washington.*) What would be the best thing to do generally for saving of life from wrecks in ships between Flamborough Head and the Staples ?—To run out at a number of ports piers, or something of that sort.

21,215. To improve the existing harbours ?—Certainly.

21,216. In addition to that should you consider anything more to be necessary ?—It would be very desirable if a large harbour could be made anywhere on the coast. Within my recollection we were afraid of the Dutch coming here. I do not think there is

much danger of them now, but we might have the Russians if they could only get sailors.

21,217. Among the existing harbours you, of course, include Whitby ?—Yes.

21,218. Do you concur with the witnesses yesterday, that an increased depth of six feet at the entrance of the bar would be a great benefit to Whitby harbour ? —I think so, because if it was an increase of only four feet more than we have now many ships that have taken refuge under the rock would take the opportunity of coming into the harbour. The breakwater would not only give increased depth, but would cause the sea to be so much smoother.

21,219. I think you said you had been many years along the coast ?—Not a great many ; I was in the coal and Baltic trade, perhaps, five years. I commanded small vessels two years in this trade.

21,220. During that time did you trade between this and London ?—Between the Tyne and London.

21,221. Did you ever happen to be detained in a fleet of ships north of Flamborough Head ?—Never north of Flamborough Head.

21,222. South of Flamborough Head ?—I have been, more particularly when I was a boy 16 years of age. I was once there when we rode out a very heavy gale of wind. When we rode out a gale then we used to have the topmasts down, now they never see topgallant masts down.

21,223. Can you tell me the reason of the change ? —No ; I think it is greatly to be regretted that it has taken place.

21,224. Is it that chain cables are more secure than hemp ?—No, I do not think they are more secure, there was an elasticity in the old cables that you cannot get now with the chain.

21,225. Is it that the ships are under-manned now ? —No, I think it is for want of, I was going to say, on account of a fear of trouble, and a little want of energy on the part of the commanders of them.

21,226. You spoke particularly of Bridlington Bay ? —Yes.

21,227. Is not that a place in which there is a great congregation of ships along this coast ?—Certainly it is ; I have seen there about 120 or 150 sail, but we sometimes hear of monstrous fleets there of 400 or 500 sail, which I never saw.

21,228. It is a common stopping place ?—Yes.

21,229. Do you think anything could be done to improve it ?—It is very easy to improve it ; a very little expense would make a breakwater at Smithic Sands ; it could be easily done, I think so. I think that out of the ships that take refuge in Bridlington Bay there would be less loss in that neighbourhood than upon any other part of the coast.

21,230. What would be the use of a harbour of refuge at Whitby to a ship crossing between Flamborough Head and Whitby Rock ?—It would be of no assistance if she could not get round.

21,231. Where would be upon that line the best plan for a harbour ?—Ships frequently go ashore on Scarborough Sands.

21,232. Is not Scarborough the deepest part of the bight in that bay ?—I think about a mile off the sands is the deepest part, to the best of my recollection.

21,233. As it happens, it is the deepest part ?—Yes, a little to the south of Scarborough by the bridge.

21,234. Would that be the most likely place to catch ships that were embayed ?—I expect that if a ship were situated in that position, and could not get off the land, the first effort of the commander would be to try and make Scarborough, but if he did not succeed in getting into Scarborough she would go ashore on the beach.

21,235. Are vessels pretty safe in running ashore about Scarborough ?—Life would be safe ; it would scarcely ever happen that any lives would be lost in light ships. There have been some severe accidents at Scarborough with life boats in endeavouring to rescue lives.

21,236. After Whitby, I think you said Hartlepool Bay is the best place ?—I think so.

21,237. You were asked if the breakwater was carried into a depth of five fathom, but suppose it was carried out to eight fathoms beyond the usual breaking of the sea, should you think the benefit would be great and that it would make a great deal more room ?—It must make a great deal more room.

21,238. Should you have any hesitation in running for a refuge harbour at Hartlepool Bay in which the outer breakwater was in eight fathoms water, and supposing that inside there was room to contain 300 vessels ?—I should run for it if I could not keep at sea ; I should try to bring my ship to and ride her there rather than go to the shore.

21,239. Should you have any hesitation in running for such a shelter harbour ?—Certainly not.

21,240. The greater part of what we have heard about the sea breaking into Hartlepool Bay would be contained within a breakwater placed in eight fathoms water ?—I think it might.

21,241. (*Capt. Sulivan.*) I suppose you are aware that a harbour made in eight fathoms water is a much more expensive affair, and would be so costly that you could only have one on account of the expense ? —Of course.

21,242. Would you consider a harbour in five fathoms, enclosing water from two to five fathoms within it, deep enough to answer all the purposes of the collier trade ?—You mean the coasting collier trade ?

21,243. I am speaking entirely of our own coasting and collier trade ?—It certainly would be of great service even in $5\frac{1}{2}$ fathoms water.

21,244. If you had to choose between one of these large and expensive harbours in eight fathoms water, or two harbours made for the same money on the two best points of the coast that could be selected of five fathoms or $5\frac{1}{2}$ fathoms, which do you think would be the best for saving the lives of those engaged in the coal trade ?—I should decidedly say that Hartlepool must be one, and Whitby the other.

21,245. I am not asking you where they should be. You said in the early part of your evidence that two or three of the coal ports improved, would be better than one large harbour ?—I should decidedly say two.

21,246. Supposing those ports could not be improved, and you could come nearer to that by having two small harbours by artificial means on different points of the coast, both sufficiently deep to take in all the colliers that might run for them,—would that be better than having one large harbour only ?—I think two would be better.

21,247. Then if you had your choice between an eight-fathom breakwater in Hartlepool Bay, and a five-fathom or $5\frac{1}{2}$ fathom harbour in Hartlepool Bay and another of the same depth at Whitby, Scarborough, or Filey, you would prefer the latter to the one large harbour at Hartlepool ?—Certainly.

21,248. If the Tyne were improved to 15 or 16 feet by works going on there, would it be a valuable harbour for light ships further north ?—It is really a very valuable harbour for light ships now. It will take them in the first quarter flood and the last quarter ebb.

21,249. If it were improved to 15 or 16 feet would it become a valuable harbour for light ships at all times of the tide ?—I should say it would.

21,250. Then if you had the Tyne improved to that depth, and a comparatively small harbour in the depth of the bay wherever it could be placed, and a second small harbour further south, do you think the wants of the coast would be well supplied ?—Yes, I do.

21,251. Did you mention the name of the *Colony* among the vessels you named ?—She was driven back, I think she was driven back, and was wrecked in going into the Tyne.

21,252. Can you tell me where she was taken by the gale ?—She had been up to Flamborough Head and put back. I think she was driven first in the neighbourhood of Berwick, then thrashed to the south and bore up here. Afterwards she was obliged to

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take up anchor and run to Shields for shelter, and in going in she was wrecked.

21,253. Do you know how far down the coast she had been before she was driven back to Berwick ?—No, I do not.

21,254. Was she off Flamborough Head ?— She was to the south of Whitby, but how far to the south I cannot say.

21,255. Are vessels often driven back off Flamborough Head to Leith Roads ?—Yes.

21,256. Supposing that to have been the case in this instance, would a harbour at Filey have saved that vessel if she had been there ?—If she had been off the Head, and if the wind had been from the south-east, it might have saved her.

21,257. You said that ships used to take much more care than they do now in striking masts ?—Yes.

21,258. What was the size of the vessel you served in 50 years ago ?—250 tons. I served my time in a brig. In the Baltic we used to have three boys and seven men. That was making two or three voyages a year to the Baltic.

21,259. Were you in the coasting trade in those days ?—Occasionally I commanded vessels in the coasting trade.

21,260. Taking a collier of 200 tons—a brig, what was the usual crew in those days ?—From eight to nine hands.

21,261. Not more ?—Nine hands would be the outside, and two boys out of the nine.

21,262. Because we understand now that the crew of a brig of 200 tons to 250 tons, is a master, mate, four men, and a couple of boys ?—I have several vessels on the coast, of from 230 to 250 tons, and they have from nine to 11 hands for their crews.

21,263. Do you think from what you know of the work on board a collier, that four or five working men at the most, besides the master and mate—including boys perhaps—could generally manage in heavy weather to get the yards and masts down, and get them up if the wind shifted in Bridlington Bay, in time to get out ?—I do not think it is very much matter. Top-gallant masts and yards, they are of little consequence getting up after a gale of wind because it is soon done. It is only a quarter of an hour's job.

21,264. But the lower yards ?—I understood you to say the top-gallant masts. The lower yards are very different.

21,265. I understood you to say that ships used to strike their lower yards and top masts ?—No.

21,266. In a collier requiring to go to sea, if the wind shifted, and having to run somewhere else, do you think with the few hands they have, a man dare get his lower yards and top-masts down ?—No.

21,267. You were referring then only to the top-gallant masts and yards ?—Only those. On the contrary, they very seldom get top-gallant masts, as half of them have no top-gallant masts up.

21,268. (*Capt. Vetch.*) Referring to the north-east coast of England, between Flamborough Head and Tynemouth, with a view to save life and property, if you had to construct a harbour with that object, what site upon this coast would you prefer for that harbour ?—I decidedly would say, this plan here before me. (*Witness referred to the Whitby plan.*) It is the most likely place to pick up ships in distress.

21,269. You are speaking of Whitby ?—Yes, I am speaking of Whitby. It would be useful if anything happened—a top mast or anything of that kind was carried away, if they could come in here.

21,270. A harbour that would admit vessels at any time of tide ?—Yes.

21,271. Gentlemen are generally rather partial to their own ports ?—I would not speak partially of my own port.

21,272. I do not want to say anything about what you have said here, but supposing Whitby to be the best site in your opinion for that purpose, what other port do you consider to be the next best ?—I should say the Tees or Hartlepool Harbour.

21,273. Do you consider that a breakwater in Tees Bay, running in a depth of seven fathoms water, would be quite sufficient to receive all vessels which are likely to require such shelter ?—I think it would for all coal coasters.

21,274. Would a line of breakwater off the Heugh, running along the line of seven fathoms, in your opinion give effectual shelter for any vessels that are likely to run for that place ?—It would.

21,275. Which of the two harbours shown upon the large plan, south-east or north-west, is the best holding ground ?—I cannot speak of that, I know very little about the port to the north of the Upgang Rock. I can speak of the south of that, I have understood that it is very good holding ground. That is all I know.

21,276. It appears that the Sand's End Ness anchorage has very regular shoaling ?—As far as regards that ground, upon reflection, I recollect very well three ships coming ashore, having broken their chains and windlasses. That shows the ground must be good.

21,277. What are you speaking of ?—The north-west part of Sand's End Ness. The wind came to the eastward, and caught them. They rode until the windlasses of two of them were upset, and the other's chain parted. That was all in one gale.

21,278. You think that in Whitby Bay, or more properly the south-east part of it, the anchorage ground is sufficiently clean and deep to answer all the purposes of an anchorage ground ?—I think it is. So far as regards the discrepancy of the water it seems to be so near the rock, that it is of no moment because no ship would ever bring up so near to Whitby Rock as laid down there. No prudent man would do so.

21,279. Then if there should be funds for one of two bays only, which would you prefer for a harbour, Sand's End Ness or Whitby ?—I think I should prefer Whitby, as it would be the greatest protection against the winds most dreaded from south-east to east-north-east. There would be no shelter in Sand's End Bay against those winds whatever.

21,280. (*Mr. Coode.*) Are your vessels engaged in the coal trade ?—A great many of them in the coal trade, and some of them in the Baltic.

21,281. We have heard that the crew sail by the voyage—is that the invariable rule ?—The invariable practice in the northern ports.

21,282. Does that apply to the master as well as to the crew ?—Entirely ; the whole crew, master and all.

21,283. It is invariably the case ?—Yes, invariably the case.

21,284. (*Sir F. Smith.*) If I understood you rightly, you give a decided preference to a harbour of refuge at Whitby ? Great or small you give the preference to Whitby over all the ports on the coast ?—Yes, I do.

21,285. Whitby is No. 1. with you ?—It is not more No. 1. with me than Hartlepool Bay or Bridlington Bay.

21,286. Now do not misunderstand me, I mean your opinion as a sailor ?—Yes.

21,287. Now what is No. 2. ?—I would say next, Hartlepool.

21,288. What is No. 3. ?—As you have made out such a case, if we cannot weather the North Cheek of Flamborough Head there is nothing but Filey Bay. I had a ship lost on the 4th January 1857, in consequence of carrying away the mainyard just as she got the pitch of the Head ; she was not able to weather it, and went ashore on Filey Sand and was lost there. That vessel was called the *Ratcliffe*.

21,289. Whitby stands No. 1. ?—Yes.

21,290. And Hartlepool is No. 2. ?—Yes.

21,291. No. 3. is Filey ?—Yes.

21,292. Will you give No. 4. ?—I do not know. I have been told Redcar is a very nice place, but I cannot speak for it.

21,293. I do not want to know any man's opinion at present but yours. As regards Redcar you can give no opinion ?—No, I cannot.

21,294. (*Capt. Washington.*) You are a large shipbuilder ?—I have been, and am a little yet.

21,295. Therefore, naturally much interested in the shipping along the coast. And you are a shipowner also ?—Yes.

21,296. You are acquainted with the entrance into the Tyne ?—Yes.

21,297. You have heard that piers are being carried out now ?—Yes ; it is nearly 50 years since I went into the Tyne, 45 or 50 years since. I have not been there since. I then commanded a coaster.

21,298. At what depth of water did you go over the bar ?—Six or seven feet at low water.

21,299. You probably are aware that, with the piers now carrying out they expect to get from 13 to 15 feet at low water ?—Yes, so I understand.

21,300. Do you consider that that would be a great boon to the trade of the north and east of England ? —I do.

21,301. Do you think it would be worth a moderately large expenditure to accomplish that result ?— Yes, a moderately large expenditure.

21,302. (*Chairman.*) Are the vessels that are employed in the coal trade, as a general rule, vessels built for the purpose ?—Many of them are not, but many of them are. I own 25 sail of ships, and all of them have been built within the last 10 years, all have been built here and at Sunderland.

21,303. Do I understand vessels in the coal trade are vessels that have been built for that special trade, generally would you say so ?—They are generally what we call second-hand ships, that have come out of the West Indian or Mediterranean trade; but there are some of them very good.

21,304. So that the vessels employed in the coal trade are generally vessels that have been previously employed in the foreign trade, and have now become old ships—comparatively speaking old ships, and are turned over to the coal trade ; is that it ?—Yes.

21,305. I presume that one reason why vessels of that description are used is from the nature of their cargo—that it not being of a perishable nature, a vessel of an inferior description is sufficient for the purpose ; is that the case ?—Yes, that is the case. They find a difficulty in getting them underwritten at Lloyd's and elsewhere, they then sell them and get new ones. Many of the ships sold are bought by people on the coast and make colliers.

21,306. In that way they get a cheap ship to do the work ?—Yes.

21,307. Many of these ships which are obtained in this way are very good ships, and quite sufficient for the purpose, and in good condition; is that the case ? —Yes, more particularly those that are owned by sailors. They know what is wanted on board ship.

21,308. Are you disposed to think that vessels that are owned and sailed by men who have followed the sea, are better found and better vessels than those that are owned by men who have not followed the sea ?— I would not say better vessels, but certainly better found. A man who does not know anything of the sea may have as good a vessel as one who does.

21,309. Have you, as a shipbuilder, often had colliers under repair ?—Yes, very often.

21,310. Then you must have a good notion of the style of vessels they generally are ?—Yes.

21,311. What are you disposed to say about them as to their hulls ?—Generally the ships belonging to this port and to Robin Hood's Bay are of a very good class.

21,312. Those are the only ships of which you have personal experience ?—Yes.

21,313. Have ships from other ports been sent to you ?—Yes.

21,314. What is your opinion of them ?—They are not a bit better than our own.

21,315. But are they as good ?—I question whether they are as good, but not a bit better.

21,316. (*Capt. Sulivan.*) How long have you been engaged in ship building ?—We represent the oldest ship-building firm in the kingdom.

21,317. Have you been engaged in that business for the last 20 years ?—Thirty.

21,318. You say you have repaired a large number of colliers ?—Yes.

21,319. Have you ever broken up one ?—No never.

21,320. It has never fallen to your lot to break up a collier ?—No.

21,321. Do you know any people here who buy old colliers and break them up ?—I do not in my experience recollect more than one ship called the *Suffold* being broken up.

21,322. What becomes of the old colliers ?—That I cannot tell. I know one ship which left Hartlepool on the 23rd of January and was never heard of afterwards. A screw steamer run her down and all hands were lost.

21,323. What is your experience of the end of old colliers ? Are many of them run until they founder at sea ?—I hope not.

21,324. Or until they are so leaky that they are obliged to be run on the coast to save the people's lives who are in them ?—I do not believe it.

21,325. But there is no other trade they are put in after they are too bad for colliers, and you have not broken up one ?—I have seen one broken up.

21,326. Therefore, to your knowledge, there has been only one collier broken up in Whitby ?—I do not know that she was a collier. I think she was a ship in the habit of going to America.

21,327. Then you have not known a single collier broken up ?—No, I do not know that I have. They are always repaired. I have a vessel between 70 and 80 years of age, and as good a one as can be sent to sea.

21,328. (*Mr. Lindsay.*) I wish to know whether in you experience you have found vessels employed in the coal trade — 20, 30, and 40 years of age — as sound and strong as they were the first day ?—I cannot speak to their internal timbers. It is impossible to say how they are without skinning them.

21,329. But when you have opened them out ?— Whenever they have been opened out they have been put in proper repair.

21,330. Is it a fact that some of these old vessels, in the course of time, are repaired at different stages to such an extent that really, if you go back with a vessel of 40 years old, you will find very little of the original planking and timber ?—There is very little, if they have been properly repaired. They have a thorough repair at the end of five years, and then in the course of 10 years another repair.

21,331. So that, in fact, they are maintained and kept up good and safe vessels to a very old age ?—To a very old age.

21,332. (*Chairman.*) Would you be disposed in that way to account for the circumstance of their not often being broken up—that they go on repairing them, and keep them running in the trade ?—Yes.

21,333. That is the way you would account for it ? —Yes.

Mr. William Broderick Smith examined.

21,334. (*Chairman.*) You belong to Whitby and are a shipowner here ?—Yes.

21,335. You were master of a ship for 19 years, and were 27 years at sea ?—Exactly so.

21,336. And you sailed principally to the Baltic ?— Yes.

21,337. You have seen the plan of the proposed harbour of refuge. Will you give me your opinion as to it ? What do you think about it ?—I think as to the locality of the harbour of refuge, and also as to the plan before me (*that put in by Mr. Harrison*), a better one could not be made anywhere along the coast.

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21,338. We have a very large plan here. Taking, in the first instance the, smaller plan of a breakwater upon the Whitby Rock, do you consider that that would be of great advantage to the passing trade ?—Unquestionably as a refuge for laden vessels bound south.

21,339. So that vessels bound south could come in here in heavy winds from the east, and wait here for a fair wind to make their passage. Is that the mode in which you view it ?—Yes ; if the wind did not go too far to the northward and so prevent them clearing the land. But to carry out the extended scheme, it unquestionably would make the best harbour anywhere to save vessels both light and laden.

21,340. Are you acquainted with the entire ground which I see marked " good anchorage ground " southward of the Upgang Rock ?—I have often seen vessels riding there with the wind very strong from the south-east and south-south-east. I always understood they ride well, and never drive there except from carelessness.

21,341. In such winds they are sheltered to a great extent by the Whitby Rock ?—Yes, particularly at low water.

21,342. Have you ever seen vessels riding there with the wind right in and a heavy sea ?—No, I never did ; there have been cases where vessels have ridden that they have been compelled to come on the beach in consequence of riding too long.

21,343. They have been compelled to come on the beach for fear of foundering at their anchors ; from fear, in fact, of the heavy sea ?—That, perhaps, might be one case ; another case is that they sometimes come on the beach under these circumstances—it is advisable when they see no chance of riding longer to come in at high water, by which means there are better chances of saving lives.

21,344. You attribute their coming ashore as much to the reason of coming in, if possible, at a high tide, as to the fear of foundering at their anchors ?—I think so.

21,345. Why do you prefer Whitby as a harbour of refuge to any other place ?—Because vessels from the northern ports seldom leave without some prospect of getting south, and almost invariably they get as far as this, or even on to Flamborough Head, before the wind comes on, and then they might get in here.

21,346. Then would not a harbour to the northward of the Head, or Filey Bay be better for catching those vessels which are making the passage, because they would rather be to windward ?—But a great many vessels do not get so far south, and a harbour of refuge there, would be of no advantage to those vessels.

21,347. Whitby is just at the spot where it would catch the great number ?—With south-east gales it would catch even the vessels at Flamborough Head, because it would be a very hard matter if they could could not get back so far.

21,348. Do you consider a refuge is more wanted for laden or for light ships ?—For laden ships.

21,349. For the reason stated by the previous witness ?—Exactly so.

21,350. In your own knowledge, can you give me any case of a vessel which has been off Whitby, and which has been wrecked going to the north in endeavouring to reach the northern ports ?—I can, unfortunately ; we had one of our own lost in the January gale, the *Zephyrus* bound here ; she could not make Whitby, and ran against West Hartlepool Bar, and was there sold as a wreck. Then there was the *Colony*, of Whitby, in the present year ; she was somewhat south of this, and brought up in these roads; she weighed from these roads and was driven to a bay near Runswick ; the crew were taken off by fishermen, and the vessel after wards got into Runswick Bay. I went down to her for Lloyd's, got her brought in, and sold her for what she would fetch. She got up as far south as Huntley Foot ; the weather then became bad ; she made for the Tyne, and was eventually wrecked. The *Amelia*, a vessel belonging to this port, was south of this in the January gale, and was lost in Runswick Bay with all hands. There were two vessels belonging to the Staithes Shipping Company, one called the *Mary Anne*, and the other *Peter and Mary*, they were both lost with all hands in endeavouring to get further north. There are a great many more which could be named.

21,351. In your experience as a master of a vessel, have you ever been exposed to taking these bar harbours in gales of wind on shore ?—No. I was mostly engaged in the foreign trade ; I was occasionally coasting, but always happened to get down to this place with suitable weather.

21,352. What do you consider the worst winds on the coast ?—Unquestionably from the south-east and east-north-east.

21,353. Do you concur in the account given by the previous witness of the way in which they come on occasionally ?—Well, we frequently see the vessels leaving the Tyne and the northern ports with the wind from the west-south-west or south-west, and as they get further down the wind comes to the southward until it gets to east-south-east and south-east, when it goes on increasing until it increases to a gale ; that is what I have frequently seen myself.

21,354. When the vessels get to the Head when the wind is from the southward, does it come more ahead as they endeavour to round Flamborough Head? —That depends altogether on circumstances ; we almost invariably find, when the wind gets to east-south-east and east, that when we get south of the Head it becomes a little more favourable. When a ship gets to the Head with a wind from the eastward, in nine cases out of ten she will get into the Humber.

21,355. But when the wind is tending southward a little, how would you then expect it to be when you round the Head ?—That altogether depends upon circumstances. If the barometer was rising, I should think it would betoken the wind to go more to the eastward ; but if it was low, it would betoken the wind to go south. That would be the view I should take of it.

21,356. I think you say that the vessels generally start with a slant of wind from the eastward ; in making the passage do they keep in-shore ?—The colliers invariably keep close to the land.

21,357. For what purpose, to avail themselves of the tide, or the slants of wind off the land ?—They have smoother water if the wind at all hangs from the land ; they very seldom leave the northern ports unless it does. With an easterly wind they keep a distance from the land.

21,358. They try to make offing when they get out ? —Certainly.

21,359. Do you think this breakwater will improve the entrance into your own harbour ?—There can be no question about that, inasmuch as vessels bound to this port, and that might want to take it for other purposes, when they come round the rock with a south-east or south-south-east wind, find the sea is so strong that, in several cases, they cannot fetch the harbour, but go on the sand ; but with this breakwater the water would be quite smooth when they come to the leeward of it, and they would make way and fetch in.

21,360. What is the greatest number of vessels you have seen anchored under the rock with the wind at east-south-east ?—With the wind at that point they begin to get away ; we seldom find them here with the wind to the eastward of south-east ; it is time to get away then.

21,361. With the wind from the south-south-east ? —Upwards of 100 sail, repeatedly.

21,362. What is the greatest number of vessels you have ever seen off Flamborough Head ?—I never saw many vessels there, being in the foreign trade.

21,363. (*Mr. Lindsay.*) Do the colliers as a rule carry barometers ?—I believe not.

21,364. Do not you think it would often save them from being caught in a gale of wind on this dangerous coast ?—I should not like to go to sea without one, myself.

21,365. Do not you think it would be wise on the part of the owners of colliers—that it would be for their own advantage, without speaking of the safety of the lives of those on board—to put a barometer into each ship?—It certainly has that effect—the rising of the barometer with a southerly wind.

21,366. Do you think if each collier sailed with a barometer there would be the same fear of their being caught on this dangerous coast?—There might, or there might not. I cannot say.

21,367. As you have had great experience in the Baltic trade, do you think a harbour of refuge necessary on the east coast of Scotland?—For ships bound to Scotland it might be; but ships bound to England seldom make the land north of the Firth of Forth. I never myself, except in one case, made the land north of Whitby, and in that case we were driven down to the Firth.

21,368. Where did you make the land?—At the Farn Islands.

21,369. That is the furthest north you ever made the land coming from the Baltic?—Yes.

21,370. Do you know enough of the trade which goes along that coast of Scotland to form an opinion as to the necessity of a harbour of refuge there?—No; I have been from the Baltic to Liverpool several times, but we went straight to the Pentland Firth, so that I cannot give an opinion.

21,371. Say that there was to be one great harbour of refuge on this coast, and that it rested between Hartlepool and Filey, which would you prefer?—I think Hartlepool, because the trade of itself would induce vessels to go there and terminate the voyage.

21,372. Do you know Redcar as a site?—I do not know anything as to its capabilities of making a harbour.

21,373. Speaking to you as a sailor, suppose you could get there the same area of deep water as you could at Hartlepool, do you think a harbour at Redcar or one at Hartlepool would be of the greatest advantage?—I think in that case Redcar, because the land is bolder, and the place would be better to make. In the Tees Bay the land is low and difficult to make in the kind of hazy weather which there often is when the gales blow.

21,374. Say the public money was divided thus:—half at Filey and half at Redcar or Hartlepool, would that do more good than making a harbour on one site?—I think the improvement of two or three of the existing harbours would be of more advantage to the trade generally and prevent loss of life, more than making one large harbour.

21,375. Would you give the preference to the improvement of the existing harbours and making them accessible at all times of the tide?—Yes.

21,376. And would the second point be to spend part of the money at Filey and part down in the Tees Bay, and then to make a harbour suitable to receive laden vessels somewhere in this neighbourhood? That could be the second point?—Yes.

21,377. You think the first point would be to make a refuge for laden vessels somewhere in this neighbourhood?—That should be the first point, unquestionably.

21,378. Next, the improvement of the existing harbours?—Yes.

21,379. Say that it was put to you to decide between these alternatives,—that you had the money put into your hands to expend either upon one site, or that you were bound to spend it upon two harbours, one being the Tees Bay and the other Filey, could you pick out any site where the money would be better expended for the saving of life and proporty than either of these places?—If you made a harbour here and another at Tees Bay, I think it would catch the most of the vessels. If they could not get one way they could another. Vessels are often caught off Whitby, and if they could not get south they surely could get north.

21,380. Therefore you would be in favour of dividing it between the two points?—I should decidedly give the preference to two harbours instead of one. I think that there should be two harbours at the two best sites that could be found for them.

21,381. Looking at the land on the map, is it the case that when a ship during an easterly gale bound north can weather Whitby Rocks she can go three points to the westward?—No, there is not that difference in the coast.

21,382. What is the course from Flamborough Head to Whitby? From Filey point what will be about the course?—About south-south-east and north-north-west. It depends on how far you are from the land.

21,383. What would be the course from Whitby point?—I think north-west by north, but you must keep clear of Kettleness; you would not keep off more than one point.

21,384. You say that the course is north-north-west from off Filey to Whitby Rocks?—I cannot say exactly.

21,385. What course do you steer down in order to clear Redcar Rocks?—There I am pretty certain about the coast; it is only north-west by north.

21,386. Only keeping away one point?—That is about it.

21,387. It looks to me as if you have more than that. Look at the map of the coast, and tell me if there is not more. Suppose that you were two miles off to the east of Filey Brigg, and you were shaping a course down so as to clear two miles off Whitby Rocks and were bound to Hartlepool Bay, the course from there, I understand, would be north-north-west?—I understood you to say Flamborough Head. At Filey you are further in shore and must steer further out.

21,388. What course would that be?—Nearly north and south.

21,389. What would the course be from a mile to the east of Whitby down to the outside of Redcar Rocks?—North-west and by north.

21,390. That is about three points?—Yes; but at Filey you are a long way within the line of the course you would go from Flamborough Head. When you asked me before I understood you to say from Flamborough Head.

21,391. If a vessel was caught with an east gale down on the line of coast between Flamborough Head and Hartlepool, and if she could weather away Whitby Rocks she would be in comparative safety, compared to what she would be between Whitby Rocks and Flamborough Head?—She would certainly be able to keep away longer before she came to the shore, because the coast goes more away.

21,392. Tell me how it is that ships are driven ashore between Whitby and Flamborough Head. There were 27 in the gale of last year, and nine with all their crews were lost. What was the cause of these ships getting on the shore? Was it not that they could not weather the land on either side?—It blew so that they could not carry canvas.

21,393. They were so situated that they could not weather Whitby Rocks to the north, or Flamborough Head to the south; is that the fact?—Yes.

21,394. Would a harbour of refuge at Whitby have saved any one of those ships?—It would, because they could have got in before the weather came so bad. They tried to get north and contended with the weather until it came bad. A good number of them were light.

21,395. But if there had been a harbour of refuge here, tell me how it would have saved any one of these vessels?—Because they would not have gone past it, knowing the danger.

21,396. I am speaking of those unfortunate vessels that were lost between Whitby and Flamborough Head; would it have saved any one of those ships?—Perhaps not, because that was an extreme case—such a gale as I hope never to see again.

21,397. There was an equal, if not a greater number, lost between Whitby and the north of the Heugh?—I think we had most lost on this sand, until we come into the neighbourhood of Hartlepool. I do not think

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that many were lost between here and there—that is, totally lost; we had a great many on Whitby Sand between here and Sand's End Ness.

21,398. And a harbour of refuge here would have saved all those ships?—Every one. It would have saved every one. Some of those that were bound here and saw no chance of getting in, were lost at Hartlepool.

21,399. Do you know the nature of the anchorage ground in the roads here?—It is good.

21,400. How do you account for these great alterations in the soundings, from 23 to 35 and from 35 to 50?—I think there is one of the old pilots here who will give better information than I can.

21,401. (*Capt. Washington.*) You were speaking of the gale of the 4th January 1857?—Yes.

21,402. Did I understand you to say that many vessels were lost on Whitby beach?—Yes.

21,403. Whereabouts were they lost? — Mostly within the line of the proposed breakwater.

21,404. Were they north or south of the entrance of the harbour?—All to the north. If they come in the south side it is sudden destruction; they never think of coming in on the south. All lost in Whitby Bay were lost to the north.

21,405. How many?—I cannot say.

21,406. What were some of the names?—The *Port Glasgow* was dismasted, and eventually drove on shore about the north end of the proposed breakwater—a little nearer to Sand's End Ness. She would have been saved to a certainty if the breakwater had been there.

21,407. Any other?—There was a brig belonging to London called the *Abema*. That vessel would have been saved.

21,408. Where was she lost?—Near to Sand's End Ness. There was also a laden ship called the *Amelia*; all of her hands were drowned; she would have been saved.

21,409. Where was she wrecked?—She foundered off Runswick Bay, but she went past here; she drove past in the gale. Two schooners belonging to the Staiths Shipping Company, one called the *Peter and Mary* I think, and the other the *Mary Anne*, though I am not certain about that name, were both lost. They both foundered with all hands.

21,410. Whereabouts?—Somewhere in the neighbourhood. They were seen off here.

21,411. Off where?—Off the port in the beginning off the gale.

21,412. Had they passed Whitby Rocks sufficiently to enable them to come into the harbour here?—Unquestionably.

21,413. When were they seen last?—There was one lost a little to the north of the harbour, and another away south. They both foundered.

21,414. You still think both could have come in here?—Yes.

21,415. How could the vessels to the south have come in?—They would have come in before the weather got so bad; they were both laden. They could do nothing but make the best of it.

21,416. Can you tell me of any more?—There were more but I do not remember the names.

21,417. You have no doubt these vessels would have been saved, had there been a refuge harbour?—There can be no question about that; it is quite certain.

21,418. On that day how many lives were lost?—In the *Amelia* I think nine or ten. In the two small vessels there were at least eight on board the two; and all these men were drowned.

21,419. How many altogether?—Taking the *Amelia* at nine, that would make 17 in these three vessels.

21,420. Do you think we might take it as a safe guide, that where the greatest number of lives are lost there the refuge should be placed?—Unquestionably so, I think.

21,421. Could any of those vessels have gone into refuge at Scarborough or Filey Bay?—I do not know that any of those three were so far south as Scarborough, although is was never known, because there was no one left to tell the tale.

21,422. You speak of those which foundered?—Those which came on the beach were light vessels, so that they must have come from Flamborough Head, but could not clear the land further to the northward, and so came ashore here on the sands.

21,423. After passing Whitby, if a vessel could not get in and is obliged to run to the north, where is the next best place?—It would depend where the harbour was made. The nearer the better, I should think. The next best place would be Tees Bay.

21,424. Did you make any voyages to or from the Tyne when you were at sea?—Only two or three coal voyages.

21,425. Are you acquainted with the shipping of the Tyne?—No.

21,426. You know it is very large?—Yes, I know that very well. I have been there several times.

21,427. Is it very desirable that an effort would be made to improve the entrance into the Tyne?—Yes, because it is notorious that in the prevalence of north winds the light vessels accumulate in Bridlington Bay or Yarmouth Roads. They run down there because they cannot, as it now exists, make the Tyne at all tides and in all sorts of weather. No doubt if the entrance to that river were improved to such an extent as may be proposed, it would save a large amount of property and some lives.

21,428. We have heard it often stated that, do what you will, vessels will try for the port they are bound for if possible?—I believe the men, being paid by the voyage, naturally endeavour to get to the far end of it if they can.

21,429. If a gale springs up the laden vessels will still hold their own in the hope of a slant of wind and in the hope of getting to the south?—Very many would avail themselves early in the gale of a refuge made anywhere between here, for instance, and Flamborough Head, especially in the winter season.

21,430. By so doing they would save a great risk of life as well as a great deal of property?—Of course they would.

21,431. (*Capt. Vetch.*) Suppose that the wind is fair for the voyage from the Firth of Forth to the Thames, but that when the vessels bound southward get off Flamborough they are headed by an adverse wind, where do you think the greatest number of these vessels would receive refuge by means of a good harbour?—For those caught off Flamborough Head unquestionably Filey would be the best, because there would be the least distance to come back.

21,432. I meant to say, that, suppose an adverse wind came on, where could these vessels be best able to receive succour by means of a harbour of refuge?—That would altogether depend upon where the ships were.

21,433. Suppose these scattered between the extremities?—In that case they would require three or four harbours to receive the whole of them.

21,434. Would not a harbour in the bight of the bay most likely be the means of saving the greatest number?—It would be in one sense of the word; but as a set off against that the land is bad to make, more particularly in bad weather, because it is low and very bad to make.

21,435. Filey Bay would catch those lying between Filey Bay and Flamborough Head?—Certainly.

21,436. Whitby would catch those which lie between Filey and Whitby?—Yes.

21,437. And Tees Bay would catch those between Whitby and Hartlepool?—Yes.

21,438. And what I want to ask is, which of these three places would be likely to save the greatest number of vessels?—That is a question I am hardly prepared to answer, because it would altogether depend upon where the greatest number of ships were.

21,439. Would Filey Bay or Whitby save the greatest number?—How is the wind?

21,440. The wind is such that you cannot proceed

beyond Flamborough Head. It is adverse?—If the wind was away from the south-east or east-south-east, an on-shore wind, I should say Whitby would be the best, because vessels which could not reach Filey would come here. If the wind was east-north-east, the vessels would go round the Head and get into the Humber.

21,441. After Whitby, which other place do you consider most likely to save vessels?—I think Tees Bay.

Mr. JAMES ELLIS examined.

Mr. J. Ellis.

21,442. (*Chairman.*) You are the pilot master of Whitby?—Yes.

21,443. You have been at sea 40 years?—Yes.

21,444. And of that period you have been 16 years master in the Baltic and coasting trades?—Yes, and in the Mediterranean.

21,445. Have your voyages been made chiefly from the Baltic or on the coast?—Well, I cannot say there is much difference. I served my time along the coast, and have been engaged in the Baltic trade as a master. I have been engaged in the Mediterranean trade as a master, and in the coasting as a master.

21,446. How many voyages have you made from the Baltic?—I have been three or four times to St. Petersburgh, and about the same number to Dantzic; perhaps a dozen or 15, I cannot exactly say.

21,447. Have you come home often late in the year?—Yes; not often, but I have come home late in the depth of winter.

21,448. Where have you made your landfall?—The fore part of the time I generally used to endeavour to make the Yorkshire coast—Flamborough Head.

21,449. I did not ask you what you endeavoured to make, but where you have actually made the land?—I have often made High Whitby, for one place.

21,450. What is the most northern point of the coast you ever made as a landfall in coming from the Baltic?—High Whitby, never to the north of that.

21,451. You have seen the plan of the proposed harbour of refuge here?—Yes.

21,452. Will you give me your opinion as to the position. Tell me what advantage you think there is in putting a harbour here at all?—I think the locality is the most suitable along the coast.

21,453. Why is it the most suitable along the coast?—Because ships from the northern ports generally take a favourable opportunity for coming out, and calculate on getting part of the way on the voyage, before they are caught. This is especially the case coming from Shields or Sunderland. They generally calculate that if they can get as far as Yorkshire, they may get to Whitby Rock. After going round that, perhaps they find the wind two or three points more southerly. These ships very often have to contend a long time with it, before they get to the Head.

21,454. Taking the passage from Sunderland or the Tyne, or the Tees, are you disposed to say that the most difficult part between the Head and those ports, is that between Whitby and the Head? Which is the most difficult part of the passage to the Head, between Whitby and the northern ports, or between Whitby and the Head?—If you come out of the ports you generally go away with a slant of wind, and get up to the Yorkshire land at Whitby. After you come to Whitby Rock, perhaps you fall in with very heavy weather. Indeed, ships often meet with a strong southerly wind after they get round the rock, that goes on increasing.

21,455. So that the slant of wind that brings them from the ports in most cases, gets them as far as Whitby?—Yes.

21,456. Taking the smaller portion of this breakwater on Whitby Rock, you have heard the reasons which the two previous witnesses have given for saying that it would be an advantage for saving life. Do you concur in these reasons?—I do.

21,457. And of course the larger would be so much better?—It would answer the purpose better.

21,458. Because you would get shelter from all winds?—Yes, it would do to take in all storms for any kind of vessels. The deeper the water at the entrance, the better it is for them to run in.

21,459. You have heard the evidence as to the most dangerous winds. Do you concur with the other witnesses in the opinions they have expressed?—Yes.

21,460. Which do you want the harbour for most—laden or light ships?—Laden ships.

21,461. For the reasons we have heard from previous witnesses?—I do not remember taking notice of them.

21,462. Then give me your reasons?—You can do with a light ship what you cannot do with a laden ship, and besides that, you can, from her not drawing so much water, go with her where you cannot with a laden vessel.

21,463. She can get into a harbour, or higher up on the beach than a laden vessel?—Yes.

21,464. You concur with the previous witnesses as to the advantages which this breakwater will be for ships getting into your own harbour?—Certainly.

21,465. (*Mr. Lindsay.*) Do you know the anchorage in Whitby Bay?—Yes, very well, indeed.

21,466. Is it good holding ground?—I do not think there is better anchorage along the coast.

21,467. Is it clean?—It is clean so far as I know. I never found any foul ground.

21,468. Never found any rocks?—I have often brought up amongst it, and never brought up on foul ground.

21,469. How do you account for these irregular roundings?—Perhaps, it will be a clay bottom. Where there is a clay bottom you never will find the ground so regular as sand, because if it once gets out it will not wash up.

21,470. Will you find so great a jump as from 33 to 55 feet?—I cannot exactly account for that. I never found any rocks, and have brought up in almost all parts where you could bring up a ship with safety, both in Sand's End Roads and Whitby.

21,471. Do ships often anchor in south-east gales just where the soundings are laid down?—I have seen ships drive close down with westerly gales where they have not given scope enough to the cable when a gale has come on.

21,472. Have you ever known ships to lose their anchors there?—They many a time lose them, having to slip their anchors, but they are invariably got again.

21,473. Do ships often lose their anchors because they cannot heave them up?—I do not think that; not to my knowledge.

21,474. Has the bay been deepening or shoaling in your experience?—I do not know that there is any difference at all in it. I had nine fathom water in the Soft Hole the other day when we were sounding, now I should think I brought up in the same water 15 or 20 years ago.

21,475. You found no difference?—None at all.

21,476. Is there much silt comes out of the harbour?—Very little, indeed.

21,477. In going over the harbour this morning, I saw an immense accumulation of sand and mud in the inner harbour, where does that come from?—That has been lying there for centuries almost, some of it ever since I knew what Whitby was.

21,478. Has it not been accumulated from silt coming down the river Esk?—I am sure I do not know; I do not suppose it was ever cleared since the memory of man.

21,479. But you are clearing it now?—Yes, they are taking away what has never been taken away since I have known the place.

21,480. Do you suppose there will not be another deposit?—I think not, because it is all rocky ground and not soft ground. There is no soil which could

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come down; the stream comes down from the moors; the water is very dark, but it is not thick until it gets well down this way.

21,481. Has that bank increased in size since you knew it?—There is a good deal of mud gets shot up, but where it comes from I do not know. A deal of it, perhaps, comes out of the Tyne and different places.

21,482. After an easterly gale have you known any alteration in the depth of the water on the bar?—It alters very much; sometimes there is mud nearly right across it; I dare say there is now.

21,483. To what extent have you known a silting up after a strong easterly gale?—I should think two or three feet of sand got there sometimes.

21,484. I speak of sand draughts from the sea?—It comes round the pier head with the flood tide.

21,485. Could the bar be deepened to any extent by means of a dredger?—I should think it could.

21,486. How many feet?—As many as we like if they could get down below the rock. I do not know to what extent it goes before we get to the rock.

21,487. You do not know the depth of the sand on the top of the rock?—I should think there will be two or three feet now.

21,488. Therefore if that sand was dredged away, and the harbour kept clear, ships of much greater draught could enter than can do so now?—Yes.

21,489. It was put in evidence yesterday that in three years about 1,800 vessels came in here for shelter. Are those the small vessels generally employed in the alum trade that chiefly seek shelter?—A great many of them; they run up from 45 to 50 tons register.

21,490. What proportion out of the 1,800 consists of vessels of that size?—I cannot say, I have only been here about three quarters of a year, so that I am not prepared to say.

21,491. But you as pilot master will see the vessels that come for refuge. Were they usually of that class?—There is a good part of them, and there are larger vessels come in occasionally. I have known several larger vessels come in when they have been caught with a northerly breeze suddenly, and a wind from the north-west to west-north-west.

21,492. Would there be one half or two thirds of these 1,800 vessels small vessels employed in the alumn trade?—No, I should think not; there are a great many loading iron stone, some load five and six, or six and seven keels of coals. There are more in that trade than in the alum trade.

21,493. Those were vessels of from 50 to 100 tons?—Yes.

21,494. (*Capt. Washington.*) We were told yesterday that vessels cast their ballast outside the harbour. Do you know is that the case?—I have seen that.

21,495. Is it your duty as pilot master to make a complaint of it?—I do not know that I have any right to interfere with it. I should think it belongs to the harbour-master.

21,496. How many pilots are there?—Twelve.

21,497. Do they hold a licence from Newcastle?—Yes.

21,498. Where do they pass an examination?—At Newcastle.

21,499. What have they to go to look for ships in?—Cobles.

21,500. And how far do they go generally?—Sometimes as far as Scarborough.

21,501. How far does their licence extend?—I do not know the particular limit. It is within any reasonable distance.

21,502. Are they not licensed for a certain district of the coast, or only for the harbour?—Only for the harbour.

21,503. Has great benefit arisen from the erection of the new lights?—Those new lights on High Whitby?

21,504. Yes?—I should think they will do good, but they have hardly been long enough up to show any great benefit, but I should think so by what experience I have had.

21,505. Before the land was lighted, did Whitby Rock pick up a great many vessels?—A great many at times.

21,506. Do you concur with the former witnesses, that the construction of the southern portion of the breakwater would be a great benefit to the roadstead and harbour?—I do.

21,507. Were you present at the gale of the 4th January 1857?—Yes, I was.

21,508. Did you hear the account of the former witness?—Yes, I did.

21,509. Do you know anything further with respect to the damage caused by that gale?—No, I do not.

21,510. You agree with the last witness, that a refuge here would have saved the vessels lost in that gale?—Yes, I do.

21,511. (*Capt. Sulivan.*) We had it in evidence yesterday, that there are two and a half feet water on the bar. Is there two and a half feet water between the heads of the pier at dead low water at spring tides?—Sometimes. I do not think that there is any at all, if it was taken down to the level of the ocean.

21,512. Is it not nearly dry at low water at spring tides—so far I mean as sea water goes?—It is when there is much sand there, but if the sand is away, then it is not.

21,513. Will there be any sea falling over that bar between the two pier heads?—At low water there will be none.

21,514. Inside the harbour where we saw the four small vessels aground to-day—is that part of the harbour dry always at low-water spring tides?—There is a small run of water down there.

21,515. But fresh water I expect. Let me ask you, is there a foot of water there to-day?—I should think that that is as much as there is.

21,516. If we were told that there was two feet and a half of water on the bar, and the same some way in——?—There will be two or three feet up along the sand.

21,517. But I am speaking now of the bar of the outer harbour?—I am speaking of that all along the pier side.

21,518. You mean, I suppose, where the two inner piers come?—Yes, I do mean that.

21,519. But between there and the place where we saw these small vessels lying aground, what do you say as to that?—There is very little water there.

Mr. Sampson Storm examined.

Mr. S. Storm.

21,520. (*Chairman.*) You have been 33 years at sea?—Yes.

21,521. And of those 33 years you have been 23 in command of a ship?—Yes.

21,522. How long is it since you came on shore?—Eleven years.

21,523. How have the ships which you have commanded been principally employed?—I think nearly half in the Baltic, and half in the coal trade.

21,524. How many voyages have you made from the Baltic?—I cannot exactly say, but for ~~three~~, four, or five years, I made three a year, and one year in particular I made four.

21,525. So you may, as master of a ship, have made between 30 and 40 voyages from the Baltic?—It may be not quite so much, nearly 30 altogether I should say.

21,526. In coming home late in the year will you tell me, not where you have endeavoured to make the land, but where you actually have made it generally?—I have made it from Flamborough Head

down as far as the entrance to the Firth of Forth, all along the coast.

21,527. Have you ever, out of 30 voyages, made it to the north of the entrance to the Firth of Forth ?—No, never.

21,528. Is your acquaintance very extensive amongst the masters commanding in the Baltic trade ?—Yes, it is.

21,529. Can you answer me this question : Has the result of their experience been pretty much the same as your own, that the Baltic ships crossing in the fall of the year seldom make the land to the north of the Firth of Forth ?—They will never make it there unless they are driven.

21,530. I am not asking as to what they tried to do, but as to what actually happened ; would you say as the result of your own experience, that generally the ships in crossing from the Baltic late in the year make the land to the south of the Firth of Forth ?—I should say that, in general, all ships going to the south make the land from the Firth of Forth to Filey Bay.

21,531. You have been present during the course of this inquiry ?—Yes.

21,532. Give us your opinion as to where the harbour of refuge should be, if we only have one upon the coast ?—If we have only one monster harbour, I should say that it should be here.

21,533. Do you think it would be better to have this one monster harbour or to improve the ports of the Tyne, the Tees, and the Wear, so as to enable vessels to get in at dead low water ?—If I am to say anything respecting that, I will give my best opinion, and I should say that pier harbours are always very dangerous to go to in bad weather, because there is sure to be a bar and a strong current.

21,534. Have you ever experienced the danger in your own case, in any ship which you have commanded ?—No ; I never risked going back to a northern port in my life, but I have been driven to the Firth twice.

21,535. Such was your opinion of the danger of taking these bar harbours in bad weather, that you preferred being driven to the Firth of Forth rather than try to take them with a laden ship ?—Yes.

21,536. You have heard the account the previous witnesses have given of the winds on this coast which are the most dangerous. Do you agree with that account ?—Quite so ; the wind from south-east to east-north-east is the most dangerous we have on this coast.

21,537. Can you tell us anything about the winds that we have not heard from other witnesses ?—No ; I think nothing.

21,538. You concur in the opinion that it is for the laden ships that harbours of refuge are chiefly wanted ?—Chiefly so.

21,539. And for the reasons we have heard from the other witnesses ?—Yes.

21,540. It is so obvious that this breakwater would improve the entrance to this harbour that I think it unnecessary to ask you opinion about that ?—Yes.

21,541. What is the greatest number of vessels you have seen lying off Whitby in south-east and south-south-east gales ?—I once counted 74 vessels ; several times I have seen 50 or 60.

21,542. When it is blowing hard is there any sea in the bay at high water ?—There is a roll, but the swell of the sea is not bad, nothing to hurt a ship with the wind from the south-south-east and south-east.

21,543. The Whitby Rock breaks it off ?—Yes, it does.

21,544. Have you ever seen a vessel riding off Whitby in a heavy gale from the north-east ?—I never did.

21,545. Can you give me any cases of vessels which have been off Whitby and have been wrecked in endeavouring to get to the northern ports ?—In 1844 I was going from St. Petersburgh with 70 or 80 sail. We all left the Sound together ; the wind drove from the southward, a good many of us made the land between Filey and Scarborough, and some down about Robin Hood's Bay. I made the land just a little north of Scarborough. Another ship belonging to our port, that was from the Baltic the same time, made the land a little to the southward of us ; we drove down nearly abreast of each other to Shields. The gale kept increasing and we had to go to the Firth ; we bore away at four o'clock in the morning, and got to the Firth of Forth between eight and nine o'clock. After I had been there some days I heard of the other vessel being lost somewhere near the Coquet ; Island it was quite a new vessel, her first year, and laden with wheat. That was one case that I recollect.

21,546. After taking your departure from the Scaw or the Naze what is a fair average passage coming from the Baltic in the fall of the year ?—It is very uncertain. I never was a week clear of sight of land in the North Sea, but I have not made my passage in a week.

21,547. You think you have been fortunate in making your passages ?—Very, very, indeed.

21,548. Would 10 days or a fortnight be a fair passage ?—Ten days is what we call a very fair passage from the Sound at the back end of the year.

21,549. How many days do you occupy in getting from the Sound clear of the Scaw ?—Perhaps a couple of days.

21,550. So that seven or eight days is a fair passage across the North Sea in the fall of the year ?—Oh yes.

21,551. What do you call a long passage ?—Some have been four or five weeks, and sometimes longer.

21,552. Have they been knocking about the North Sea all that time ?—No, they will not be so long knocking about. They principally get into some port in Norway.

21,553. (*Mr. Lindsay.*) Now if a monster harbour is to be made, you think this is the place for it ?—Yes.

21,554. Say it rested between making a monster harbour here and a small harbour here and another small one—I mean a comparatively small one here and comparatively small one at Filey Bay, or a comparatively small one at Hartlepool Bay—and that the sum required for the monster harbour was to be distributed over the three, which would do more to same life and property ?—To be sure ; the more harbours, the more life and property will be saved.

21,555. If now it rested between Filey and Hartlepool, which should you prefer then ?—I should prefer Filey.

21,556. Why would you do that, all things considered ?—Because we have principally to look to the laden ships for safety, and when they leave the harbours in the north they always leave with a fair prospect, and I think that if there is a harbour at Filey they might get there, or that if there was one at Whitby they might get there. We do not want to have harbours where we leave the ports of loading, because we have harbours sufficient to lie in until we want to go to sea. We never go out without a prospect of getting to the southward.

21,557. Is it your opinion that most of the vessels which are lost in the bight of the bay are vessels which have been a good way to the southward and have been driven back ?—I am quite of that opinion.

21,558. It is not generally the case that ships are caught immediately after leaving the loading ports and are then lost ?—It is not so. They almost always go away with a prospect of a good run.

21,559. Generally a man sees his way clear for a fair run ?—He will never go to sea without seeing a prospect of getting to the south.

21,560. As far south as Flamborough Head if possible—at all events as far south as Whitby ?—Yes.

21,561. Therefore you conceive that a harbour of refuge somewhere along this coast, even as far south as Filey, would be of more advantage than one in Hartlepool Bay ?—I am quite of that opinion.

21,562. Is there any other reason why you should

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prefer Filey as a site to Hartlepool ?—I do not say Filey particularly. Either that or Scarborough, if there is a safe harbour made, would be most advantageous—more advantageous than any at the ports of loading.

21,563. You say you have objections to running for pier and river harbours, and give very good reasons why, I think. Now say that the Tyne could be deepened so as to have 25 feet of water at low water, would you have any hesitation in running to the Tyne for refuge in a gale of wind ?—I would sooner run for a harbour that was made without any tide in it.

21,564. You would have hesitation in running on account of the tide ?—Yes, with piers.

21,565. If the piers were carried out to the extent I have named, so as to give 25 feet at low water, would you then consider the Tyne valuable as a harbour of refuge ?—If it was carried out you would still want an entrance. If you take the piers out and make a narrow entrance there will be a very strong tide, and that will cause a very heavy sea in gales of wind, and when the tide is running out it would be very dangerous to take the harbour.

21,566. You think it would be dangerous during the ebb tide ?—It is what if I went to sea I should never attempt. I would sooner risk the ship going to the Firth.

21,567. Do you know anything of the coast of Scotland ?—Very little ; I have passed and repassed, but not to be near hand.

21,568. Do you know enough of it to offer an opinion whether a harbour of refuge on the east coast of Scotland would be of value ?—I have not that experience. I have passed and repassed perhaps 20 or 30 times, but never was in any harbour. I have passed through the Pentland Firth, and been in the Firth of Forth perhaps eight or ten times, but I never was in any of the northern ports, I never landed.

21,569. Then you are not prepared to offer an opinion as to the necessity or otherwise of a harbour north of Aberdeen ?—I think they do not require it so much as we do on the east coast of England, on account of the quantity of ships on this coast. They have more fishermen than we have, but we have a great many more ships passing and repassing, and a good few fishermen sail in the season, so I think there is more risk here than on the Scotch coast.

21,570. (*Capt. Washington.*) I think you said that vessels seldom leave the ports in the north without a fair prospect of getting north ?—Very seldom.

21,571. Leave, that is, the Tyne, the Tees, the Wear, and Hartlepool ?—Yes.

21,572. Of course it depends on the wind, but how far up do they generally get ?—As the last witness made the remark, they came out with a wind from the westward in general. They will come to Whitby, and when they get a little south of High Whitby we generally find the wind meets us there a point or two. Likewise coming the other way, just similarly the wind is more to the southward. It is a place we often come right up along the land ; when we get south of Whitby we get it south and south-south-west.

21,573. It is high land from the north cheek of Robin Hood's Bay to High Whitby ?—The north cheek is not so high. High Whitby is higher, but it is high land, and thereabouts they meet with a change of wind.

21,574. They generally meet with a change of wind there ?—Yes ; I attribute that to the drawing of the land both ways. The land falls in on both sides.

21,575. And does the wind drive them off ?—Yes.

21,576. What do they do then ?—Ply off to the eastward, according to the tide, whichever way the tide is running on them, to take advantage of it in order to gain the mast and lose the boat.

21,577. Do they still strive and struggle up to get as far as Robin Hood's Bay in Scarborough ?—Yes, sometimes they keep struggling on for days, as long as ever they can get a little ground.

21,578. If there was a shelter at Whitby would these vessels come here or still struggle on ?—Some would come here, and some would struggle on.

21,579. As long as they could carry moderate sail ?—Oh yes, with good ships.

21,580. Directly the wind increases they would run for some place ?—Yes, the nearest they could get for shelter then.

21,581. I suppose they would be scattered all along the coast ?—We generally see them scattered all along the coast ; when we do leave we generally leave in large fleets at back ends and springs. From one port to another there is a matter of 15 or 20 miles of vessels scattered along different ways.

21,582. Are there a great many vessels often seen off High Whitby ?—Yes, more than off any port of the coast.

21,583. Is there any telegraph or look-out there ?—No, nothing of the kind.

21,584. More than any part of the coast ?—They come nearer the land there.

21,585. A great many always congregate off Flamborough Head ?—Yes, there are ; that is another point where the land alters a little each way. When they get to the Head they often find the wind get a little round ahead. If it gets to south-west and west-south-west we dodge a little and sometimes bring up, but I never brought up but once there, it was near Speeton Cliff, between Flamborough Head and Filey.

21,586. You are speaking of laden vessels ?—Yes.

21,587. What do the light vessels do ; will Whitby shelter any of them ?—Not at present.

21,588. Supposing it was made a refuge ?—If it was made a monster refuge it would shelter them very much.

21,589. A monster refuge if you like, but I think we shall get a moderate one ?—I should like to have three or four instead of one.

21,590. And amongst these—— ?—I think Whitby should have one.

21,591. And then it would be the means of saving light vessels as well as laden ?—Yes.

21,592. Do you agree it would be a great benefit to improve the existing harbour—the harbour between the two piers ?—It is sure to be a benefit if you can make more water.

21,593. If you could get six feet at the entrance would that be a great benefit ?—Certainly.

21,594. It would take the most of the light colliers along the coast ?—Yes, if deepened six feet it would take the light colliers.

21,595. Do you mean that six feet would take a light collier in ?—If it was deepened six feet at high water it would take them.

21,596. But at high water it takes them now ?—Sometimes it does.

21,597. But even deepened there would only be six feet at low water ?—A light ship will seldom run more than six feet to eight and a half feet at the utmost.

21,598. From what you know of vessels on shore or in danger in all the gales we have had, will you say how many ships you think a purely refuge harbour would be required to take in any one gale ?—In heavy gales, in general, we have not so many ships out at sea as at other times, because they seldom come on so suddenly but what many ships can get into places before the force of the gale comes on ; so that generally we have not many at sea during the gales.

21,599. What should you think should be the accommodation provided in the harbour of refuge to take in all the vessels which would require to enter it in one of these dangerous gales ?—I think not more than 100, or 150 at the utmost.

21,600. If it was calculated to take 200 laden colliers, would that be sufficient for the shelter required in any gale of wind ?—I am quite of opinion it would.

21,601. Supposing a harbour made entirely by piers, would it be of great advantage for the colliers that you

should have an entrance both ways, so that you could run out at either end without working out?—Yes, it would be a great advantage.

21,602. Do you think that almost a necessity in connection with any harbour of refuge on this coast?—Yes.

21,603. Supposing a pier is run off the land, giving a good passage round one end, and having a small opening near the land to admit vessels in the other direction—how wide a space is necessary for a loaded collier to take? I suppose you have often run into these pier harbours?—Not often.

21,604. What width of space between two pier heads would you think it safe to run for with a gale on-shore?—I should like a place as wide as possibly could be permitted, because the wider the place is, the better they would go in, and there would be no danger.

21,605. But there would be more danger inside, would there not?—Yes, if there was not shelter.

21,606. Then the wider the space the more danger there would be to vessels at anchor—from the outside sea I mean?—Yes, there certainly would.

21,607. Then it would be an object to get the entrance as small as would be quite safe for vessels to take. I want to know how small such an opening could be made with safety for a loaded collier to take it?—I think it certainly should not be less than 50 fathoms at the least.

21,608. Would 100 fathoms be sufficient?—It would be sufficient, more than sufficient, I think, for any colliers.

21,609. An opening of a cable's length in width would be quite sufficient?—Quite sufficient, I think.

21,610. That is 600 feet?—Yes.

21,611. If it is made 400 feet in width, would that be safe?—It would, and less too.

21,612. Would you be satisfied with 400 feet?—Ye

Mr. W. B. Smith re-called.

21,613. (*Chairman.*) I omitted to ask you how many voyages you had made from the Baltic?—Upwards of 50.

21,614. Coming across from the Baltic in the fall of the year what was generally your landfall? I do not mean where you endeavoured to make the land, but where you actually did make it?—Almost invariably between Flamborough Head and the Humber in the winter season.

21,615. Did you ever make it to the north of the Firth of Forth?—I never made it to the north of the Farn Islands.

Mr. James Gudwood examined.

21,616. (*Chairman.*) You are a shipmaster, and have been 25 years at sea?—Twenty-three years.

21,617. Of that period, how many in command of ships?—Sixteen.

21,618. In what trade were the vessels which you commanded chiefly employed?—In the coasting trade, France and London, the Tyne and London, chiefly to Whitby in the trade I am in now.

21,619. You have heard the evidence of the previous witness as to Whitby being the best point on the coast for a harbour of refuge, is that your opinion?—Yes, for a single harbour.

21,620. Give your reasons for entertaining it?—In regard to leaving the Tyne we generally always get to the southward of Whitby (I am only speaking of my own experience); sometimes as far up as the Head, before we are caught with an adverse wind. Then if it comes adverse, we undoubtedly have to go off to sea.

21,621. It is your opinion, that a harbour at Whitby would catch the greatest number of ships that would require refuge in strong winds from the southward?—Yes, or from the northward. I mean that on a grand plan. I do not mean in a large scale, but as to depth of water so that there shall be shelter into 10 fathoms water. We frequently see the water break in eight fathoms. It can be observed from here. I am sorry I could not give my opinion with many of the witnesses that have gone before me.

21,622. Will you just state in what respect you differ from those who have gone before you?—They gave their evidence to eight fathoms and some as low as five, I believe, which in the gales of wind in which the breakwater or harbour of that description would be most required, undoubtedly would not be safe.

21,623. When have you seen the sea break in eight fathoms?—Frequently outside here.

21,624. Breaking heavily in eight fathoms?—Yes.

21,625. Anywhere else have you seen it do so?—I have seen it break very far out at Newcastle. I have been several times on Tynemouth Castle when a gale of wind has been blowing, and have frequently seen it break very far out and very heavily.

21,626. Anywhere else?—No, I cannot say, unless it is about the Head. Round the Head, if there is a strong easterly wind and a strong ebb tide, sometimes it breaks in 10 fathoms.

21,627. The breaking of which you talk, is it a real breaking of the sea?—It is.

21,628. Not the kind of break you see on the top of the sea?—No, it is a complete overlap; what you may call the first blow of the sea.

21,629. You entertain the opinion, that laden vessels are those which want refuge most?—I say Whitby is the place when it is wanted for light and laden equally in regard to property; in regard to life. I should say more so for laden ships.

21,630. Do you agree with the opinion of the previous witnesses as to which are the most dangerous winds here?—South-east, east-north-east, and north-east.

21,631. Do you consider that these onshore gales generally give a man a fair warning so that he can get off?—I cannot concur with that altogether.

21,632. Tell me about that?—I have been caught several times with the wind from the north, and have sometimes seen vessels caught with stun-sails set—caught all aback with a gale from the north, before they have had time to take them in.

21,633. The change of wind is so sudden?—Yes, it is.

21,634. But although the wind comes suddenly, is there any indication about the sky to enable an experienced man to see what is coming on, and to get in his sails?—I have seen it sometimes when there has been no warning.

21,635. It is absolutely necessary, that vessels that sail out of these ports should keep close to the shore in order to make the passage?—It depends on what the master thinks. If the wind is likely to east, he naturally draws off the land. If we come out of Shields with the wind from the eastward, east-north-east, and north-east, the first thing the master does is to get a proper offing if possible, and then if a gale comes on he is generally in a position, if he has a ship that can do it, to keep off, unless he is completely forced on shore, which causes him to run for Whitby. We know many instances when Whitby, in regard to laden ships, would be a saving of life and property coming from all ports of the north. For instance, a vessel coming over a bar in the north and touching the bar or springing a leak, often calls at Whitby for extra hands; if they can get them, they get them, and if not they have to proceed. Perhaps they are caught before they can get here. They cannot come in with the land, and the men have to pump or sink, or run on shore.

21,636. In westerly winds is it necessary to keep near the land to make the passage?—With that wind the closer in we get the faster we get on. If it falls

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Mr. J. Gudwood.

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Chairman.

calm, and you wish to stop a tide, you are in a position where you can better do it. If you are off, you most probably go to leeward and drive a tide.

21,637. Therefore it is necessary in off-shore winds to make the passage to keep close to the shore?—Undoubtedly.

21,638. During your time at sea, have you ever been in great risk of being lost in running into one of these harbours?—I have been in risk of being lost going into the Tees and going into the harbour.

21,639. Tell me about it?—When we ran into the Tees, we were bound northward loaded. We were in sight of Tynemouth; the gale came on from the north-east; I thought, rather than go back to Bridlington Bay, I would either take Hartlepool or the Tees, and calculated by running into Hartlepool to be there at daybreak. But I had overrun my distance, and laid to by the Tees. In hauling out off the Tees, a sea broke aboard and carried away the bulwarks, and washed a man overboard. When we got into the Tees it was just breaking daylight.

21,640. You managed to get into the Tees after considerable risk?—Yes.

21,641. If you had been prudent would you not have run for Bridlington Bay?—I considered that bad wind to eastward, and should have been as bad there, and my object was to get with perfect safety.

21,642. Therefore you ran for the Tees and Hartlepool that you might get perfect safety, not to save the loss of the ground you would otherwise have lost by running to Bridlington Bar?—That might have been combined with it, which I do not know that it altogether.

21,643. It was half-and-half, perhaps?—It might be.

21,644. Any other occasion on which you have been exposed to danger coming into these harbours?—I have shot into this harbour just by mere providence. We had been off here knocking about the whole night, sometimes with single, sometimes with double, reefed top sails, with the wind east and east by south, waiting for tide time. The tide that morning was just flood at daybreak. We came away for the harbour, and I calculated to be there at daybreak. The consequence was that we came to the rock. When we got there it fell as calm as ever it was in the heavens. Except for the flapping of the sails you could have carried a candle about the deck. I said to the mate "I believe there is going to be a shower." He replied "We had better let go the anchor then." I said "No, it is of no use, we are upon the Scar." I saw there was a chance for us at the next sweep of the sea. The first time the sea swept in, the ship lost steerage way. I said to the mate "I am afraid we are going to be lost." The next run of the sea canted us, and when it left us we lay with our head over for the long pier end. The ship lay that way until another run, and then she ran over for the north pier. My heart was as near out of my mouth as it could be. I believe nine feet further her bowsprit would have rested on the pier. Another run came and she ran up alongside the pier. The pilots could not get off, but one of them came down and sung out to me to run out the anchor, and give him a rope. We were then over by the buoy in the bight. We had coasted there as it happened. The pilot jumped on board after we had got a rope fast to the buoy. We were setting the sails; the men were setting the topsail and the mainsail, when the breeze came on fresh as ever. The pilot ordered the men to loose the topsail, and we ran up the harbour.

21,645. That happened in a lull of wind?—Yes.

21,646. After knocking about for weeks in thick weather, when you have not seen land for two or three days, is there much difficulty in calculating your position?—Sometimes I have had a good deal of difficulty. I have gone out of my course. I have sometimes gone from the east to the Tyne. We have steered down north and by east, and, before we have come in with the land we have been as far as Huntley Foot. Another time, when it was thick, I have steered down the same course and fetched Sunderland buoys.

21,647. Then you were considerably out of your reckoning?—Not more than by miles each way.

21,648. A man well acquainted with the coast and with the tide, can he generally have a good idea where he is?—Not if he is long out of the sight of land.

21,649. The most experienced men on this coast would have considerable difficulty in being certain as to this point, if he had been in a fog for three days?—Undoubtedly.

21,650. (*Mr. Lindsay.*) Do you carry a barometer?—No.

21,651. Nor ever did?—No.

21,652. Do many colliers carry barometers?—I cannot say as to that.

21,653. Do you think it would do most good to improve the existing harbours, so as to admit vessels at all times of the tide, or to erect one great harbour?—If the existing harbours could be made safe for a ship to go into in any weather, undoubtedly it would be a vast improvement; in my estimation the more of them the better.

21,654. If the Tyne were improved to 25 feet at low water, would you have any hesitation in running for it in a gale of wind with an ebb tide?—I should be very frightened then if there was a heavy swell, especially if there was any ebb out. I do not think I should take it as long as my ship was good.

21,655. You would still be frightened to run for it? Yes, if there was any ebb.

21,656. Say there was only one harbour to be made, and it rested between Filey Bay and Hartlepool, which should you prefer?—I cannot say. I think ships are so scattered, each port would be valuable to some.

21,657. Which do you think would do most good?—I should almost think Whitby.

21,658. Leave out Whitby and say it rested between Filey and Hartlepool?—I should prefer Filey.

21,659. Tell me why?—Because with Hartlepool as it is there might be some chance of saving life, but if Hartlepool were improved, undoubtedly it would be a good place.

21,660. Speaking as to position only, do you think the position of Filey or of Hartlepool would be the best for the construction of a harbour of refuge, if only one was to be made and it rested between these two places?—I should say Filey in respect of loaded ships.

21,661. And with regard to light ships?—Well, Filey would be a good place for light ships, and if there was an entrance for vessels at both ends, undoubtedly masters would look greatly at that; I mean the facility of getting out if there was a fair wind.

21,662. All things considered, if it rested between the two places, I think you would prefer Filey?—Yes.

21,663. Because when ships come from the northern ports they have a chance of being south?—That would depend upon how the gale came on and how soon it came. We often see a large number of ships leave in one tide; those that go fast get first, those that are slow are left last. If the gale come soon equal refuge would be wanted for both.

21,664. Did you ever leave harbour without seeing a fair prospect of getting a run to the south?—Sometimes with a very fair prospect.

21,665. I ask because I should like to know whether you think the ships which are lost in the bight of the bay have consisted principally of ships that have been lost shortly after they have left the harbours, or ships that have been caught on the coast to the southward and obliged to put back?—There are a great many of them that have put back.

21,666. Do you think the larger proportion consist of ships that have gone to the south and been obliged to put back?—I cannot say as to the larger proportion. I could name several that have been to the south of Whitby and then wrecked, and that would have been saved if there had been a harbour here or in this neighbourhood. I can name two or three that have foundered; if there had been a place sheltered from

the north and north-east about Whitby the lives of their crews might have been saved. The *Merchant* struck on Shields bar; the pilot was on board, she had to come away and could not stop. Had they known there was a place of complete safety at Whitby or any other place at hand, they would have run directly for that place. In my opinion, they had hesitated in running for the shore until they found they were forced to it. The vessel foundered short of the shore, somewhere not far off; the name board was washed up on Whitby sand.

21,667. That is a case in which a harbour at Whitby would have saved the ships?—Yes; and there is another that foundered to the southward, I cannot name the vessel, but she had gone past here and she would have been saved also. Several screws to my knowledge have foundered. Had Whitby been a secure place of refuge I have not the least doubt they would have been saved. Rather than let the vessels be foundered at sea they would have come to Whitby. There was the *Ann* of London; she passed Whitby and went into Robin Hood's Bay and drove ashore there. A life-boat was capsized going out to sea, and 12 hands were lost altogether. Had Whitby been a place of refuge that vessel would have been saved, part of the crew would have been saved, the lifeboat would not have been upset, and the crew of the life-boat would also have been saved. I can name vessels that the lifeboat has gone out to from Whitby, and fishermen also have gone to assist. The life-boat has been upset and several lives have been lost; this has happened on two occasions, if I remember rightly.

21,668. Were you out in the gale of January 1857?—No, I do not think I was.

21,669. If it rested between Whitby, or somewhere thereabout, and Filey for a single harbour, which do you think would be the means of saving most life and property, especially life?—It would depend on the position of the ships; I really cannot give an opinion; but in regard to the vessels that have gone ashore in Runswick Bay, several might have been saved had there been a port of refuge at Whitby. The vessels Mr. Smith named, the *Amelia*, the *Severn*, and the *Port of Glasgow*, had driven past Whitby; the *Port of Glasgow* went upon a small bit of ground, in such a position, that had she been a few cables' length either way all hands would most likely have been lost. Had there been a harbour of refuge, several light ships and property would have been saved, but very few lives are lost from light ships; if they don't go upon a very rocky place, if they can come to land such as Whitby, or find a good place in Robin Hood's Bay, or a good place in Runswick Bay, they may be almost always saved.

21,670. Suppose only one harbour of refuge to be made on this coast, what number of ships ought it to be made to contain?—I can't say, not seeing the number of vessels.

21,671. Would a harbour if it contained 200 sail of the usual description, and so as to allow them to ride at anchor, be sufficiently large?—I should almost think so, but it would depend upon the place that they had to go into; for instance, if they had plenty of water to go in, and had plenty of room to get out of each other's way, a very small place might do. But we know of cases of two or three ships running for a port together; they have completely blocked up the road, and the consequence has been property has been damaged and almost all destroyed; for instance, at Hartlepool, when there was so much damage done there, we had cases of ships that did not want to go there, light ships; part of them would have been here had there been a place of refuge, because the man who was prudent and thought bad weather was coming on would have stopped in Whitby Bay, had there been provision for his getting out easily and taking the tide at the proper time. A new ship belonging to Whitby, called the *Spring*, was run down, it was supposed, by a bark; I believe had there been a port of refuge, that vessel would have taken refuge; the people in the bark did not see the vessel until they struck her.

21,672. Say there is only one harbour to be made, and it is to be made at Whitby, if there was sufficient space to anchor 200 sail in water of three fathoms and upwards, do you think that would be enough for the wants of the trade?—I cannot say; it would depend entirely on the vessels that were on the coast, because sometimes off Whitby, with the wind away from the eastward, I have seen myself 200 or 300 light ships and laden ships coming up; if they were taken by a sudden gale, they would want a great deal of room.

21,673. If you have seen so many light ships off Whitby, how many laden ones have you seen?—I have seen perhaps 100 or 200 laden ships.

21,674. Then with the light and laden together, there would be fully 500 vessels?—Yes; I should think so.

21,675. (*Capt. Sulivan.*) You say that comparatively few lives are lost from the light ships; are by far the largest proportion lost in the laden ones?—Yes.

21,676. Should you consider it is the first importance, in choosing a site for a harbour of refuge, that it should have reference to saving laden vessels?—Undoubtedly in regard to lives.

21,677. You would make that your first object?—Yes.

21,678. You spoke of vessels running into a harbour two or three at a time and getting damaged, would you have any fear of running between two piers having an opening two thirds of a cable's length across?—In a gale of wind I should.

21,679. You think it would not be wide enough?—It would not, in my estimation. The openings of our own piers are not more than two thirds of a cable, and we have very great difficulty in getting in.

21,680. Do you think your opening is two thirds of a cable?—I think very nearly.

21,681. By the plan, the entrance between the piers is not half that?—Then I am mistaken.

21,682. If you had an entrance, not like the narrow channel you have here, but two piers coming to each other, so that the moment you passed the ends you would be inside; would an entrance of that sort, twice the width of the Whitby entrance, be safe to run for?—I think so. Undoubtedly the widest possible entrance is the best, so long as the sea does not get in.

21,683. Would you think it of great importance that there should be two ways in and out of the harbour?—Undoubtedly I would.

21,684. Would you consider it of great importance that there should be two openings, so that, whichever way the wind was, whether south-east or north-east, a ship might enter with a fair wind, instead of having to haul round to leeward and work in?—Undoubtedly, if that could be done.

21,685. Have you ever seen a large number of laden vessels under Flamborough Head?—Several times.

21,686. At anchor?—Some at anchor, and some laid to, driving about, making to windward.

21,687. Have you ever seen them with strong south winds?—Yes, strong south winds I have. I have been laid there at anchor, and forced to leave from under Speeton Cliff.

21,688. You mentioned that a life-boat was upset in Robin Hood's Bay, and another at Whitby?—Yes.

21,689. Were they the new sort or the old?—I cannot say.

21,690. I ask the question, because it might go forth to the public that life-boats which are now used on the coast had drowned the crews. I am anxious you should say whether they were of the old construction or the new?—I cannot say in respect of that.

21,691. How long ago did it happen?—It was on the 4th of February 1848.

21,692. It was long before the improved life-boats were put on the coast, was it not?—Yes, undoubtedly it would be.

WHITBY.

Mr. Thomas Douglas examined.

Mr. T. Douglas.

23 Oct. 1858.

21,693. (*Chairman.*) You have been a pilot at Whitby for 34 years?—Thirty-three.

21,694. Have you been present during this inquiry?—Yes.

21,695. You have heard what has been stated by the previous witnesses. Do you generally agree with them?—Yes.

21,696. If there is any point on which you differ from them state it?—No, I do not think that I do, unless you can remind me of them. There is one thing I have to state, I have not come to give an opinion on the coast; I am no coaster. I am here only to give an opinion as to the piloting of the port. I am not a practical man coastwise.

21,697. Perhaps you can tell us something about the anchoring ground. What is the nature of the bottom at the spot which is marked "good anchoring ground" on the plan?—It is sand.

21,698. What is under the sand? Is there clay?—The anchors are quite clean when they are brought up; they are bright; there is no clay.

21,699. In this plan you will see close under Whitby Rock some very uneven soundings; is it a rocky bottom?—It is rocky. I saw the steam-boat go off; the soundings were taken at the harbour's mouth, whereas they should have been taken at the north side of the pier. There the soundings are more fair; the side of the rock is quite clear.

21,700. So that, in point of fact, the uneven soundings in the neighbourhood of Whitby Rock are continuations of the rock under water?—Yes. I think the deep hole is made by the heavy sea coming over the north end of the rock and washing the sand away. There are 10 fathoms of water in it.

21,701. It scoops the sand out from between the rocks?—Yes. I have known ships come there at low water tides, and back off, there being such a slope.

21,702. How far does this rocky bottom extend from the outline of Whitby Rock which is marked on the chart—for a cable's length should you say?—It slopes away until you have fetched the north side of Whitby pier. It is foul ground until it slopes in that direction.

21,703. You see the outline of the north side of Whitby Rock marked on the plan. How far from that does the uneven ground extend—for a cable's length, or three quarters of a cable's length, or what?—I should think not for a cable's length before you come to good ground.

21,704. After half a cable's length have you a clean bottom?—Yes, we have a clean bottom.

21,705. (*Capt. Sulivan.*) I see, nearly two cables' and a half from the rock to the northward, 30 feet and 37 feet marked near it. If the bottom gets clean half a cable off, how can there be that sudden slope in the soundings about two cables off?—I cannot think how it is; but very few masters know of this hole, and not many bring up there. It is not what we call anchorage so close to the north end.

21,706. Is it where the 57 feet or nine fathoms and a half are marked?—There is 10 fathoms in the scoop of the hole.

21,707. I see 57 feet marked two cables from the rock. If that is so, the hole must extend two cables from the rock?—It is scooped out like a basin.

21,708. I want to know how it is that you say the clean ground begins half a cable from the rock when I see the hole marked in the chart two cables from the rock?—I don't see it, and I have been riding all over here from the northward to the hole.

21,709. How far is the outer edge of the hole from the rock?—I have not marked the whole distance; I mean the central point in the middle of the hole.

21,710. The deepest part of the hole marked here is 57 feet?—Sometimes the hole is deeper.

21,711. That depth is marked here two cables' length from the rock; how, then, can the ground be clean half a cable from the rock if the hole is marked two cables off?—I mean clean to the north of the hole.

21,712. (*Chairman.*) Do you think with a pencil you could mark on the plan the part of the anchorage which is unfit for vessels to anchor in?—All come to the north side of the north pier.

21,713. Have you any marks for anchoring, for keeping you to the northward, within which you now anchor?—We generally bring up as the wind and weather may prove.

21,714. What are your anchoring marks on shore?—We take the best marks we can by night.

21,715. By day?—We have our own ideas just according to the wind. If the wind is blowing strong westerly, we come close in the shore; if southerly, we get as close up to the rock as we can fetch.

21,716. You go by the eye?—Well, by our own judgment. All are guided by their own judgments.

Mr. Robert Foster examined.

Mr. R. Foster.

21,717. (*Chairman.*) You are a shipmaster?—Yes.

21,718. And have been 27 years at sea?—Yes.

21,719. Out of which how long have you been master of a ship?—Fourteen.

21,720. Have you traded exclusively betwen the Tyne and the Humber?—Yes.

21,721. Have you heard the evidence of the previous witnesses?—Yes.

21,722. Do you generally agree with the evidence which they have given?—I do.

21,723. Is there anything they have not told us which you can tell us?—I think not.

21,724. (*Mr. Lindsay.*) Do you think one great harbour or the improvement of the present harbours would be more advantageous?—The more harbours the better to save life and property.

21,725. Therefore, you think the improvement of the existing harbours would do more to save life and property than one great harbour, even if placed at Whitby?—I do.

21,726. Say there was to be one, where would you put it?—At Whitby.

21,727. Say it rested between Filey and Hartlepool, where would you have it?—In some cases it would answer at Filey, but not in all cases, because there are ships that never reach Filey that could make Hartlepool. If you wanted me to decide what place I would have it I should say Filey.

21,728. You must know a great deal about this coast, having always traded between the Tyne and the Humber?—Yes, I do.

21,729. You are no doubt aware that there have been a great number of ships lost in the bight of the bay, that is to the northward of Whitby towards Hartlepool, and off Sunderland. Do you think these ships had been caught with a gale immediately after they had come out of the harbour, and had been further south and been obliged to run back?—They had been further south in my opinion.

21,730. Have you seen vessels running down in gales of wind from the south for shelter in the bight? I have seen that. I have seen many that have been quite off here.

21,731. Have you ever gone to sea with your ship when you saw very little chance of working your passage to the south?—I cannot say that I ever did. The vessel I go in is a small one.

21,732. Before you put to sea you generally think, at all events, that you have a fair chance of getting south of Whitby?—I do.

21,733. When you do not see a fair chance of getting south of Whitby you keep in port?—Yes.

WHITBY.

Mr. WILLIAM PATTISON examined.

Mr. W. Pattison.

23 Oct. 1858.

21,734. (*Chairman.*) You reside at Whitby ?—Yes.

21,735. You have been at sea 51 years ?—Yes.

21,736. How long have you been on shore ?—Eighteen months.

21,737. You have been 16 years in the command of ships ?—Yes, of small ones.

21,738. Where have you principally been employed? —Between the Humber and the Tyne, and from Whitby to Sunderland and Newcastle.

21,739. Was the ship your own ?—No.

21,740. Have you been present yesterday and to-day ?—Yes.

21,741. Do you generally agree with the evidence which has been given ?—Yes.

21,742. Is there anything you would like to add to what you have heard as the result of your own observation and experience ?—No, nothing.

21,743. (*Mr. Lindsay.*) Did you hear the answers Captain Foster gave just now ?—Not exactly.

21,744. From your long experience, say there is to be one great harbour, and one only, where ought it to be put ?—Midway between Shields and the Humber, which is Whitby.

21,745. Do you think one great harbour at Whitby, or the improvement of the existing harbours along the coast, so that ships could get into them at all times of the tide, would do most to save life and property ?—The improvement of the existing harbours.

21,746. Even in preference to a great harbour at Whitby ?—Yes.

21,747. Putting Whitby aside altogether, tell me if it rested between Filey and Hartlepool, and there was only one to be made, and it were left with you to put it either at Filey or Hartlepool, looking to the saving of lives in laden ships and in the light ships, and the saving of the ships themselves, all things considered, where would you put it ?—There are more ships out of Shields and Sunderland than all the other ports besides. When the wind is south-south-east and south-east, and they are coming to the Yorkshire coast, if they are caught in a bad gale suddenly and there were a harbour at Hartlepool they would take it, and provided the harbour were filled up some of them could be put in Old Hartlepool and some in West Hartlepool. We have the same chance at Whitby, if the outside harbour were filled up, they could shift them back into the inner harbour, and so get more room for refuge ships to come in.

21,748. Should you prefer Hartlepool to Filey ?—Yes, I should, on that account.

21,749. Have you seen many ships that have got to Whitby running back seeking for shelter in a gale of wind ?—Yes, many times.

21,750. Do you think that those ships which are lost in the bight of the bay are caught by the gale immediately coming out of the harbour, or do they get south ?—We cannot tell exactly where they have been caught.

21,751. As a general rule ?—They get as far to the south as they can. If they cannot take Shields perhaps they cannot clear the Farn Islands, and are compelled to go on shore one way or other.

21,752. Say only one harbour was to be made, I think you said you would prefer Whitby as a site for it ?—Yes, because it is the deepest, and the soundings are most true.

21,753. You would prefer Hartlepool second ?—Yes.

21,754. What would be the next ; would Filey be the next ?—Yes ; because many ships are sometimes dodging off the Head with the wind south, and when it gets south and by east they have to run.

21,755. (*Capt. Sulivan.*) How wide do you think the entrance of a harbour of refuge which ships are to run for in a gale of wind should be, in order to take a loaded collier into it in a heavy sea ?—About three-quarters of a cable's length.

21,756. A cable being 100 fathoms long, you think that would be sufficient ?—I think so ; she would steer very badly if it was not.

Mr. MATTHEW BEDLINGTON examined.

Mr. M. Bedlington.

21,757. (*Chairman.*) You are a shipowner, and reside at Robin Hood's Bay ?—Yes.

21,758. You are secretary to the Robin Hood's Bay Insurance Company ?—Yes.

21,759. How long have you been secretary to the Insurance Company ?—Since March 1857.

21,760. How long have you been ashore ?—Two years.

21,761. You have been 25 years at sea ?—Yes.

21,762. You were master of a ship ?—Yes.

21,763. Chiefly employed in the coasting trade ?—Yes.

21,764. You have been present yesterday and to-day ?—Yes, nearly the whole of the time.

21,765. Do you agree generally with the evidence which has been given ?—Some of it I do not, but generally I do.

21,766. Will you state in what respects you differ from the evidence which you have heard given ?—I do not agree with that part of it that goes for the improvement of the existing harbours altogether, if you mean those harbours that are on the Durham coast. They would be all very well in their way, but I think something else is wanted.

21,767. You think the improvement of the existing harbours would not meet the exigencies of the case ? —I think not.

21,768. You are for one harbour somewhere ?—One or more.

21,769. Where would you put one harbour ?—If you are only going to have one, Whitby would be a very good place.

21,770. Is your name to the memorial from Robin Hood's Bay ?—No.

21,771. You would not think that Robin Hood's Bay is a place for a harbour ?—They were so late in beginning ; I did not know they were going to begin.

21,772. You have not had time to consider the question ?—I have had time to consider it, but I think there are better places, all things considered.

21,773. After Whitby which would be the next best place ?—Hartlepool, I think, if you can get sufficient water.

21,774. After Hartlepool which would be the next best place ?—I cannot say. I should like to have it in the bight if there is only to be one.

21,775. Will you state your reasons ?—Because I think you can always fetch there. Very often ships for the Tyne do not get any further than Hartlepool, or very little.

21,776. But frequently get up to Whitby ?—I was to suppose that Whitby was out of the question.

21,777. (*Mr. Lindsay.*) I think you said, you did not think that the improvement of the existing harbours so as to make them harbours of refuge would be sufficient ?—Exactly so.

21,778. Do you think that a harbour somewhere to the south, between here and Flamborough Head, together with the improvement of the existing harbours so as to make them accessible at all times of the tide—do you think that such a distribution of the public money as that would meet the demands of the trade ? —If you include Hartlepool with the existing harbours, I think it would.

21,779. Do you think that mode of spending the public money would tend most to the saving of life and property, or could you tell me of another mode which would save more life ?—I think if you were to have one here and one at Filey Bay.

21,780. You think that distribution of the public money, one at Filey and one at Whitby of the same size, and the improvement of the existing harbours, would be the best mode of saving life and property ? —Yes, I think it would.

WHITBY.

Mr. W. Jameson.

23 Oct. 1858.

Mr. WILLIAM JAMESON examined.

21,781. (*Chairman.*) You are a shipowner, resident at Whitby?—Yes.

21,782. And are one of the trustees of the pier and harbour of Whitby?—Yes.

21,783. How long have you been connected with the port in the capacity of trustee?—Since March 1854.

21,784. For what period as a shipowner?—Nearly 30 years.

21,785. Have you ever been at sea?—Yes.

21,786. For what period?—Twenty-four years.

21,787. In what capacity? In command of vessel?—Yes.

21,788. In what trade were the vessels employed which you commanded?—The southern trade; to South America, the Mauritius, and the Cape of Good Hope, altogether in the southern trade.

21,789. You have been present during this inquiry?—Yes, nearly all.

21,790. Give your opinion upon the question generally?—I can offer no opinion upon the general question of the evidence, because I never was on this coast in my life; I can only speak from books and what I heard, therefore I would rather not give an opinion, when you have heard so many practical men who have been so long upon the coast; I do not consider myself to give an opinion upon a part of the coast which I have never seen; I would rather confine myself altogether to Whitby, to which my attention has been drawn from the position which I hold; I would rather not give an opinion, which perhaps I should not be able to substantiate. Perhaps you will allow me to state, with regard to the plan before me, (that put in by Mr. Harrison,) that the Chairman of the Committee, accompanied by Mr. Harrison, waited upon the trustees of the piers and harbours of Whitby, and submitted this plan for their consideration; they explained it to us, and when I say this plan I will altogether confine myself to the breakwater at Whitby Rock, which is intended to afford shelter for laden vessels with south-east winds; that was the only part of the plan which we took much into our consideration, and upon which the discussion almost altogether turned; there was no extended plan, but all the discussion was upon the breakwater on Whitby Rock. The trustees approved of the plan of a breakwater on Whitby Rock. In their opinion, if it were made it would afford a very good place for ships to ride in safety with south-east gales. These south-east gales are the worst gales upon this coast, and of course those during which shelter is most needed. With the wind at south-east, according to the plan, I understand there would be a sheltered area of 350 acres, where 125 vessels could safely ride; with the wind at east there is an area of 200 acres, where 70 sail could safely ride. If the Government would construct this harbour out of the public money it would be the means of saving from shipwreck a great number of valuable lives and a great amount of property; therefore the trustees would recommend this plan to your kind consideration. I wish further to bring under your notice the advantages of having a harbour of refuge where supplies of all kinds might be readily obtained, and where repairs of vessels in case of need to any extent might be effected. I believe there is no part of the coast where they could be done better or cheaper. The general advantages of the plan would be to afford shelter from the south-east gales, which are the most dangerous on this coast for vessels weighing to go to the southward. I will put in Mr. Walker's plan of Whitby Harbour.

21,791. Will you forward to our secretary a tracing of this plan, authenticated before a magistrate?—It shall be done. I was going to make one or two remarks upon the advantages of this breakwater, as improving the present harbour. If it were carried out, it would cover the mouth of the present harbour of refuge from all winds from south round to north-east, and thereby cause much less swell on the bar with the wind from those points, and by as much as the lift of the water was exceeded so much would the depth of the water be in effect increased upon the bar; consequently, the harbour would admit vessels of a greater tonnage in safety. The second advantage to which I wish to call your attention, would be this,—that from the same cause, with the same winds, the harbour would be rendered available for the entrance of vessels seeking shelter and refuge for a longer period during each tide, both ebb and flood. The next point is, that if this breakwater were carried out, it would shelter the course of all vessels coming in with a gale of wind at south-east. With such a gale vessels frequently bear up from the southward to make Whitby Harbour. In attempting to seek refuge in the harbour many of them, especially strangers, not being well acquainted with the place, come along aback the rock. They are so much afraid of the rock that they give the north end too wide a berth, and when they attempt to haul up probably the wind will start, and they cannot work sufficiently to the windward to gain the entrance of the harbour. Therefore, they have no resource left but to come upon the sand to the westward of the west pier. If the breakwater was carried out, the water would be so smooth that they would come up under the lee of the breakwater; they need have no lee tide, and they would be enabled then to come up with a south-east wind, with a very little weather tide; while with a lee tide they would be enabled, by the smoothness of the water, to fetch up from the east to the breakwater—to Whitby Harbour, and which they would otherwise not be able to do. The last point on which I wish to observe is, if this breakwater were made, vessels coming into the bay in bad weather, and in a leaky state, or without anchors, not being able to bring up in the bay—coming in at low water, and at a time when they could not enter the present harbour of refuge, protection would be afforded to them, and the beach to the westward of Whitby pier, where the ships could be reached, is one where the preservation of life would be certain. Those are the points on which I think this breakwater would render advantage to the present harbour of refuge.

21,792. It has been stated to us, as one of the advantages of making a breakwater as you propose at Whitby Rock, that vessels might run into the harbour of refuge, and that if the harbour got crowded some of them might come into the existing harbour?—That would be an advantage.

21,793. What area of refuge would you calculate upon having inside the piers?—Do you mean in the lower harbour?

21,794. I mean in the lower harbour?—About 24 acres below the Swivel Bridge.

21,795. Would there be any available space above for refuge vessels?—Yes, nearly 45 acres.

21,796. Then in the tracing which you forward to us, will you have inserted the depth of the water in these two refuge areas, above and below the bridge, at quarter flood?—Yes.

21,797. By that I mean the soundings at quarter flood?—Yes.

21,798. (*Sir F. Smith.*) Have you seen any wrecks along shore?—I have frequently seen them. I am not so much in the habit of being on the shore as most of the witnesses who have gone before me.

21,799. Have you examined any of the wrecks?—Yes, I have seen some.

21,800. Have you ever found any in a lamentable state of disrepair?—I cannot say I did.

21,801. On the whole do you think the contrary? Would you say that they were in a fair condition?—I should consider the ships generally in a fair condition so far as I have seen.

21,802. I think you call Whitby a harbour of refuge?—A harbour of refuge.

21,803. Do you think you are justified in calling it so in the strict sense of the word?—I believe

it to be, if not a perfect harbour of refuge, certainly the best on this coast. If I understand you rightly, you mean to say, that I should not call it so unless vessels can enter at all tides, but I think it is the best that we have at present.

21,804. You think there are none to compare with it?—None to compare with it on this coast.

21,805. You do not include the Tyne on this coast?—The Yorkshire coast I mean.

21,806. Do you include Hartlepool, or what do you include?—I would rather keep at home, if you please.

21,807. You say it is the best on this coast?—It is.

21,808. You must compare it with something, what are the others with which you are comparing it. If you had rather not answer the question I will not press it?—I told you I only spoke from books, not from experience of ever being on the coast.

21,809. By being the best on the coast you mean better than any to the southward of Whitby. I think I am entitled to ask, what are the others as harbours of refuge?—I do not know any other one which can be called a harbour of refuge.

21,810. Whitby is the only one?—Yes.

21,811. I presume you think some other harbour of refuge to the south of this is desirable?—I would rather not give an opinion upon a thing that I know nothing of.

21,812. Have you in any of your voyages kept close to the Land's End?—No.

21,813. Have you run along the south coast of England? Have you ever stood in need of a harbour of refuge there?—No.

21,814. None would ever have availed you at all?—No, I never wanted one.

21,815. Not even as far as the Land's End?—No.

21,816. You never took refuge nor desired it near the Land's End?—No.

21,817. (*Mr. Lindsay.*) You very properly desired to confine yourself to the limits within which you are yourself acquainted, and therefore I will confine my questions to you within these limits. Do you think, if anything was done at Whitby, it should be limited to the construction of this south-east pier of 3,800 feet in length?—No; I think that that is the only thing to which my attention and that of the trustees has been directed. That is the point I wish to stick to, the breakwater upon Whitby Rock. There cannot be two opinions about that. If the large plan was carried out it would be a perfect harbour of refuge.

21,818. This pier I think you said would afford shelter to vessels with winds from the south to east?—I say that is stated by Mr. Harrison; I only mentioned the east; I said 350 acres south-east, 200 acres east. In the large area 172 vessels could ride, and in the smaller 120.

21,819. This pier of 3,800 feet would afford no shelter with the winds anything to the northward of east?—Not to the northward of east certainly.

21,820. Would it afford shelter to vessels in east-north-east winds?—That would be a fair wind to go away to the south. This shelter is for laden ships which want to proceed to the south. If the wind come to east-north-east, they would not remain there, because it is a fair wind to go away.

21,821. You are aware that the gales may be so strong that a vessel caught down in this place, which is comparatively a bight to Flamborough, the gale might be so strong, considering the leeway that colliers make, that a ship could not weather away Flamborough Head with an east-north-east gale?—I think you have it in evidence, that these were not the winds that occur on this coast. I am told that if a breakwater was made here, and vessels were struggling between this and Flamborough Head to make their passage to the southward, that no captain would ever hesitate to run into this harbour to shelter from a south-east wind under any apprehension of the wind shifting round to the north-east.

21,822. Unfortunately we have it in evidence that that gale of the 4th January 1857, commencing at the south-east, went round to the east-north-east, and then it blew as is described, a perfect hurricane. Therefore in that gale, would your pier of 3,800 feet have afforded any shelter?—I believe you have it in evidence that here the wind was not east-north-east when it blew the hardest.

21,823. We had it in evidence from other places further north, that the wind blew strongest at east-north-east?—It does not follow that it should blow the strongest here from that point, because it blew the strongest from that point 30 or 40 miles to the north.

21,824. Your pier would not afford shelter from east-north-east gales, would it?—To a certain extent it would.

21,825. Would it afford any shelter from these winds?—I have not given any attention to that. I take the figures from Mr. Harrison's explanation.

21,826. I want to ask something about Whitby itself, about the harbour. When was it constructed?—It is a very long time ago, I cannot tell the date. There is an Act of Parliament of 1702 for rebuilding and improving the piers and harbours. But when they were first built I do not know.

21,827. Where was the money found that rebuilt the harbour of Whitby?—The duty on coals raised it, at least that is the largest item.

21,828. It is raised by means of a tax upon the passing ships or upon the coals in these ships?—Not strictly so.

21,829. Then how is it raised?—There are other dues in that Act.

21,830. Just give them briefly?—The first is ½*d.* per Newcastle chaldron upon coals; the next upon coals delivered in the harbour; the next upon salt, corn, grain, and upon other goods, and the next upon ships and vessels.

21,831. What is the present amount of your revenue derived from these sources?—For the last year?

21,832. Yes, for the last year, or two years, if you have it?—The revenue of last year was 5,232*l.*

21,833. Separate the items?—The amount derived from the halfpenny a chaldron upon coal, was 4,990*l.*, and 240*l.* was from everything else.

21,834. That is on vessels passing here with coals?—That was levied upon the coals shipped.

21,835. Not from vessels coming in but passing?—From all the coals that are laden, not in all the northern ports, but in Newcastle, Sunderland, Blyth, and North and South Shields.

21,836. How is this revenue expended?—Entirely upon repairs and improvements to the harbour.

21,837. The whole 5,000*l.*, and upwards, is expended upon the improvement of the harbour?—There is a large interest on the debt.

21,838. How much is paid for interest?—In round numbers, 1,441*l.* That is the interest upon the capital borrowed for the construction of the harbour, that is the interest upon borrowed money.

21,839. Borrowed upon security?—Yes.

21,840. How is the remainder spent?—Entirely upon the repairs and improvement of the pier and harbour, the salaries of officers, and the expenses of lights. We have two tide lights.

21,841. Could you give the items of expenditure?—Interest is 1,441*l.*, salaries 468*l.*, rates almost 70*l.*, light keepers about 80*l.*

21,842. Does that make up the sum total of 5,000*l.*?—Then there is all the labour which is required for the repairs, and of course the materials, stones, and other things.

21,843. Used in maintaining and repairing the piers?—Yes.

21,844. What portion of the revenue is employed in deepening the harbour?—I cannot give it particularly. In this account it says "workmen's wages."

21,845. Is there a large proportion spent annually in deepening the harbour?—I cannot tell the quantity that has been taken out. There was 45,220 tons of mud taken out in the last three years.

WHITBY.

Mr. W. Jameson.

23 Oct. 1858.

Mr. Lindsay.

21,846. Could the harbour be greatly improved if you had a dredger there?—Perhaps; that is an engineering question. But if I might form an opinion, we do not want a dredger yet. It might be required if we could get what has been stated, six or seven feet water at low water; but at present, when the mud comes above the water at low water, it can be done by hand labour, and therefore it is a question of which is the cheapest mode.

21,847. My object in asking is, that it appears that the revenue of this harbour is chiefly raised by means of a passing toll, and I want to see if the ships that pay the toll cannot derive some benefit from Whitby as a harbour of refuge. Now, there can be no doubt that the only means whereby they can derive benefit, is to see if we cannot obtain a greater depth of water in Whitby Harbour than what there is now?—It can be done I should fancy. I do not know anything to prevent it.

21,848. Tell me why you think a dredger is not wanted?—Because I should think it is cheaper to work as it is, but I have not any experience. I really do not know what the cost of a dredger would be. But my idea is that the proper occasion for a dredger is when you cannot use manual labour. That is in working under water at a greater depth of water than that at which it can be done by manual labour.

21,849. Unless you have something that can work under water, as the bar has generally a little water over it at low spring tides, you cannot deepen it. You cannot deepen it if it does not dry, except for a very short time at low water spring tides?—There is no doubt it might be deepened.

21,850. Have you an engineer connected with the harbour?—Yes.

21,851. Is he here?—Yes.

21,852. And will he be able to state to what extent the harbour could be deepened, and at what cost?—Yes, he can.

21,853. (*Capt. Sulivan.*) Is the mud removed from the harbour by contract?—No.

21,854. All done by day work?—By tides work.

21,855. By paid labour?—Yes.

21,856. Have you any means of showing us what the removal of the 45,000 tons taken out has cost?—That would be more a question for the engineer.

21,857. The accounts would show?—In the account I have before me, it is included in the workmen's wages. The first item is the workmen's wages; that includes the cost of taking, or whatever you call it, out of the harbour.

21,858. Does the engineer superintend all their works, and has he superintended them during the past three years?—Yes.

21,859. (*Capt. Vetch.*) Is it the case that the upper part of the river above the bridge is capable of being converted into a floating dock?—No; that has not been so converted.

21,860. Would it not be very useful?—That is more an engineering question. I do not see the benefit of it.

21,861. I suppose if the mouth of the present harbour was sheltered by the south-east arm of the proposed harbour, then it would be more important for the trade of Whitby to have a floating dock?—The vessels that usually come here are vessels that are always lying on the ground in most ports.

21,862. But if you had a sheltered entrance by which vessels might come in, then a floating dock would become more useful I suppose?—It would be made at great cost, and the trustees have no money to undertake such a work.

21,863. Would anything want doing except putting up dock gates?—I am not engineer enough to reply. Probably you are aware there is a river stream. There is another thing would have to be provided for. There are a great many dry docks in the upper harbour. If you made a floating dock you would do away with the utility of all these, unless you had a stone wall all the way down inside, and then there would be another disadvantage. You will still allow me to call it a harbour of refuge. As soon as ever there is water in it, that is early in the neap tides and north-west winds, when light vessels principally come, the bridge must be opened at all times for them, as soon as there is water. If you had a dock above, you would in a great measure destroy the harbour of refuge.

21,864. (*Chairman.*) Are the accounts of the pier and harbour trustees printed annually for the use of the trustees?—They are, and they are always sent to the clerk of the peace at Northallerton.

21,865. Will you put in a copy for the last three years?—You shall have it.

21,866. Have you a copy there you could let me see?—I can (*handing up one*). I am reminded that they are also placarded upon the town hall annually, and are also sent to the clerk of the peace and published in the York county papers.

21,867. I see in this statement there is a charge of 2,025*l.* workmen's wages. Is the work not stated in more detail in the accounts? Could we get it in more detail from the books, and could we there ascertain the general character of the work?—I cannot immediately answer that question, but I will answer it if you will allow me time.

21,868. Will you ascertain at a later period whether from the books which are kept by the harbour trustees you could make such extracts as would show to us the character of the work which has been done?—I will.

21,869. (*Sir F. Smith.*) Mr. Harrison has proposed a breakwater of 3,800 feet in length which you think it is very desirable to construct, and he has given us the probable cost. Do you imagine that if the Government were to grant half of the amount required, the local authorities would raise the remainder?—We have no power; we are trustees for the pier and harbour of Whitby.

21,870. There are no means of raising any money?—We have none as trustees.

21,871. Is there any power in any other way? Supposing a grant of half would enable you to carry out the work?—Do you ask me as a trustee or as an inhabitant?

21,872. As an inhabitant?—I am aware of none. There are certainly no public funds that I am aware of.

21,873. In fact, you see no means of aiding the Government grant towards this desirable object?—That is the very reason we want help because we cannot help ourselves.

21,874. Supposing the Government are disposed to help you?—Allow me to make the remark that, I cannot exactly see that if this was made why the inhabitants of Whitby should subscribe towards making a breakwater on the Whitby Rock for the protection of all strange vessels.

21,875. Our ideas are that this breakwater is for the protection of all vessels passing the port, not like the northern ports for our own trade. We are now speaking of a harbour of refuge. That is the point to which I wish to keep your attention; it is not a trade question?—I do not say that it would be no advantage to the town as a town itself, or to the inhabitants of the town. The advantage that would be afforded by this breakwater would be in giving shelter and protection to life and property on board vessels passing along this coast, and as I observed particularly, laden vessels with coals from the north attempting to make their passage to the south and not being able to do so.

21,876. No doubt the great object is a national one, and therefore the nation might perhaps be put to the expense of defraying the cost of the national part of the object. But you do not mean to say that the town would derive no advantage from the vessels belonging to the town being able to get refuge and being saved from being wrecked?—Of course there must be some advantage, but the great national advantage, the saving of life and property, is the point.

21,877. You think there would be a local advantage of some amount ?—I think of some amount.

21,878. And in return for that you are able to contribute nothing ?—Voluntary contributions might be raised, but we have no funds.

21,879. (*Mr. Lindsay.*) You said that the great object of this harbour was to afford shelter to ships which passed. Would not the best means be to give more water ? In the account for the last year which you have handed up, I find a sum of 2,026*l.* balance in hand. Why was not that spent in deepening the harbour ?—We only get these accounts occasionally. It might happen that the returns from the north ports had only just arrived before it was made out. Perhaps you will allow me to observe, that in 1844 the bar was very bad and the entrance was wide. Mr. Walker, the engineer, whose plans you have before you, was appointed by the trustees to come down and examine the state of the harbour and report to them. You have his plan before you. Since that time, not that plan exactly, but a great part of it has been carried out—so far as this, that the east pier has been extended 325 feet and the entrance has been narrowed according to that plan. To get that work executed we had to incur a large debt, the interest of which you see in that account. We have so far carried out that plan. But it is not yet completed, and that is why we have not yet turned our attention to dredging the harbour. We are going on carrying out the plan, but I believe it will require some time before it is completed. There is also in the preamble of the Act under which this harbour is managed words showing that the money is granted to the trustees for the purpose of keeping the harbour in order. It says, "Whereas the piers and rocks of the "said harbour are much exposed to be injured and "demolished by the force of the sea and other inevitable "accidents so as to require constant repairs," &c. There has been a little defect on the outside of the east pier, which you see is exposed to the violence of these very south-east winds. Had it not been immediately attended to, a breach might have been made in that east pier and the cost of its reparation might have been enormous. The work might have been carried away. That accident occurred in the part of the old work near the foundation, and we are still engaged in repairing it. When these works are completed there is no reason why we should not turn our attention to dredging and deepening the harbour.

21,880. Was the capital on which you pay the interest of 1,446*l.* borrowed for the purpose of carrying out these more recent works ?—Principally so.

21,881. In respect to the surplus of 2,026*l.* which you have now here, are you allowing it to accumulate in the shape of a fund to pay off the debt ?—I do not know that ; it is very possible that it is accumulating, because it is very possible that when that balance was struck, the money had just come in from the north. There would be three or four months' wages and expenses going on, which would lessen it probably to something under 1,000*l.* We cannot always keep a balance. We only get the money occasionally, but the expenditure is going on daily.

21,882. I daresay the 2,000*l.* includes a great many open accounts not rendered. But are you allowing the surplus revenue to accumulate as a fund to pay off the debt which you contracted, or do you intend the debt to remain and use the whole revenue for the purpose of improving the harbour ?—We intend to use the whole revenue towards improving the harbour. We never have had too much yet, because whenever anything extra has occurred we have always had to borrow money.

21,883. (*Capt. Washington.*) Who is your consulting engineer ?—Mr. James Walker, the Admiralty engineer.

21,884. Has he visited Whitby since 1844 ?—I believe not.

21,885. You said that there was sufficient appliances for repairing ships here ?—Yes.

21,886. Is there a graving dock ?—There are several, seven I believe.

21,887. What is the largest sized ship they will take ?—600 tons.

21,888. Can repairs of steam machinery also be carried out in the port of Whitby ?—No, I think not. Of course there are smithies, but there are no means of repairing steam machinery to any extent.

21,889. What are the chief exports from the harbour ?—Stones.

21,890. Of which there is abundance ?—Abundance. I mean more than one kind of stones. There is a great quantity of freestone and a very large quantity of ironstone, and also a kind of stone, a blue whinstone, from the basaltic ridge, which is used as paving stones.

21,891. In the accounts you have produced is there any statement of the primage paid to the Trinity House at Newcastle ?—No, it does not appear here.

21,892. Is there any account of that ?—That will be at the custom house ; it will be easy to ascertain, and it shall be ascertained for you.

21,893. The pier lights are supported out of your revenue ?—They are supported by the trustees ; the tide lights, not the new lights. The expense of the two pier lights are paid by the trustees.

21,894. Is that a large expense ?—About 120*l.* or 130*l.*

21,895. Are the pilots any expense to the trust ?—We have nothing to do with the pilots. There is a board of sub-commissioners, as they are called, under Newcastle.

21,896. They are paid by their earnings ?—I believe so.

21,897. Does the Trinity House of Newcastle give you anything for the primage you pay in the shape of buoying or lighting the place—to the harbour ?—No ; the buoy at the end of the shoal is kept up by the Trinity House of London.

21,898. Can you mention anything the Newcastle Board does for you in return for your payment ?—No; except that the pilots have their licences from them, and are considered as their servants. The board of sub-commissioners only report to the board at Newcastle.

21,899. Is any portion of the money paid to them by you spent for the benefit of this port ?—Not that I am aware of.

21,900. Do any of the people of this port benefit indirectly in the shape of pensions, almshouses, or anything of that kind ?—I do not know any.

21,901. (*Capt. Vetch.*) Do all the ships which come into the harbour lie aground at low water ?—Yes.

21,902. (*Chairman.*) Have you read the report of the Select Committee of the House of Commons upon harbours of refuge ?—Well, I cannot say that I have not, but I cannot say that I have paid much attention to it.

21,903. Towards the close of the 26th paragraph, which is rather a long one, and I will not read it, the Committee point out that several of the ports along the coast being in possession of considerable funds, have done a good deal to improve their own ports, and it further goes on to suggest the advantage which would be derived from advancing sums to assist them in these local efforts to improve their harbours, on the same principle that the drainage money was advanced, the rate of interest not to exceed three per cent. and the debt to be payable by means of a sinking fund extending over a period of 50 years. I think it was at Swansea I read this paragraph to one of the witnesses who was chiefly concerned in the improvement of the harbour, and asked him what Swansea would be disposed to do if the Government oy way of a grant or loan was to offer some assistance ; his answer was, whatever other ports in this locality may do Swansea will not be behind hand ; now what will Whitby do ?—If you ask me as a trustee I must say, nothing.

21,904. I ask you as a gentleman residing in

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Whitby ?—I am afraid I should have the same answer to give.

21,905. Do you think that no local funds could be raised to meet grants or loans from Government ?—Not to any extent, speaking of the outlay ; I presume you are alluding to the outlay on the breakwater on the rock ?

21,906. I allude to that, and also to the deepening of the harbour so as to enable ships to get into it at half flood or whatever it might be, which no doubt would improve your harbour for local purposes, as well as render it more valuable as a refuge ?—I understand you to say what sum would the Whitby people give towards any sum which might be granted by the Government ?

21,907. No, not what sum would they give, but what would the inhabitants of Whitby be disposed to do in order to meet any grant from the Governm —I do not know, I am sure.

Mr. Francis Pickernell examined.

Mr. F. Pickernell.

21,908. (*Chairman.*) You are the engineer of the harbour ?—I am.

21,909. How long have you held that situation ?—Nearly 37 years.

21,910. (*Mr. Lindsay.*) Have you much silt in the harbour ?—A good deal of deposit.

21,911. Where does it come from ?—From the river Esk, it is the alluvial deposit held in suspension in the water of that river.

21,912. Have you much silt upon the bar ?—A good deal.

21,913. Where does that come from ?—From along the coast, from the shore and the detritus from the cliffs.

21,914. What means do you take to remove the sand from the bar and the silt from the harbour ?—We seldom make any attempt to move the sand from the bar ; it is so rarely we get the boats on, and when we do we make so little impression that we do not consider it worth working there.

21,915. Have you had a dredger ? — A dredger would be considerably better than the means we have for that part.

21,916. Could you deepen the bar ?—I do not think a dredger would deepen the bar, because it is formed of strong alum shale.

21,917. What extent of sand is over it ?—Varying from two to sometimes four feet.

21,918. A dredger would deepen it down to the alum shale ?—Decidedly.

21,919. What means could be adopted to remove the alum shale, which is a species of soft stone ? Any other means but blasting ?—I do not think blasting would be desirable, because the entrance of the harbour is so narrow it would shake the foundation of the works.

21,920. Is there any other means you could suggest of deepening the harbour after the dredger had gone down as far as it could go ?—I am not prepared to give in any plan because I have not considered it on this point ; we have two feet more water between the two pier ends than we have 100 fathoms within.

21,921. I suppose by means of a dredger you could deepen the harbour there to the same extent as you have at the bar ?—Decidedly, because a little within the entrance it becomes a mixed strata of all kinds, gravel and different materials ; it is not rocky.

21,922. So that means could be found out for deepening the harbour to a greater extent than you could work the dredger, but would the foundation of your piers admit of a greater depth ?—Not a great deal.

21,923. How much ?—The work in which I have been concerned, 330 in length, is upon the alum rock and not very deeply founded ; it was taken down sufficiently for the security of the building, but not with any view of deepening the entrance between the two piers.

21,924. Could you with safety cut down to the foundations of the pier or to any depth in this alum ? —If two feet were taken out four feet might be taken out all the way up to the bridge, and I think it would not be prudent to go deeper.

21,925. You could take off about three feet of sand and two feet of alum shale without affecting the foundations of the piers ?—I think so.

21,926. That would be five feet. If you had that would not that be a great acquisition ?—Most decidedly.

21,927. And render it much more a harbour of refuge than it is ?—Yes ; because vessels could come in so much earlier and so much later of the tide.

21,928. To deepen it to the extent of five feet, would that entail a very heavy outlay ?—Yes, a very heavy outlay. The trustees have no means to meet it ; their funds would not pay the expense of a dredger.

21,929. Put aside the means of the trustees altogether. Could you tell me roughly about what the cost of getting five feet more water into your harbour would be ?—Speaking of something like analogy, I think at Sunderland the dredger costs about 5,000*l.* a year. If we had that at our harbour we could soon get a very excellent harbour. The harbour might be excavated above bridge so that ships could float.

21,930. How do you take out the mud above bridge ? —We have two boats made out of old keels ; we pay the men so much per ton to dig out the mud.

21,931–2. (*Capt. Washington.*) What is the whole amount you have dredged ?—Here is a statement of what has been taken out for the last 15 years. Since 1836 the aggregate amount is 114,954 tons. 45,220 tons the aggregate for three years.

21,933. 15,073 tons the average per year for the last three years. I do not understand whether that is only for three years ?—For three years.

21,934. You said you should fear deepening too much on account of the piers, what is the width ?— 150 feet in the narrowest part ; as you come in, it widens all the way.

21,935. I suppose the piers could be underset if funds were provided ?—They might be, but it would involve great expense.

21,936. If the piers were underset, do you know any other engineering difficulty in getting six feet additional ?—I know of none.

21,937. Would it be of great benefit to the harbour ? —Decidedly ; of course.

21,938. Do you know how far the tide would flow up if it were not stopped by the mill dam ?—Only a little above what it does now, and at the spring tides, perhaps once a fortnight, it is a good tide if it reaches to the foot of the dam.

21,939. How far is that from the pier heads ?—Two miles.

21,940. It would not reach half a mile further ?—I think not ; many days it does not reach the dam.

21,941. What is the rise and fall of the tides ?— From 15 to 18 feet ; ordinarily 15 or 16 feet ; a good spring tide 18 feet.

21,942. That gives a flow of eight feet to the mile ? —It will be nine feet a mile.

21,943. Is that not very rapid ?—It goes out very sluggishly.

21,944. Do the freshets come very rapidly ?—We have, comparatively, so small a quantity of water and so long a time for it to come in that it goes very slowly. There is no scouring power at all, in my humble opinion.

21,945. You think it would not be increased if the mill dam could be spurred ?—Only three or four days a month.

21,946. Do the freshets scour the shore ?—They do.

21,947. They come down very strong ?—Yes.

21,948. Does the Esk drain much country ?—17 or 18 miles.

21,949. Has it a very large basin ?—It is very small

at the beginning, and is widened by tributary streams as it comes along.

21,950. You spoke of the alum shale being very hard?—It is hard for the bucket of a dredger to scoop out; it is not hard for a man to pick.

21,951. Suppose you had a bucket armed with a steel lip and horns, would not that break it up?—I hardly know, having had no experience in dredging.

21,952. (*Capt. Sulivan.*) I do not quite understand whether the bar at present between the two pier heads has a deposit of sand on the shale, or whether the shale is the only bar?—I do not think there is much sand on it at present, nor does it come as much as it did before Mr. Walker's design was carried out. We had an opening of 290 feet then, it has now decreased to 150, and consequently the sea water is accelerated in passing considerably, and that which is held in suspension is brought, by the force of the north-west winds, into the harbour along between the piers.

21,953. It is nearly dry between the piers at low water; does the shale form the dry bed?—It does.

21,954. All you would have to take out between the piers would be shale. There is no depth of sand over the shale?—No, the sand is easily worked. It would be with the shale that there would be the difficulty.

21,955. You said the pier heads were founded about two feet in the shale?—About that.

21,956. Is the shale firm enough to make a cutting away some six or eight feet clear of the foundations?—I should not advise it. The action of the waves would soon wash it away.

21,957. You could not underset it with a coffer-dam which would partly block up the entrance?—You could work with a tidal coffer-dam only two or three feet beyond the work required.

21,958. Even with the depth you have at the entrance now, is it not the case that vessels which pass between the heads will ground at the turning of the shallows inside?—That is the great evil of the channel between the pier ends and the one called Scotch Head, and the other Burgess Pier.

21,959. Would not dredging clear away all that if you choose?—It would.

21,960. Would not that remove the greatest objection of all, at present, to the harbour, that vessels ground immediately inside? I saw four vessels this day ground almost together, if there had been any sea, they would have been likely to have had some damage. Would not deepening the inside enable vessels to be in greater safety, and remove the greatest difficulty you have at present?—I do not clearly understand.

21,961. Would not clearing out the outer harbour give more room for vessels when they have passed the entrance, to get space to get out of the way of others coming in? Would not that be a great improvement?—A dredger would take the whole of the mud away, but there is much silt sand, &c. comes in with strong north-west winds.

21,962. Is the bar to the north of the channel formed of sand?—The whole of it is formed from the beach, not from what comes down the river.

21,963. Does not Scotch Head throw the current more the other way, and so tend to increase the bar?—You have hardly any current. No back water in point of fact.

21,964. With a dredger could not you keep a straighter course and keep the channel nearer the pier?—A dredger might be made to take it away faster than it accumulates.

21,965. There is a great deal of sand comes from the seaward every day?—Yes.

21,966. (*Mr. Coode.*) You knew the harbour before the new works were carried out?—Before the extension of the east pier.

21,967. What has been the effect of that upon the silt and sand?—It has accelerated the stream, running through a narrow opening instead of a wide one, and instead of the sand depositing in the entrance, it is driven into the harbour, and accumulates about three hundred feet higher up.

21,968. Is the accumulation of sand greater at this point than it used to be?—Yes, it is, because of what would have been deposited in the entrance a part is brought by the strong flood tides into the harbour.

21,969. Have you any section of the surface of the alum shale, which would give us an idea of the level?—I have Mr. Walker's sections of the whole level of the harbour.

21,970. Upon the surface of the alum shale?—Upon what may be the bottom.

21,971. Can you give us a copy?—Certainly.

21,972. What is the depth of water at the first quarter of flood tide?—During that time we have very little water at all, none above the bridge. It comes in slowly at first, and rapidly afterwards.

21,973. The whole of the material between the outer end of the bar and the Scotch and Burgess piers comes from the sea?—All on the west side is from the sea. On the east side there is no deposit from any place.

21,974. Is the bottom there alum shale?—No.

21,975. Of what is it composed?—Of shingle, sand, and different matter.

21,976. Do you think that this deposit on Collier's Hope is brought from the river or comes from the sea?—I do not think any of the deposit below the bridge comes from above, but a good deal above the bridge, it does.

21,977. It is your opinion that that which is deposited below the bridge comes from the sea?—Yes, except a little that may be brought in spring freshets, but the great bulk comes from the sea.

21,978. (*Sir F. Smith.*) Do I understand you would have any difficulty in blasting the alum shale between the piers?—I do not expect any difficulty in getting down about two feet, that is as far as it could be required.

21,979. (*Capt. Washington.*) I think you said the entrance of the harbour had lately been decreased from 290 feet to 150 feet, that is nearly one half?—Yes.

21,980. Have you had any complaints from ship masters that they cannot make the entrance?—I have heard complaints that the entrance is too narrow now.

21,981. Has any damage arisen from it?—I believe vessels have come in contact with the east pier in consequence of the tide running so rapidly past; before they could make the entrance the tide caught the starboard quarter and threw them against the pier head.

21,982. A flood tide?—Yes, a flood tide. The spring flood tide sets very rapidly. It sets out and runs almost to the east, and if they are not very cautious they are sure to come up ahead to the westward, they lose their steerage way, and perhaps run against the pier end.

21,983. Would the construction of the south arm of the breakwater remedy that?—Decidedly, because it would take away the strong current of tide that runs past.

21,984. Is not there to be an opening between the breakwater and the harbour?—Yes, but I do not think it will run past thus rapidly.

Dr. GEORGE MERRYWEATHER examined.

Dr. G. Merryweather.

21,985. (*Chairman.*) Are you a resident of Whitby?—I am.

21,986. You wish to make some statement relative to the advantage or necessity of a harbour of refuge at Runswick Bay, do you not?—Precisely, as an introduction to the evidence.

21,987. Will you proceed with your statement?—The claims of Runswick Bay to be made a harbour of refuge are the great advantages which it possesses seaward by nature, which could not be similarly constructed by art for less than 10 or 15 millions sterling; it is naturally formed into a harbour; that from the

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immense quantity of freestone of a most endurable character which is close at hand at the end of each breakwater, a breakwater could be constructed in a comparatively short space of time, and give security to shipping, and life, and property, without much delay; that the comparatively small amount of money which would be required would be insignificant compared with the life and property that would be saved; and that it would greatly multiply the number of the fishermen, and thus form a nursery of seamen, and consequently be of great benefit to the nation.

Mr. JOHN BOULBY examined.

Mr. J. Boulby.

21,988. (*Chairman.*) You are an engineer and surveyor, and reside at Whitby?—Yes.

21,989. Make any statement you have to offer relative to the facilities afforded by Runswick Bay for a harbour of refuge?—In referring to that I would state by referring to the plan it will be seen that Runswick Bay, between the low-water mark and the breakwaters shown upon the plan which I produce, contains an area of 601 acres. The grounds on which it will be brought forward are, first, its geographical position; secondly, a sufficient capacity; and thirdly, the great facilities for the construction of breakwaters. If you will allow me, I will refer to a report which I have made, and which will sufficiently explain the grounds upon which it is brought forward. First, as to its situation; situated midway between the Tyne (which may be taken as the northern extremity of the coal shipping ports) and Flamborough Head, it occupies a superior local position upon the coast, recommended for consideration. The advantage of this towards rendering a harbour of refuge for vessels in the coasting trade equally available for both loaded and light ships is unquestionably of the greatest importance, for, as loaded vessels would not sail except with a prospect of commencing the voyage in safety, and without detention, then Runswick Bay, being placed exactly one third of the distance between the Tees (the southern extremity of the coal shipping ports) and Flamborough Head, is just where such a harbour would begin to be required, and when needed would prevent the danger and delay of vessels running back to the north, as well as the uncertainty, when upon a lee shore, of their being able to do so. The same advantages of situation equally apply in the case of light ships coming from the southward, which could make avail of a harbour in Runswick Bay, where in many cases one further north would be beyond reach. Taking the whole distance from the Farn Islands to Flamborough Head, it will be found that the greatest extent of coast totally unprotected, without a single place of safety for a vessel to run to in the north-east gales, is the Yorkshire coast, extending as it does from the Tees to Flamborough Head, a distance of nearly 60 miles. Along this line a great proportion of wrecks occur, and which would not be prevented by having a harbour of refuge to the northward of it. Second, the area of the bay from low-water mark to the position shown by proposed breakwaters contains 601 acres. The depth of the soundings, together with the complete shelter from all gales that would be afforded to almost every part of the bay, would give greater capacity, especially for ships of large class, than would happen in many places having a large acreage. The superiority of the soundings (taken at low water) will be at once evident upon reference to the plan, whilst the bottom, consisting of clay, is not to be surpassed as holding ground. Thirdly, the facilities for construction of breakwaters are very great, from the immense beds of freestone in the cliffs at each point of the bay, at Lingrow and Kettleness. These beds are sixty feet in thickness, and the very small quantity of cover resting upon them offers every facility for making them available. The suitable nature of the stone for sea works is evident by inspecting the immense blocks upon the beach, many of which have laid there for ages. The bay and adjoining coast are entirely free from sandbanks and other deposits. Those common and frequently difficult to be foreseen effects caused by breakwaters would produce little or no interference with the present course of the tide, which runs in a direction across the mouth of the bay, and is so little felt within that ships at anchor never swing with it. The rise at ordinary spring tides is 16 feet; the quantity of fresh water coming into the bay, though ample as a supply for shipping, is too small to cause any tendency to silt up with alluvial matter. A natural opening exists between Lingrow Knock and the shore, having a depth at low water of four feet, and, consequently, at high water of 20 feet; this, if required, might easily be deepened and enlarged, and without interfering with the shelter of the harbour, might be of frequent service. Although at present Runswick does not possess the facilities for repairing and refitting vessels, yet it is quite certain that along with a harbour of refuge, these would spring up as a necessary consequence. I was not aware until yesterday that particulars with respect to these breakwaters would be required, and therefore I must be excused for not being in possession of sections to lay before the Commissioners, but since then I have been enabled to give an idea, which I believe will be a very correct one, as to what quantity of material will be required, and the probable cost of breakwaters. In the two breakwaters the quantity of stone required would be 3,000,000 cubic yards, which I am perfectly satisfied can be procured and deposited at 3*s.* 4*d.* per cubic yard, which would make the total cost 500,000*l.* These breakwaters, as I have described them, will be eight feet above high-water mark, and will have a breadth at the top of 45 feet, with a slope towards the sea of one in three, and towards the shore of one in two.

21,990. Does that conclude your statement?—Yes. I shall be glad to answer any questions.

21,991. Is the statement which you have made printed?—What I have stated with respect to the breakwaters is not stated in the pamphlet at all. I have made the consideration this morning.

21,992. You are not prepared with any well considered estimates?—I have no doubt this is correct.

21,993. Five hundred thousand pounds is the total expense?—Yes.

21,994. What are the figures?—Three million cubic yards of stone at 3*s.* 4*d.* per cubic yard.

21,995. These are all the figures as to it?—Yes; but I believe that gives as far as I am prepared at present the expense of the proposed breakwaters.

21,996. (*Sir F. Smith.*) (*Referring to the pamphlet entitled "Plan and Soundings of Runswick Bay."*) I should have been obliged if you had sent us this pamphlet yesterday?—I was not aware but you had had it already with the plans; I was under the idea that they had been forwarded to the Commissioners.

21,997. I think you said you propose to give a slope of three to one externally, and of two to one internally?—Yes.

21,998. Are the breakwaters to be composed of rubble stone?—Entirely as taken from the quarry.

21,999. Where is the quarry?—Close beside, Kettleness on one side, and Lingrow on the other.

22,000. Close to the works?—Yes, quite close.

22,001. What is the character of the stone on both sides?—We have very good evidence as to the character of it, because there are hundreds of thousands of tons of it upon the Scar which have come from the same beds; the stone has laid there for ages, and there is no appearance of any action of the water upon them.

22,002. What is the stone, geologically speaking?—Freestone, lying above the lias formation, immediately above what is called in this neighbourhood "dogger" or oolitic ironstone.

22,003. Is there any strata of the stone exposed to the wash of the sea which we could observe to note

the effect of the sea upon it?—The bed of stone lies at a considerable elevation above the level of the sea, but the stone lying upon the Scar is stone that has fallen from it and been exposed to the action of the sea for ages.

22,004. You have given us an account of the acres between the breakwaters and the low-water line; can you tell us what acreage you will have of five fathoms and upwards?—I am not prepared to state that, because I have not the soundings near low water with sufficient accuracy to do it.

22,005. Of three fathoms and upwards?—I have not made any calculation.

22,006. In fact you can give us no information as to the soundings for vessels of a considerable depth of water?—I am not in possession of soundings to the depth to give it accurately.

22,007. Take it at two fathoms?—I believe it would deduct about 150 acres.

22,008. You are aware that this is a considerable element in the calculation?—Undoubtedly; I should have been prepared to furnish the information at the present time had it not been for this, that when a great part of the soundings were taken there was so much sea upon the coast breaking in the shallow water, that it was impossible to take soundings there.

22,009. How long was the project under your consideration?—In the first instance, when I commenced this plan it was for private purposes, it was not for the purpose of laying it before the Commissioners, and these soundings were taken by the bearings of the compass; afterwards, when I was told that there was a probability of the matter being brought before the Commissioners, I went into it rather more accurately, and therefore used a quadrant for taking the bearings, but when I did that it was impossible to get into the shallowest places in consequence of the sea breaking.

22,010. I ask you a simple question and you give a long answer; perhaps you will give a direct answer to the question; how long was this under your consideration for a harbour of refuge?—About six weeks.

22,011. And was it not a great element to know the depth of water, which you have not ascertained with accuracy?—The soundings marked in the plan are correct I believe.

22,012. You cannot tell me the anchorage you have got in any amount of depth?—I merely give with accuracy between the low-water mark and the breakwaters.

22,013. That is not what we want?—If you ask me what is the area at any particular depth, I am not prepared at present to give you it very particularly.

22,014. You had better ascertain it as speedily as possible and send it in to the Commissioners; we have invariably had these particulars given in by inquiries?—I am perfectly aware of that, and it would be done in the present case, but when I commenced this survey it was not with the idea of the plan being brought before the Commissioners, I was not acquainted with it, and I did not know it was for that object; afterwards when I took the soundings it was not possible to take them in the shallowest water.

22,015. You have had it under consideration for six weeks?—Six weeks since I first begun with it.

22,016. Under whose directions, and for what object did you first produce the scheme? Who employed you?—At first when I was requested to make surveys of Runswick, it was by the direction of the Marquis of Normanby; I was not told for what purpose they were required, and it was not for me to inquire.

22,017. The Marquis of Normanby was your employer?—Exactly, in the first instance.

22,018. How long do you imagine it would take to complete this work?—That would depend upon the amount of labour employed upon it, it might be done in a very limited time, if there were sufficient men employed; it might be proceeded with from both ends, both breakwaters at the same time.

22,019. Have you made any computation whatever as to the time it would take to complete both breakwaters?—That depends entirely upon the amount of labour expended upon it. I have no doubt that in two years it might be done.

22,020. Suppose you had unlimited supply of funds and labour, how long would it take to complete both breakwaters?—Not exceeding two years.

22,021. So that in two years, for 500,000*l.*, your breakwaters would be completed?—Undoubtedly, with an unlimited supply of funds.

22,022. Are you satisfied that the holding ground is good throughout the whole of the space?—I have every reason to believe that almost the whole of the ground is clay; there will be little of it that does not partake of that character, except in shallow water.

22,023. Only in shallow water. Then are you prepared to state that there is not deep water in which there is a made bottom?—According to the best of my opinion, in the whole of the deep-water soundings there is clay at the bottom.

22,024. And you have taken great pains to ascertain what is the matter of the bottom?—I have relied upon information I could get at; I have taken it from the evidence of those persons who are best acquainted with it.

22,025. What description of persons?—They are here to-day, and will give evidence.

22,026. (*Mr. Lindsay.*) What are the most dangerous winds on this coast?—I would rather a nautical man answer that question.

22,027. Is not the first element you have to consider, as an engineer, to ask yourself from what winds you have to provide shelter?—From my own knowledge, I say east-north-east and north-east.

22,028. Looking at your breakwater, does not the east wind blow right into the proposed roadstead?—It does.

22,029. So that your roadstead would be open to the most dangerous winds on the coast?—After you get into the entrance with the wind from the east, you get into comparatively shallow water where there is the worst anchorage in the bay; the best is to the southward of the south breakwater; where the deepest water is, is the best anchorage.

22,030. Would not an easterly gale send in a heavy sea between the piers?—There, where it is marked wreck-hills on the plan to the west, there is the most shallow water in the bay, that would not be the place where vessels would drive to.

22,031. Would there be much necessity for this north pier 1,450 yards long?—It would be a shelter from the north.

22,032. In fact north winds would be the only winds from which that pier would protect ships?—It would be so; yes.

22,033. Do you not think that some plan might be devised, with much less length of pier than that one you have laid down, to cover in quite as large an extent of anchorage from the most dangerous winds?—I quite believe that if a harbour of refuge was formed at Runswick, it would be desirable, instead of running out the north breakwater as I have put it, to have it not so far outside; that would reduce the area of the bay considerably, taking off 80 or 100 acres, but it would materially reduce the expense.

22,034. Cast your eye over this line of soundings, parallel with the bight of the bay between Kettleness and Wreckbill, it runs 40, 54, 41 feet; how do you account for 54 lying between 40 and 41?—Where the breakwaters are shown is not the deepest part; where the 54 feet is, is much the deepest part in the bay.

22,035. How do you account for it so suddenly deepening?—I do not know on what ground it may be accounted for, but the fact is it is the deepest; I believe it is named Kettleness Hole; in my opinion that is the deepest part of the bay.

22,036. Are you certain there are no rocks on 40 and 41? Is it all good ground for anchorage?—According to the best of my opinion.

22,037. As an engineer, it is an all important point, before you ask for public money for this work, to know whether you have good anchorage and if there

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are any rocks ?—I am informed by persons who know the bay that there is clay to the bottom there.

22,038. There are no rocks in the bay ?—Not where we are speaking of.

22,039. Are there any at all ?—There are Scars in the bay, but the soundings show that there are no rocks where the deep soundings are shown on this place.

22,040. Where are the rocks ?—They are not marked on this plan, but it is indicated here by the shallow soundings.

22,041. Is that where you have 15 feet in the lower part of the bay ; are there rocks there ?—There are persons here who can speak more to the point than I can.

22,042. But these are important points for you to consider before you submit the plan, with which you ought to have made yourself acquainted. Cannot you tell us in what part of the bay there are rocks ?—There, in the shallow soundings, as shown on the plan. There are 12 feet there, 14 feet, and then 15 feet.

22,043. Is it rock where these are marked ?—It is scar.

22,044. Consequently a small ship could not anchor in 15 feet, the anchor would not hold ?—I am told it is full of fissures and in some places an anchor would hold.

22,045. What is the nature of the shore ?—It is scar generally, except off Runswick, where there is sand and clay.

22,046. Is there any rock ?—At that particular part there are stones running right up in the very bight of the bay.

22,047. Could a ship get in from the anchorage ground to the sandy beach if obliged to run for it without coming upon these rocks ?—I am not quite able to answer the question.

22,048. Do you reside at Runswick ?—No.

22,049. Have you frequently been there ?—Very little here, except in making these surveys.

22,050. Is it much used as a shipping place by vessels ?—I cannot say from my own experience.

22,051. You have only had to do with this design ?—Exactly.

22,052. Why did you design the north pier to overlap the southern ?—Because it would be a shelter to the bay in northerly winds. If vessels took shelter in north-east winds and the wind came round more to the north there would be a protection for them.

22,053. Would not there be equal shelter if the pier heads came out into the same depth of water, and simply left an entrance between ?—In the same line it would be more exposed.

22,054. You think the overlap is necessary ?—Yes, so as to make the harbour of refuge everything that could be required of it.

22,055. (*Mr. Coode.*) Have you examined the beds of stone on the other side of the bay ?—Not to the same extent.

22,056. At what depth below the surface do you find the freestone fit for such a purpose ?—At 10 feet, but at some places less than that.

22,057. Would the stone be fit for such a work as you propose ?—Undoubtedly it would.

22,058. What depth of stone would you find there in the thickest parts ?—About 60 feet in thickness.

22,059. Is that all freestone ?—Sixty feet of freestone.

22,060. What level ? Is it 60 feet above the surface of the sea ?—I am not prepared to speak positively. About perhaps 200 feet.

22,061. How do you propose to get it to the works ?—By an inclined plane.

22,062. What distance from the commencement of the breakwater would the site of the quarry be ?—Not more than a quarter of a mile, and some of it nearer than that.

22,063. You propose to drop the 200 feet in something less than a quarter of a mile ?—About a quarter of a mile. The bed extends a long way along the cliff, so that where the inclined plane might commence further off, there is the choice of it.

22,064. You speak of hundreds of thousands of tons of stone at the beach, have you satisfied yourself that there is more than 100,000 tons there ?—Not having measured it, I cannot speak as to the exact quantity, but I should assume that.

22,065. Have you examined it pretty closely so as to enable you to form an idea of the quantity ?—Not particularly ; I have not made any calculation, and I am merely speaking my own ideas.

22,066. Were your soundings made at low water at a spring tide ?—Yes.

22,067. You took the depths yourself ?—No, I did not heave the lead myself ; the person who did it is here.

22,068. Were you present ?—I was present.

22,069. Did you reduce the soundings for the level of the tide at the time you were taking them ?—Yes.

22,070. How did you do it ?—It always was made according to how far the tide was from low water ; when the soundings were taken and the necessary deductions were made, I relied as to what the deductions were to be upon persons who knew the bed.

22,071. Had you a tide gauge set up ?—No.

22,072. Then those soundings are but approximate ?—I believe they are correct for all practical purposes.

22,073. Still you cannot say positively that they are corrected to low-water spring tides ?—They are corrected by the best evidence I can get.

22,074. You rely on the evidence you have heard coming from persons present ?—Yes.

22,075. You said the deepest place was called the Lobster Hole ?—I believe that is the name.

22,076. Why is it so called ?—I do not know, except it is a place where they find lobsters. I cannot tell.

22,077. Are lobsters in the habit of frequenting rocky ground ?—I cannot speak to that. The bottom of it is clay ; I do not know if they like that ground or not.

Mr. Richard Brown examined.

Mr. R. Brown.

22,078. (*Chairman.*) You are a shipowner ?—I am.

22,079. Where do you reside ?—At Hinderwell.

22,080. You were formerly at sea ?—I was, and commanded a ship 23 years, and was at sea altogether about 31 years.

22,081. In what trade were the vessels employed that you commanded chiefly ?—In the coal trade, the Baltic trade, and the American trade. I was round the Horn one voyage.

22,082. How many voyages have you made from the Baltic ?—I do not remember the number of voyages ; but I have made four in one year ; it is a considerable time back. Probably 20 or 30 voyages, or something of that kind.

22,083. Will you tell me, in coming from the Baltic in the fall of the year, where you generally made your landfall ?—We generally, if the summer was fine, endeavoured to make the Head ; in the winter time, I always took care to make the Yorkshire land ; and in all my experience I never made the land north of the Tyne. To the best of my knowledge I never made the land to the north of the Tyne. I have made the Tyne, but never to the north.

22,084. You have been north-about through the Pentland Firth ?—I have.

22,085. How many times ?—I cannot enumerate the times, but I have come several times that way from America.

22,086. Give me your opinion of that firth as a place to run through in bad weather ?—It is a very dangerous place.

22,087. Will you state your reasons for considering it so ?—On account of the strong tides. If you have the tide coming against you, you cannot go—you durst,

not go. I have been several times through, when we took the inner passage round the little island of Swona to cheat the tide and get through at once.

22,088. Have you ever been in the firth in a calm ?—I think I have on one or two occasions, but it is so far back my memory will hardly serve me; but I have been there when we were obliged to let the ship take her own way, and have fortunately got clear.

22,089. Have you ever been in Wick Bay ?—No; I have never been there.

22,090. You know it by the chart ?—Of course; it is a few miles on this side of the firth.

22,091. If there was a good harbour at Wick, enclosed by a pier, so that when you got in you would be safe, and you were running for the firth with a fair wind from the southward, would you take Wick, or endeavour to get through, or would you time your arrival so as not to meet the weather tide ?—I remember on one occasion running through, bound to America. The winds from the south and east are very bad winds, as it is always rainy and thick. I remember once instead of running for the firth I ran between the islands of Shetland and the Orkneys, giving a preference to going between these two groups of islands, rather than attempting to go through the firth. There is no doubt, when the thing is dangerous, it would be of great service to have a harbour at Wick.

22,092. If you had a safe harbour at Wick, would you, with a fair wind, make for that harbour, or go round about, or endeavour to make your passage by timing your arrival ?—I would go through as soon as I could rather than go to the harbour. I would not stop in the harbour if I had a fair wind, unless there was a strong sea. If it was blowing strong in the firth and I thought it was dangerous going through, of course I should take a harbour instead of going through the firth.

22,093. You have made the passage through the Firth from the westward, I suppose, coming home from America; give me your opinion as to that ? Was your vessel timber laden ?—Yes, and discharged in this very harbour.

22,094. Had you a deck load ?—Yes, we had.

22,095. At what time of the year ?—I have come through several times in that way.

22,096. Have you come through timber laden late in the year ?—I have so, at Christmas time.

22,097. More than once ?—Yes.

22,098. Give me your opinion as to the advantage, then, of a harbour at Wick for a timber vessel that had got through and as far down as Buchan Ness, and was there met by bad weather and a gale from the southward ?—On one occasion I did not come through the firth, I made the land about the Lewises; I only saw the bottom, and was so certain from my own knowledge, and reckonings, and other indications, that that was the Butt; I saw a portion of it and had to work my way through. It is very dark at that time of the year; and I had to make my way through where it was dangerous to attempt to find the firth; I worked away through the Shetland and the Orkneys, came round the Land's End on the Scotch coast, before I made any land but what I have told you of. At that time I was bound here to Whitby with timber. I was 21 days on that coast between Kinnaird's Head and the Firth of Tay, dodging about with the wind from the south-east round to south-south-west. Sometimes you cannot fetch up for weeks. I dodged about with it blowing tremendously strong, but kept the land aboard, and managed to dodge off and on. If there had been a place at Wick, of course I should not have stopped there, but should have gone into the place. If the wind had got farther out I should have been in danger, and must have got the Tay. If the wind had come farther still I might have risked Cromarty.

22,099. You would not have liked to go up the firths ?—No.

22,100. You are disposed to say that under the circumstances in which you were placed, a harbour at Wick would have been a great boon to you ?—I believe it would, and it would be a boon at all times.

22,101. As respects the saving of life, what do you say about that ? Were you ever in danger of your life during this time ?—I do not think so, merely driving through the firth when it is a calm.

22,102. In this particular case ?—No.

22,103. Did you ever consider you wanted a harbour at Wick, not simply for the purposes of hanging on until the wind came fair, but for the purpose of saving your life and the ship ?—Oh no; it could not be in that case. The wind was off the land.

22,104. Will you give me your opinion as to the necessity of a harbour of refuge on this district of the coast, and where you would like to have it ?—I think I have had a good deal of experience as master of a ship and otherwise. When this first came out, of course it was considered that there was to be one large scheme, and I paid no attention where it was to be, taking no interest, though we had a many ships. Though there are objections to the Tees, I consider there is no other place that ought to have it, inasmuch as it is the centre of all the coast. It is the leewardest place with the most dangerous wind on this coast. The most daugerous wind is the wind dead on the land at east-north-east. Place yourself in any position, wherever you like, you will find it at all times to be the most dangerous. There is an equal balance going either north or south. The ships all come into the bay if the wind is in that quarter; hundreds of ships come down there bound from various places. If a ship is caught on a lee shore she is as sure to come into that bay as can be.

22,105. Am I to understand you, that you consider the best place for a harbour to be the bottom of Tees Bay, if one is made upon a large scale ?—I should recommend only one breakwater. I lived two years at Hartlepool; I would not have a southern breakwater at all. I would carry the breakwater from the Heugh, leaving an entrance if you like. Carry the breakwater out there, and have one entrance, carrying the breakwater sufficiently far, and turning it to Redcar Rock, leaving a space so that vessels might run in and out when they pleased.

22,106. You say you are decidedly of opinion that the thing to do is to have one large harbour of refuge placed at Hartlepool ?—If you are to have one monster harbour, I would.

22,107. What do you say as to the advantage of endeavouring to improve the Tyne and the Wear ?—I have not a doubt, so far as my opinion goes on that matter, that if there are a number it will always be better. I am ready to state that if there were two or three made or improved, we should save more lives by them. There is not a question we have many imprudent men who will run into risks at various times. If they run past a place of safety they get themselves into dilemmas, but if you had more than one place, they might save themselves by it.

22,108. Therefore, besides one large harbour, would you be disposed to endeavour to improve the existing ports ?—I should advocate three places if we could get them. Though it may be considered speaking for my own interest, I would advocate Runswick Bay, both as a herring station and a place of refuge. The Tees could be improved for a very trifling cost. I was down two or three times at the Tees, and was one of a deputation to the Duke of Northumberland when he was in the Ministry. He raised several objections to the Tees. I answered all his queries, and I suppose those answers will be in the Admiralty.

22,109. As respects Runswick Bay, you stated that you prefer Hartlepool ?—As a large scheme.

22,110. Tell me why you prefer Runswick Bay ?—I prefer Runswick Bay on account of its being able to be made at much less cost, and on account of the depth of water there.

22,111. I think, if you look at the chart and run your eye along a line taking 10 miles from the land to any distance, three to five leagues, you will always get Runswick Bay, no matter from what position, with

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the wind at east-north-east. But you know 1,000,000*l.* at Hartlepool and 500,000*l.* at Runswick Bay is rather a large demand on the public. Do not you think they are rather too close to each other?—I do not recommend Runswick and Tees Bay together. I say, if only one is to be made, let us have it in Tees Bay.

22,112. Which would you take first?—Tees Bay decidedly. If that cannot be done let us have Runswick. The only reason I would give is that I think Ranswick more preferable on account of the ports to the north of the Tees. When ships trade in the Tees and this locality they will always congregate about the trade places, and there would be more ships to save than we could save at Runswick.

22,113. (*Mr. Lindsay.*) It is your opinion that if only one harbour is to be made, the Tees Bay would be the best site for that harbour?—I believe it is sufficient on a large scale.

22,114. Whether do you think Redcar as a site, presuming you could get the same area of water at Redcar for the same cost as you could get it at Hartlepool, whether do you think Redcar or Hartlepool would be preferable?—There is a very nasty sea at Redcar.

22,115. If the public money was to be devoted to the construction of two harbours, where would you make them?—One at Runswick, and the other in the Tyne. I would improve the Tyne. I think that would answer all purposes.

22,116. Say that it rested between spending half a million of money at Filey Bay, and half a million of money at Hartlepool, do you think the money so distributed would do more good in that way, than if it were all spent in Hartlepool Bay, all things considered?—As regards Filey Bay there is one point we must remember, the vessels that are always dodging about off Flamborough Head. They consider it quite comfortable and safe; and if a space was made they might go in instead of dodging about.

22,117. Looking to the saving of life and property, and the facilities of commerce—looking to all points of view, but above all to the saving of life (which is the all important point), do you think that the money distributed between Filey Bay and Hartlepool Bay would do more good than if it were all spent at Hartlepool Bay?—I think it would be better all spent at Hartlepool Bay. The reason is this; because Filey Bay is no convenience, except to that very one point. Then there is another thing. You might say, if there were any ships dodging under the Head at the time, and they wanted to take shelter, that it was not worth while spending a great deal of public money upon Filey; for if they had West Hartlepool to run to as a place of refuge, of course they could run with safety and go to Hartlepool. The only thing to be said to that is, that it might so happen that some of the vessels should be lost in running there. I think it would not be well to spend money for that purpose there.

22,118. We have heard a great deal about the danger that ships encounter in running for Hartlepool Bay, on account, it is alleged, of the shallow water and the broken and troubled seas which extend considerably out from the land. Do you see objections to Hartlepool on that ground?—None, if you carry out the breakwater sufficiently.

22,119. You think that if a line of breakwater, such as you have mentioned, were carried out into a line of six fathoms water, or say seven fathoms water—do you think there would be any danger to a ship coming in in heavy south-east or easterly gales? Do you think there would be any danger to ships outside of the line of the breakwater? In a word, you think they would encounter greater danger between the breakwater and the 15 fathoms line of depth, than they would outside of the 15 fathom line, where there could be no broken water by any possibility?—As you shoaled your water you must have more danger, but I do not apprehend any danger in a vessel going before the sea. If she had to cross it there would be danger.

22,120. Knowing this part as you do so well, do you think there is any danger from broken water in Hartlepool Bay at a depth of seven fathoms?—I think on account of its gradually deepening, which it does, you get deep water as soon as you do from Redcar Rock. On account of its gradually deepening the water is more quiet going in, and it does not break so suddenly. There must be danger at all times where the sea does break, and the shallower the water the more dangerous the sea.

22,121. Do you think there is any extra danger in running between the 15 fathoms line and the seven fathoms line in approaching Tees Bay?—I should not consider so.

22,122. Do you think any advantage would be derived from the construction of a harbour of refuge at Filey, so as to warrant the expenditure of public money, say, to the extent of half a million?—I do not see it.

22,123. You think not?—I think not.

22,124. You think that, even if a fine harbour could be made there which would afford protection in the most dangerous gales of wind, it would not be of that value to warrant the expenditure of half a million of the public money upon it?—I do not.

22,125. As the last witness did not understand the nautical part of the Runswick Bay case as you do, tell me what kind of a beach there is there?—The beach where Runswick is, is sand.

22,126. On each side of it?—There is freestone right under the Scar.

22,127. Are there any rocks that intervene between this anchorage ground and the sand or beach in Runswick Village?—I believe there are a few that have come from the cliff, and been shoved into the water, and been there a considerable time, but these are all moveable stone.

22,128. Are there any rocks which would catch a ship if running upon a sandy beach?—Decidedly not; the *Amelia* was coming in when she was lost; two vessels were coming for Runswick beach, and if they had come, no doubt they would have saved their lives.

22,129. In the line of soundings between Kettleness Scar and Rust Hill, can you account for the 54 feet lying between the 40 and 41 feet?—I do not know the reason.

22,130. Do you know if the bay is free from rock?—Quite so.

22,131. All over the bay?—I believe so; the only rocks we have are on the side, which is an advantage to the breakwater, and they would be an assistance in carrying them out; they are on the low-water mark, running a little farther out.

22,132. Is there any trade in and out of Runswick Bay?—We are shipping ironstone; we have two harbours of our own in course of erection now, under my house, not in the bay.

22,133. For what sized vessels?—Vessels of 120 tons; we have had three or four of that size, or a little less.

28,134. Say the Government were to think of constructing a small harbour at Runswick Bay, are there any parties, proprietors of existing harbours or others, interested in the district, who would be disposed to subscribe?—There are no persons but the Marquis of Normanby who have a great interest; there are very few gentlemen about there; there would be no funds of that kind to assist.

22,135. No means at all to assist the expenditure?—Not any as I believe; they are wanting a railway to come there from the North Eastern.

22,136. There are no parties resident to find funds?—I think none, without it was the Marquis of Normanby, and very likely he might give the stones for nothing, which he could very easily afford to do; that would be a few thousand pounds.

22,137. (*Capt. Washington.*) When five of the Commissioners visited Runswick Bay yesterday, they saw some works going on at Kettleness?—That is the Marquis of Normanby's.

22,138. What are they ?—Alum works.

22,139. Are there alum works on the other side ?—Yes ; they are worked by a Company at Leeds ; that is my ground.

22,140. On the north side ?—Yes.

22,141. Do a large number of fishermen belong to the Bay ?—Yes, a great many belong to Staiths and Runswick.

22,142. How many fishing vessels were there ?—I think 21 out of Staiths, and I think two or three from Runswick, besides small cobles ; we have a lot of the fishermen here.

22,143. (*Mr. Coode.*) Do you know any instance of a vessel caught off Flamborough Head being driven to the north ?—No doubt many ; but I cannot name them.

22,144. Is that a matter which often happens ?—Unquestionably ; but vessels do not always run back, because they cannot keep their place ; but when one man goes, they are like a flock of sheep, all follow. When one goes they all follow, and go ashore together.

22,145. Did you ever hear of any vessels foundering in running back to the north ?—I think there are not many vessels that founder at sea.

22,146. Do you think they never do ?—No doubt, occasionally, but I think very rarely ; there are several mutual insurance societies at Whitby, and several at Scarborough, in which I have an interest, and several also at Hartlepool, and various other places ; and if their averages were examined you would find they paid very little money for vessels foundering.

22,147. You spoke of the *Amelia ;* do you know how far south she had got ?—The owner is here and he will give you the best information about it ; I know the particulars about her, but do not know how far south she went ; she was wrecked close to my works ; she got too far to leeward and the men belonging to Runswick knew she could save herself.

22,148. Were any lives lost ?—Yes, she got too far to leeward, and got upon the Scars ; those which are marked by dots upon the chart, the sea lifted her and knocked her to pieces. There was another vessel wrecked at the same time.

22,149. (*Mr. Lindsay.*) You say you resided two years at Hartlepool ?—Yes.

22,150. Was it Old Hartlepool ?—It was Old Hartlepool. It was before the docks were made. It would be 15 or 16 years since ; probably 14 years since I left.

22,151. During your residence there, or since, has it come to your knowledge that the bay was silting up ?—I have never examined it. It is a thing which ought to be taken care of ; and I believe that, by contriving passages in the breakwater, it may be taken care of, if the harbour could be constructed without stopping the progress of the tide. I wish to say about Filey that I don't see the utility of Filey, with the exception of one point. I never think we are on a lee shore, dead on land, if we have the wind east-north-east or east, having made Whitby Rock. We consider, if we can fetch Filey Bay, we can fetch Flamborough Head ; and if we can fetch Flamborough Head, and get round we can get into Bridlington Bay ; or, if we don't like that we can go into the Humber. There is no case in a thousand where we might not be in that position on this coast.

22,152. Do you mean, that in any wind that you can fetch round the Brigg at Filey point, you can weather away Flamborough Head ?—Unquestionably, I think so, unless you were close ashore, which would very rarely happen.

22,153. Unless you were right in the bight between Filey Brigg and Flamborough Head ?—Yes; and by extending the breakwater at Filey, and running it further south, there is another objection, that you would have to steer further out to get round.

22,154. By extending the breakwater you would increase the difficulty ?—Yes.

22,155. Then do I understand you to say that, vessels following the usual course bound south, would, in any winds that they could weather away Filey Brigg, weather away Flamborough Head ?—Unquestionably, any winds of any service to them.

22,156. And with the winds with which they can weather away Flamborough Head cannot they reach the Humber ?—Unquestionably, without they are very wrong ; that is, if they take the usual track. If they get round the Whitby Rock in that direction they have a south-south-east course.

22,157. Then your evidence goes to the extent, that the construction of a harbour of refuge at Filey Bay would only be of value to those ships which are caught close in to the northward of Flamborough Head in the bight of this small bay ?—Yes, that is it.

22,158. For this reason, that when they could weather away Filey Brigg they could weather away Flamborough Head, and when they could weather away Flamborough Head they could get to the Humber, where there is a place of safety ?—Yes.

22,159. Consequently, that the site of Filey Bay could only be of use to those ships which were caught out of the usual track, close to the northward of the Head, in the bight of this small bay ?—Yes.

22,160. Do I understand that is the substance of your evidence ?—That is the substance of my evidence.

Mr. JOHN DOBSON examined.

22,161. (*Chairman.*) How long have you been at sea ?—Twenty-five years.

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22,162. Are you still at sea ?—I left 2½ years ago.

22,163. How many years were you in command of vessels ?—Sixteen years.

22,164. Do you appear here to advocate the formation of a harbour of refuge at Runswick Bay ?—Yes.

22,165. Will you state to the Commissioners your reasons for wishing to have one there, and the advantage and the necessity of having one there in preference to any other place on the coast ?—I was invited to inspect Runswick Bay, by the parties who were interested in the matter. I did so, and was very much astonished to see it such a very nice little place as I found it to be. I have anchored there when master of a collier, merely stopping the tide. I always had a favourable opinion of it ; and it happens that it is within six miles of being exactly midway between Flamborough Head and Tynemouth, where most of the wrecks on this coast occur. It is, in my opinion, very useful on account of vessels leaving Hartlepool. For instance, supposing a vessel left Hartlepool to clear the northern part of the Yorkshire coast, her course would be about east-south-east. If the wind blew strong at east-north-east the ship would be in a dangerous predicament. By laying south-east by north she would not weather the North Cheek of Robin Hood's Bay. If she were opposite Runswick she would run in. If she tacked could not regain Hartlepool on the starboard tack, and she would be wrecked about Huntcliff. I am decidedly of opinion that several small harbours of refuge on the east coast of England would be better for saving life and property than one grand scheme ; but still I cannot help thinking that the river Tyne and the Wear might be improved so as to save life from shipwreck. Only last Wednesday I was at Cullercoats ; there was a vessel from Hamburgh came close in shore, the fishermen drew my attention to it ; I said, "It is "going to blow very hard, this ship is shortening "canvas ; she will fetch round to Huntley Foot, and "ten to one she will go on shore ; what is the cause of "it ?" The fishermen said she got off the Tyne when it was not tide time, and the captain stood off for the north. If he did not get away she would have been lost. I think it might be made a harbour so that any vessel might take it at any time of the tide ; it would be useful then, if not it would be of no use at all. I certainly think from the soundings in Runswick

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Bay, which I have examined, and from the nature of the beach, and taking everything into consideration, the quantity of ships which it will hold,—the immense number of ships that it would hold,—that it would be decidedly a very excellent place for a small harbour of refuge, an auxiliary harbour.

22,166. Have you anything further to say?—Nothing at present.

22,167. You were in the room yesterday and to-day?—No, I was not; I was obliged to leave.

22,168. Were you here to-day?—I have been here a portion of the day.

22,169. Do you agree generally with the other witnesses as to the character of the wind on this district of the coast?—There is no mistake about it.

22,170. In your experience of the coast have you ever been in danger of your life in running into any of these harbours?—Yes.

22,171. On what occasion?—Once, when Mr. Lindsay was at Hartlepool, when I was commanding a collier, I was in great risk of my life, and had to run the vessel on shore.

22,172. What were the circumstances in which you did that?—The vessel shifted her ballast; it came on to blow very hard and I was obliged to run in, she struck on the ground on going in and shifted her ballast. There was one other occasion on which I was obliged to run in and save life. I have fortunately not been placed in many very awkward positions on this coast, but on the south coast of England I have had to run to save my life.

22,173. (*Mr. Lindsay.*) I think you said you were in favour rather of improving the existing harbours than making one great one?—Yes.

22,174. Supposing the Government arrives at a different conclusion, and decides that only one great harbour is to be made, where should you prefer it?—At Hartlepool.

22,175. Did you hear the evidence Mr. Brown gave just now?—Yes.

22,176. Do you agree generally with him?—Yes.

22,177. You do not differ with him on any points, either with reference to Hartlepool or Filey?—I am quite of his opinion about Filey, and also about Hartlepool.

Mr. William Clarke examined.

Mr. W. Clarke.

22,178. (*Chairman.*) You were for four years master of a ship, and after that harbour-master at Whitby?—I was.

22,179. For how many years?—I got 13 years' pay, but was only 12 years and nine months harbour-master.

22,180. Do you now reside at Runswick?—Yes.

22,181. Have you been present during the course of this inquiry?—Yes.

22,182. Would you be good enough to give your opinion as to the advantage or necessity of one harbour of refuge on this district of the coast?—I think it is very necessary there should be one, but I would recommend two or three rather than one on a large scale, because the ships might get to one when they could not get to another. I will answer any other questions which you may put.

22,183. Would you be disposed to recommend the improvement of the Tyne, the Tees, and the Wear, if possible, to take vessels of 16 feet draught at low water, in preference to the establishment of one large harbour anywhere else?—Well, if there was only to be one harbour I should recommend Filey. When ships come out of the north country ports they generally have a fair wind, and always manage to get as far as Flamborough Head. At least it would be very bad weather if they did not. I think a harbour at the Tees would be good, only it is too near to the loading ports.

22,184. You say that ships which leave the ports are generally able to get up to the Head. But we have had it put strongly in evidence to day, that they seldom get past Whitby Rock?—It all depends upon circumstances. I cannot say, the ships will always get as far as Flamborough Head, but I suppose they would; I cannot say it for a fact.

22,185. (*Mr. Lindsay.*) Did you hear what Mr. Brown said with regard to Filey?—I did.

22,186. Do you differ with him in that respect?—Not at all.

22,187. Then why would you prefer Filey to Hartlepool?—It is a more central place. I have been riding in Filey Bay, both light and loaded, and I should prefer Filey to the Tees.

22,188. Is there any reason besides it being a more central point, and because you happened to ride there once as master of a ship, why you should prefer Filey to Hartlepool, more especially as you heard the evidence of Mr. Brown, and say you altogether agree with him? Are there any other reasons?—If you were caught with a heavy gale of wind off Flamborough, you could go to Filey and be in safety; and, perhaps, before you got to Tees Bay you might lose your ship and all hands.

Mr. Robert Pollett examined.

Mr. R. Pollett.

22,189. (*Chairman.*) You live at Hinderwell and are a shipowner?—Yes.

22,190. Did you follow the sea formerly?—Yes, for 27 or 28 years.

22,191. For what period were you master of a vessel?—For 20 years.

22,192. Have you been present to-day?—Yes.

22,193. And yesterday?—Yes.

22,194. Are you for one harbour of refuge, or for the improvement of the existing ports?—I should be for the three ports, Filey Bay, Runswick, and Hartlepool Bay, say at one side or other of the Tees.

22,195. Will you tell me why you select these places?—I think they are well divided on the coast. I do not know much about the coal trade myself, having always been in the foreign trades, the southern trade and the transport trade, and very little upon the coast. I prefer Runswick for a harbour of refuge, because it always has been a place of refuge since I knew it, and many hundreds of lives have been saved there.

(*The witness was evidently suffering from severe indisposition, and it was with difficulty he could make his voice audible.*)

(*Chairman.*) It is useless my professing to hear you. I have not heard a word you have said. If you cannot speak louder, and are labouring under indisposition, you had better be kind enough to put what you have to say upon paper, and send it to our secretary.

Mr. Richard Verrill examined.

Mr. R. Verrill.

22,196. (*Chairman.*) Were you formerly at sea?—Yes.

22,197. How long have you left it?—Five years.

22,198. How long were you in command of a ship?—Twenty-five years.

22,199. Where do you reside?—At Staiths.

22,200. In what trade were the vessels you commanded generally engaged?—The coasting, the Baltic, and the Archangel trades.

22,201. How many voyages have you made from the Baltic?—I was 16 years employed in that trade out of the 25.

22,202. How many voyages did you make on an average?—Never more than two in a year; one at

Archangel generally, and one to Petersburgh, or some other port in the Baltic.

22,203. So you may have made 16 voyages from the Baltic, and 16 to Archangel?—No, only about nine times, I think, to Archangel.

22,204. Have you ever come home from the Baltic late in the year?—Yes.

22,205. Where did you generally actually make the land in coming home?—I have generally made Flamborough Head, the Shetland Islands, and Buchan Ness. I have made the Orkneys and different parts of the coast.

22,206. As a general rule can you state one part of the coast, more than another, where you generally made your landfall?—I think, Buchan Ness for the most part; but frequently I had to call at Peterhead for orders.

22,207. Then there was a reason for making it?—Yes.

22,208. What is a fair period in winter for a voyage from the Scaw or the Naze for this part of the kingdom? What would be a long voyage from there?—Three weeks or a month.

22,209. Are passages of that description frequently made?—Often from a week to a fortnight.

22,210. But long passages?—Not very often.

22,211. Ships that make these long passages, have they been at sea all the time or have they taken shelter in the ports of Norway?—I have been a month myself and never took shelter.

22,212. Where were you?—Knocking about in different parts of the North Sea, trying to make my voyage.

22,213. What was the time of the year?—Different parts of the year; in the summer time, the backward, and the fall.

22,214. Have you ever been so long about it in the winter time?—I have been there in December.

22,215. Was the weather very coarse?—Both coarse and cold.

22,216. When you made the voyages from Archangel, did you call at Peterhead for orders?—Not always, but sometimes.

22,217. In making your passage home from Archangel, what landfall did you endeavour to make?—I generally endeavoured to make the Shetland Island, or Peterhead, or Buchan Ness, or some other headland. It just depended upon how the wind was. If the wind was from the eastward, south, and east, I tried to make the land on the Yorkshire coast.

22,218. With a fair wind where did you make your landfall?—With a fair wind, sometimes at the Farn Islands, and different other points—Flamborough Head, anywhere likely. It all depended where we were bound to. We generally think that when clear of the land there is more rest; and when we come in contact with the land a ship has many things to fear.

22,219. Bound to this port from Archangel, where would you make your landfall with a fair wind?—About the Farn Islands.

22,220. (*Mr. Lindsay.*) About this coast here, do you think one great harbour or the improvement of the existing harbours would do the most good?—I think the improvement of the existing harbours would be the better.

22,221. Say it was decided otherwise, and that you were only to have one great harbour, where should you have it?—I think in Hartlepool Bay.

22,222. Do you know the site of Redcar?—Very well.

22,223. Do you think one at Hartlepool or in Redcar Bay would be of most service?—I think it would be of most service in Runswick Bay. In Runswick Bay there are 100 fishermen from that shore every day who are exposed to very serious weather. If it were not for Runswick there would be serious loss of life, and therefore we consider it a place of refuge in a general position as it now is. It would be made a place of refuge with a very little amount of money. I think we ought to try to do something for the safety of fishermen as well as sailors.

22,224. (*Sir F. Smith.*) How many boats are there?—Twenty-one large boats.

22,225. How many losses have you had of late years?—I am sure I cannot say. I think in my time I could name nearly 40 or 50.

22,226. The men have perished?—The men have perished in sight of their own native home.

22,227. Within how many years?—In about 35 years.

22,228. That is upwards of a man a year?—Yes. Runswick is their only place, and when they go off shore in a morning, and the weather comes on bad, they have nothing but Runswick to flee to in its position as it now lies. The *Peter and Mary* and the *Mary Ann* have been spoken of. I had the management of those two vessels when they were lost.

22,229. I see in the neighbourhood of Runswick Bay you have the Runswick Sands?—Yes.

22,230. What is the length of the sandy beach?—It will be near upon a mile along to what are marked in the chart "the white stones." These are freestone stones.

22,231. What is the length of the beach marked the "white stone"?—It varies in some parts.

22,232. The length of it?—I think the farthest I can name is about half a mile or so. Then you come to sand, and then you come to freestone again. All the way along the cliff there are inlets of sand round Runswick Bay.

22,233. How much sand is there upon which the fishermen can beach their boats?—I should think three quarters of a mile going from the village of Runswick to a place called Cuthbert Hill. If you had this breakwater it would be all sand, because the stones would go to make the pier.

22,234. As the bay stands at present, what quantity of sand is there on which the fishermen can beach the boats?—I think three quarters of a mile.

22,235. That is the space marked the "white stones," which is unfit to beach the boats?—Yes.

22,236. If they attempted to beach boats on that beach would they lose their lives?—The would lose their cobles.

22,237. But not their lives?—Not their lives, I think.

Mr. JAMES WOOD examined.

22,238. (*Chairman.*) You reside at Runswick?—Yes.

22,239. You are a fisherman?—Yes.

22,240. For how long have you been employed in that occupation?—Forty-five years.

22,241. Will you make any statement you like to us, which will express your own sentiments, and those of the fishermen who have come from Runswick?—If ever we get inside the Kettleness Point we are safe. The Staiths men often cannot get home. It has saved hundreds of lives in my time; they would all have been lost if it had not been for Runswick; it is a refuge for fishermen all along, and I have kept the coast from Flamborough Head to Shields hundreds of times, and we cannot find another refuge. We can always save ourselves if we get into Runswick. If our boats are lost there never is any accident if we get within Kettleness Point. If there are many lost they are always lost at sea.

22,242. You have a bit of sandy beach, have you not?—Yes.

22,243. When you reach that, you save yourselves in the boats?—Yes.

22,244. What is it you would like done, that there should be a harbour made for you to run inside of, instead of beaching the boats?—Yes.

22,245. Are you aware that in very large districts of the southern coast and other parts of England, there are great lines of coast where the fishermen have nothing but open beach on which they are in the habit of coming in bad weather, and beaching their boats?

WHITBY.

Mr. J. Wood.

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Chairman.

—I do not know. They heave them up directly. We cannot.

22,246. I may inform you that it is the case; that there are large districts of the coast of England, and probably of Scotland and Ireland, in which the fishermen have open beaches upon which only they can beach their boats. I should imagine, if anything is to be done for the fishermen of this country, that it would form a very important element in the consideration of what is to be done; and those fishermen who are located on iron-bound coasts, and have no sandy beaches on which to beach their boats, would be the fishermen who would have to be first considered?—We should be much better off if we had something to shelter us.

22,247. (*Mr. Lindsay.*) Whenever you can get in with your boats to the sandy beach which is in Runswick, you can always save your boats and your lives?—Yes.

22,248. Then a pier run out there would not make it more safe than it is now?—Oh yes, it would.

22,249. How could it when you tell me you can always save your boats and your lives?—If we reach the sandy beach we can.

22,250. A pier would make it more easy?—Oh yes, and save a great deal more of ships coming in; ships run ashore and save their lives, but they could save the vessels also if there was a pier.

Mr. William Ward examined.

Mr. W. Ward.

22,251. (*Chairman.*) Are you a fisherman?—Yes.

22,252. And reside at Staiths?—Yes.

22,253. How long have you followed your present occupation?—About 35 years.

22,254. Can you confirm the statement of the previous witness that fishermen who belong to Runswick Bay can always save their lives?—Not always, but in general they are able to save their lives in bad weather by beaching their boats; they cannot beach the large boats without loosing them; the smaller boats they can; the large boats they dare not beach; there are 21 large boats at Runswick and Staiths.

22,255. What is the size of the largest boats?—From 33 to 36 tons.

22,256. Are they decked?—Yes; they carry nine hands in one of those boats of from 33 to 36 tons.

22,257. Are they good sea boats?—Yes.

22,258. First-rate sea boats?—Yes.

22,259. Then can they keep the sea in very bad weather?—Oh yes.

22,260. Then in point of fact they are much in the same case as coasters?—Yes.

22,261. What do they draw?—Some draw very nearly eight feet; seven to eight feet in ballast.

22,262. They draw less water than a light collier?—Some of them draw nearly eight feet water in ballast.

22,263. Therefore it is more especially for these that you would urge the necessity for a refuge?—Yes.

22,264. You consider the same refuge is required for them as for the smaller class of coasting vessels?—Yes.

22,265. What particular advantage does Runswick Bay present for a refuge for the smaller coasting vessels? Is it not much better than any other place?—It is a fine bay for small vessels to go into.

22,266. Are the fishing grounds in the neighbourhood? If the boats were caught in bad weather, would they be likely to be in the neighbourhood of Runswick?—Sometimes they go under there.

22,267. Where are their fishing grounds? in what direction, and at what distance from Runswick Bay?—They are fishing now about 40 miles from Scarborough, fishing for the herring.

22,268. Therefore a harbour of refuge in Runswick Bay would not be of any use to them? In that case they would get a refuge, a better refuge and a nearer one, in Scarborough, or somewhere else?—Yes.

22,269. Where do they fish during the greater part of the year?—They have been fishing north-north-east from Staiths about 50 miles.

22,270. If taken by a gale of wind on shore, they have rather a choice of harbours to run to, as they can get into most of the harbours on the coast?—It would be nearer to their own homes if they wanted to come there. They have to come and get bait once a week.

Lieut. Henry Bainbridge, R.N., examined.

Lieut. Henry Bainbridge. R.N.

22,271. (*Chairman.*) You command the coast-guard?—Yes, at this station.

22,272. How many years have you been in the coast-guard on this particular district of the coast?—It is 12 years since I first came, but I have been twice away during that time, leaving nine altogether here.

22,273. You have been present during the greater part of this inquiry?—Yes.

22,274. Be kind enough, at your convenience, to forward to the secretary any observations which you may like to make upon the evidence you have heard, keeping in view the object of our inquiry?—Certainly.

(*Chairman.*) Are there any other parties whatever interested in this inquiry, who have evidence to tender to us?

No answer.

Sittings at Whitby closed.

FILEY.

Monday, 25th October 1858.

PRESENT:

Admiral Hope (Chairman).

Sir Frederic Smith.
Mr. Lindsay.
Captain Washington.
Captain Sulivan.
Captain Vetch.
Mr. Coode.
Mr. Evans, Secretary.

FILEY.

Dr. Cortis.

25 Oct. 1858.

(*Dr. Cortis.*) I have a memorial, signed by upwards of 100 of the Filey fishermen, requesting to be allowed to give evidence as to the advantages which would accrue to them from a harbour of refuge being formed in the bay. (*The memorial was handed in.*)

(*Chairman.*) Will you now, Dr. Cortis, be kind enough to proceed with any statement which you wish to make relative to the advantage, or necessity of a harbour of refuge on this point of the coast, observing, that it will be convenient to us if you will abstain as

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Dr. Cortis.

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far as possible from telling us anything which we have before us already in an official shape in the Reports of the Committees of the House of Commons upon this subject?

(*Dr. Cortis.*) Mr. Chairman and gentlemen of the Commission,—In making the following statement to Her Majesty's Commissioners, I beg to claim some little indulgence, inasmuch as, while other places which have put forward claims as suitable sites for the formation of a harbour of refuge are represented by Dock or Harbour Commissioners, whose duty and profession it may be said to be to see these claims properly put forward and supported by suitable evidence, with funds at their disposal on which to draw for the carrying out of their objects, here it is entirely different. A population mainly dependent on fishing for a hardly-earned livelihood, with neither wealth nor influence, nor any officials with professional knowledge and acquirements to manage their case, they have been compelled to trust to such advice as chanced to be within their reach. With the diffidence which becomes every landsman in approaching nautical subjects, I beg to make a few remarks in opening the case to the Commissioners. Before doing so, perhaps I may be allowed to say that the proposition for a harbour of refuge at Filey dates from a very early period. I hold in my hand a document containing an account of a survey of this bay in the year 1741, 117 years ago. I need not occupy the time of the Commissioners by reading it; but if you will allow me to make an extract from the commencement and termination, showing what the document is, I shall feel it as a favour. It is headed, "A True and Exact Plan of Filey Bay," and commences, "From the point "of Flamborough Head to the easternmost part of Filey "Bay is about eight miles, which bay was sounded and "surveyed on the 21st and 22d September 1741, both "at high and low water in a common tide." It goes on to give certain soundings of the bay at that period, and then it terminates thus:—"Every one will "be satisfied that this is not set forth for any view "of interest not further than as information public of "the commodiousness of this place for a harbour. "One would fancy that every gentleman and others "that are well-wishers to this large and brave and "active branch of Northern navigation will do their "best to endeavour to act for the safety and welfare "of it. For instance, the 1st of November 1740, "was totally lost, 9 sail of large ships under Flam-'borough Head, and much damage was caused—no "less than 12,000*l.*; nay, much dearer than that was "lost, two-thirds of the sailors belonging to them. "Provided there had been a harbour in Filey Bay, "both life and goods might have been saved. On "the contrary, many a widow and fatherless child "was made." In advocating the claims of Filey Bay, I contend, first, that the situation of Filey Bay is incomparably superior to all others, inasmuch as it is just exactly at that part where the greatest difficulty and danger arise, consequently, where more lives and vessels might be saved by the construction of a harbour of refuge than elsewhere along this coast. Secondly, because the character of the bay is such that it is provided by nature for the formation of a harbour of refuge. Thirdly, because a harbour of refuge can be made at Filey Bay at less cost, acre for acre, than at any other point along the coast. We believe that these advantages contain the whole of the matter. I beg to remind the Commissioners of the evidence which has been already given before the Parliamentary Committee upon these points by Admiral Ross, Captain Anderson, Mr. Clarke, and masters of long experience, whose opinions are entitled to considerable weight. Most of the witnesses have stated that vessels usually leave the coal ports on this coast with such a wind that they get up as far as Flamborough Head, when the wind very frequently bears away from south or south-east and they are baffled, and bring up under Speeton Cliffs, and dodge about for days. Supposing even that they can weather the head, and proceed a little further to the south, they often dare not do so, knowing that their meeting such a heavy sea increased by the outset from Bridlington Bay, that as soon as they have lost the shelter of the head they will be driven back again here; they hang on as long as possible at imminent danger, and often in difficulties—frequently many hundreds of them—until the wind getting more easterly and increasing, they are compelled either to stand out to sea or to run north in search of shelter. All the gentlemen I have mentioned were, I believe, unexceptionable witnesses and men of capacity, and they all agreed in this, which all residents of Filey can confirm, that constantly during the winter months we see large fleets hanging about the head and anchoring under the Speeton Cliffs. For instance, in proof of this, what occurred during the present year I may be allowed perhaps to allude to. On Sunday, the 7th of February last, we counted between 90 and 100 sail brought up under Speeton Cliffs, and several others dodging about the head. A gale came on from the south-south-east on the following day, and they were compelled to get under weigh and leave the place. In the *Shipping Gazettes* of the next few days I noticed the accounts of wrecks of not less than 50 of these vessels, and fortunately I extracted two or three of them, from which I will read the masters' accounts of their proceedings:—"Extracted from the "*Shipping Gazette* of 13th February 1858.—Captain "Thos. Hall, of North Shields, from Shields for London "—coals, left Shields on the 5th inst. Wind west. "Fine. 6 P.M., wind south-west, strong; double "reefed topsails. Midnight, south-south-west, in-"creasing; stowed main staysail and jib, Scarborough "bearing north, distant 10 miles; tacked ship off the "land; 4 A.M., tacked to windward; 9 P.M., brought "up in Filey Bay in 8 fathom water, and remained "during the whole of the 7th, wind being south "and very strong. 8th, at 8 A.M., wind south-south-"east, strong; got under weigh; stowed topsail "and double reefed foresail; sea on; sailed off and "on, pumps going every half hour, the sea being "heavy and the ship making water greatly. 9th, "still kept the ship to windward, water increasing. "10th, 6 A.M., Scarborough distant 10 miles—blowing "strong, three feet of water in the hold; called "all hands; bore away before the wind, steering "north-north-west; both pumps continually going; "found the water increasing very fast; ran for "Whitby, and got assistance. 1.30, off High Whitby, "7 feet of water in the hold—ship unmanageable; "rounded her to. 2 P.M., 7 feet 5 inches of water in "the hold. 2.30 P.M., a steamboat came and took "the crew off. 2.53 P.M., ship foundered in about 33 "fathoms of water." A few days later we find a report of Captain S. Fuller, master of the *Billow*, of and from Sunderland, with coal:—"Left Sunderland "on the 5th instant; wind south-south-east; double "reefed topsails; wind increasing; stowed foresail; "stood on and off; wind east-south-east." The course of this ship is very much the same as that of the other, and the end of it is that the ship goes on shore in Runswick Bay. On the 15th the cargo and stores were saved by a private enterprise, and three hours afterwards the sea increasing, getting heavy, she went broadside on to the beach, and was dashed to pieces. The report of the *Colony* brig, of Whitby, dated Berwick, bound from Shields to Whitstable, is, that the vessel had got a little to the southward of the head, but was off the head on the 8th; was driven back to Coldingham Bay, near Berwick, and there sustained considerable damage. Another is, the *Friends' Goodwill*, of South Shields. I had a letter from the Captain, in which he gave me an account of their voyage. I may say that on that voyage he was no less than three times to the southward of the head, and always obliged to run back. He abandoned the ship off Whitby, but she was afterwards recovered. In the *Shipping Gazette* is also the report of the brig *Annandale*, Captain Blakerstone, in the same gale. Hearing that she had been

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in the same gale, and had been driven to Leith, I wrote to him to get an account of his voyage, in answer to which I received the following letter :—

"17, Herring Street, Shields,
2d April, 1858.

"SIR,

"ON my arrival at South Shields the other day, a letter was put on board the ship *Annandale*, of which I was in command, from you, desiring my opinion of a projected harbour of refuge in Filey Bay, and desiring me to make a statement of our late voyage, which I will most willingly do. We sailed from Shields for London on the 5th of February [the same day that the other vessels had left their ports]. We got as far south as Robin Hood's Bay ; fell in with gales of wind from the south-east ; dodged for several days off the head, and put back for Leith Roads on the 11th of February. Leaving there again on the 14th we got again as far as about six or eight miles to the southward of Flamborough Head. Meeting gales again we drove as far to the northward as Shields, and the tide being at the worst had a second time to run for Leith Roads, which we reached on the 24th of February. Heavy gales of wind continued from the eastward, and on the last of February and 1st of March we drove some considerable distance ; and we were obliged in the end to take assistance, to slip from our chains, and proceed up the firth to Queensferry. Now, had there been a harbour of refuge at Filey or Redcar, instead of having to put back 200 miles for shelter, we could have put into that place, and saved all those disasters, besides saving to the owner the loss of the chains and anchors, and also the moneys paid for assistance. In your letter you ask me three questions ; first, whether Flamborough Head is the point where laden colliers are most frequently caught with gales of wind north of the Humber ? I beg to state, in answer to that question, that I have often found it so, and there we have no safe refuge, as I have already said, until we reach the Firth of Forth. Your next question is, whether under such circumstances a harbour of refuge at Filey would not be particularly useful ? I have for many years been of that opinion, and often had long conversations with several of our north country or collier captains about it. Your third and last question is, any general facts I may be able to state showing the desirableness of a harbour of refuge at Filey Bay. I have now been 30 years at sea, about 20 of which master and mate of vessels principally in the coal trade, during which time I have had very many opportunities of observing the great necessity there was of having a safe harbour of refuge between the Humber and the Forth. Only about three years ago I was obliged to ply about with the same ship I am now commanding for six days between Flamborough Head and Whitby, blowing very strong from the southward until we split several of our sails ; whereas, if there had been a harbour at Filey, we might have put in, and hauled the ship in safety all the time, and saved our canvass. While at Queensferry there was a gentleman who told me he was going to publish a book as to the desirableness of harbours of refuge on the north-east coast, and wished my opinion whether I considered Filey or Redcar the most eligible place on that part of the coast. I at once gave my opinion in favour of Filey.

"I beg to subscribe myself,
"Your obedient servant,
"JOHN BLAKERSTONE."

I never saw that man in my life, and I never had any other communication with him than that to which he refers. Filey not being a port, we have not all the facilities of procuring the evidence of masters engaged on the coast, especially at this season of the year, when they are so constantly at sea, but an immense volume of testimonies has already been given by sailors employed on the coast in favour of Filey Bay. Sailors on the north-east coast generally, to the number of nearly 2,900, signed a petition, which was presented to Parliament, and referred to the Select Committee of the House of Commons then sitting during the last session, of which I beg to hand you in a copy.

"The petitioners desire to call attention to the great and peculiar advantages possessed by Filey Bay for the construction of a harbour of refuge, first, because its situation on the coast is well adapted for a harbour of refuge from the circumstance of its being close to Flamborough Head, where so large a number of vessels are frequently caught by bad weather, and for want of shelter are compelled to run for the different tidal harbours along the coast, thereby causing the loss of many vessels and their crews. Secondly, because with contrary winds a great number of vessels now anchoring off Flamborough Head and in the south part of Filey Bay are frequently detained for considerable periods waiting for a shift of wind to get to the southward, and are exposed to great danger with a heavy sea, and in case of a gale coming on from the eastward. Thirdly, because Filey Bay already possesses considerable shelter from the natural formation of the coast. The anchorage ground is of good quality, and we believe that from its situation and the great natural advantages it is unequalled as a site for a harbour of refuge by any other along the north-eastern coast."

I have not the precise numbers of those who have signed this petition, but I am quite sure that I am within a very small number in the figures which I have stated. It was signed by nearly 2,900, between 2,800 and 2,900, of whom nearly 1,480 were either masters or mates. A similar petition was presented from the different ports upon the coast, one from the River Tyne with 900 signatures, of whom nearly 275 were masters and mates. One from Hartlepool and the River Tees, with nearly 470 signatures, of whom nearly 200 were either masters or mates. The total number of signatures to the petitions presented to Parliament during the last session in favour of Filey Bay amounted to about 5,450 within a trifle one way or another, more or less. The fishermen also employed on the coast petitioned Parliament to a similar effect, which petition had about 850 signatures, making a total of 6,300 individuals engaged on this coast who have petitioned Parliament in favour of a harbour of refuge in Filey Bay, including the sailors of Hull, who signed a petition to the number of nearly 700. These petitions I beg to put in. (*Several petitions were handed in.*) Since our case was laid before Parliament, I have occasionally taken opportunities of getting information from masters of colliers by letter as well as vivâ voce, and I have received many, about 20, very interesting ones. The writers are all at sea without exception, otherwise some of them would have attended before the Commissioners. Under these circumstances I trust I may be allowed to read one letter, dated from Seaham :—

"SIR,—I received your letter, and I hope you will succeed in getting a harbour of refuge at Filey Bay. I myself came out of Hartlepool in December 1852, and got to Filey Bay with many more ships in company, about 100 sail, and all were driven back for want of a harbour of refuge at Filey. I was in company with two ships which foundered with all hands.

"(Signed) HENRY SAYERS,
"Master Mariner."

(*Chairman.*) Do you give these letters in as evidence ?

(*Dr. Cortis.*) Yes, I do.

(*Chairman.*) Have you any more of these letters ?

(*Dr. Cortis.*) I have several.

(*Chairman.*) Just count them and see how many they are. If you will be kind enough to tie up the remainder of these letters, and hand them in as they are to the Secretary. They will not be received as evidence at present, but we will consider whether

they can be so admitted, and will inform you at a future period.

(*Dr. Cortis.*) They are mixed with other papers at present, but I will take care to forward them to the Secretary. It seems to us that the most easy way of providing safety for these vessels is to do so just where their dangers and difficulties occur, and not to compel them to run to a place 50 miles distant in imminent risk of founding or being driven on shore during every mile of their running that distance, which will be often increased to 70 or 80 miles. It is to be remembered that a vessel does not get into safety immediately on rounding the head. She has to sail 30 miles distant to the Humber, and many a vessel is caught just north of the Humber in a gale from the south and east, and being unable to reach that river, is compelled to run or drive north. The last wreck but one which occurred in this immediate neighbourhood presented an instance. The brig *Minerva*, of Whitby, was caught south of the head by a south-east gale, and beat off as far as off Dimlington. In order to fetch the river for shelter the master carried a press of canvass, and beat about for some time, until, in consequence of the straining, the ship became leaky, and was compelled to bear up. That was a ship coming round Flamborough Head. Early next morning, being evidently in great distress, she came towards our beach. The life-boat was manned, and everything in readiness to save the crew, when they changed their minds, and bore away to Scarborough, where they beached the vessel, with a considerable quantity of water in the hold, and the crew were taken out by the life-boats. We had gone along the cliffs with the rocket apparatus to save the crew, as the vessel seemed scarely able to reach the distance. I saw the master when he came ashore, and got the above particulars from him. I am aware that great stress is laid upon the fact that so many wrecks occur in the Tees Bay, and further north, but the entire testimony of practical seamen bears out our argument, that most of those wrecks are of vessels which have run all the way from Flamborough Head or its neighbourhood in search of shelter; and also the particulars of wrecks in our last great gale, that of the 4th of January 1857, support it very strongly. Upon that occasion a fleet of laden vessels, said to number about 200, having left the coal ports on the 2d of January, got up the greater part of them to Flamborough Head, were overtaken there on the morning of the 4th by a gale from the east; as was also a fleet of light ships, numbering about 80, which left Yarmouth Roads on the previous day. The disasters which then occurred are probably fresh in the memory of most of us. Two vessels, one laden and the other light, came ashore in our bay. Their crews were saved, after the light broke, by the life-boat, and almost the first remark of their masters was their dread of what would happen to the large fleet with which they had been in company at nightfall. There can hardly be a doubt that the 34 vessels contained in this list were part of that fleet, and that a very great proportion of the other vessels lost on that day were likewise caught at Flamborough Head. (*A return was handed in of vessels wrecked on the 4th of January* 1857, *known to have been caught by the gale near Flamborough Head.*)

(*Mr. Lindsay.*) You give this in as a return?

(*Dr. Cortis.*) Yes, I do. The masters of the vessels lost in Filey Bay are both at present away on foreign voyages, or I should have endeavoured to place them before the Commissioners as witnesses. I have letters here from Captain Baines, of Shields, who says that if there had been a harbour at Filey the greater part of the ships and lives lost in that gale would have been saved:

"In the abstract of the returns of Wrecks and Casualties in the year 1857, the principal part of those on the north-east coast occurred between Newbiggin and Flamborough Head. This space may be divided into three equal lengths, each rather less than 30 miles; the first extending from Flamborough Head to Whitby inclusive, between which points light vessels bound north, and loaded ones running in search of shelter in easterly gales, are frequently embayed; the second extends from north of Whitby to about Blackhalls, and is of consequence chiefly to vessels bound to and from Hartlepool and the Tees, and includes these important entrepôts; the third extends from Blackhalls to Newbiggin, and includes Seaham, Sunderland, Shields and the Tyne, Blyth, &c.

"In connection with these districts, the Wreck Chart, for 1857, shows,—

	Partial Loss.	Total Loss by Stranded or Foundered.	Sailing Vessels in Collision with each other.		Sailing Vessels in Collision with Steamers.	Total from all Causes.
			Total Loss.	Partial Loss.	Partial Loss.	
Reference Marks in Wreck Chart	⊙	X	○⊙	○○	○I	
From Flamborough Head, including Bridlington to Whitby	28	25	10	1	2	66
Whitby to Blackhalls	24	17	7	1	0	49
Blackhalls to Newbiggin	22	35	4	0	2	63

"Although the claims of Filey as the best site for a harbour of refuge do not rest on the number of wrecks in its neighbourhood, but on the fact that the dangers occur here, the wrecks taking place to the vessels running back, it nevertheless appears that in the first, which may be called the Filey district, there were of wrecks from all causes:—

Totally lost - - - 40
Partially lost - - - 26
Gross number - 66

"In No. 2, Hartlepool, or Tees district—
Totally lost - - - 31
Partially lost - - - 18
Gross number - 49

"In No. 3, Northern Ports, or Tyne district—
Totally lost - - - 26
Partially lost - - - 37
Gross number - 63

"No. 1 thus having a preponderance over No. 2 in vessels—
Totally lost - - - 7
Gross wrecks - - - 17

"Over No. 3—
Totally lost - - - 12
Gross wrecks - - - 3"

Some time ago, certain returns were sent by the Filey Committee to the Commissioners for their information, in connexion with the wrecks in the gale of the 4th of January, 1857. I see that the correctness of these returns, as to ships lost between Flamborough Head and Whitby, has been called in question, and I beg leave to say that I am responsible for those returns, and am prepared to defend their bonâ fide character, and general correctness.

(*Mr. Lindsay.*) Will you be good enough to give in that return to which you are referring, signed and vouched?

(*Dr. Cortis.*) I wish to give this explanation. The cause of this return having been compiled was this: I noticed in the evidence of Mr. Calver, given before the Select Committee of the House of Commons, that he stated that all the wrecks in the 4th of January gale on this coast would have been saved by a harbour of refuge in Tees Bay. It appeared to me that the ships lost in Filey Bay could

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not be so saved, and I therefore proceeded to search the *Shipping Gazette* of the following days for reports of ships wrecked between Flamborough Head and Whitby. I afterwards examined as to the ships wrecked north of Whitby, and I included all of which I could get any particulars. It is very probable that the return of those lost to the north of Whitby does not include all that occurred, for I had great difficulty in obtaining them. I included all that I could find any account of. But I believe that the principal matter which has been called in question with regard to Return No. 1 is this, that ships have been included at Whitby.

(*Chairman.*) I should like to have a copy of that return. (*Document handed in.*)

(*Dr. Cortis.*) I may state that I find an error has accidentally crept into No. 1 by my writing Robin Hood Bay for Runswick Bay, which affects apparently two vessels, the *Peter and Mary* and the *Amelia*. It does not, however, affect the question of what is proved by the return, for I have a letter from Captain Henry Binton, the master of the *Ratcliffe*, in which he states distinctly that the *Amelia* was in company with him off Flamborough Head the night before the gale. That letter is dated "Sunderland, February 9," before these statistics were printed, and I will put that in as evidence. (*The letter of Captain Binton was handed in.*) I have also, in the *Shipping Gazette* of January 9, a report of the captains of two of these ships lost in Whitby Bay, which are two of those called in question. —"Captain William Ellis, of the *Abeona*, brig, of "London, for Hartlepool. Left London January 2d. On "the 4th, about 2 A.M., ship 15 miles off Flamborough "Head, rounding north-north-east, wind south-south-"east, constantly increasing. 2.30, wind east, a gale; "close-reefed fore and main topsail, stowed mainsail. "At 5 P.M. stowed foresail. Heavy sea on. At 7 A.M., "on the 5th, sighted the south cheek of Robin Hood "Bay, distant half a mile. [There are other details "which I need not read.] Rounded Whitby Bay. "At 2.30 P.M. carried away lee bulwarks and stan-"chions; could no longer keep off the land [which, "I apprehend, is the essence of the matter]. Put the "helm hard a-starboard, and ran for the beach at Sand's "End." In the same paper there is another account: —"Captain John Quesnel, master of the *Lively*, of "Guernsey, for Shields, in ballast. Left London on "the 1st of January. About 11 A.M. passed through "Yarmouth Roads. 1.30, wind north-north-west, "the breeze increasing. Bore off for Yarmouth "Roads for shelter. On the 3d, wind south-west "[and here there is an account of a collision]. "On the 4th, wind east by south. At 2 A.M. wind "strong; Flamborough Head bearing west-south-"west, distant 10 miles. At 3 the gale increased. "At 4.30 hove ship to under double-reefed mainsail "and standing jib, all the others furled. At 11 "A.M. made the south cheek of Robin Hood's Bay, "bearing west three miles distant. At 1 P.M. the "north cheek bearing west by north, about a mile and "a half; kept the ship off in order to weather Whitby "Rocks. At three minutes past 2 P.M. wind east-north-"east, Whitby Bay bearing north-west, distant one mile. "Found it impossible to weather Sand's End Ness "Point. Lowered the mainsail; squared the yards; "put the helm hard a-starboard, and ran for the "beach." Captain George Robinson, master of the *Medora*, of Whitby, reports:—"Sailed from London, "1st January, for West Hartlepool, in ballast. Wind "on the 2d west-north-west. Anchored in Yarmouth "Roads. On the 3d, 7.20 A.M., wind south. Weighed "anchor, and proceeded northwards. At 10 P.M., about "15 miles south of Flamborough Head, rain and "wind from south-east suddenly increased. Double "reefed topsail. At 2 A.M., on the 4th, passed the "head distant six miles; gale increasing. 4 A.M., "wind east, a sea struck the ship on the starboard "quarter; hove her under the wind; split the fore "topsail. 8 A.M., made Whitby west-south-west, "distant 1½ mile. Found it impossible to keep the "ship off the land, and ran her for the beach."

(*Chairman.*) I may take the opportunity of observing, with reference to what you have been reading, they are, I understand, extracts from the *Shipping Gazettes?*

(*Dr. Cortis.*) Yes.

(*Chairman.*) What you have read, of course, is not from your own immediate knowledge. It is, therefore, merely a statement. If you wish it to be received as authentic evidence, your better plan will be to have the extracts made from the *Shipping Gazettes*, and to have the substance of the statements regularly deposed to before a magistrate, and sent up to our Secretary in London.

(*Dr. Cortis.*) I think that these reports prove that the statistics which were sent to the Commissioners from Filey were not without foundation. I further think that the wrecks on this part of the coast in that gale fully prove this position; namely, that a vessel just to the eastward of Flamborough Head, with the wind up east and by north, may not be able to weather Whitby, and therefore reach the Tees Bay. Neither can it be said, that, had there been any good harbour in Tees Bay, the case would have been altered by the laden ships bearing up sooner, or the light ones making sooner for a port; for all the captains' reports agree that the gale came on suddenly; in fact, the light ships were already making the best of their way down either to the the Tyne, Sunderland, or the Tees Bay when they were caught by the suddenness of the gale. Of course, I am aware that any one harbour on this line of coast cannot prevent the loss of every vessel; but these statistics tend to show that if only one harbour be constructed, and if that harbour be placed to the north of Whitby, a very great proportion of these wrecks will still take place. On the other hand, with a single harbour immediately at the end at Filey Bay, most of the wrecks would be prevented. It may undoubtedly occasionally occur that a vessel cannot reach Filey, being caught too far to the north by gales from the east-south-east; but this will be a much more rare case. As for the prospect of reaching a safe harbour as anchorage, they will persevere; and it will very seldom happen that a vessel will be caught so suddenly with a gale, and with so slight an offing, that she cannot reach this bay. I am not precisely aware of the exact way in which these statistics have been questioned, but I believe that the case of the *Duke*, of Lynn, was mentioned. I have a report from the captain of the *Duke*, of Lynn, here, and I beg to say that return was received by a highly respectable gentleman in Lynn. It was received in the presence of a witness, and it can be fully substantiated as being the report of the captain. The foregoing remarks refer to the case of colliers alone, as that of the vessels particularly requiring refuge; but there is another case entitled to consideration. I mean the Baltic traders. For these vessels bound for Hull, and the more southerly ports, the only place where you can provide a harbour of refuge is Filey Bay. I need hardly point out this to the Commissioners, as it is particularly notorious that with these traders bound from the Humber, Flamborough Head is usually the last land sighted, and it is the first made by vessels both bound for the Humber and more southern ports. The masters of these traders will tell you that a harbour down in the Tees Bay would really almost never be used by them. These ships are too large to be taken down into such a deep bight of shallow water, and they would still go to the Firth of Forth in preference when they were obliged to run north for shelter. Filey Bay would be similarly well situated for the trade from Archangel, and also from Hamburg for Hull. Again, for vessels coming through the Pentland Firth, and for Scotch traders, after passing the Farn Islands, the next land made is Flamborough Head, and for similar reasons Filey would be the best point where a refuge could be provided for them. But there is still another class of vessels which have hitherto been entirely left out of view in the consideration of this question. I allude to the fishing boats. Off this

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coast, to about 30 miles south and about 30 miles north of Flamborough Head, lies the fishing ground, upon which, for the greater part of the year, seldom less than 1,000 craft, each with a crew on the average of eight or nine men, are employed. When a gale springs up from the south and east all these boats which cannot reach the Humber, and consequently a very great number of them, have no harbour for which they can run, and are obliged to keep to sea until the gale is over. If they attempt to run during the gale for any of the ports on the coast, such as Whitby, Scarborough, or Bridlington, they are burnt off, as the signal that they cannot enter, and they must keep to sea until the gale is over. For these, again, Filey Bay is the most suitable site at which to provide a refuge; and upon this subject I may perhaps be allowed to take this opportunity of remarking, that not only do these losses actually take place, but the prosecution of the fishing is very much checked by the want of a harbour of refuge in this neighbourhood, for the fishermen are continually deterred from putting to sea in beautiful weather by the knowledge that if a storm does occur there is no port into which they can get. The produce of these fisheries probably reaches one million annually; and I feel satisfied that it would soon be doubled with the construction of a refuge harbour here. Flamborough Head is thus the joining point of the several different trades, and a source of danger to them all. Fortunately the means of remedying these dangers are alone at hand. At Filey you have a good bay, with sufficient depth of water and unrivalled holding ground. At present it is only open to six points of the compass, and with the materials on the spot for the construction of whatever artificial works are necessary to make this a complete harbour. In these local advantages we fearlessly challenge all rivals, so that in the important item of expense, whatever a harbour may cost here will be enormously increased—in some cases doubled—elsewhere. From the peculiar circumstances in which we are situated, we have not thought it advisable to offer you any engineering evidence. We have not the slightest alteration to propose in our plans or in our estimates, or, in fact, in anything connected with them. We are perfectly satisfied that they will stand any test which may be applied to them. I believe that at Hull you will hear some engineering evidence. The commercial people at Hull, and the people interested in the commerce of Hull, take considerable interest in this question, and the consulting engineer of the Dock Committee has been sent over to examine the spot; and I believe that his evidence, whatever it may be, will be laid before you when you get to Hull. There is no cause to fear for the maintenance of the harbour when made, as Filey Bay is not exposed to any action of silting. Now I am aware that this is a most important point; for I imagine that Her Majesty's Commissioners will hardly advise the expenditure of much money in the formation of a harbour here were that harbour likely to prove a mere sand-trap, and be filled up in a few years. I am also aware that it is a danger to which the harbours on this coast are very much exposed; but we think that in this place it will be impossible, for the following reasons, that any silting should take place:—Following out the line of the cliffs to the brigs, we find that this brig continues to run at the depth of 12 or 14 fathoms right across the bay to opposite Flamborough Head, presenting on its external face perpendicular scars, so that any sand in the bay might easily be shot out of the bay, and fall over those scars; and any silt travelling along the bay northwards and southwards by the tide would have great difficulty in getting above the face of the scar. When the soundings are examined carefully, the lead tells you that it dips sometimes 10 or 12 feet in a single fall. Again, looking at the places where the silting does take place, we can see some cause acting which is absent at Filey. For instance, Mr. Calver has proved, in his report to the Admiralty, dated the 31st of March 1855, that the whole of Hartlepool Bay, at a line from the Heugh to the Long Scar Rocks has silted up several feet, and gives as an explanation of the cause of the silting the existence of sand frontages north and south of the bay, and the quantity of alluvial matter brought down by the River Tees. Here we have rocks north and south, as well as in front of our bay, and no river to bring down alluvium. Again, it was given in evidence before the Parliamentary Committee that a considerable shoaling has taken place in Bridlington Bay, and from Bridlington along by Barmston Swards there is an enormous wasting of the coast annually to the extent of several acres. In a paper which was read at the meeting of the British Association in Hull it was stated that the whole of the coast line is thrown back two yards and a quarter annually —that is, the coast line south of Bridlington. It is possible that a considerable portion of this may have been deposited in Bridlington Bay. But here we have no such land waste. Further, were there any danger of silting we might expect to see indications of it against those Roman works, "the spitals," which run for some distance nearly parallel with the proposed breakwater; but here is nothing of the kind. It is important that here there is no such silting; because it has been given in evidence, and there is no doubt that it has been going on to a considerable extent in the bay of Hartlepool. In fact, during the last summer, one of the herring cobles, drawing less than two feet water, grounded on the bar at Old Hartlepool: and the men waded on the bar, and dragged their cobles over. I find that at high-water springs, in one instance at any rate, a vessel of 300 tons burden grounded in coming out of old Hartlepool, and was fairly dragged through the bar by the assistance of powerful steamers. Before concluding I wish to point out, what I cannot help thinking will not, under present circumstances especially, be considered irrelevant,—namely, that in drawing the plan of this harbour the point of national defence has not been neglected. It will be seen that this plan (*referring to the published plan in the Report of the Select Committee of the House of Commons*) will give 200 acres of completely sheltered area, with a depth of water sufficient for the largest ships in Her Majesty's Navy; and this space can be easily increased if considered necessary. It has already been given in evidence, by more than one naval officer, that a harbour between the Humber and the Firth, capable of accommodating Her Majesty's largest ships, is highly desirable. Now, gentlemen, where ought such a harbour to be placed? Surely not at the bottom of a deep bight in the rear of the coast to be defended. Whatever difference of opinion may exist as to whether the bottom of the bay, or one of its salient points, is the best position for a commercial refuge harbour, in a strategic point of view, I apprehend no such difference is possible. Here the mere question of 2*s.* or 3*s.* per ton less at which Her Majesty's ships can be supplied with coal cannot for an instant be allowed to stand against the advantages of such a position as ours — prominent for attacking the enemy and for defence, covering the whole coast seawards as far as the Wash, and westwards as far as the Firth of Forth. In the presence of such authorities as Her Majesty's Commissioners I touch upon this subject with deference, and shall merely point to the evidence of Admiral Ross in support of these views. I may yet remind you here, that the last attempt that was ever made by an enemy to intercept a Baltic fleet was made by his lying off Flamborough Head, proving that 80 years ago it was then notorious that Flamborough Head was the point at which the Baltic fleet made the land when homeward bound. I may also remark, that during the last war privateers were generally on this coast, for on two different occasions the inhabitants of Filey and the neighbourhood beat off the attacks of the enemey's privateers upon vessels which ran into this bay for shelter. In one instance, the volunteers turned out, and with the assistance of two field-pieces beat off the enemy. In another, some of

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the inhabitants boarded one of the vessels which fortunately had a couple of small guns, and on that occasion also beat off the enemy.

(*Chairman.*) Will you hand in to the Secretary by and by a statement of the dates to which you refer, and also that of the occasion upon which an attempt was made to intercept a Baltic fleet—I suppose you mean a Baltic convoy ?

(*Dr. Cortis.*) Yes; I mean the action when Paul Jones fought his action off here, 80 years ago. In conclusion, I will merely point out that from the nature of the proposed works here, they would offer from the very commencement a very considerable protection to the vessels upon the coast, and therefore no time would be lost in accomplishing the desirable object which the Commissioners have in view. Before calling witnesses, may I put in a very important document, dated Bridlington Quay, 22d October 1858?

"We, the undersigned masters of vessels belonging to the ports of Ipswich, Sunderland, and the Forth, and elsewhere, do hereby declare that we are willing to make oath to such declaration, based upon the long experience some of us have had as masters and owners of vessels trading to and from the north-east coast of England, say, between the Firth of Forth and London, that, should a harbour of refuge be constructed, that harbour of refuge we most earnestly recommend should be constructed near Flamborough Head and in Filey Bay; the said bay not only being the most central place between the Firth and the Humber, but also the very best site which can be fixed upon for the saving most shipping in the winter season, and a very large amount of life and property. And, further, the undersigned, most of them, are at this time in Bridlington Harbour with damage and expense, which would not have occurred had there been a harbour of refuge in Filey Bay. We also declare that we can at no time trust to the holding of our anchors in Bridlington Bay, when the wind comes in from the eastward, or indeed when the wind is westerly.

(Signed by)

"John Cooke, master of the schooner *Enterprise*, of Ipswich, with 50 years' experience."

"Jas. White, *Favourite*, Ipswich, 18 years' experience."

"John Finch, schooner *Wave*, Maldon, 30 years' experience."

"Henry Turner, schooner *Britannia*, Colchester, 30 years' experience."

"Capt. Andrew Calder, brig *Pearl*."

"Capt. Joseph Collier, schooner *Spring*, Colchester, 10 years' experience."

"Capt. Alexander Johnson, master of the clipper *Maldon*, 30 years' experience."

"William Beaumont, 39 years' experience."

"James Beaumont, master of the *Samuel*, Ipswich, 20 years' experience."

"J. G. Cooper, master of the schooner *Salatia*, Yarmouth, 20 years' experience."

(*The document was put in.*)

These vessels were riding in the last gale; some of them were compelled to go into the harbour, and several of them received considerable damage. I have another letter from Capt. Randolph, of Her Majesty's ship *Cornwallis*, which is to the following effect:—

"Sir,—I regret much I was not in the way when you did me the honour of calling on board the *Cornwallis*, more especially as it happens that to see me was the principal object of your coming to Hull. I have to thank you for the pamphlet which you left explaining the views of the Committee which you represent. I cannot have any hesitation in saying that it, appears to me perfectly indisputable, in a nautical point of view, —and I take no other, either engineering or pecuniary —that a harbour of refuge at Filey would be more useful than one at any other point between the Humber and the Forth. I do not see why there should not be one especially for the benefit of the Tyne and Wear trade at Hartlepool. In adopting the arguments used in the address of your Committee, I believe, speaking from memory, it omits the most important circumstance, that ships might and would run for a spot upon the coast with bold and comparatively high land north and south of it, when they dare not do so for land of an opposite character, such as Hartlepool. Having stated my concurrence in your views, I regret that I shall be precluded from intruding my opinions on the Commissioners in any way, nor is it at all likely that they will ask for them.

"I am, your obedient servant,

"George Randolph."

22,275. (*Chairman.*) You reside at Filey, Dr. Cortis ?—I do.

22,276. How long have you been resident at Filey ? —Sixteen years.

22,277. You talked of the fishing boats belonging to Filey. Of what tonnage are they ?—Forty tons new measurement; about 60 old.

22,278. What number of that size are there belonging to the place ?—Twenty-five.

22,279. And therefore when you spoke of these fishing boats you referred to them in point of fact as being the same as vessels in the coasting trade; they are not boats, they are vessels ?—They are yawls.

22,280. What distance from Filey are the fishing grounds, and in what direction ?—The Doggerbank is the principal fishing ground, except the herring trade, which lies between the Doggerbank and the coast; sometimes close upon the coast, and sometimes further off at sea. It depends on circumstances; they seek the herrings all the way between the coast and the Doggerbank.

22,281. You cannot give the bearing and distance of the fishing ground. Shall we have fishermen who can do so, and do you prefer to refer me to them ?—Yes; the only thing which I wish to state is, that I believe this place is about opposite the centre of the Doggerbank.

22,282. (*Sir F. Smith.*) In the plan before us, I see that the east and west lines are stated to contain two and a half fathoms, and upwards of 685 acres ?—666 acres.

22,283. Can you tell me what extent of acreage there is in three fathoms ?—535 acres.

22,284. In five fathoms, five fathoms and upwards ? —204.

22,285. In four fathoms ?—It is not marked in four fathoms; but it would be something between the two.

22,286. You think about a mean between the two ? —I think so. I should think it would be perhaps nearer to 535 than to 204; but it would be somewhere between the two.

22,287. Is there any tendency to a movement of land along your bay ?—Not the slightest perceptible.

22,288. Filey Brigg is marked in the plan as terminating at the end of the line in a south-easterly direction. Does it terminate abruptly there ?—It gradually dips.

22,289. From that point it goes gradually into deeper water ?—Yes.

22,290. But does it turn out in the direction of the proposed breakwater ?—It tends a little more to the southward. The rocks and scars face north-east. Of course there is comparatively deep water at the back of those scars. The line of the breakwater is very much the same as that of the land. One fisherman tells me it goes to about half a mile or a mile outside Flamborough Head. If you take a point at that distance, and draw a line from there to the Brigg, you will then have got about the direction in which the rocks run under water.

22,291. You have reason to be sure that that is so ?—That is the information the fisherman gave me.

22,292. There has been nothing to determine that ? —Nothing but the Admiralty survey. The fishermen have been engaged sounding a little just to see the correctness, and to prepare themselves a little for examination before the Commissioners.

22,293. Have they had before them the Admiralty plan ? have they discovered any error in it, or any change in the soundings since that was made ?—

They have taken the soundings to the northward, and their soundings give rather more water than the Admiralty soundings.

22,294. Much more ?—Not very much more.

22,295. What is the greatest difference in any one case ?—Their soundings are taken at half flood ; they were taken upon the rock, and therefore any difference that has been found cannot be one of alteration in the bottom : it must be one arising from the difference between their soundings and the Admiralty soundings ; the bottom there being rock, it is impossible it can have altered. The soundings have been taken out in a line to the north, about east-north-east of the breakwater, and are more particularly taken for the purpose of ascertaining the facilities with which sailing directions might be laid down, by which vessels might feel their way from Filey Bay to the northward by means of the lead.

22,296. Did I understand you to say that Filey Brigg would intercept the movement of the sand along the coast ?—Yes.

22,297. You say there is none now moving in your own bay ?—None in our bay.

22,298. Is there any tendency to move beyond Filey Point ; is there any amount of sand coming from the north ?—There is a movement in Scarborough.

22,299. Is it moving towards Filey Brigg ?—The movement in Scarborough Bay is of a local character. The sand comes into Scarborough harbour. I believe at one period last winter there was less water than at any time before you have entered Scarborough harbour.

22,300. You think there is no movement of sand into your harbour ?—No.

22,301. There would be less chance when a breakwater was formed ?—I don't think it would make much difference. There would be this less tendency, that as the sand which exists in the bay seems to be formed by the striking of the wave upon the cliff, causing a little wearing away, and as that wave would then be kept off, I should apprehend there would be nothing else to cause a formation of sand.

22,302. Shall we have evidence before us to prove that the holding ground is good ?—I can give excellent evidence.

22,303. Also to show that it is free from rocky substances ?—Every witness that comes before you almost.

22,304. Also that there is no tendency to deposit : will there be evidence to that effect ?—The fishermen will give evidence to that effect.

22,305. Persons who have made it their study ?—Persons who have been sounding practically by means of lines all their lifetimes.

22,306. With regard to the materials of which the breakwater would be formed ; they will not be able to speak to that ?—No.

22,307. Can you speak to that ?—I can tell you that on the cliffs round to the north from Carnaze, there is stone which has been pronounced by different engineers to be of excellent quality. It is oolitic stone.

22,308. I believe that Filey Bay is midway between the Firth of Forth and the Thames, is it not ?—It will be about midway.

22,309. Is there any harbour of refuge properly so called between these two points ?—There is nothing but natural harbours, such as the Humber, Yarmouth Roads, and Harwich.

22,310. How is Filey situated for obtaining coals for the navy ; what is your nearest coalfield ?—They would be West Yorkshire and the north of England, which would be brought down by railway.

22,311. (*Mr. Lindsay.*) In your list of witnesses I suppose you have seafaring men who have been trading along the coast ; and I will therefore only ask you one or two questions. During the 16 years that you have been here, what is the greatest number of vessels that you have known to be anchored under Speeton Cliffs ?—I have sometimes endeavoured to count those dodging about the head, and sometimes got as far as 400, when I gave it up as useless, and could not count them at that distance. There was certainly more, but how many I can't say, under weigh and anchoring.

22,312. Were those vessels which were to the northward of the head ?—Yes ; under the head, and including vessels about to the westward; I include those anchored under Bempton and Speeton Cliffs, as well as those dodging just north of Flamborough Head.

22,313. How many vessels have you known on shore during the time you have been here between Flamborough Head and Filey Brigg ?—I can't speak to the number.

22,314. Twenty or 30 probably during 11 years ?—Yes.

22,315. Were there very many lives lost during that time ?—Two vessels were lost with all hands; but I am glad to say that our fishermen are always so ready to man the life-boat, and so dexterous in using her, that it is very seldom a loss of life occurs. One reason appears to be, that vessels here take the beach so easily. The beach is an excellent one for beaching upon.

22,316. Were those vessels which were lost with all hands driven on shore, or did they founder ?—They were driven on shore.

22,317. In what part were they wrecked ?—They were upon the Reighton Sands, near the Farm.

22,318. How long ago is that ?—It will be 10 or 12 years ago. They were two Scotch clippers.

22,319. Do you remember how the gale was ?—No, I don't.

22,320. (*Capt. Washington.*) How many lives did you say the life-boat had saved in Filey Bay ?—I can't tell the number. I have no idea of the number of lives she has saved, but a very great many ; the crews of almost all the ships that have come ashore. I may tell you, that before I came the life-boat took the crews out of 10 vessels. Thirteen came ashore in one day, and the life-boat took the crews out of 10. One had soldiers and soldiers' wives and their children on board, and there was not a single life lost. A man will be produced, John Ruddick, who was the master of the life-boat then, and was engaged on that day taking out the 10 crews without the loss of a single life.

22,321. Can you state the number of wrecks that have occurred in Filey Bay between Flamborough Head and Filey Brigg ?—During the time I have been here ?

22,322. Either that or during the last 10 years ?—I have not kept any record of them.

22,323. During the last five years is there a record ?—I have seen a list of wrecks here.

22,324. Does it give the total number in five years or from any period in which you have it drawn up ?—I can give you them from 1852 to 1857 inclusive. There were 14.

22,325. Between Flamborough Head and Filey Brigg ?—Yes. These are vessels that came ashore.

22,326. Do you know how many lives were lost out of those vessels ?—They were all saved. That does not include the vessels that foundered off Filey Bay ; it merely includes those that came on shore in the bay.

22,327. Have you a statement of those which foundered off Filey Bay, and could have come into refuge ?—Nothing but what the wreck chart shows.

22,328. In the printed return of wrecks are the columns headed rightly ?—The total and partial loss from collisions should be changed places. The printer has headed the columns wrong. He has transferred the figures.

22,329. Would it not be better to append that as a note to the bottom of the page ; otherwise your evidence and the return will be in contradiction ?—I have entered it in the report I was reading, and which I intended to have put in.

22,330. Taking the district of the coast between Flamborough Head and the Firth of Forth, only the

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vessels caught in a south-easterly gale between Flamborough and Filey Brigg, that is, a distance of eight or ten miles, could have taken advantage of a refuge in Filey Bay ?—Do you mean with a wind at south-east ?

22,331. Thereabouts: from the south-east ?—They could not.

22,332. Did you not state that the south-east was the most dangerous wind that blew on this coast ?—No ; I was never asked such a question.

22,333. Is not the south-east wind the most dangerous on the coast ?—I don't think so.

22,334. Will you state what wind you think is the most dangerous ?—From about east and by south to east and by north. With a south-east wind a vessel can stand off the land on the starboard tack, and clear the land. It is not an embaying wind at all.

22,335. Do the vessels off Flamborough Head not bear up with a south-east wind ?—They sometimes attempt to ride with a south-east wind, if it is not very heavy. I have seen vessels riding this winter. There was one vessel rode this winter with the wind at south-east.

22,336. Where ?—Under Speeton Cliffs.

22,337. A single vessel ?—Only one. One vessel rode out the 7th of January gale under Speeton Cliffs from the south-east. They usually go away. Most of them will often go when the wind is about south-south-east. They will begin to go then.

22,338. What do you consider the most embaying wind on the coast ?—From east and by south to east and by north.

22,339. At that time it would only be vessels actually between Flamborough Head and Filey Brigg which could gain a refuge in Filey ?—That would depend upon the offing they have with the gale that we are speaking of. The 4th January 1857, one of the vessels that came ashore in Filey Bay, the *William IV.*, was caught off Flamborough Head. He stood to the north until he got off Whitby, when the wind came to east and by north, and he ran back, and came ashore in Filey Bay. I apprehend it will depend on what offing you have how far a ship can reach Filey Bay with the wind at east and by north.

22,340. What do you consider the most dangerous wind on this coast: east and by north ?—Yes ; or from east and by north to east and by south. A vessel will want but a very small offing if she can carry double-reefed topsails to reach Filey Bay even from Whitby.

22,341. I think you said, in answer to a question, that there is no accumulation of mud or silt in the bay ?—I did.

22,342. Is there any debris from the cliffs ?—Very little.

22,343. Do these cliffs wash down ?—Very little.

22,344. From the Reighton or Bempton Roads is there any drift ?—Very slight.

22,345. You do not know of any accumulations of sand under the Brigg ?—I know of none ; the fishermen do not report any. The fishermen do not report any : I have asked the question over and over again. I have asked it of the oldest fishermen in the place, and they all say, none. One or two of them say, "We believe there is more water in the bay than "there was when we were boys," but none have reported a diminution of it.

22,346. What number of vessels did you say you had seen under Filey Bay ?—I said I had sometimes counted until I had got to near 400, and then given over counting. They were not all at anchor.

22,347. I understand—dodging about ?—Yes ; dodging about and at anchor.

22,348. (*Capt. Sulivan.*) You have read many letters and put in many statements of men from different ports, commanding vessels, with reference to this place. Can you state whether all these men are perfectly independent of all local interest connected with Filey ?—The greater part of them were ; almost all of them, with one or two exceptions. I never had any communication with them, except seeing their reports in the papers of their vessels having been caught here. I wrote to ask them the circumstances under which they were caught, desiring them to express their opinions with respect to Filey Bay. I have the letters particularly from one man on the Tyne, whom I never saw in my life, and never had any communication with him except on this occasion. That man sends the names of five or six, six or eight other captains, who would be glad to come and depose that Filey Bay is the best place for a harbour of refuge ; but I never saw one of them in my life.

22,349. Are all these men, so far as you know, quite unconnected with the locality ?—Entirely unconnected with the locality ; and I may also state that I never received an answer from any sailor to whom I have written, unfavourable to the claims of Filey Bay.

22,350. Have these answers been given perfectly gratuitously, and independent of all local influence, only looking to the real merits of the case, so far as you know ?—Entirely so.

22,351. Can you tell me anything about that petition: how were all the signatures obtained to the petition ?—The petitions to Parliament ?

22,352. Yes ?—We obtained a good many in this way :—We had a petition drawn up, and sent a man down to the north with it. The men were so anxious to sign that many of them took printed copies, and sheets, saying, "If you will only give me copies, I know several captains who are on the river." They took them with them to Shields, and got them signed themselves.

22,353. You said that a harbour in Hartlepool Bay, in addition to one in Filey Bay, would also be desirable for vessels in the bay, or something to that effect?—One of the letters that I read said that there should be a harbour somewhere down in Hartlepool Bay.

22,354. I think in your statement I understood you to make some remark on Hartlepool Bay ?—I made the remark that one harbour would not save all ; but I did not say anything about Hartlepool.

22,355. I did not say Hartlepool, but in the bay ?—I said one harbour would not save all the vessels. I said that a second one would be required somewhere.

22,356. That is what I allude to. I fancied you said that that would be required more to leeward in the bay. Is that your opinion that that second harbour should be somewhere further in the bay ?—I have considered the question a good deal, and asked the opinions of sailors on that point. I have said, "It "is very evident that our own harbour will not save "every vessel upon the coast ; where do you think we "should have it for those cannot reach here?" The opinion has been either "Well-water Harbour at Red-"car," or else "Improve the entrances to the rivers "Tyne, Wear, and Tees." As I have said, the opinion of a landsman is worth nothing on this subject, and the opinions of sailors are very much divided.

22,357. I do not ask you any further on that point. Supposing the harbour at Redcar and one of the ports in the bay improved, is it your opinion that the harbour at Filey would more especially save life and property in laden vessels, and that the port in the bay or a harbour in the bay could more particularly save them in light vessels ?—That is just the case. But I wish to be particularly frank. Filey would not save vessels that are occasionally caught in this way. It occasionally happens that a vessel is caught short in such a position that she could not reach Filey Bay. A harbour down in the bight would save such a vessel, but the greatest majority of vessels would be able to reach Filey Bay.

22,358. Of laden vessels ?—Of laden vessels, and also a great number of light ones.

22,359. From your knowledge of this coast, do you know whether it is the case that the great loss of life occurs in laden vessels ?—I believe there cannot be a doubt of that.

22,360. You alluded to a number of vessels having

come into the bay. I think nine on one occasion, before you came here?—Thirteen.

22,361. Are those vessels generally got off again?—Almost always, unless they are very old things. One of these ships was dismasted when she came ashore; but I believe every one of these 13 vessels was got off.

22,362. Have you found laden vessels oftener become total wrecks than light ones?—Much more frequently.

22,363. Do you speak of that from your own knowledge?—Decidedly I can.

22,364. You say that 14 vessels have been lost in six years inclusive in Filey Bay. Under present circumstances would it be the case that a small number of those off Flamborough Head would be lost here in consequence of the endeavours to get back, and therefore many being lost to the northward of this port along the more rocky coast, would it therefore be the case, that, although a comparatively small number are lost in this immediate bay, that many more that were in the neighbourhood of the bay are lost in endeavouring to get back into some place of shelter, and are lost on the more rocky coast?—There is no doubt about that. We see them flying past here in gales of wind in great numbers constantly.

22,365. You spoke of 1,000 fishing vessels and boats within 30 miles north and south, but you gave me no idea about the places where they are principally stationed?—From the boats belonging to Staiths in the north, to Lowestoft, including Yarmouth.

22,366. I understood you within 30 miles?—I said "Engaged fishing within 30 miles north and south." The boats come from a distance to this fishing ground.

22,367. There are eastward of this coast about 1,000 boats gathered from different places?—Sometimes more. We have French and Dutch as well.

22,368. Do you include the small fishing cobles, or are they all sea-going fishing boats?—All sea-going fishing boats, yawls, and smacks.

22,369. (*Capt. Vetch.*) Supposing a south-easterly gale to come on when the vessels are sailing from the Firth of Forth, the Tyne, the Tees, and the Wear down to this part of the coast, how many vessels, that is, what proportion of the vessels, do you think this harbour at Filey, if it was constructed, would save?—I believe that as the greatest number of these vessels from the coal ports would, before the south-easterly gale came on, have got into the neighbourhood of Flamborough Head, that it would save the greatest part of them.

22,370. Supposing it is not so? supposing the gale came on when they had not reached there?—I do not think it is exactly a supposition, because we know it is a fact. We know that the vessels coming from the coal ports get to Flamborough Head, and cannot pass it. An accumulation of days, nay, of weeks, takes place there. I have seen them gradually accumulate for nearly six weeks, the vessels going out in the morning to try to get round Flamborough Head, and coming back at night, bringing up again to the north of the head. That has gone on for weeks, and in the meantime vessels keep coming up the coast as far as there, and do not get further south.

22,371. Do I understand you to say that vessels are never caught to the north of Flamborough head in a south-south-east gale?—I just now said "occasionally," but few would be so caught.

22,372. (*Chairman.*) You stated, Dr. Cortis, that to the best of your knowledge the opinions of these seafaring men were very much divided as to whether, supposing a harbour were made in Filey Bay, they would like to have one more, or whether they would like to improve the three ports. Have you any idea how the majority of opinions goes on that question?—I believe that if you could satisfy them in an engineering point of view that you could improve the ports so as to maintain a certain depth of water at their entrance, the majority would be in favour of improving the existing ports.

22,373. Then do I understand you that there is considerable doubt in the minds of these men as to the possibility of improving the three ports to the extent requisite?—They have great doubts about it.

22,374. Very great doubts?—Yes.

22,375. How is the opinion of the majority upon that point?—I should say that the opinion of the majority is, that you cannot do it.

22,376. (*Mr. Lindsay.*) You give in a return here of 32 vessels which were known to have been caught in the gale of the 4th January near Flamborough Head; but it does not show the position of any of these vessels. Are we to understand by this return that these vessels were all in such a position when they were caught by the gale that if there had been a harbour of refuge at Filey they could have found shelter in it?—Decidedly. That is my strong opinion.

22,377. Do you know the position that these vessels were in at the time they were caught by this gale, so as to be able to say that if a harbour had been constructed here they would all have been able to have fetched into it?—I do not know the position of each individual vessel, but I have the testimony of some of their captains that they were caught off Flamborough Head. The captains of the *Radcliffe* and of the *William IV.* described themselves as being in company with an immense fleet of vessels off Flamborough Head. Then you have these facts, that these vessels left the ports at the same time as the *Ratcliffe* and other ships. I know that the *William Alexander* had got considerably southward of the head. The *Amelia* was off the Head, and so were other vessels. I know by examining the returns that other vessels left the same ports at the same time and tide, and therefore it is probable they were in company with those named.

22,378. It is probable with some of them, but are you prepared to say that all those vessels when they were caught by the gale were in such a position that if a harbour of refuge had been made at Filey they would have been able to have taken it?—I apprehend there cannot be a doubt about it.

22,379. But you have no facts which are sufficient to warrant you in saying that the whole of them could have taken the harbour of refuge in Filey Bay if one had been there?—I should not like to state that every single vessel was so placed.

22,380. Then you do not know that?—I do not.

22,381. Then you cannot state it as a fact of your own knowledge that the whole of the 32 vessels which were caught in the gale were in a position that they could have taken refuge at Filey if a harbour had been constructed?—I should not like to pass my word that each identical vessel was in such a position that she could, because it is a serious thing to pass one's word for what you have no proof of; but I do feel perfectly convinced that every one of these vessels was in such a position that she could have got into Filey Bay.

22,382. You are aware of the fact that those you have named were in that position, but you are not aware of the others beyond merely supposing it?—Yes, with the grounds I have named for my opinions.

22,383. Referring to the statistics of wrecks, Table No. 1, which you have put in, are you aware of the fact that those 27 vessels named in it as having been lost between Flamborough Head and Whitby were lost during the gale at the places which you have specified in the return?—I have taken these facts from the *Shipping Gazette.*

22,384. You have made up your returns from the columns of the *Shipping Gazette*?—Principally from the columns of the *Shipping Gazette.* I have one or two vessels, about which I have private information, but the great majority of them I have taken from the columns of the *Shipping Gazette.*

22,385. The *Shipping Gazette* does not report the places where they were lost. Am I to understand from you that you have received from the masters of

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these ships, or from other authentic authority, the places where these vessels were lost ?—Yes.

22,386. Then your return is made up from the lists which appeared in the *Shipping Gazette* and from authentic documents, either from the owners or masters of the ships ?—Not from the owners or masters.

22,387. What are the documents ?—I believe the *Shipping Gazette* contains every vessel, with one or two exceptions, I know of.

22,388. In any of the letters which you have read from the various masters of ships, or in any others which you state you have in your possession, and which we have to consider, did the masters of the ships make the statements voluntarily to you ?—I wrote to them by post to ask the questions which I have named to you, and by post I received their answers.

22,389. But they had no communication with you, or any party interested in the establishment of a harbour at Filey, until they were first communicated with ?—None whatever.

22,390. Have you kept a copy of the letter which you have sent to the masters ?—The substance of my letter is contained in the one which is put in evidence, for it contains the questions which I asked, and the captains' answers. My letter is very brief. It would be :—

" Dear Sir,—I see you lost your ship in such and such a gale, will you be good enough to tell me the circumstances under which she was lost, and how far a harbour of refuge at Filey would have prevented that loss."

22,391. That was the substance ?—Yes.

22,392. (*Capt. Washington.*) This printed return you have put in is not precise as to which part of Whitby Bay you mean. It would be better to define it exactly ?—I mean the whole of Whitby Sands, from Whitby Rock to the north of Whitby Sand inclusive. Kettleness Point bounds Whitby Bay to the north.

22,393. You say, in the return, between Flamborough Head and Whitby ; do you include the whole of Whitby Bay, as far as Sands' End Ness ?—Yes, the whole of Whitby Bay, as far as Sands' End Ness.

22,394. Other returns which we have seen have excluded the north of the entrance of the harbour apparently, and therefore that produces an appearance of discrepancy which might not exist. Then the wrecks north of Whitby, which we see here, are from Sands' End Ness north. The Return No. 2 should be, wrecks north of Sands' End Ness, Whitby. I wish to get it distinct, that there may be no question about whether other accounts do not concur with these.

22,395. (*Sir F. Smith.*) May I ask whether the letters written to every captain were identical ?—They were identical. I do not mean to say exactly word for word, but the substance was precisely the same.

22,396. The questions were all the same ?—All the same.

22,397. Will you put in a copy of the letter so far as you have got it ?—I doubt whether I have a copy, except what is contained in the letter of Captain Blakerstone.

22,398. Could not you obtain such a letter from one of the captains ?—I am afraid they will not have kept it for such a length of time. I had no idea of the letter being applied to such a purpose. I should think the captains do not generally keep letters; they will probably have destroyed it.

22,399. It would be very desirable that you should obtain it ?—I will endeavour to do so ; but I am afraid I cannot.

22,400. In any one case did the information you derived from the *Shipping Gazette* differ very much from that which you obtained from the captains or other sources ?—No, in no instance.

22,401. I see you call this return, " An Abstract of " Vessels wrecked on the 4th January 1857, known " to have been caught by the gales near Flamborough " Head." How are we to understand the word " near ?" What distance do you include in that word ?—Well, I should say Flamborough Head to, perhaps, Scarborough, or a little north of the Scar.

22,402. Within these limits—that is quite the extreme ?—If a vessel was caught south of Flamborough Head I should still include her if she was a few miles south, because in reality the case would be stronger.

22,403. I only want to know the limit, because the word " near " is very indefinite.

Mr. Alexander Curzon examined.

Mr. A. Curzon.

22,404. (*Chairman.*)—You reside at Lynn ?—Yes.

22,405. Were you ever at sea ?—I was bound apprentice in 1805.

22,406. During the period you were at sea for how many years did you command vessels ?—From between 1815 and 1816.

22,407. In what trade were the vessels generally employed that you commanded ?—Between London and Firth of Forth, Hamburg, Antwerp, and the north coast, twice to Lapland, generally out of the Channel, and one voyage to Gibraltar.

22,408. Generally foreign ?—Yes ; to those places that I have named just now.

22,409. Did you ever go north about through the Pentland Firth ?—Never.

22,410. To Archangel ?—No ; I have been to the north of the North Cape, but not to the White Sea.

22,411. To the Baltic ?—Never to the Baltic, but up to the Baltic.

22,412. How long have you been on shore ; how long have you left the sea ?—Well, three years ago on the 19th December I was riding in Yarmouth Roads with a very large fleet of ships in a gale of wind from the south-east, and——

22,413. How long have you given up the sea and come ashore ?—I am giving an answer to that question.

22,414. I only want the time and not the circumstances ?—Three years. I was then taken with an ague in my eye.

22,415. You are aware of the object of this inquiry ?—Yes.

22,416. Will you now give your opinion as to the advantage or necessity of one single harbour of refuge on this district of the coast, or whether you think that, with a view to the saving of life, it would be better to improve the Tyne, Tees, and Wear ?—My opinion is, that for the safety of life and property it is absolutely necessary that there should be a harbour of refuge about this locality ; but I am of opinion also that there should be a second harbour of refuge down somewhere in Tees bight.

22,417. Supposing that it is possible to improve the several harbours at the mouth of the Tyne, the Tees, and the Wear, so as to take in ships of from 16 ot 18 feet draught of water, would you still prefer one down in the bight to the improvements of these three ?—And not have a harbour of refuge at Filey at all ?

22,418. Supposing you have a harbour at Filey too ?—If there is a harbour at Filey, and the other harbours could be improved so as to admit vessels such as you have named, there might be no objection. But, for my own part, I rather fear that those harbours could not be improved. There are strong objections, I think, that may be brought against the harbours of the Tyne and Sunderland, in consequence of the heavy freshets coming down. They would, at all times of heavy rains and so forth, have a heavy sea on the bar with the wind at east ; and we should find it difficult for ships to steer. The consequence is, that innumerable accidents have in times past happened, and I rather fear that they would not be avoided in the future.

22,419. Supposing that could be avoided, the difficulties which you have named about the freshets and the want of water; should you prefer three to one in the bight of the bay?—I certainly should, if these difficulties could be entirely avoided, inasmuch as a larger extent of coast would be covered; but I do not think that any of these harbours, either the Tyne, Sunderland, or Hartlepool, would exactly meet the case of the emergency of vessels taken down in Tees Bay. I rather am inclined to think that a harbour somewhere about Redcar would save life and property better.

22,420. You talk of a harbour at Redcar, putting out of the question the difficulty of tides and freshets and circumstances of that kind. Redcar is not down in the bight; Teesmouth is down in the bight. Which would you prefer, Redcar or the Teesmouth?—Redcar is close down in Tees Bight, and the wind is always down there when the wind is from the east-north-east. It is down direct on there.

22,421. Looking at the chart, I have the Tees Bay bounded on the south by Redcar, and on the north by the Heugh of Hartlepool. Supposing a vessel to be embayed, disabled, and in distress between these two points, of what use would a harbour at Redcar be?—If the wind was from the north-east, it is down directly on the harbour of Redcar.

22,422. I am supposing the wind to be dead into the bay?—Dead into the bay, a ship could either take Hartlepool, if it was a harbour, or she would take Redcar.

22,423. Drawing a line from the Heugh of Hartlepool to Redcar Point, and supposing a vessel to be within that line, and to be disabled there with a wind dead in shore, how could she get into either Redcar or Hartlepool?—If the wind was from the north-east, she could.

22,424. I have not given you the wind from the north-east, but dead into the bay, whatever that may be. I do not care what quarter it is from?—If the wind is dead into the bay, if a vessel carries any canvas, she could either reach to the north for Hartlepool or direct for Redcar.

22,425. Supposing she could carry canvas with a heavy sea setting on shore, and under low canvas, and with a heavy gale, could she get into either Redcar or Hartlepool?—Yes.

22,426. How many points leeway would she make under close-reefed topsails and reefed canvas—a loaded ship under close-reefed topsails and reefed courses?—She would make perhaps $2\frac{1}{2}$ if heavy canvas was carried on her.

22,427. Not more than $2\frac{1}{2}$ with a heavy sea and a heavy gale blowing?—If there was a very heavy sea and wind. But she could make more than $2\frac{1}{2}$.

22,428. How many?—$3\frac{1}{2}$.

22,429. How many would a light ship make?—I should say she would go to leeward altogether; but the sea is so heavy down there at times that it is almost impossible to calculate exactly the leeway she would make, except one was on board the vessel.

22,430. (*Sir F. Smith.*) To what point in Tees Bay should you give the preference for a second harbour of refuge?—I should say take Redcar for the saving of life, but Hartlepool would be the best for an outlet for ships to come southwards afterwards. A harbour at Redcar would be a bad outlet to come south.

22,431. Taking all these circumstances into consideration, and supposing that the public funds could only be applied to make a harbour here, and in making a harbour to the northward, then what point would you select?—For the first harbour I should prefer Filey Bay. It is in my opinion the most advantageous point that could here be selected.

22,432. I assume that as a settled point. I want to know which of the points to the northward you would select, supposing you had but one now to make; where would you apply the public funds?—I would apply them down in the Tees bight.

22,433. Do you mean at Hartlepool?—Either at Hartlepool or Redcar; one or the other.

22,434. You consider Redcar as part of the bay?—Yes; as part of the bay.

22,435. Have you been much in the Tyne?—Yes.

22,436. Sufficient to enable you to give a strong opinion against its being made?—Yes; I have traded a great deal to the Tyne at all times. I have taken the Shields Bar under very varied circumstances.

22,437. Is Lynn much interested in this question: do you come at the desire of the shipowners of Lynn, or do you come from any other motives?—No; we were written to by the Chamber of Commerce at Hull to know whether we would come and give evidence upon the present question.

22,438. Then the Chamber of Commerce at Hull is interested?—I presume so.

22,439. Were you asked to come individually, or was any attempt made to get up evidence at Lynn?—No attempt whatever is made. A gentleman was written to upon the subject, and he applied to us individually. We who have come here have all come in the same manner. We know nothing of each other as witnesses, although undoubtedly we have a perfect knowledge of each other.

22,440. You have come here from pure motives of humanity?—Pure motives of disinterestedness; it does not matter to any one of us who have come here whether there is a harbour of refuge here or not as regards pecuniary matters, only as far as regards the safety of lives and property.

22,441. You feel no doubt that it is a great national question—the establishment of a harbour of refuge somewhere upon the exposed coast?—A very important one indeed, both to the naval and mercantile marine.

22,442. An imperative duty?—Yes.

22,443. And looking upon it as an imperative duty, you have no hesitation in saying that Filey Bay presents the greatest number of advantages?—Oh yes.

22,444. You have no doubt about it?—Not the least doubt on that subject whatever.

22,445. (*Mr. Lindsay.*) How many colliers have you at Lynn—that is, vessels trading from Lynn?—Our vessels have greatly diminished since the bringing of coal by railway. Our trade has fallen off considerably. The import was, I think, 240,000 tons annually; I think last year it was only 160,000.

22,446. From the northern ports, Newcastle, Shields, Blyth, Seaham, Sunderland, and Hartlepool?—Yes.

22,447. In coming along the coast, what is the usual track of colliers? What distance do they keep off the land, say between Whitby and Flamborough Head?—That will entirely depend upon circumstances when we leave the northern ports; how the wind is, what is the appearance of the sky, &c.

22,448. Say the wind is tending from the west off the land, what distance do you keep from the coast?—We should keep close in along the coast. If we were leaving Hartlepool, for example, we should keep close in to Whitby and come as close round as we could, so as to get the advantage of hugging up.

22,449. At what distance from the coast?—About three or four miles.

22,450. If the wind is tending from the east upon shore, what distance would you keep then?—Directly upon leaving Hartlepool we would steer out east and by south, or south-south-east, until we had got a little offing out of the bay.

22,451. At what distance would you aim to keep from the land then?—I should keep seven, eight, or ten miles, according to circumstances.

22,452. With the wind from the land, you would keep off from three to four miles?—Yes; but if the wind was off, and the weather fine, we should keep nearer in than then, say a couple of miles nearer, going in all the way along.

22,453. Then your answer is, that with the wind off you would keep from two to five miles off the land?—Yes.

22,454. Not less than two nor more than five?—Yes.

22,455. With the wind on the land, you would steer

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a course of something from eight to ten miles from the shore ?—Quite so.

22,456. It was stated to us in evidence at Whitby, that considering the usual track of vessels, there was no wind which a vessel could weather away Filey Brigg with which she could not also weather away Flamborough Head. What do you say to that ?—Well, that depends entirely how the wind would be.

22,457. But the statement was that there was no wind. And it was stated to us by a sailor of experience, that there was no wind with which a vessel could weather Filey Brigg with which she could not also weather Flamborough Head ?—If a vessel was close in off Filey Brigg, and the wind was east and by north, blowing very fresh, we shall often make one and a half points leeway, and we should be on Speeton Cliffs.

22,458. That is hardly the question. Looking to the usual track which vessels take, and which you have given just now, are there any winds which would enable a ship to fetch into Filey Bay, but would not enable her to weather away Flamborough Head ?—Oh, certainly ; she might fetch perhaps rather within Filey Bay, and would not go further than Speeton Cliffs. If the wind was from the east she would only lie south-south-east from Filey Brigg, and she would go under the cliff, and would not go further.

22,459. With the wind east-south-east, that is, upon the land, the usual course, as you have told us, would be from eight to ten miles off the land ?—Yes.

22,460. Looking to a ship eight or ten miles off the land, tell me the winds with which she could weather away Filey Brigg and not weather away Flamborough Head. Ten miles from Scarborough we will take, for instance. Take your own time to answer it ?—Ten miles from Scarborough, with a wind south-south-east, she would lie somewhere in for Filey Bay, I think. I, perhaps, could not at the moment tell that, unless I had the position of the vessel placed exactly ; but I should say that 10 miles from Scarborough, with the wind east-south-east, she would come down into Filey Bay, but would not go round Flamborough Head.

22,461. Do you think vessels caught off Scarborough in the track of 10 miles from the land, caught with a gale at east-south-east could weather Filey Brigg when they could not weather Flamborough Head ? Is that your opinion ?—It is.

22,462. Did I understand you to say that if a second harbour was to be made you would give the preference to Redcar as a site over Hartlepool, or that you thought either site would be of equal value ?—Either site is of equal value. I think, perhaps, that Redcar would save more life than Hartlepool would ; but Hartlepool would be the best outlet for ships going to the south. The other would be down on a lee shore with the wind north-east.

22,463. The question is the saving of life and property. All things considered, and if the site for a second harbour rested between Redcar and Hartlepool Bay, which would you prefer ?—I think Redcar.

22,464. Have you often run for Hartlepool in an easterly gale ?—I have.

22,465. A great deal has been said about broken water along the head of the bay. Have you thought that you were in greater jeopardy in approaching Hartlepool Bay than you were outside ?—Yes; in going down into the bay, as soon as you get somewhere in the line with the Heugh, the sea becomes considerably broken, in a similar way to what it does in approaching Shields Bay. There the sea is low ; but as soon as you come on the bar it becomes broken. It is so to a certain extent at Hartlepool, though not to the full extent that it is at Shields.

22,466. Then off Shields have you found the broken water more dangerous than you have in Hartlepool Bay ?—Yes ; as the sea is heavier off Shields.

22,467. I am speaking, not of the usual sea, but of the broken water ?—Yes.

22,468. Then does that broken water off Hartlepool apply equally to other places ?—Yes, quite so. It does to Shields, and at Sunderland there is considerable broken water there too ; but the land being flat above, the broken water is really not so dangerous. You gradually go into the Bay ; but it is not so at Shields or Hartlepool.

22,469. Is there a greater sheet of broken water off Shields in an easterly gale—a sheet extending further off than what there is off Hartlepool ?—I think so ; the sea is heavier.

22,470. Have you in your experience known many ships capsized and foundered in this broken water ?—I never saw one do so myself. I had a brother-in-law that once took Shields during the war with a little vessel. They had gun ports ; stern chasers they used to have. The first sea struck her upon Shields Bar, took all the timbers abaft, and whipped the two guns upon the top of the tiller. The vessel hove across the sea unmanageable, of course, at once. The people took to the rigging. One of them, however, jumped down below, and got an axe. As soon as the man came up with the axe, another sea came, and shot him away, axe and all. He took to the rigging immediately. Presently the water coming off the axe a little, they saw the axe lying against the scuppers. One of the crew got down, seized it, and liberated the tiller just in time to get off the Herd Sand, and the ship got in safe.

22,471. Does the broken water extend a long way outside the bar ?—Only upon the bar. In extremely heavy gales I have seen it break into many fathoms, but only occasionally.

22,472. In what depth of water have you seen the sea break off Shields Bar ?—I cannot speak to that exactly.

22,473. (*Capt. Sulivan.*) You say you have seen the water break off Hartlepool in a line with the Heugh. I see there is about four fathoms just abreast of the Heugh going in. If a breakwater was made there at the five fathoms' line, with an entrance sufficient for ships to take in safety, either at either end or in the middle, should you have any fear of taking the breakwater in a gale of wind on account of the sea ?—No ; I have an opinion with reference to Hartlepool being made a harbour of refuge, that the bay would require to be enclosed entirely, say, that from the Heugh that long pier were run out to the Long Scars ; and then I think vessels might take it with comparative safety ; but still I have seen the sea breaking very heavily out beyond where you would possibly think of placing your breakwater.

22,474. With a harbour enclosed as you describe there could only be one entrance ?—Well, there might be two.

22,475. So you would prefer two ?—I think they would find it necessary perhaps to have one on the north-east side, and somewhere by the Long Scars.

22,476. If these entrances were at five fathoms dead low-water spring tides, do you think, generally speaking, there would be any fear of the largest loaded colliers taking them in safety ?—I think there would then be danger in their taking them from the heavy seas, but not from their striking.

22,477. You think there would be danger then with piers carried out to five fathoms' water ?—Yes ; the sea runs very cross in that bay. Whether it is the tide going out of the Tees going round the Heugh, or whatever cause, the seas run exceedingly cross in the Tees Bay down there.

22,478. You were asked about vessels not weathering Flamborough Head, and yet weathering Filey. You have heard the evidence that a large number of colliers collected about Flamborough Head—off the Head—in south-easterly winds ?—Yes.

22,479. Does your experience bear out the statement we heard from Dr. Cortis on that point, of the large numbers of colliers being caught by foul winds off or in the neighbourhood of Flamborough Head ?—I am only astonished, on having seen, and also heard from report, of the number of vessels which at times collect under Speeton Cliffs, or what they term get

into Filey Bay, how it is that, with such a number of vessels collected together there at different times, you have not a great deal more damage than you have.

22,480. Then you confirm the statement about the large numbers frequently collected there?—I have been bringing up myself when there have been from 100 to 150 sail of vessels. Only last spring—I have an interest in two vessels—one, the *Unanimity*, left the Tyne somewhere about February, and came out with a number of vessels, and just exactly reached Filey Bay or Speeton Cliffs; and another, the *Dove*, came up also out of Seaham, also with a large number of vessels, and reached up under here. Here they rode two or three days, I do not know exactly which, when the wind shifted from the south-south-west to south-south-east, and perhaps a little more easterly. The small vessel, the *Unanimity*, had to slip her anchor, and went away for Shields, and got in in safety. The *Dove* had to go off to sea, with several other vessels, before the storm came, running the risk of being run down at sea, and so forth. They drove back as far as Scarborough, when they up helm, and went away for the Firth of Forth. Both these vessels might have got into Filey Bay if there had been a harbour here. During the time the *Dove* was away the captain reports that he saw a vessel go down with all hands. He did not specify the particular place, but it was somewhere between here and the Tees.

22,481. Do you know of any other vessels under the same circumstances?—There were lots of other vessels here. Some went away to the Firth of Forth, and some of them took the harbours. The *Catherine Fraser* took the harbour at Hartlepool, and struck going in. The captain of the *Dove* would not go there, because he once had taken that harbour with a small vessel, and got on shore, and suffered damage which it cost 300*l.* to repair.

22,482. The large number of vessels which you have seen at anchor under the head are cases of vessels that have weathered Filey, but cannot weather Flamborough Head?—It happens very frequently that when the wind is from the south-south-east, blowing hard, we cannot beat up.

22,483. Are not all these cases of vessels that have weathered Filey but cannot weather Flamborough head?—Yes; or if they have weathered Flamborough Head they have thought proper to come back.

22,484. We were told by one witness that one advantage of Hartlepool over Filey was, that when the wind came to the north-east sufficient to start again, they could weather Flamborough Head from Hartlepool, when they could not from Filey; can you fancy any wind or any possible case in which that could occur?—Well, if I came out of Hartlepool I should like to steer east and by south, or east-south-east, to get a tolerable offing; and if I was in Filey Bay and wished to get out, I think coming out south-east and south-east and by east would soon take me round Flamborough Head.

22,485. Would it be a great advantage to loaded vessels that had to take refuge after being off Flamborough Head that they should have a port somewhere near the head, not only to save them from running back into the bay, but to give them such a much better start when the wind came fair for them to proceed on their voyage?—Oh yes; the most dangerous part of the passage would be over, and riding here they could at any time up anchor and go away.

22,486. Is it the case that when a vessel has got round Flamborough Head with a slant the worst part of the passage is over?—So far as the coast is concerned, because this is what we term an iron-bound coast, and has no place of refuge.

22,487. We were told by a witness of a northern port that he never slept comfortably until he had passed Flamborough Head, and got the harbour under his lee: is that in accordance with the general feeling of masters bound south?—I dare say that all participate in that feeling.

22,488. From your experience, is it the case that much the largest number of lives are lost in the laden colliers in proportion?—Yes.

22,489. Then you would look upon it as more particularly desirable that wherever a harbour of refuge was placed it should be for the advantage more particularly of the laden colliers?—I should say so, because now it, as it were, hangs like a dead weight on the mind of a man commanding a vessel drawing 14 or 15 feet of water, and about to leave any of the ports in the Tyne, the Wear, or Hartlepool, that he perfectly well knows that as soon as he is out at sea, come what weather there may, he has no place of refuge.

22,490. If a harbour were also constructed in the bight of the bay, would that be especially valuable for light colliers which, having come round Flamborough Head, have got into difficulties, not having tide enough to run for other ports?—It often happens that light colliers are put ashore in the spot I mentioned somewhere off Filey.

22,491. Would it not be the case that a harbour nearer Flamborough Head would be especially valuable for laden colliers, while one in the bight would be more valuable for light colliers?—For both Filey Bay would be equally valuable, for light and for loaded colliers.

22,492. Such light colliers as you described as being caught in the gale you mentioned south of Flamborough Head; but are not the large mass of colliers running to the last moment in the hope of reaching the ports, and therefore quite north of Filey? Would not a port in the bight of the bay be more valuable for all that class?—They are frequently not able to reach the bight of the bay.

22,493. In some cases we have evidence to that effect, but I am speaking of the large mass. I ask whether generally the vessels that would take the harbour at Hartlepool or Redcar would not be light colliers, with some laden ones which could not reach as far as Filey; while, on the other hand, Filey would take a larger number of laden, with some light ones that got into it before they got past? Would that generally be the result of harbours at those places?—Those that could not make the northern ports would readily take a harbour of refuge; the light colliers, if they could not get to landing ports, would take the harbour of refuge at Redcar, or wherever it was placed.

22,494. If you had your choice, looking only to the saving of life and property, and you had to choose between one very large harbour of seven or eight fathoms, at one point on the coast, or a more moderate harbour at two places, such as Hartlepool and Redcar or Filey, each large enough to take laden colliers at all times of the tide, by day and night, which would you prefer—two smaller harbours, in two places, or one large harbour at any place you might select?—The two smaller harbours would be the best, if they were equally accessible, because they would extend to a greater distance, and would have a better chance of saving life.

22,495. Have you ever taken the Tyne and Tees at high water?—I have taken the Tyne, but never the Tees, except with a pilot. I have taken other harbours without a pilot, under circumstances where no pilot could ever get off.

22,496. You are aware that they hope to get 15 feet at low water at the Tyne?—I am aware of that.

22,497. How far would that be safe for vessels to take in a gale of wind (from the experience you have had in taking it), say at half tide, which would be about the same water, or something near it, that vessels now have there?—If it is after heavy rains it would be attended with extreme danger, in consequence of freshets coming down so strong. Freshets out of the Tyne run immensely strong, the same as they do out of the Wear.

22,498. Is it not the case that in the case of easterly gales, which are those in which you most want refuge, the wind on the coast in a great measure dams up the current and reduces its strength?—It may to a cer-

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tain extent; but I have known very heavy gales of wind from the east, with heavy freshets, that nothing would stand against—freshets that have been so strong that both ships and keels, and everything on the Wear, have driven out against the wind, and have quite jammed up the place.

22,499. We have it in evidence that one advantage of having a harbour of refuge at an established port is, that it would be much better for getting supplies, and that if a harbour was placed where there were no established docks, or port or trade, that vessels taking refuge would not obtain supplies; and that if a harbour were placed where there were no established docks, or port or trade, vessels taking refuge there would not obtain supplies of spars, anchors, and things of that kind, such as they require. From your knowledge of the trade generally, will you tell me whether you should fear that if a harbour was placed, say at Filey, and ships came in there damaged, and wanting anchors, sails, cables, rope, or other supplies that ships usually need, there would be any fear of the trade not supplying their demands in Filey when a demand occurs?—None whatever. The harbour of refuge would soon bring persons down that would keep all these articles.

22,500. You think a trade will always follow the demand, and supply all that is wanted?—Yes; and only be too ready to embrace such an opportunity.

22,501. (*Capt. Vetch.*) Do you consider that a harbour of refuge between Flamborough Head and Blyth harbour would be very necessary and useful in saving life and property?—I think one is absolutely necessary.

22,502. Where would you place that harbour?—At Filey.

22,503. And supposing that two harbours were to be constructed for the same object, where would you place the other one?—In the Tees bight.

22,504. Supposing these harbours to be made, which of the two would in your opinion secure the greatest number of vessels and save the greatest number of lives?—Filey.

22,505. (*Chairman.*) I think from the tenor of your evidence that you consider it hopeless, owing to the freshets and the difficulties of the tides, thoroughly to improve the Tyne, Tees, and Wear to any great extent as subsidiary harbours?—Yes, as places of perfect safety to take.

22,506. Therefore in your view a refuge harbour at Hartlepool which would not be at the entrance of the river, would be preferable, as not being exposed to the tides and freshets to the same extent?—Yes, as places of perfect safety to take.

22,507. You mention that you have been in the Tyne pretty often in bad weather, as I understood. Can you mention any instance in which you have been in danger of losing your life or your ship in doing so? I cannot perhaps recollect dates at this distance of time. I have taken these ports so many times that dates are of no consequence to me.

22,508. Without dates, could you refer to any incident, and tell us the circumstances of any case in which you nearly lost your life and your ship in running into any of these harbours?—I have been one of those fortunate men in one respect. I never met with any accident myself, but I have been very unfortunate in other respects, for I have had vessels that have been lost for me.

22,509. Could you give us the details of the circumstances under which any of your vessels have been lost in taking any of these bar harbours?—I have had a vessel ashore. The *Dove* got ashore in taking Hartlepool some time ago.

22,510. But Hartlepool is not a bar harbour. I am talking of bar harbours in the Tyne, the Tees, and the Wear?—I never had a ship which got ashore in going into these harbours of the Tyne or the Wear.

22,511. In your experience have you ever seen or heard of a man bearing up for the Tyne, and putting his crew into the rigging, except himself and the man at the helm, and running into that bay in a heavy gale of wind?—I can easily account for that.

22,512. Have you seen it done?—No; I have not been an eye-witness.

22,513. (*Mr. Lindsay.*) You put the position of a ship caught with an easterly gale, with a gale east-south-east off Scarborough at 10 miles distance, and you said that that ship could reach Filey when she might not be able to reach to weather away Flamborough Head, but could it be because that a ship in that position with a gale at east-south-east could reach Hartlepool?—She could go back to Hartlepool very well.

22,514. She could reach Hartlepool with as great facility as Filey?—In going to Filey with a wind in that way they would have to keep the vessel at the wind, and carry very small canvass in order to fetch Filey, whereas if they were going to Hartlepool they would only have to bear away before the wind.

22,515. Then she could fetch Hartlepool more easily than Filey?—Considerably so.

22,516. Supposing a vessel in that position caught with a gale at east and by north dead upon the land?—Then Filey would have the advantage precisely as Hartlepool would have when the wind was east-south-east.

22,517. Then in that position, right abreast of Scarborough, 10 miles distance, would she be able to weather away Flamborough Head?—She would go round the head if it was not too heavy, but if it was an extraordinary gale a prudent captain would in that case rather take Filey than proceed onward.

22,518. Do I understand you to say, that, as a general rule, caught with a gale in that position at east and by north which is dead upon the land, and, consequently, the most dangerous gale upon this coast—that, as a general rule, though a captain might prefer taking Filey, he would weather away Flamborough Head if he could reach Filey?—Yes; he could go round Flamborough Head if the wind was east and by north, if he could carry sail on the vessel.

22,519. (*Capt. Washington.*) Do shipowners like their captains to go into refuge harbours, and especially on the road, if they can help it?—If they can escape the gales thereby, and save the wear and tear, they are glad, but if some of their companions make their passage, the one that has taken the harbour would get frowned upon sadly.

22,520. We have been speaking a good deal of a fleet of ships under Flamborough Head. Supposing the wind southerned upon them, they must go off; when the wind gets to south-east they must go off shore?—Yes.

22,521. Would they at once bear up for a refuge harbour, or thrash against it for some time, trying to get round Flamborough Head?—There would be no object to accomplish with the wind in that direction, even to get round Flamborough Head, because they could not make the passage, and, therefore, they would take the harbour of refuge immediately.

22,522. But, once round Flamborough Head, have they not the whole of the sea that they can work in? Have they anything nearer the lee than the Humber, and have not they that in any danger they will be able to run for the Humber?—It will depend entirely upon the wind.

22,523. When the wind comes south-east does not it often get a little more to the eastward?—Yes.

22,524. They would still struggle against that?—If they had once made the attempt, and got off to sea; but if there was a harbour at Filey they would never make that attempt.

22,525. That is just what I am asking; you think masters would be able to excuse themselves for going into a port under those circumstances?—Oh yes; they would be justified even by the owners in taking a harbour of refuge under such circumstances. The risk is increased so immensely by the steam vessels upon this coast that we are very glad in dark nights to get out of the way of the usual track.

22,526. (*Capt. Sulivan.*) Is it not the case that in the north and north-east winds a large number of light vessels congregrate in Bridlington Bay ?—Yes.

22,527. Then if laden vessels on the north side are similarly situated with north-east winds, are they not equally likely to get into an anchorage that will shelter them from these winds, if they have one ?—Yes, certainly they are.

22,528. Then from the fact of thousands of vessels anchoring on the south coast of the head rather than thrash about, and proceeding northward is not equally likely that if shelter is provided the laden vessels which congregate on the north side will make use of it in south-easterly gales ?—Yes, that is certainly conclusive enough.

22,529. (*Chairman.*) Have you any information whereby you can confirm or confute the correctness of the statement concerning *Duke*, of Lynn, in the printed statistics ?—No, I have nothing.

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22,530. (*Chairman.*) You are a fisherman ?—Yes.

22,531. And reside at Filey ?—Yes.

22,532. How many years have you followed that occupation ?—Fifty.

22,533. What is the size of the boat you fish from ?—Nearly 36 tons, new measurement.

22,534. How many hands have you on board ?—Ten.

22,535. What is the bearing and distance of the fishing ground from Filey ? As it may vary at different times of the year, and according to the nature of the fishing, just go through them all ?—We sometimes steer away east-north-east, other times east and by north, other times east and east-south-east as far as south-east ; sometimes we go off 20 miles, sometimes 30, and sometimes 40, as far as 50 miles ; we have been going off lately as far as 80 miles.

22,536. Your boats, what you call fishing boats, are in fact small vessels ; decked vessels ?—Yes.

22,537. And good sized boats ?—Very good sized boats.

22,538. I suppose you can keep the sea in any weather in which a small coasting vessel can do it ?—Yes, perhaps better than the generality of them.

22,539. Certainly better than laden coasting vessels?—Yes; a great deal.

22,540. You make much better weather than a laden collier ?—Oh yes ; unless she be a very large one.

22,541. Even if the collier is very large and very deep, do not you make better weather than a deep collier ?—Oh yes.

22,542. When it comes on a breeze of wind on shore, and you are 30 or 40 miles off shore, do you run for a harbour or keep the sea ?—We run for the Humber if we can possibly get there.

22,543. What water does your vessel draw ?—seven feet.

22,544. Besides the Humber, what other place can you run for ?—If the wind is anywhere from the north, round for Bridlington Bay.

22,545. Is there anywhere else you can run for ?—If the sea is not very bad we can run for Scarborough harbour.

22,546. Can you get into Scarborough harbour at all times of the tide ?—No.

22,547. At what times ?—First quarter flood if the weather is not very heavy.

22,548. Do you ever run for Whitby ?—Never so far north. No, we dare not go to Whitby.

22,549. (*Sir F. Smith.*) Would a harbour at Filey be of great use to you ?—Oh yes, of very great service.

22,550. In what respect ?—The first thing, many a time we dare not put to sea, being frightened of a gale coming from east-north-east or east-south-east, right upon the shore, anywhere from that quarter ; frightened we cannot get back into the harbour again, but be obliged to keep to sea.

22,551. You lose many opportunities of fishing for want of a harbour here ?—Yes.

22,552. Is there any point in the offing from which you can weather Filey Brigg, but cannot weather Flamborough Head ?—No ; if we can weather Filey Brigg anywhere with the wind from the east we can always weather Flamborough Head.

22,553. Do you know whether this bay silts up at all ?—Oh no, it never silts up, never since I can tell ; I think there is rather deeper water.

22,554. What reason have you to think so ?—We always find more water now down against the Brigg than ever we did before.

22,555. There is no sand comes round the Brigg, is there ?—Oh no, it cannot get round the Brigg.

22,556. What is the total length of the Brigg ?—I am sure I cannot tell that ; I never measured it.

22,557. (*Mr. Lindsay.*) You said that you had fished about 20 miles from this place many times ?—Yes, twenty.

22,558. What is the greatest distance to the fishing ground ?—Forty miles off.

22,559. You fish between 20 and 40 miles off ?—Yes.

22,560. That is about the distance ?—Yes.

22,561. Say, you were caught with a gale from east-north-east, could you fetch the Humber ?—Oh yes.

22,562. If it was east-south-east could you fetch the Humber ?—Yes.

22,563. Then you can fetch the Humber from your fishing ground in all the dangerous gales on the coast, and it is good anchorage, is it not ?—Oh yes, the Humber is good anchorage.

22,564. Then would a harbour at Filey be of great value in those most dangerous gales ?—Oh yes.

22,565. How so ?—Because in about five hours we could be in harbour at Filey, and perhaps we have to run 10 to get tothe Humber.

22,566. That is on account of the distance ?—Yes.

22,567. (*Capt. Washington.*) How many yawls fish out of Filey ?—Twenty-four.

22,568. From the coast just to the north and south of Filey ?—I do not know exactly ; I should think there would be 60.

22,569. Does a very large fleet of yawls come to to the Doggerbank ?—Yes.

22,570. Where do they come from ?—From Yarmouth, Lowestoft, Staiths, Runswick, Scarborough, Filey, Flamborough, all the way along the coast. And, besides that, we have Frenchmen and Dutchmen without number.

22,571. Altogether 1,000 vessels perhaps ?—I should think 1,300 or 1,400 altogether.

22,572. In case of a gale obliging them to run, where do they all go to ?—The Frenchmen keep the sea and the Englishmen run for the Humber ; that is the principal place. We have no spot unless we can get into one of the places before the sea gets heavy, or else keep the sea.

22,573. Do you go right off to the Doggerbank ?—Right off to the north-east corner.

22,574. What distance is that from Filey ?—I am no scholar, I do not know.

22,575. Fifty or sixty miles ?—It will be sixty miles.

22,576. What is the least water you ever get on the Doggerbank ?—Eleven fathoms. I have heard of boats being in seven or eight, but I never experienced that.

22,577. (*Capt. Sulivan.*) You said that with east-north-east round to east-south-east gales the boats could take the Humber ?—Yes.

22,578. If you were on the Doggerbank, and it was blowing a gale from south-east to east-south-east,

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Capt. Sulivan.

could you fetch the Humber then ?—We can, with the wind to the south-east.

22,579. You would be very close in the wind to fetch it ?—Not so very close, but we can fetch it.

22,580. If you were on the south part of the Dogger, what would you do ?—If on the north-west part of the Dogger we could fetch the Humber. Anywhere from the Dogger with the wind to south-east.

22,581. With gales from south-south-east and southerly, where do you go to ?—Under the head under Speeton Cliffs.

22,582. You said French boats kept the sea; are they much larger than yours ?—Yes.

22,583. Decked vessels ?—Oh yes, very large boats. I have seen some of the French luggers carry upwards of 30 men.

22,584. Are all your boats decked ?—Yes.

22,585. From stem to stern ?—Yes.

22,586. (*Capt. Vetch.*) I wish to ask whether you ever run to Bridlington Bay for shelter on those occasions ?—Many do run for Bridlington Bay.

22,587. Do you find that a very convenient place ?—Yes, with the wind from the north.

22,588. How many fishing boats have you seen there at a time ?—I should say 30 or 40 at a time ; but I never counted them.

22,589. (*Chairman.*) What is the largest number of vessels you have ever seen brought up in Filey Bay ?—I have known upwards of 700.

22,590. On what occasion ?—With the wind from southward.

22,591. But when ?—I cannot tell the date of the year. I never expected I should have that to answer any more.

22,592. Was it a long time ago ?—Yes, it was a good bit ago ; 30 years ago or more.

22,593. Was it during the last French war ?—Oh, was since then.

22,594. After the peace ?—Yes.

22,595. Then those 750 vessels were not a convoy ?—No, not convoys ; brought up.

22,596. Just vessels that came in and brought up ?—Yes, gathered up by laying there so long.

22,597. Have you seen many vessels come on shore from under Speeton Cliffs ?—No ; but I saw one at that time which came ashore here. She was amongst that fleet, and could not find a place to anchor.

22,598. It was so crowded ?—Yes ; and she was driven down to Scotland, caught in a gale of wind from away north-east, and was driven ashore here, and lost.

22,599. How do you know she was driven to Scotland ?—Because the master told me.

22,600. Can you give the name ?—The *Old Friendship*, of Yarmouth.

22,601. And the name of the master ?—No ; but I can name the mate.

22,602. What was his name ?—Taylor.

22,603. Can you remember any other occasion of a fleet being caught there and vessels wrecked ?—I can remember one going down under Speeton Cliffs, in Filey Bay.

22,604. What was her name ?—The *Commerce*.

22,605. Were the people lost ?—No; all hands were saved.

22,606. Can you give me any other occasions on which vessels have come on shore ?—I saw a Scotch ship come on shore, and all hands perished ; if there had been a harbour it would have been saved.

22,607. Do you know her name ?—No.

22,608. How long ago was that ?—I suppose about five or six years ; I cannot exactly say.

22,609. (*Mr. Lindsay.*) When you say that you have seen 700 vessels anchored in Filey Bay, you mean in that bight under Speeton Cliff and all along ?—Oh yes ; all for shelter ; all right up.

22,610. You do not mean Filey Bay proper ; you mean between Filey Bay and Flamborough Head ?—Yes, between Filey Bay and Flamborough Head, riding and dodging about, gillying about backwards and forwards. I once saw 13 come ashore here.

22,611. When was that ?—I do not know the date of the year.

22,612. In one gale ?—They were all light ships that weathered Flamborough Head and came in here.

22,613. Do you remember how the gale was blowing ?—About east ; east and by north, and that way. I do not know to a point.

22,614. Where did they come on shore ?—Between Speeton Cliff and Filey.

22,615. Were there a great many of them within Filey Bay ?—Yes.

22,616. (*Capt. Sulivan.*) Were those all vessels down from the south ?—Yes.

22,617. That had weathered the head and were driven in here ?—That had weathered the head and were driven in here.

22,618. Did some run to the beach and save themselves ?—They all ran on the beach ; 13.

22,619. Was it impossible for them to weather the land to the westward ?—Oh, yes ; impossible.

22,620. Or to weather Flamborough Head and go away south ?—They were really embayed ; they could not get anywhere else but here, or run among the rocks, which they liked. They might have been on shore rather further to the southward, or rather further to the northward.

Mr. Thomas Cammish examined.

Mr. T. Cammish.

22,621. (*Chairman.*) You reside at Filey ?—Yes.

22,622. You follow fishing ?—Yes.

22,623. How long have you followed that occupation ?—About 28 years.

22,624. What is the size and rig of the vessel you command ?—A yawl.

22,625. The size ?—Thirty-six tons.

22,626. Did you hear the evidence of the previous witness ?—Yes.

22,627. Was his description of the fishing ground correct ?—Why, we have gone further than what he has said at times. Further than 80 miles I have myself.

22,628. Do you agree with him as to being generally able if a gale of wind comes in on shore to run either into Scarborough or to the Humber ?—Upon all but one thing.

22,629. Tell us what that one thing is ?—When the wind is to the south-east they cannot get to the harbour,—not to Filey.

22,630. If you could get a harbour at Filey with the wind at south-east, could you not get a harbour at Scarborough, which is to leeward ?—Yes ; but at neap tide there is not room for us all to enter.

22,631. You cannot get in ?—No.

22,632. At what period of the flood can you get in at neap tide ?—At the top, high water.

22,633. Can you not get in sooner ?—Not at neap tides.

22,634. How many days in the month would you be disposed to say that you do not find shelter in Scarborough on account of want of water ?—About two days in every fortnight.

22,635. But at other times you can always get in at quarter flood ?—Well, you can get in at quarter flood at neap tides, but at spring tides the water is too low.

22,636. At neap tides you can always get in at quarter flood ?—Yes ; so far we cannot get right in ; we just come to the entrance.

22,637. Can you get shelter from a breeze of wind ?—There are so many craft that you could not always get shelter.

22,638. The harbour is too small for the number of craft that run there ?—Yes.

22,639. Supposing Scarborough is shut, is there any place to leeward you can run to ?—There is no place we should choose to take.

22,640. But is there any place you could run for if you chose ?—We would rather keep to sea.

22,641. Your boats are fine sea boats ?—Yes.

22,642. Have you ever known any founder at sea in a gale ?—Yes ; I knew my father lost in 1854.

22,643. Do you know of any other instance ?—Yes; my three brothers were lost at Scarborough in the same gale.

22,644. Within your 28 years' experience, how many of the fishing boats have foundered at sea from stress of weather ?—I do not remember. My mind does not comprehend it.

22,645. Will you endeavour to recollect ; I wish to know ?—I cannot remember all those that foundered at sea. I can remember three in that gale.

22,646. Will you, when you go home, think the matter over, and give Dr. Cortis a statement on paper, with your name signed, in the course of the next three or four weeks, putting down the number of those fishing smacks that have foundered at sea within your knowledge ?—Yes.

22,647. (*Mr. Lindsay.*) You mentioned a case in which your father was unfortunately lost in a boat that foundered at sea ?—Yes.

22,648. Would a harbour of refuge have saved those two cases ?—A harbour of refuge would have saved my father, because he was in that bay, and had to put to sea. She was lost next day. He would not have gone off if there had been a harbour of refuge. It was blowing a gale of wind when he was obliged to go out.

22,649. Where was he laying ? — He was in the bay, somewhere about where the boats were yesterday, at the north end of the village.

22,650. He was obliged to put to sea on account of having no shelter ?—Yes, and consequently was lost the next day.

22,651. Have you seen many ships at anchor in the bight of the bay ?—I have seen 300.

22,652. Have you known cases in which they were obliged to slip, and run ?—Many. I have often got their anchors.

22,653. (*Capt. Sulivan.*) You said that with south-east gales the boats ran for Scarborough. Such a wind is right into the entrance of Scarborough harbour, is it not ?—We have been obliged to do so when we have had no other places.

22,654. Is not a south-east gale directly into the entrance of Scarborough harbour ?—Yes ; but there is a little shelter, because of the south cliffs.

22,655. The entrance of the pier where the boats would have to round the outside would be right in a heavy sea in a south-east gale, would it not ?—Those piers fetch near about north-north-east.

22,656. Is a boat running for those piers with a south-east wind exposed to a very heavy sea ?—Yes, right before it.

22,657. In such shallow water is not the sea breaking outside ?—Yes.

22,658. Is it not very dangerous for boats of that size to attempt in that sea to round too, and enter Scarborough harbour, even if there is room ?—If they see it is too dangerous, they generally kindle a fire on the top of the castle ; and when we see it we put our boats to sea again.

22,659. I am speaking of south-east gales, and I want to know whether it is not very dangerous for hundreds of boats running to the entrance of the harbour in such gales ?—Yes ; if those on shore see that it is too heavy they light a fire, and we are what we call burnt off, and put our boats to sea again.

22,660. Then even if it would hold all the boats, Scarborough is no harbour of refuge for fishing boats in a south-east gale ?—No.

22,661. How many boats have you known running for the Humber at a time ?—Hundreds. A couple of hundred, I should say: Yarmouth and north country boats and others.

22,662. How many men ?—We carry 10.

22,663. Would a couple of hundred boats have a couple of thousand men ?—They would average 10 a piece.

22,664. They would average 10 a piece ?—Yes.

22,665. Did you hear what the last witness said about the bay silting up, and there being deeper water now near the brigg. Have you found that ?—Yes, it is deeper.

22,666. Is it close to the brigg ?—At the back side.

22,667. Have you known any alteration within your experience as a fisherman ?—If there is any alteration, I think it is better now than ever I knew it.

22,668. Whereabouts ?—Close to the brigg, and round about the back of the Speeton cliffs.

22,669. (*Chairman.*) Can you state any instance in which you have been nearly lost yourself for want of a place to run to ?—I can state one.

22,670. Will you do it ?—It was in March. I was off here when I was borne off with the violence of the gale, and lost my mainsail and nearly all I had. My father was lost in November, and this was in the spring of the year, in the month of March, in the year 1855. We were borne off with a very violent sea breaking on us. We thought we would keep at sea. We were driven a good bit north, and lost some of our men. The first land we sighted was the Speeton Cliff, about a mile from it, thick with snow, with the wind about east and by north. With great difficulty we got round the head, and then kept to sea. We durst not attempt to take the Humber, night coming on, and it being thick with snow. If there had been a harbour of refuge at Filey, we could have got in with safety.

22,671. It was all you could do to weather the head ?—Just so.

22,672. If you had not weathered it, what would you have done ?—We should have tried to 'bout ship, and to go on the other tack ; but there would have been great danger. There were hundreds of seas breaking that would have smothered us ; but Providence ordered it differently.

22,673. Any other instance ?—No ; I have been in the life-boat several times assisting men.

22,674. How many men have you assisted to save out of vessels ?—I cannot tell ; a great many.

22,675. How many vessels should you say ?—I should say 20.

22,676. And five or six men out of each ?—About that perhaps.

22,677. On the average, taking one vessel with another ?—Yes ; I remember once having very hard toil to save a crew ; that was from the *Medusa*. There was a boy lost at sea. We were 13 or 14 hours at work with the life-boat.

Mr. Benjamin Simpson examined.

22,678. (*Chairman.*) You live at Filey ?—Yes.

22,679. You follow the fishing ?—Yes.

22,680. How many years have you been at it ?—About 28.

22,681. You have a vessel of your own ?—Yes.

22,682. What size is she ?—Thirty-nine tons.

22,683. A decked vessel ?—Yes.

22,684. A good sea boat ?—Yes.

22,685. Have you heard the evidence of the previous witnesses as to the bearing and distance of the fishing ground ?—Yes.

22,686. It is correct ?—Yes, I think it is.

22,687. You agree with them ?—Yes ; on one point I don't.

21,688. State any point on which you differ from them ?—They said that with the wind at south-east, or about that, they would fetch a vessel from Dogger Bank. A vessel won't fetch it.

22,689. What is the largest number of vessels you have seen anchored in Filey Bay and its neighbourhood at one time ?—200 or 300.

22,690. Has it ever happened to you to be in risk

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of your life from having no place to run to ?—Several times.

22,691. Will you give me an instance of that ?—In 1844 I was fishing off the Doggerbank, on the 23d of February, the wind about south and by east, blowing heavy. I wanted to get into the Humber, but could not yet, so I bore down into Filey about 11 o'clock at night. About five o'clock in the morning the wind dropped round to east by north, blowing heavy. With great difficulty we had to get the anchor ; and I put out of the bay, and bore away for Scarborough. I fell in company with other two boats, one belonging to Filey and the other to Scarborough. The Scarborough boat was a little a-head of us. The sea took her as she tried to make the pier, and capsized her just like a dish. I saw that if we persisted in the same track that she was going we should be worse, so I put the tiller a-weather, and ran her on shore. The other boat, close behind us, was capsized too.

22,692. Was your boat saved ?—It was.

22,693. Was she much damaged ?—Not a great deal.

22,694. If the other two boats had taken the beach as you did would they have been saved ?—The first would ; the last could not have got upon the sands ; it would have been rocks.

22,695. What became of the men ?—The vessels that were capsized drowned all hands.

22,696. The first could have taken the sands ?—Yes ; but in rounding the pier head the sea capsized her.

22,697. Do you confirm the statement of the witness just before you, that Scarborough is no place for fishing boats to run to in heavy southeast gales ?—No place at all ; it is not worth running for.

22,698. Blowing hard from east-south-east, will it do ?—No ; no good either.

22,699. East ?—No.

22,700. East-south-east ?—No.

22,701. What is it good for ?—It will do with a northerly wind.

22,702. Only with a northerly wind ? — And the wind away from south-south-west.

22,703. How far round to the eastward is there anything to be made at Scarborough ?—I once went in myself with the wind at east-north-east. It will be about four years since. The people on shore never thought she would bring us in at all.

22,704. How would north-east do ?—There would be shelter as soon as you rounded the castle.

22,705. Would it be difficult to get in ?—Not very, if it was a flood tide.

Mr. John Paul examined.

Mr. J. Paul.

22,706. (*Chairman.*) You reside at Lynn ?—Yes.

22,707. How many years did you follow the sea ?—I was bound apprentice in 1804.

22,708. How long is it since you have come on shore for good ?—Two years.

22,709. How many years were you in command of vessels ?—Forty-two.

22,710. In what trade were the vessels chiefly employed which you commanded ?—Chiefly on the east coast of England.

22,711. How far north ?—From the Firth of Forth to London.

22,712. What size and description of vessels were yours generally ?—Small vessels, from 113 to 114 tons.

22,713. Smacks or schooners ?—Brigs and schooners.

22,714. You have been present during the inquiry to-day ?—Yes.

22,715. Therefore you are aware of the objects of it ?—Yes.

22,716. Will you give me your opinion as to the necessity or advantage of a harbour of refuge in Filey Bay ; and also state what you think of the improvement of the three ports, the Tyne, the Tees, and the Wear ?—It is my impression that one at Filey Bay would serve a very great purpose, although it would not save all ; but there is many a time that I should have been very glad to have had a harbour under my lee here where I could have gone, instead of going to Scarborough. I have borne away and gone to Scarborough with a small vessel, but it was no place to go to when you got there. Bridlington Bay was no place to go to ; but if there had been a harbour of refuge at Filey I would many a time have taken it. If there was not, with loaded ships we were obliged to go to the Tyne. For the greater part of my time there was no other harbour. Hartlepool was not made.

22,717. Suppose a harbour was to be made at Filey, and something else was to be done farther north, would you rather endeavour to improve the three ports, the Tyne, the Tees, and the Wear ; or would you make one harbour (which would not be a bar harbour) at Hartlepool ?—I should say one harbour in the bight of the Tees.

22,718. Why do you say so ?—Because I consider that these bar harbours about the Tyne and the Wear are so constructed that when the freshets come down vessels are not safe when they get below the fresh and salt water. I have frequently seen vessels turn quite round in spite of you.

22,719. Have you ever run into the Tyne in a gale of wind against a strong freshet ?—I have run in there. There has not been that strong freshet at the time perhaps which there has been afterwards and before. Indeed, I once took the Wear when it was blowing very hard. We got between the piers, and were driven out by a freshet, and obliged to go to sea again.

22,720. Do you recollect how the wind was ?—Right in.

22,721. What was the time of tide on that occasion ?—About half flood, or a little better.

22,722. What description of vessel was she ?—A brig.

22,723. What sails had you set ?— We had all the sails we could set on account of the wind.

22,724. What were they ?— Double-reefed topsail.

22,725. And foresail ?—Yes.

22,726. Nothing else ?—Nothing else.

22,727. It was blowing a heavy gale of wind ?—Yes, blowing very strong. I have been in a great deal heavier gale, but it was blowing strong. But the freshet was so powerful we could not go in.

22,728. Had you a heavy sea ?—No ; the sea was not so very heavy.

22,729. Can you give me any other instance in which it has happened to you to be in danger in running into these bar harbours ?—I remember going over Shields Bar with the wind at south-east, when we shipped a sea, which did not wash everything off the deck, but the greater part of them. I remember standing at the fore braces myself very well. The sea caught me and took me as far as the braces and my arms would let me go.

22,730. Had you a pilot ?—No pilot.

22,731. The pilot could not get on board ?—No.

22,732. The wind dead in ?—The wind was from the south-east.

22,733. Is that dead in or not ?—No.

22,734. How was the wind then ?—Round in the south-east.

22,735. Was it on the port quarter, and how many points ?—It was on the larbourd quarter.

22,736. Do you recollect what sail you were under ?—We were, I think, under double-reefed topsails, foresails, and fore topmost staysail.

22,737. And blowing very hard ?—Yes.

22,738. That was as much sail as you could carry ?—Yes.

22,739. When the decks were swept what happened ?—We got in safe after all.

22,740. Were the men washed from the helm?—Yes, the mate was washed away.

22,741. Was the ship broached to?—No, she kept end on.

22,742. Any other instance?—No, I don't remember any.

22,743. Do you know anything about Hartlepool Bay?—Yes, I have been there several times.

22,744. Does the sea break, and how far?—Yes, all the way.

22,745. How far out?—I should say two or three miles.

22,746. In what water?—I should say in eight fathoms.

22,747. A heavy breaking sea is bad for a ship?—Yes.

22,748. What sort of land is it to make about Hartlepool?—It is not very good.

22,749. In thick hazy weather?—No, not in thick hazy weather. The land is in the background.

22,750. But is not Hartlepool Heugh easily made out; is there anything on the coast like it?—When at a distance you will find the land at the back is higher, so you cannot make it out perhaps until you get well in shore.

22,751. Hartlepool Heugh is so obscured under the higher land that you cannot make it out well until you get in shore?—No.

22,752. Supposing you cannot see the land behind, but can see the Heugh?—You could not see it if you could not see the land at the back.

22,753. Is there any other point on this coast which resembles the Heugh, so that you could mistake one for the other?—No.

22,754. So that if you see the Heugh, and make out its shape, you know it?—Yes.

22,755. What kind of soundings have you running into Hartlepool Bay?—We come out of deep water, and it shoals gradually.

22,756. So that, in thick weather, could you run in by your lead?—I could if I was to the southward of the harbour. Then you come to 12 fathoms, to 10, to 8, and so on.

22,757. In thick weather you could feel your way by the lead?—I would not like to attempt it in bad weather.

22,758. You could do it in fine weather, but you would not like to try it in bad weather? You would think it too much risk?—Yes.

22,759. From the northward, can you in thick weather feel your way in by the lead?—No, I think not.

22,760. Why not?—On account of the rocks at the Heugh.

22,761. In working your passage along this coast are you accustomed to hug the land?—Different people have different opinions about that.

22,762. What is yours; how do you generally endeavour to make your passages?—I generally keep two or three miles from the land; if the wind is so as to allow me to go within two miles, that is quite near enough.

22,763. Then are you in the habit in fine weather of coming in to get slants of wind and take advantage of the tides?—I should not like to do so amongst these rocks.

22,764. With the wind from the eastward at all, what kind of offing do you endeavour to keep?—Ten miles.

22,765. Are the shifts of wind on this coast very sudden?—Sometimes.

22,766. If you are well in with the land, and not much wind, does it ever happen that a gale of wind comes on in shore?—It has done so.

22,767. Is that a frequent occurrence?—Not very frequent; it has sometimes done so.

22,768. When it does happen, what kind of warning have you; three or four hours by the look of the sky?—Sometimes, and sometimes not that.

22,769. So that a man who knows the coast and the winds will have sometimes been taken by surprise by these gales in shore?—Yes.

22,770. (*Mr. Lindsay.*) If the Tyne was deepened so as to have 24 feet at low water, would you have any hesitation in running for it in an easterly gale?—If it entered as a tidal harbour, I should.

22,771. Speaking of it as it is; if the entrance was deepened to 24 feet at low water, would you hesitate?—Yes.

22,772. Is that on account of the freshets, setting out?—The deep water comes so sudden on to the bar that there is the greatest danger imaginable when you come on to the bar of the ship turning athwart.

22,773. Would there still be danger if the water on the bar was deepened to 24 feet at low water?—No, there would not be that danger.

22,774. That would lessen the danger?—Yes; but at present the sea coming out of deep water and striking the bar causes the sea to break.

22,775. Is it the sea coming out of deep water and breaking and rolling upon the bar which causes the troubled sea, the troubled wave, or is it the tide coming out and meeting the gale blowing in; which of the two causes the heavy sea?—Both of them.

22,776. Which has the greatest effect in making the troubled sea, do you think?—If it blows hard right in a freshet comes out at the same time; they assist each other.

22,777. Now, tell me why you would prefer Filey to any other site, supposing there was only one great harbour to be made?—On account of the tidal harbours.

22,778. Putting tidal harbours out of the question, and speaking entirely in regard to position, tell me why you would prefer Filey to any other place?—Because I think the greatest number of vessels are collected together about this point.

22,779. That is to say, your opinion is, that there are generally more vessels collected under Flamborough Head and about it, than at any other point?—I think so.

22,780. Is it the case that the wind often baffles them about the head, and they cannot get round?—That is the case sometimes.

22,781. And is it the case that before these dangerous gales, the gales blowing from east-south-east or east-north-east, come on, you often have baffling and variable winds, or how do they usually come on?—Sometimes we have them very sudden; other times they wear round either one way or the other. If the wind is to the westward away to the southward, sometimes it backs round to south-east; at other times it will come the other way.

22,782. Do they blow hardest when they back round from the westward to south-south-east?—That I cannot tell you.

22,783. Now you give Filey the preference to any other place, because you think more ships congregate about Flamborough Head. Say there was to be another harbour, where would you have it?—In the bight of the Tees.

22,784. Say that it rested between Redcar as a site and Hartlepool Bay as a site, which should you prefer, all things considered?—I scarcely know which to prefer. If you make the harbour at Hartlepool I think we should be in danger very often, with so many light ships coming in there; there would not be room sufficient for refuge, and still you would have a tide out of the harbour at the same time.

22,785. Then your objection to Hartlepool is, that on account of the number of light ships coming there to seek for cargoes there might at times not be sufficient space for refuge ships?—That is one reason.

22,786. Is another reason, because there is no tide coming out there?—There is a tide coming out there.

22,787. There is no river?—There is no backwater.

22,788. That is what I mean?—But there is a tide coming out of the bight, and setting round the Heugh.

22,789. Have you any other reason against it?—No, I don't know any other particular reason.

22,790. (*Capt. Sulivan.*) Do you think it is generally the opinion among the masters you are acquainted

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Mr. J. Paul.

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with at Lynn, that for laden ships the great difficulty is near Flamborough Head ?—Yes.

22,791. Do you think a harbour at Flamborough Head would save more laden ships than a harbour in the bight ?—I think it would.

22,792. Would not a majority of light ships get down in the bay, and therefore would not Hartlepool save more light ships than laden ?—Yes ; but there is not the same danger with a light ship that there is with a laden one.

22,793. Not the same danger to life ?—No.

22,794. Nor property ?—Nor property.

22,795. Light ships are oftener got off the beach again ?—Frequently, and if not they go higher up so as to save life.

22,796. In a laden ship you have the additional value of the coals or well of the vessel ?—That is true, but it is not a great deal.

22,797. Do you know whether it is the case that vessels which are caught at Flamborough Head and try to keep to sea, not only are frequently driven back great distances, and knock about for a long time, but often get into a leaky state, wear out the men at the pumps, and so get into danger ?—Yes.

22,798. Is that a common case ?—It is a common case.

22,799. Would a harbour here in a great measure prevent risk in such cases ?—In a great measure it would.

22,800. I believe colliers as a class are generally rather old vessels compared to others, are they not ? —They are not first class generally speaking, although there are some first-class vessels in the trade.

22,801. Generally speaking they are vessels which can't get general cargoes—which cannot get cargoes in another trade ?—That is so.

22,802. Do you know what becomes of the old colliers when they are worn out ? did you ever know of colliers being broken up ?—I have known some.

22,803. Is it a rare thing to have a collier broken up ?—The greater part of them, I think, founder at sea or else go on shore. I can give an instance of a vessel I was in. We got to the southward of the Head twice the same passage, and were driven back. Another vessel, in which I had an interest, on the 3d of December 1847, got to the southward of the head a considerable way, half way down to the Humber, but she was obliged to bear away, and went ashore at Hartlepool. She did not become a wreck, but we had to strip her, put her on a slip, and repair her, which cost several hundred pounds. Had there been a harbour of refuge here at the time it would have saved all that.

22,804. (*Chairman.*) In the case which you have just mentioned, did the crew of that vessel run any risk of their lives ?—Yes ; they were obliged to take to the rigging as soon as she got ashore.

22,805. When the vessel got ashore they were obliged to take to the rigging ?—Yes, and wait until the water fell, so that they could get off.

22,806. They were all saved ?—Yes.

22,807. Have you any information by which you can confirm or confute the statement respecting the *Duke*, of Lynn, in the printed statement ?—No ; I do not know the circumstances.

22,808. In answer to a question a little time ago you said that, in consequence of the hard work on board these colliers, knocking about in bad weather, in pumping, and so forth, a harbour here would be of great use to them ?—Yes.

22,809. I understood you to say that the crews of colliers run great risk in consequence of being out in bad weather with leaky ships, in which they have to be constantly pumping ?—Yes.

22,810. What is the risk they run ? is it the risk of foundering at sea or of going on shore ?—The risk of foundering at sea, and the risk of being run down.

22,811. And therefore are you able to say that you consider that risk so great that a harbour which could be made here would be most effectual, not merely for the purpose of saving property, but of saving life as well ?—It would save both.

22,812. And do you think that in these instances men really run the risk of their lives ?—Of course they do.

Mr. Samuel Cuthbert examined.

Mr. Cuthbert.

22,813. (*Chairman.*) You reside at Lynn ?—Yes.

22,814. How long have you followed the sea ?—Fifty years.

22,815. Of that period how long have you been master of a vessel ?—Thirty years master and owner.

22,816. In what trade have the vessels you commanded been chiefly employed ?—Most frequently on the coast between Lynn, London, and the Firth of Forth.

22,817. What description of vessels have they been ?—Brigs.

22,818. How long have you given up the sea ?—Three years.

22,819. You have been present during this inquiry? —Yes.

22,820. Will you now give us your opinion as to the advantage or necessity of a harbour in Filey Bay, and generally what you think on the subject ?—Yes. I have for many years been of opinion, and frequently talked it over with brother seamen, that no place along the coast between the Humber and the Firth of Forth would be a more convenient place, or a safer place, for a harbour of refuge than Filey Bay.

22,821. Why do you think so ? Give us your reasons ?—Because there is not another place that I can find which a laden vessel can take in safety when it has got to the southward of Filey, or to the southward of Flamborough Head, and cannot reach the Humber. In the large fleets which bear away for the northern ports many disasters occur by their waiting for the tide time, and all wanting to go together. We cannot enter while the ebb is running out, on account of there not being water sufficient. Moreover, it is very dangerous for vessels, when freshets come down and strong ebbs prevail, to enter with the ebb coming down. Therefore, we wait for a sufficient time of tide, and then we all want to go together, and that frequently causes damage. But I myself was never one to go to these harbours if I could see the sea. Perhaps, like Mr. Curzon, I have been one of the most fortunate men that ever sailed out of Lynn, so far as avoiding damage goes. I always went home with the same ship that I came out in, but I have known plenty of my neighbours who have borne down from Filey, Scarborough, or Whitby to these ports, and many of them have been wrecked when I have kept the sea, and have then made Holy Island or the Firth of Forth. I cannot say that ever I came from Scotland, and got a second time to the south of the head, and had to go back. I have got a long way to the southward, and then had to go back to Holy Island ; but I never would take Tynemouth or the Wear, on account of the freshets : I mean, in gales of wind.

22,822. You prefer to run to Holy Island instead of taking the ports of the Tyne, the Tees, and the Wear ?—Yes.

22,823. What kind of anchorage have you at Holy Island to run to ?—At Holy Island it is very good, but not a deal of room.

22,824. Good shelter ?—Good shelter from all seas.

22,825. Under the Farn Islands ?—Under the Farn Islands it is very well, but I never would stop there if I could get to Holy Island. It is well enough in the Farn Islands, with east winds, if you cannot get to Holy Island.

22,826. You have heard the evidence of the previous witnesses from Lynn, Captain Curzon and Captain Paul ?—Yes.

22,827. Do you generally concur with them ?—Yes.

22,828. Is there any point on which you differ from them ?—I differ a little from them about Hartlepool.

22,829. In what respect ?—I have borne down for Hartlepool in heavy gales of wind from the south-south-east, and that in the south-east, and further than that. The broken water has frightened me from going in, and I have held out to sea and gone away to Holy Island rather than go in among broken water. I think Captain Bailey's evidence that he gave, if he mentioned it, would throw some light upon that, for in that gale of last January he actually unshipped his rudder in broken water, without touching the ground.

22,830. Who was that ?—That was the master of the *Duke*, of Lynn. I have that from himself.

22,831. Can you tell me anything of the *Duke*, of Lynn, as to the correctness of the statement in the printed statistics ?—No.

22,832. I understand you to say you have never been in any danger of life or vessel in running into bar harbours yourself ? You have been fortunate ?—I have ; but I have suffered by them for all that. I have had two vessels, in which I had shares, lost in taking Tynemouth Harbour.

22,833. Tell us the circumstances ?—Three years ago the *Annie* left Lynn ; it was the very first Saturday in January, but I cannot tell the day of the month. Another vessel that belonged to me left with her. It was just as the frost broke up, and they left on the Saturday. The *Annie*, she ran down next, moving for Tynemouth Bar. There was a heavy freshet out. We had had a fall of snow, and as soon as ever she came to the fresh water the ship became unmanageable, and went ashore on the Herd Sand, and there became a total wreck. The other vessel that came away with her kept out to sea for, I think, two days longer. The master would not go down for the bar. She was a small vessel, and when the gale was over he went in. Another was lost was one of the finest little vessels that belonged to Lynn—the smack *Lively*. She was loaded, and bound for Sunderland, but the tides being small the captain durst not take Sunderland, and preferred Tynemouth Bar rather than keep the ship to sea, which he could have done if he had liked. As soon as that vessel came to the freshets she lost her steerage, went on the Tynemouth side of the rocks, and there became a wreck. In both cases it was on account of the freshets coming down.

22,834. (*Capt. Washington.*) Notwithstanding those accidents, if the entrance of the Tees could be improved, so as to have a depth of 12 or 15 feet at low water of spring tides, by means of piers running out, would you then see any objection to running for the Tyne ?—Not if you could turn the force of the current another way, I should not. But if the current had still to come out between the piers, with the strong freshets, and the ebb tide which runs so very strong, I should have the same objections which I have now.

22,835. I dare say you are not much of an engineer, are you ?—No.

22,836. Nor I either. But there are two sorts of piers. You know the piers of Sunderland, which run parallel for some distance. Suppose at the Tyne they were to build piers curved only to meet each other at the two ends, with a large expanse inside, so that directly the wave went in there would be an expanse upon which it might expend itself. Do you think there would be any fear of taking such pier heads ?—I think in taking any pier harbour there is very great danger indeed. I think you, with me, must have seen that.

22,837. You have said you have seen a great deal of broken water in Hartlepool Bay ?—Yes.

22,838. Have you been there often ?—Yes, often. I have passed it some hundreds of times, but never went down to it in gales of wind. I saw enough without.

22,839. How often have you actually had occasion to go there ?—Why, I never was much in Hartlepool. I do not think I ever was in Hartlepool half a dozen times in my life. I was 20 years in the Newcastle trade.

22,840. The Tyne was your chief place ?—Yes.

22,841. You have accidentally gone into Hartlepool half a dozen times ?—I have not gone there for refuge. I have gone there to load.

22,842. In fine or bad weather ?—In fine weather.

22,843. Then you never saw anything of the broken water ?—Only once, when I bore up with a loaded ship, intending to go to Hartlepool ; but the broken water was so bad that we thought it better to haul the ship out to sea.

22,844. You hauled her off. Where did you go to ?—To Holy Island.

22,845. How was the wind blowing ?—About south-south-east, quite far enough southerly to enable me to keep the ship off in safety.

22,846. How close did you run in on that occasion ?—When I hauled the ship, perhaps I would not be above two miles from the Heugh.

22,847. What depth of water, ten fathoms ?—I did not sound, I should think, all that. In fine weather I have been down by the lead to Tees Bay.

22,848. Have you been far down the coast of Scotland ?—Not except when a very young man in Her Majesty's service.

22,849. Have you ever been off a bold headland like Flamborough Head ?—Buchan Ness, I have ; but I knew but little about it.

22,850. What I wanted you to tell us was, whether you think the sea breaks heavier where you jump suddenly from deep to shoal water, or where the bay gradually shoals ; which is the heaviest sea ?—I think Flamborough Head will show us a little about that ; for I find that off Flamborough Head, and I think off St. Abb's Head, are two of the heaviest places as to sea of any on the coast,—Flamborough Head in particular.

22,851. Then you are of opinion that a large harbour of refuge should be made somewhere along this coast ?—Yes.

22,852. Would you have one, or more ?—I should say that two would be none the worse.

22,853. Where would you place those two ?—I cannot myself see any place more suitable than Redcar for the second.

22,854. Suppose you got comfortably into Redcar with a large fleet, and the wind came from the northward, would you have any difficulty in getting out ?—Yes, with the wind at the north.

22,855. Would you with the wind at north-east ?—If it was fine weather you could get out, and if it was bad weather you do not want to get out ; you do not want to be on the coast at all. We want to be in harbour then.

22,856. But somewhere in Tees Bay, on one side or the other, you think the second harbour should be ?—Yes ; I would certainly recommend one in Tees Bay,—in any part of it preferably to the Wear and the Tyne ; a place where there are no freshets, and which is accessible at all times of the tide.

22,857. But I think you admit that the trade of the Tyne is so important that it is worth trying if the harbour there cannot be improved ?—Yes ; the trade of the Tyne is very great. We will allow that. But there is good water in the Tyne now, and I cannot see how that when it is deepened three or four feet you will still have that same current of fresh and salt water out as you have now. If that continued I cannot say that it would be any safer for ships. Take Sunderland piers. They must be three times as long as they were when I first knew Sunderland, yet now there is quite as much danger in taking them as ever there was, and the sea is quite as heavy.

22,858. (*Capt. Sulivan.*) You say that the sea is very heavy off Flamborough and St. Abb's Head. Is that probably caused in a great measure by the strong tides around the headlands ?—Perhaps it may ; I am not able to say what is the cause of it; but the truth of it is, it is so off Flamborough Head.

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Mr. S. Cuthbert.

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22,859. Do you agree with the previous witness as to the great danger being in laden vessels ?—Yes.

22,860. Much more than in light vessels ?—Much more than in light vessels. Light vessels invariably come high up on the beach when they are obliged to run on shore or when they are driven upon the shore, as compared with what laden vessels do, and therefore there is not the same risk either to life or property.

22,861. You said there was great danger in running for any pier harbour. Would not that apply to a harbour of refuge built anywhere, with a tide or not, or did you mean with piers and with a tideway ?—Yes.

22,862. You said running for any pier harbour ?—Any pier harbour, whether with a tideway or not.

22,863. Would not that apply to all harbours of refuge made with piers ?—I think not to Filey, with a great space for making a breakwater. If it was carried as far as is proposed in the plan there would be plenty of room for a vessel to work out or into Filey Bay.

22,864. Would you not in any harbour try to have an entrance at both ends ; say that a ship could come in and go out with a leading wind instead of having to work out ?—We have talked about that, but I am afraid it would let the sea in very much when the vessels were at anchor; that it would let more swell in.

22,865. Have you taken many pier harbours ?—I have been in many pier harbours, but not in bad weather—Sunderland and Dover and Ramsgate.

22,866. What width of opening between the piers would you consider it safe to take with a laden collier? —200 or 300 feet, it ought not to be less.

22,867. 400 feet you think would be safe to take in any weather, with a gale even ?—I think it would if there was not broken water too far away out.

22,868. Did you ever take Whitby piers ?—I have been in, but it is a long time ago—not since the piers were extended. I have not been there for these twenty years.

22,869. With an entrance 400 feet wide, do you think any collier, provided she could go in with a fair wind, would be in danger in taking it ?—I really do not think she would with that breadth, provided the piers ran out into deep water.

22,870. In a place like Filey, what depth of water would you consider quite sufficient at dead low water spring tides, for the heaviest collier on the coast to take, allowing for the sea that would get up with an easterly gale ?—I think six fathoms.

22,871. You think it ought to be six fathoms ?—Or five fathoms ; I do not think any collier would come to the ground on that water.

22,872. If at Hartlepool there were piers with five fathoms of water at the entrance, do you think that any vessel with a fair wind need hesitate to take them ?—Five fathoms would be broken water there.

22,873. Say to six or seven. Would it be broken water then ?—At Hartlepool I think it would.

22,874. Then the same objection would apply ?—Do you think colliers would hesitate to run for it with five fathoms ?—Some would hesitate ; some would not go to harbours if there was ever so much water.

22,875. Why ?—They would prefer keeping the sea.

22,876. But suppose they were embayed ?—If they were embayed they would be very glad of such a place to run to.

22,877. Do you know Redcar ?—I know it, but I do not know anything definite about it, only as I have heard other people say. I never sounded or anything of the sort.

22,878. Would there be less sea in running for a harbour at Redcar than at Hartlepool ?—I think so, with the wind from the south and east.

22,879. No, but from east-north-east ?—Then we must not expect many light vessels will come there with the wind.

22,880. Why ?—I think with that wind they would get up to Flamborough Head.

22,881. Suppose the case of laden vessels caught by the gale before they had weathered the high land of Whitby ?—I should think that a harbour at Redcar would be the best. There is deep water close to it.

22,882. You would carry the deep water close to the piers, while in Hartlepool Bay you would have shoal water for a long way ?—That is my own opinion of it.

22,883. (*Chairman.*) I think I understood you to say that in bad weather you preferred keeping the sea to running for harbours of refuge ?—I always did.

22,884. Why ? — Because I have seen so much damage done by ships running for harbours as compared with the damage which has been done to those ships that have kept the sea. I have invariably found that where one of our ships has been lost by keeping the sea, three or four of them have been lost or wrecked by bearing up for harbours.

22,885. Therefore you encourage your captains to keep the sea ?—Yes.

22,886. Do you give them any positive instructions on the subject ?—I give them positive instructions not to run for a harbour in bad weather if they have a light ship and good canvass, with which I generally take care to get them provided, and if they can keep off the land with safety. If they can make a harbour in safety before the gale comes on so heavy, do so.

22,887. It was told us the other day at Whitby, I think, that sailor owners generally find their ships the best. How is that in your experience ?—Well, they understand the nature of the thing better than farmers, grocers, and bakers, and all those people do. I can only account for it in that way ; but to tell the truth I believe sometimes in a gale of wind I have slept better aboard my ship when I have got pretty well off the land, and under good canvas, than what I can do in a gale of wind at home.

22,888. Therefore you rather agree in the statement that, as a general rule, owners of ships who have been captains look sharper after the way in which they are found than those who have not been ?—I do.

22,889. (*Capt. Sulivan.*) With reference to your having ordered the masters of vessels to keep off the land, I understood you that that alludes particularly to the dangers of tidal harbours ?—Yes.

22,890. But suppose in future you had a harbour made safe at all times of tide, and without those dangers, would you then consider it so advisable to keep off the land ?—Oh no ; I should not then advise them to keep off the land, thrashing about. If they could get such a place as the Humber, Harwich, or the Firth of Forth, or anywhere there, I should advise them to take it.

22,891. Your objections apply to bar harbours ?—To bar and tidal harbours.

22,892. Not to harbours generally ?—No ; we call them roadsteads.

22,893. (*Chairman.*) Your objections would not apply to roadsteads ?—No.

22,894. And as an owner of ships, would you direct your masters to take a roadstead to save the wear and tear of the ship and damage to the cargo ?—Yes, if it was a roadstead where they were safe from all winds. Not such a place as Bridlington Bay ; I would not advise them to go there. It is very well with a northerly wind, but if the wind gets round to east or east-north-east, up anchor, and get off if you can ; get to the Humber.

Mr. JOHN ANDREWS examined.

Mr. J. Andrews.

22,895. (*Chairman.*) You reside at Lynn?—Yes.

22,896. How long have you followed the sea ?—Twenty-six years.

22,897. How long have you been ashore ?—Twelve years.

22,898. Do you own any ships?—No; I am not a shipowner.

22,899. Are you connected with the shipping interest in any way?—I am agent for Holloway, Hart, and Company, of Lynn.

22,900. Are they shipowners?—No; they are merchants.

22,901. Do they own any ships?—No; they do not.

22,902. For how many years were you in command of vessels?—Twelve, as master.

22,903. In what trade were the vessels which you commanded?—The coal and the Baltic trade.

22,904. How many voyages have you made home from the Baltic?—Two and three in a year.

22,905. How many should you say altogether?—I have made a vast number of voyages to the Baltic, because I was 15 years in that trade.

22,906. How many have you made home from the Baltic?—About 22 or 23 altogether.

22,907. Late in the year?—Yes; as late as Christmas time.

22,908. To what port were you homeward bound?—Always Lynn.

22,909. As a general rule, where did you make the land fall; I do not mean where you endeavoured to take it, but where, as a general rule, you did actually make it?—Flamborough Head. I always endeavoured to make it there, and generally did.

22,910. How far north did you ever make it?—As far as Blyth.

22,911. Never further north than Blyth?—No, never.

22,912. What was your longest passage home from the Baltic?—Three months from Petersburg.

22,913. Under what circumstances?—Gale of wind from the westward, in the later season of the year.

22,914. Did you take refuge in any Norwegian port?—No; we had a very short passage from the Sound. We laid a month in a bay in the Gulf of Finland.

22,915. How many days did you pass between the Scaw or the Naze and Lynn?—Only 12 days from Elsinore Roads to the Humber. The principal time was spent in the Baltic.

22,916. You have been present to-day?—Yes.

22,917. Give us your opinion about the inquiry. What do you say: is there to be a harbour here or not?—I think it is very necessary and essential that there should be a harbour here.

22,918. Tell us why?—Ships congregate so much here. They come from the north ports with the wind from the south-west. They work up a long way, and when they get to Flamborough Head the wind frequently gets south-south-west or south-south-east, and they cannot get any further. I have been laid here under the cliffs for four or five days together with 300 and 400 sail, some riding and some under canvas.

22,919. Therefore a harbour here would be a great boon?—There is not the least doubt of it.

22,920. Are you disposed to say that it would be more than a boon, and that loss of life and destruction to property would actually be prevented?—It would be the greatest boon which you could offer to the merchant service on the north-east coast.

22,921. Supposing we had a harbour here, what do you say about the ports to the northward? Would you have one more harbour to the northward in the bight of the bay, or endeavour to improve the Tyne, the Tees, and the Wear?—It would be more essential to have another one if we could pick a suitable place. That is the greatest difficulty I see—the getting a suitable place.

22,922. Which would you prefer—to improve the existing ports, or have one east entirely new harbour in the bight of the bay?—I do not like the bight of the bay.

22,923. Why do you not like it?—The water is so shallow, and the sea breaks so.

22,924. Where would you put it?—It is total destruction to go into broken water.

22,925. Where would you put it?—I could not put it there. Perhaps you might improve the existing ports to the northward, but to them I have strong objections on account of the freshets which set out of them.

22,926. Are these freshets very frequent in the winter, because freshets won't run from one year's end to another: are they of frequent occurrence in the winter?—In the winter, and during the rains and easterly gales.

22,927. How many freshets have you in the year out of the Tyne—really dangerous freshets?—Not many; they generally occur in the spring.

22,928. How many did you say—two or three?—More than that.

22,929. Would you say six or eight in a year?—Yes, perhaps.

22,930. You have no idea of the number?—No.

22,931. Has it ever occurred to you to be in danger of losing your life or your ship in running into these bar harbours?—In going into Shields I have.

22,932. On what occasion?—Running in, in ballast I have seen the sea break right over a vessel, and the men have had to take to the rigging.

22,933. Give an account of any instance of this kind which has happened to yourself?—It has never happened to myself but once, when going into Shields harbour, and then I was not the captain of the vessel; I was only a seaman.

22,934. Give the name of the vessel?—The *Margaret*, of Lynn, a brig. The wind was from the east-south-east, blowing a very heavy gale; but there was no freshet at that time—merely the sea breaking on the bar. We had to take to the rigging then; the sea completely overran us.

22,935. What was she—a collier?—A brig.

22,936. What sail were you running in under?—Single-reefed maintopsails. We were generally obliged to set more canvas in taking the bar, in order to force the vessel before the sea. Single-reefed main-foresail, double reefed foretopsail, and topsail.

22,937. Dead before the wind?—Yes.

22,938. What time of tide?—About half flood.

22,939. You were all in the rigging except the man steering?—Except the man steering.

22,940. You were in the rigging to save your lives in case of accident?—Yes; and to attend to the braces.

22,941. Where you pooped?—Yes; completely from the stern. The sea pooped her.

22,942. Did the vessel broach to?—No; she was kept before the wind. She was steered well, and being in ballast was easier managed.

22,943. You got in all right?—Yes, all safe; without the loss of anything, fortunately.

22,944. Still you felt it a considerable risk?—It was a great risk.

22,945. If the vessel had broached to what would have happened?—The sea would have swept her off, and she would have gone on shore upon the Black Middens or the Herd Sand.

22,946. Were there any other occasions in which you ran similar risks?—No.

22,947. (*Capt. Washington.*) How often have you been to Hartlepool?—A number of times; I could not tell you how many. For seven or eight years I traded to Hartlepool and the Tees.

22,948. In fine weather generally?—Yes; it is a good fine-weather harbour.

22,949. You never went there with the wind blowing hard?—Not from the eastward, but I have been there when it has been blowing very heavy from the westward, and the sea breaking very heavily over the land.

22,950. Have you been there within the last 12 years?—No.

22,951. Then you don't know anything about the

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improvement of West Hartlepool ?—They were making the dock at the time I was there last.

22,952. Where do you say you would place the second harbour ?—I did not mention any place. You cannot find the place. I do not like these deep bays.

22,953. You think Filey the only place between Flamborough Head and the Staples ?—If you could get a place to the north it would be much better.

22,954. Where do you mean ?—To the north of the Filey.

22,955. In your opinion, there is no place ?—Not what you may call a safe place. The depth of winter is the time when the greatest danger occurs ; they are all good summer harbours, and smooth water places, and they are all improved since I first recollect them, and a very great deal, too.

22,956. (*Capt. Sulivan.*) If they got 15 feet water at the Tyne, will that make it a much safer harbour ? It won't prevent the sea from breaking ; the sea breaks in a much greater depth than that. At times the sea breaks in six or seven fathoms, or even 10 fathoms. Do you think the sea off Hartlepool would be too heavy for a vessel to run through it if she had got a safe harbour under her lee, having got into less than five fathoms water ?—I should never think of going to Hartlepool with a ship in a gale.

22,957. If you had a safe harbour into which you could get at five fathoms dead low-water spring tides, would you then hesitate to run through the breakers ? —I should hesitate. I would keep the sea if I possibly could. If my vessel was only seaworthy, and I had good canvas, I would rather keep the sea. More casualties occur in running down into these deep bays, where vessels get into broken water, spring a leek, and are frequently lost, than from keeping the sea.

22,958. Are not many vessels so situated that they cannot help themselves, and cannot keep out of the deep bay ?—Force is one thing, and choice another. What you are forced to do you must do.

22,959. Have you heard of the losses in the gale of January 1857 ?—Yes.

22,960. A large number of vessels were wrecked that could not possibly keep out of the bay ?—The principal number of them, I believe, bore away to Hartlepool, and foundered in shoal water.

22,961. Numbers ran on the beach, not being able to keep the sea ?—Yes, there were.

22,962. For vessels situated in that way would not a harbour at Hartlepool, or Redcar, or somewhere in the bight of the bay, be a great boon, particularly to light vessels ?—For light vessels there is not that danger ; they would find water enough.

22,963. But if they get disabled before they get to to a harbour ? Suppose a ship was disabled some time before one got near a harbour, and lost her rudder, or something of that sort ?—In the gale of the month of January one ship was disabled and a man was washed overboard at Hartlepool.

22,964. Have you any information whereby you can confirm or refute the statements respecting the *Duke* in the printed statistics ?—That statement was made to me with a little addition, that the master could have made Filey had there been a harbour of refuge, and that Scarborough bore south-south-west when he made for Hartlepool Bay.

22,965. Then you can confirm that statement ?—I can ; it was made to me.

22,966. Do you know anything of Redcar ? Would there be the same objection to it as there is to Hartlepool ?—I do not know much about it. I have understood there is a good deal of water within the Scars.

22,967. I am supposing there are equal means of making the harbour ?—I cannot speak for Redcar. I have been many times past, but don't know the depth of water, or anything about it.

22,968. I am supposing a harbour can be made with equal depth in both places. Would you have the same objection as to the danger of running to Redcar which you have in running to Hartlepool ?—Redcar is deeper over the bar than Hartlepool. I would rather take the Tees, if possible, than Redcar; I should get more water I think. I have been in the Tees many times ; there is no objection to the Tees if the weather is clear and you can see the Fairway buoy.

22,969. I am supposing a harbour made at Redcar ; would you have any objection to run for that ?—I cannot answer.

22,970. Do you think if the Tees were deepened five or six feet it would become a safe place ?—In the Tees, when I traded there, there was more water than there is now.

22,971. I think about 11 feet ?—There was more than that then ; I know a vessel, the *George*, of Whitby, sailed up a short time ago ; she drew 10½ feet.

22,972. I am speaking of 11 feet at dead low-water spring tides ?—I am taking part of the water. I have been towed into the place at low water many times.

22,973. If deepened so as to have 10 feet at dead low water, do you think that would be a safe place to run for ?—Not in a gale of wind. In that you always have more broken water to get through than at Hartlepool.

22,974. What do you think would be the best way of laying out money so as to ensure, as far as human means can go, the safety of vessels in the bight, supposing you have done all you want at Filey ?—If you would improve the northern ports, that would be the best mode of spending the money. That is the only opinion I can give. As to the bight in Hartlepool Bay, no money would be well spent there ; it would be liable to silt up.

22,975. Do you say that from your own knowledge or from report ?—From my own knowledge and from report. It has shoaled considerably since I recollect it.

22,976. Hartlepool has ?—The bay has.

22,977. But you have not been there for 12 years ? —No ; but before that.

22,978. Before that did you know it as silting up ? —Yes.

22,979. On what do you found that statement ?— —There is so much sand accumulates about there ; it grows up.

22,980. On what ground do you state that ? how did you ascertain that it grew up ?—By the shoaling —by the broken water.

22,981. Have you brought up in the bay ?—Yes ; we have frequently had to ride off Hartlepool. There is not so much water there as there was when I first went by some few feet. I have seen the water breaking tremendously in Hartlepool roads. At every sea the ship nearly came to the ground.

22,982. Did you hear what the previous witness stated respecting the dangers of laden vessels keeping the sea after they got up to the Head, by springing a leak, and by thus wearing out the crews at the pumps ?—I cannot confirm any statement as to the vessels being leaky ; but I know they often turn out so in stress of weather. I have no recollection of particular instances, but they do.

22,983. Do you know that colliers which have been caught off the Head have got into danger from the leaks increasing, and the men being kept to the pumps, and so being very much worn out ?—Oh yes, that frequently happens in gales of wind.

22,984. For vessels under those circumstances would a harbour here be of great value ?—No doubt this would be a harbour of refuge such as those vessels want.

22,985. Do you think they would use it, and that the owners would not object to the vessels coming into the harbour when it was made ?—No prudent owner would object to that, if they took the harbour in time before the gales came on.

22,986. (*Chairman.*) In making the passage up and down the coast with an off-shore wind, do you keep in shore generally ?—Yes.

22,987. With on-shore winds, what offing do you

keep ?—As far off as we can keep. We must avoid the land.

22,988. Are the changes of wind very sudden on the coast ?—Very sudden sometimes.

22,989. And do they give any warning ? Does not the state of the weather and so on give a man a warning ?—At times they do not ; they chop round very suddenly, and you are taken all about entirely with the wind in an opposite direction.

22,990. So it may happen to a man who knows this coast well and the weather well, and who keeps a sharp look-out, that he may be caught in a breeze of wind very close to the shore, and may get into a scrape ?—He might. A sharp look-out, though, is a great thing in coasting—everything.

22,991. I ask whether a man who knows the weather well and the coast well, is likely to be caught in that scrape for want of warning ? I want to know if a man who is well acquainted with the weather on this coast is likely to be caught on a lee shore, from a gale of wind coming on without any warning ?—No ; there is always some warning, or appearance of some sort to guide you ; either the clouds in the sky, the look of something brewing, or something of that kind.

22,992. Are these changes of wind preceded by light winds which would prevent a man from getting off shore, although he saw what was coming ?—I do not understand the question.

22,993. Are these gales of wind which come on in the way you describe, on shore ; are they ever preceded by light winds and calms which would prevent a ship close in shore from getting an offing before they should come on ?—Not always.

22,994. But does it ever happen ?—It seldom or ever happens that it falls from a gale to a calm instantly.

22,995. But from a calm to a gale, I suppose it does sometimes ?—Not so sudden as that. It comes on a little gradually.

22,996. So that a man who knew the coast and the weather, and who kept a sharp look-out, could generally get an offing before the breeze came on ?—I never was caught in such a difficulty as that.

22,997. I think you know Hartlepool well ?—Yes.

22,998. What kind of land is that about Hartlepool to make in thick weather ?—It is very well. In thick weather all lands are very bad to make.

22,999. Well, if all lands are bad to make, some are worse to make than others, and I want to know how Hartlepool stands in that respect ?—Hartlepool is low by the shore ; the land behind is very high, and in easterly gales the haze hangs very much on the land, and the land is very bad to make.

23,000. When you do see the land two or three miles off in bad weather, do you know it when you see it ?—I know it very well ; you can tell it immediately by the church.

23,001. As a rule, when you could do so, would you keep the sea in bad weather instead of running for a harbour ?—I never put back to a harbour.

23,002. Why did you not ?—Because I thought it was dangerous to go ; I did not like it.

23,003. You thought it was safer with a good ship to keep the sea ?—Yes ; and I always had a good ship, good canvas, and a good crew. There was no danger then.

23,004. You heard the question I asked, as to whether ships owned by men who have been to sea are better found than others ?—I think that ships are badly found ; they are often so badly found that you can hardly keep them together.

23,005. You think all are badly found ?—No ; there are some exceptions.

23,006. You heard the question, whether ships owned by men who have been at sea are, as a general rule, better found and more carefully looked to than other ships ?—Their owners are practical men ; I think they are better found.

23,007. You attribute that to the fact that the men who own them are more thoroughly acquainted than other people with what ships require ?—Exactly so.

23,008. (*Capt. Washington.*) I think you said you had not been at Hartlepool for a good many years ?—Twelve years.

23,009. Then I think you do not know the state of affairs there ?—I do.

23,010. Perhaps you will reconsider your opinion when I tell you, that for the last 20 years 22 lives have been lost annually in Hartlepool, and that in the gale of the 4th of January 1844 alone, 44 lives were lost in that bay. Such being the state of things, do you consider it desirable that a refuge harbour should be placed there to save life ?—They were lost I suppose principally through running down for shelter. The ships were lost by running into disasters, and not by any other cause.

23,011. In an easterly gale no one would affirm that they would find shelter there, and therefore it is fair to presume that they were embayed and could not get off ?—They got into broken water and foundered. If even there was a harbour of refuge they would frequently be destroyed in the same way in attempting to take it.

23,012. What depth do you think that broken water is ?—Nine or ten fathoms.

23,013. Do you believe a number of vessels foundered in 10 fathoms water ?—No, not a number.

23,014. Light vessels or laden ?—Laden ; light vessels do not founder.

23,015. Not in broken water ?—It is a very rare occurrence.

23,016. Is it a very common thing for a vessel to founder ?—It is for a laden one. They get into broken water, shallow broken water.

23,017. Do you think that vessels founder from the seas breaking on them, or from leaks chiefly ?—From seas breaking aboard ; very often that causes them to spring a leak and to founder.

23,018. I ask you as an old sailor. I think you and I have met before ?—We have.

23,019. Do you believe that vessels founder at sea from springing leaks, or from seas breaking on board and the weight of water swamping them ?—The seas breaking on board them and causing them to spring a leak.

23,020. That is your opinion ?—Yes ; the sea breaking on board would cause almost any disaster. It will clear the decks, stanchions, bulwarks, boats, and everything.

23,021. On these occasions do the vessels batten down the hatches ?—Yes.

23,022. Then suppose the bulwarks swept away, need she founder ?—If the stanchions were swept away there would be holes for the water to get down, and she would spring a leak and founder.

23,023. If the stanchions are swept away sufficiently below the decks to make a hole through the decks ?—They are sometimes.

23,024. It is your experience as a sailor that this is a common occurrence ?—I never saw it.

23,025. No, nor I either.

23,026. (*Capt. Sulivan.*) You mean that the stanchions break out the covering boards ?—Split the covering boards.

23,027. And then an opening is made for the water to get down ?—Yes ; I have known the covering boards to have been split, but it has been in a Baltic ship with timber.

Mr. Frederick Makinson examined.

23,028. (*Chairman.*) Where do you reside ?—At Leith.

23,029. Are you still in command of a vessel ?—No ; I am at present a North Sea pilot.

23,030. Before being a pilot were you at sea ?—Yes.

23,031. For how many years ?—From 1808.

23,032. Did you ever command a ship ?—I com-

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manded a ship from 1825 up to about four years ago.

23,032*a*. In what trade were the vessels which you commanded chiefly employed ?— Principally in the London and Scotch trade.

23,033. Between Leith and London ?—Yes.

23,034. What were they ?— Schooners, steamers, and smacks.

23,035. You have been here to-day ?—Yes.

23,036. Give us your opinion as to where a harbour of refuge should be, and whether you would have more than one ?—I should think it would be better to have two, but I think the principal one should be at Flamborough Head.

23,037. In the neighbourhood of Flamborough Head ?—Yes.

23,038. And why ?—Because it is easy to approach, and a quantity of vessels bound north and south generally meet there.

23,039. Supposing there was one here, what would you do then ? Improve the three ports of the Tyne, the Tees, and the Wear, or try to put one somewhere else ?—I cannot say much about that, for my brig has not been there. It has been going along the coast. I have only been twice in the Tyne in my life.

23,040. Do you agree in the account as to the weather which is found on this coast ?—Yes.

23,041. As to the shifts of wind, and the worst winds on the coast ?—Sometimes the wind shifts very suddenly, and at other times it comes round by degrees, and perhaps in 24 hours.

23,042. What is the worst wind on the coast ?—East and by north.

23,043. The wind which blows hardest ?—West, west-north-west, and west-south-west ; but the most dangerous wind is east and by north, east-north-east and east-south-east.

23,044. In making a passage along the coast with a wind off shore do you keep close in ?—Three or four miles off ; that is, with a sailing vessel.

Mr. John Loudon examined.

Mr. J. Loudon.

23,045. (*Chairman.*) You belong to Ipswich ?—I do.

23,046. How long were you at sea ?—I have been at sea for 50 years.

23,047. When did you go on shore ?—I go to sea occasionally now.

23,048. For how long have you been master of a vessel ?—I have been master since 1823, about 15 years.

23,049. In what trade have the vessels you commanded been chieffy employed ?—The chief part of my practice has been on this north-east coast ; a portion up the Baltic ; a portion to Holland, Sweden, and the parts about.

23,050. How many voyages have you made hence from the Baltic, should you say?—Somewhere about 20.

23,051. Some of them late in the year ?—Not extraordinarily late ; never beyond October.

23,052. For what port were you bound ?—Generally London.

23,053. I won't ask you where you endeavoured to make your landfall, but where did you actually make it in coming across ?—In the summer time, in the month of July, I would endeavour to make my passage to the westward, and come in about Lowestoft. In October, I would at that time endeavour to make Flamborough Head.

23,054. You have told me what point you would try to make. Where did you generally make the land ?—Generally where I had anticipated, at Flamborough Head or Lowestoft.

23,055. Have you ever made it to the north of the Tyne ?—Never.

23,056. What have you got to tell us about harbours of refuge ? What is your opinion ? — My opinion is, that a harbour of refuge is particularly required for the safety of life and property, and I believe I entertain that opinion in common with most people along the coast. I know my own opinion is, and has been for a long time, that a harbour of refuge is very particularly required, and that this spot, being so central between the Firth of Forth and the Humber, no better site can be desired than this. That is my opinion, and that is the opinion of most people belonging to my port.

23,057. Supposing we had a harbour of refuge here what would you say as to anything else ? Would you improve the existing ports of the Tyne, the Tees, and the Wear, or would you have another harbour of refuge down at the bottom of Tees Bay ?—That question I will endeavour to answer, but I must first declare to you that I would give the preference to a harbour here at Filey Bay. If you were to have a second harbour I first considered Redcar Bay might do. I thought Redcar, perhaps, might be better than any other ; but I do not believe so now, from what I have heard, though it is true I have never had the practice of going into Redcar. I have never had the practice I could wish for giving an answer. From what I have heard of Redcar I should now decidedly give the preference to Hartlepool. I believe Hartlepool is preferable for a harbour of refuge than either the Tyne or the Wear, for this reason : that both the Tyne and the Wear send out strong tides, more especially at spring tides. Again, when we have rain there is a great current coming out in addition to the ordinary tide of these rivers. At Hartlepool, now, there is not that extraordinary tide ; and, although there is broken water near Hartlepool, there is also broken water near Sunderland and the Wear, and on that account I give Hartlepool the preference.

23,058. You prefer Hartlepool because there is no strong tide running out there ?—Decidedly.

23,059. Do you know the Tyne well ?—Yes.

23,060. How many freshets should you say there are there in the course of a year ?—I could not tell you ; but I can tell you, that when I am at sea as commander of a vessel, and bound to the Tyne, if we had a heavy rain at any time previous to my arriving at my destination, I should be in great anxiety for fear that a strong freshet was coming out, but how many times that occurs in a year I am really not in a position to tell you.

23,061. Has it ever occurred to you to be in risk of losing life or ship in running into these bar harbours ? —I have been one of the most fortunate men who have been on the coast, and cannot declare that I have been in risk. I have sometimes run in with a heavy sea, but I do not recollect that ever I had occasion to run into one of these bar harbours when it was blowing a heavy gale.

Mr. William Dodds examined.

Mr. W. Dodds.

23,062. (*Chairman.*) Do you live at Scarborough ? —Yes.

23,063. How long have you been at sea ?—Twenty-six years.

23,064. How long master of a vessel ?—Eighteen years.

23,065. In what trade ?—In the coal trade.

23,066. You have heard the evidence of the previous witnesses ?—Yes.

23,067. Have you anything to add to that ? Do you generally concur in what they have told us, or are there any points on which you differ from them, and which you would like to state to us ?—I should like a harbour of refuge at Filey Bay.

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23,068. You think it the best place?—Decidedly so.

23,069. And why?—I have plenty of reasons. I have been practising here a good bit. The ship I have now I got off the rocks at Carrnaze. I have had another ship on at the other side. I have gone all along the coast, and have been at work in the bay two winters running, and I think this the finest place for a harbour of refuge. I have run two or three times to the north, but never would do so again. If caught at the head, I would, instead of going to sea, shove the ship ashore in Filey Bay, in case she was making water.

23,070. Would you prefer running her ashore here to going to the Firth of Forth?—Yes; I know I could save my life here.

23,071. Supposing we had a harbour at Filey Bay, what would say as to the other part of the coast? Would you improve the three harbours of the Tyne, the Tees, and the Wear?—I would improve all three, or make them improve themselves. We pay a passing toll to Shields; and there, every voyage we go, it costs me about 15*s.* 11*d.* I have paid it for four years, and never got any benefit from it.

23,072. Putting that on one side for the present, supposing you had the choice of spending a considerable sum of money in the improvement of those ports, would you prefer that to having one harbour at the bottom of Tees Bay?—I should not approve of one immediately at the bottom of Tees Bay at all, because I had a vessel in Hartlepool slip once, which cost me about 450*l.* Another time I got "raffled" up like a bale of old spun yarn along with other ships, and lost my mast as well as everything else, in taking the harbour. We ran down in the bay, and got to the entrance of the harbour. It was blocked up with laden ships, and before they could get in the light ones ran in amongst them, and all were almost sunk together in the channel. We were there until the night tide made. A vast many of us closed down to the pier end. The light ships came in at night, and they came right in and sailed slap into us, taking bulwarks, stanchions, and everything out of us.

23,073. Do I gather from your answer that your reason for preferring the three ports is, that shipping running in, particularly light ships, would be divided amongst the three, and therefore there would not be so much crowding?—Decidedly; if I could have got further north, and saved the daylight, I would not have gone to Hartlepool. I should have gone to the Tyne. I should have been there almost all the time, except in the cases in which I have cut, and been forced to take Hartlepool as a refuge.

23,074. You have heard the evidence as to the preference of keeping the sea with a good ship, or making a harbour?—I should prefer it to the harbours which now exist; but if there was a good one to go to I would go directly.

23,075. Why would you do so?—In case the wind was foul, to save my own property; especially if I was there myself.

23,076. To save the wear and tear of ship and cargo?—Yes; I could do as I liked if I was there.

23,077. You are disposed to say that, instead of keeping the sea in bad weather, and attempting to make the passage, it would be better for the ship and the cargo and the owner to go and lay up and wait for a change of wind or moderate weather?—Yes.

23,078. With these harbours of refuge I presume it would be very essential to have them so constructed that ships could get out easily when the weather moderated?—Yes.

23,079. With a passage sufficiently wide that with a moderate wind any ship could work out easily, would that be necessary?—I think it would, so that you could work out, or a passage that the tide would come through, so that they could go out with the tide, if it could be made in that way.

23,080. After heavy gales on shore, does the swell on the coast last for a considerable time?—Sometimes it does a good bit.

23,081. How long should you say altogether? how many days?—Forty-eight hours I should say.

23,082. So that with the wind into these refuge harbours, there might be sea enough to prevent a ship getting out for 48 hours?—Not so long in a roadstead; I mean upon the beach.

23,083. I want to know, if light ships run into harbours, and there was a moderate and light wind blowing in, whether, for a day or two, there would be swell enough to prevent their getting out?—I don't think there ever would be any swell to prevent a ship getting out here. I have gone out with a gale from the north-east, and have gone in a light ship round the head. There is a tremendous sea in the offing; but you can always get vessels out.

23,084. (*Capt. Sulivan.*) Do you concur in the opinion that the great danger is for laden ships, and that it is for them especially that harbours should be made?—Decidedly; they cannot get into any port along the coasts, except at high tide.

23,085. You think that the danger is much greater in laden ships?—Decidedly; I would run for Scarborough or anywhere there, if I thought there was a fleet of ships likely to be caught at any one time. They flock in so, that I might get 100*l.* or 200*l.* damage.

23,086. (*Chairman.*) What are the most dangerous winds on the coast?—From about east-north-east to east-south-east.

23,087. What do you think of Bridlington Bay?—If I were riding in Bridlington Bay with a light ship, and there was a refuge here, as soon as the wind came enough from the north-east I should reach out, and reach down to where I should be in safety, because there is no safety there. If you go into Bridlington Harbour they make you pay for it.

23,088. Is Filey Bay well known by vessels along the coast?—It is known by almost everybody. Some strangers I have seen come and bring up, and call themselves in Filey Bay, where they have been right outside altogether, and not in Filey Bay at all. Many ships do bring up right out.

23,089. Have you had any experience of riding under Speeton Cliffs yourself?—I have been riding there four or five different times. I was riding there in this April. The wind came in from the north-east upon us when we were riding. We got our anchor, and sheered off with the ebb, and went away clear of the land altogether.

23,090. Was that because you felt you could not remain there any longer?—When the wind came in that way we had no business there any longer. It was time we were cutting out of the way.

23,091. Have you ever been driven from the Head to the Firth of Forth?—I never got up into the firth. I got above St. Abb's Head.

23,092. You preferred going up to trying the bar harbours?—I had tried one of these before, and always got damage. I thought I had better risk trying further north.

23,093. (*Capt. Washington.*) You said that if you go to Bridlington, they make you pay. You mean, if you go into the inner harbour, not for anchoring?—If we get caught in the bay, and cannot get out, what must we do? We must go for the harbour.

23,094. Have you ever laid there with a great many vessels?—With between 600 and 700 sail of light ships.

23,095. Have you been detained there for any time?—About a fortnight.

23,096. How do the vessels get supplies?—We had to go ashore and take the bread bag to the bakers, and leave it at the shops, sometimes three or four days before we could get it at all, and when we got it it burnt our backs. We took the beef off just cold; sometimes took it off warm.

23,097. What I meant is this,—is the inner harbour sufficient to supply such a fleet of ships, or could anything be done on the north beach by which you could more easily land and approach the town?—I don't think so. You see 500 ships is a serious affair.

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There are a good many now, at least 5,000, perhaps. I don't see that anything at all can be done. We pay passing toll every voyage going south, both for that place and Whitby, which is of no use all. I would take and block them both up.

23,098. Could you point out how the bay could be made use of at Bridlington ?—I could not. The bay runs shallow from the piers. I think if we had a good refuge harbour here they would not come into Bridlington, but would always come down here instead. You could always get out of Bridlington Bay, and get down into this by taking the ebb tide, and fetch down into this bay.

23,099. You think that many of the ships that now take refuge in Bridlington would, if there was a refuge here, come to Filey Bay ?—They would proceed the first tide to get into a proper and safe position.

23,100. There would be light vessels coming northward ?—Yes ; for vessels going south you can almost always get worked up under Speeton Cliff ; but when you get to the Head the wind is more southerly. It is not often you see laden vessels in Bridlington Bay, only when the wind is north. I have been with a laden vessel when the wind was so strong from the north that we durst not run across the deeps, and waited till the weather moderated a little.

23,101. If these vessels came to a refuge in Filey, and if the wind came free out to go to the northward, could they get out and go away ?—A light ship could always work out of Filey, because there is plenty of room to turn out.

23,102. You think there would be no difficulty ?—Not at all ; not in the least.

23,103. Did you not say you were forced to run into Hartlepool Bay under some difficulties once ?—Twice.

23,104. Why did you go there ?—Because I was caught by the sea one time, and run down for the harbour with a laden ship in a gale, the same as everybody else.

23,105. Were you bound there ?—I was bound south.

23,106. Why did you run to Hartlepool Bay ?—Because the ship was making a little water, and I thought I should get in as well as the rest. I did, but I got all smashed to pieces.

23,107. The upper works ?—Yes ; all about the top and the keel, all amongst the stones aback of the pier ; we got the keel all knocked to pieces.

23,108. Were there a great many ships in the bay at the time ?—A great many ships in the entrance of the harbour, not in the bay, inside the piers of the channel.

23,109. What took them all there ; were they bound for that port ?—No ; bearing up from the Yorkshire coast, some from the southward of the head, some from one place, and some from another.

23,110. Could they have got farther north ?—They could if they had laid their ships off to sea.

23,111. But they thought the bay sufficiently safe to run for ?—I don't know why they run down there. I did not think it sufficiently safe, but thinking it might be a dirty night I thought it was better to try to be in there than go farther north.

23,112. Would it be a benefit to ships under these circumstances to have some refuge provided ?—Decidedly it would be, if there could be a refuge ; but I don't see any refuge in Tees Bay, the sea breaks off so far. The second day after we got on the ship ; having discharged our cargo, we got on the ship—a brig, they called the *Dublin*, of Whitby, came round, and she was knocked down by the sea before she could come to Hartlepool Bar. She was nearly under water before she came to the bar, and when she got to the bar of the old harbour she laid down. The life-boat was ready and got two or three of the crew out, but most of them were lost.

23,113. What time of tide was it ?—Two thirds flood or ebb.

23,114. Could she not take the bar ?—She was knocked down by the sea, and making water, I expect. She hardly even reached the shallow water outside the pier. She laid down as she came to the bank outside the pier—laid down with her yards in the water. The life-boat got away in time to take off two or three of crew.

23,115. She was leaking badly, I suppose ?—I expect so.

23,116. (*Capt. Sulivan.*) Surely if there had been a refuge harbour at Hartlepool the whole of them might have been saved ?—She was knocked down by the sea.

23,117. If the piers were in a line with the outer pier of the Heugh that would have saved her, would it not ?—They might be a good deal better than they are, and there is no doubt they are making them better.

23,118. You spoke of the light colliers in Bridlington Bay. Which winds prevail most on that coast for the longest time ; south and south-west or north and north-west ?—It used to be about north-west and south-east, but lately them come any way—sometimes one way and sometimes another.

23,119. Do the south and south-west winds blow longer during the year than the others ?—In the winter months I believe we have the wind more from the south-east than in any other direction.

23,120. If so many vessels congregate in Bridlington Bay, bound northward, would not that make it pretty certain that there would be an equal number of laden vessels, bound south, as frequently glad to take refuge in a harbour on this side of Flamborough Head ?—Decidedly. If there was a harbour on this side both light and laden vessels would take refuge.

23,121. But more especially laden ?—Yes, more especially laden, because there would be no chance of getting round the head with a south-east gale.

23,122. On the average, there must be as many laden vessels hanging on this side of Flamborough Head as light vessels on the other ?—On the average, throughout the year, there will be the same each way ; there will be the same number backward and forward.

23,123. Would not that show that a harbour on this side of the head would be equally valuable as the anchorage on the south side now is to light vessels ?—More valuable, because it would be of advantage to light vessels, which would never ride more than one tide in Bridlington Bay.

23,124. You were asked if your colliers could get out of Filey Bay to the north with southerly winds, and you said they could work out. If there was an opening in the north part of the breakwater, so as to give them a fair wind out with south and south-west winds, would not that obviate the difficulty ?—There is plenty of room to work without.

23,125. But it would be an advantage if a light collier could go to the north, or a laden one to the south, without having to work out ?—I think it would be an advantage.

23,126. Would that remove all the difficulty as to light colliers getting to sea with south winds if they come in now ?—They could get to sea without that. There is plenty of room for a ship to work out without that.

Mr. Richard Elders examined.

Mr. R. Elders.

23,127. (*Chairman.*) You reside at Scarborough ?—Yes.

23,128. How long have you followed the sea ?—About 40 years.

23,129. For how many years have you commanded vessels ?—For 12 years.

23,130. In what trade were the vessels which you commanded chiefly employed ?—The coasting trade.

23,131. What description of vessels have you generally commanded ?—Schooners.

23,132. Have you heard the evidence of the previous witness, from Scarborough, Mr. Dodd ?—Yes.

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23,133. Do you generally concur with what he has stated ?—Yes.

23,134. Is there any point in which you differ from him, or what you think he has omitted which you would like to state ?—There is nothing that I know of.

23,135. Have you been at anchor under Speeton Cliffs ?—Yes, different times.

23,136. Have you ever been there in bad weather ?—Yes.

23,137. Have you ever been blown off?—I have been obliged to get my anchor and run away.

23,138. From the wind coming round ?—Yes, from the south-east.

23,139. Would you put a harbour of refuge at Filey ?—Decidedly so.

23,140. Why ?—Because I think it the most proper place. It would be preferable to any other part in the north.

23,141. Why would it be preferable here ?—I have been going to sea often from the northern ports. With the wind north-west we can always reach up here, and when we reach the head we are often met by the wind coming south-south-west and that way.

23,142. If there was to be a second harbour, where would you put it; or would you improve the three harbours of the Tyne, the Tees, and the Wear ?—I cannot say anything about them.

23,143. You have no experience on that point ?—Not in regard to that.

23,144. And you would rather not give an opinion?—I had rather not.

23,145. (*Mr. Lindsay.*) Have you anchored all over this bay ?—Yes.

23,146. What kind of holding ground is it ?—Very good, where I used to bring up.

23,147. Where was that ?—Where the boats generally ride, in the bight of the Spittles.

23,148. What is the nature of the ground, is it clay or sand ?—It is clay.

23,149. Blue clay ?—Yes.

23,150. If there is only one harbour to be made, you would prefer a harbour here in Filey Bay to one anywhere else along the coast ?—Yes.

23,151. Do you think a harbour here would do more to save life and property than one down in the bight of the bay, say down about Hartlepool Bay ?—So far as my experience tells me, it would be preferable here.

23,152. Do you speak from experience ?—I do speak from experience so far.

23,153. You think it would do more to save life here ?—I think so, both life and property.

23,154. After making a harbour here, if it were desirable to make another harbour where would you put it ?—I don't know, I am sure, where I should choose then.

23,155. Are you prepared to say anything about that ?—Not in regard to any other place.

23,156. Do you know Tees Bay ?—No ; I never was down there much. I have been off Old Hartlepool once or twice.

23,157. But you don't know it sufficiently to offer an opinion ?—No.

Mr. JAMES SKERRY examined.

Mr. J. Skerry.

23,158. (*Chairman.*) You belong to Scarborough ? Yes.

23,159. Do you follow the sea ?—Yes.

23,160. For how many years have you been at sea?—For forty-two years.

23,161. For how many years have you been in command of vessels ?—Twenty-nine years, nearly thirty.

23,162. In what trade were the vessels which you have commanded chiefly employed ?—In the coasting, the Baltic, the Mediterranean, and the American trades.

23,163. Have you given up the sea now ?—No.

23,164. How many voyages may you have made from the Baltic ?—25 or 26 altogether.

23,165. In making them home, for what port were you generally bound ?—Different ports; Scotch ports; in fact all the ports along the coast almost.

23,166. What is the northermost port you have ever been bound to ?—Leith.

23,167. Coming across from the Baltic in the fall of the year, have you ever made the landfall to the north of the firth ?—Yes ; I have been through the Pentland Firth; I have made the land there, and gone through there if bound to the other side of the land.

23,168. But I mean when homeward bound for London, did you ever make the landfall to the north of the firth ?—In general St. Abb's Head. I never was but once at Leith from the Baltic.

23,169. Generally speaking, to what ports were you bound from the Baltic ?—Hull, Newcastle, and London.

23,170. When bound to Newcastle, where did you generally make the land fall ?—Some part of the Yorkshire land.

23,171. You say you have been north-about ?—Yes.

23,172. Often ?—Two or three times.

23,173. There is a question as to a harbour of refuge either at Peterhead or Wick; which do you think would be most useful for ships bound north-about ?—I should give the preference to Wick.

23,174. Will you give your reasons ?—I think it is more in the bight where ships fall with the easterly gales. Another thing is, that I think it would be more acceptable to a vessel which is bound through the firth. Many times it is blowing a gale from the north and east, and a ship cannot get into it. If there were a harbour of refuge they would take it.

23,175. You think the use of this harbour would be for them to hold on until there was a fair wind ?—Yes.

23,176. In such a case, though very useful, it would be necessary to the saving of life ?—Of course it would save life.

23,177. Is there any case in which you are disposed to say, that the harbour at Wick would be useful for vessels bound through the firth, as a means of saving life ?—No doubt. In many instances where they durst not take the firth they might get into a harbour of refuge, and save life and the ship also.

23,178. In what way ?—Say, for instance, bound close down with the wind from the south-east, blowing a gale of wind. The tide is somehow running so rapidly that a ship dare not take the firth. Perhaps before they could get a favourable tide the ship might be on shore, or blown to the northward.

23,179. What is to prevent the ship being hove to, and waiting for the turn of tide ?—She would drive to leeward.

23,180. What is prevent her heaving to in time ?—She might heave to in time.

23,181. What would prevent her shortening sail in time, so as to hit the right time of tide ?—She might sometimes do that, but you cannot do so at all times.

23,182. Do you think it would frequently happen that a vessel would be forced into the firth, whether she liked or not, against a weather tide ?—Many times.

23,183. As respects a harbour of refuge on this coast, where would you put it ?—At Filey.

23,184. And why ?—For the same reason the other witnesses have given ; on account of Flamborough Head being a prominent part of the coast, and so many vessels always accumulating about there.

23,185. You have no doubt it would save a great deal of life and property ?—There is no doubt about it.

23,186. Supposing there was to be another harbour,

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where would you put it; or would you prefer trying to improve the three harbours of the Tyne, the Tees, and the Wear?—If that could be done it might do, but I should be rather afraid of that.

23,187. You have great doubts whether that could be done?—Not with safety for any vessel with a great draught of water.

23,188. If we could get 16 feet at low-water spring tides, would that serve your purpose?—If it could be done; but I should dispute that myself. Shields harbour is a very dangerous harbour to take, and would be so even if it had 16 feet of water in it; and it is most dangerous with the wind from south-east, east-south-east, and so on.

23,189. Have you ever taken it in bad weather?—Yes, many times.

23,190. Have you ever risked ship and life?—I have been in risk, but never fell in with any accident. I always got safe in, but often with a very heavy sea. It was with light ships.

23,191. Will you give an instance?—I don't know that I can now. I have gone in many and many a time; never with a loaded ship, always with a light ship.

23,192. Supposing there was a good harbour of refuge at Wick, and you were going to make your passage north about, and reached the entrance of the firth with a strong east-south-east gale, would you attempt to avail yourself of the fair wind to run through the firth, or would you go into the harbour?—Of course I should if it was prudent to do so. The wind at south by east is right through.

23,193. Why would you run?—To make my passage.

23,194. (*Mr. Lindsay.*) I think you said you would prefer Wick because it is down in a bight?—I did.

23,195. And you prefer Filey because it is close to a promontory?—Yes.

23,196. Why do you prefer the bight in one case and the headland in another?—There are many instances of a ship coming from the north from Archangel bound to the Firth of Forth that gets to leeward with the wind east-south-east and cannot get round Buchan Ness. They are jammed completely, and there is nothing but the firth they can run up. They could get a place of safety even there.

23,197. Is Long Hope a good anchorage?—Yes; it is a beautiful place when you get in, but it is very dangerous sometimes to get there.

23,198. Do you think any harbour could have a better anchorage than that one?—The only difficulty in getting in is the tide, which runs out so fearfully.

23,199. When you are down in the bight of the bay you have Long Hope to run for?—A loaded vessel would sometimes be foundered before she could get there if it were blowing a heavy gale.

23,200. Would you have any hesitation in going through the Pentland Firth with a south-east gale and an ebb tide?—Sometimes in a heavy gale I should; with the tide with me, of course not.

23,201. But with a flood tide and a gale of wind from the south-south-east?—With a strong spring flood, particularly in a laden ship, there is not one vessel in a hundred that would live.

23,202. When caught in the bight of Tees Bay, is there any harbour like Long Hope or any other place of refuge to go to?—No; but there would be a harbour of refuge, if we had one built, that would be as good as Long Hope.

23,203. I am speaking now of the bight of the bay. You preferred the bight of the bay in the case of Wick, where you have Long Hope to go to; but you do not prefer the bight of the bay on this coast, where you have no anchorage to go to where you can find shelter in easterly winds. Why prefer it in the one case, and not in the other?—I prefer Filey because it is central. Ships, both light and laden, are all caught about Flamborough Head. In general, more ships accumulate together at a time, and make it very dangerous, particularly for laden ships. I have been many times for days and days beating off Flamborough Head at the risk of being run down—many times when, if there had been a place of refuge, we should have taken it, and laid in comparative safety, particularly now, when there are so many steam-boats on the coast that it is dangerous for laden vessels to lie there.

23,204. Do you desire a harbour of refuge here on account of the danger of collision, or on account of the danger of being caught on a lee shore?—On both accounts.

23,205. Say that a harbour were made here, and that it was considered desirable to make a second harbour between this and the Farn Islands, where would you put that second harbour?—I should myself give the preference to Redcar. If it were possible to have a second harbour made, there, I think, would be the most suitable place.

23,206. You would prefer Redcar to Hartlepool Bay?—I should.

23,207. Why do you do so?—There is more water, and there would be no fear of the harbour silting up. I think there is not so much danger of the sea running so heavy in the deep water as when you get into Tees Bay.

23,208. Is the sea very heavy and dangerous in Hartlepool Bay in seven fathoms?—I have seen it break in 10 fathoms there.

23,209. Have you ever seen the sea break in 10 fathoms anywhere else, at any other part of the coast?—Yes, very many times along the coast. It breaks off Scarborough in 15 or 20 fathoms sometimes, with heavy gales from the east. That is a rare case, in very extraordinary gales; but in Tees Bay at any time in nine or ten fathoms. In a gale from the east-south-east or the east-north-east the sea breaks most tremendously.

23,210. Do you say that the sea breaks in 10 fathoms to the east of Hartlepool more heavily than at any other part of the coast?—I don't say Hartlepool, but Tees Bay.

23,211. You mean to tell me that you think the sea breaks more heavily in 10 fathoms as you approach Tees Bay than it would break in 10 fathoms water approaching Filey, approaching the Tyne, approaching Scarborough, or approaching any other part of the coast?—I think I should almost say so. The tide drawing from the Tees sets so strong out in the bay, meeting the easterly sea coming in, that it causes it to break further out. There is no disputing it.

23,212. (*Capt. Sulivan.*) You described the state of the weather and the tide that would make it advisable for a vessel to go into Wick; a south-east gale and a flood tide. Could a vessel, under these circumstances, possibly cross that tide and go into Long Hope?—It is very dangerous. They might do it. It is possible.

23,213. Could a vessel do it with safety?—Not with safety.

23,214. Then, under these circumstances, Long Hope would not be a harbour of refuge for vessels so situated?—They durst not attempt it.

23,215. In coming from the westward would vessels bound up to the southward, and meeting heavy gales from the south-east and east between Peterhead and the Pentland Firth, be placed much in the same position, and, having the firth under their lee, have no alternative but to go back either to the firth, or go into Wick, if there was a harbour there?—Of course they would go into Wick.

23,216. At present are vessels that come through the firth liable to be caught there in a dangerous position if they get south-east gales?—Not so; because if they get it in the tideway it is possible that the gale is so heavy that they may tack and go away to the northward, to the Orkney Islands, if the wind is at south-east.

23,217. You mean go back to the Orkneys?—Yes, rather than attempt the firth again.

23,218. But for vessels in that position would Wick be a very good place of refuge?—Of course it would, equally the same as it will with the wind anywhere

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from the east or east-north-east, and you right from the place.

23,219. If you know that vessels of 1,000 tons take refuge in Scarborough Roads at the west entrance of the Pentland Firth, would that be a reason, do you think, why a harbour at the east end also would be very much used by vessels if it should be made?—I have no doubt of it. Scarborough Roads is a beautiful place. It is almost a harbour of refuge with certain winds.

23,220. Does that show that a safe harbour of refuge at the other end of the firth, if there were one, would be very valuable, and that a large number of vessels would use it?—No doubt of it—vessels bound there away with gales from the south and east.

23,221. Do you know any place through which you have taken a vessel more dangerous than the Pentland Firth?—I have been pooped two or three times; the last time with a heavy-laden vessel.

23,222. (*Chairman.*) What sized vessels have you generally commanded?—The one I was then going through with was 286 tons.

23,223. And the other?—The last one was 236 tons.

23,224. How have they been laden?—With all sorts of cargoes.

23,225. What is the worst cargo you ever carried?—I mean to say that railway iron is the worst, and the deepest too.

23,226. Was your vessel very deep then?—Yes, very deep.

23,227. Was she a brig or a schooner?—A brig.

23,228. If you were out in the North Sea in bad weather with a cargo of that kind in a heavy gale, which would it be safest to do—to sail or to lie to?—As to that, I should be guided by circumstances. Of course, if the vessel would lie to, by all means I should lie her to.

23,229. I am talking of this vessel with railway iron on board?—I should lay her to, if I durst not run. I should forereach her under two close-reefed topsails.

23,230. If the wind was blowing so hard that you could not carry close-reefed topsails?—I generally make it a practice of carrying two close-reefed topsails, if possible, and never but once have been put off it.

23,231. On that occasion, when you were put off it, was it safer to heave to, or to run?—I deemed it safer to heave her to.

23,232. Leaving that particular vessel, what would you say as to the general run of vessels employed in the coasting trade if deeply laden? Is it safer in very heavy weather, when there is lots of sea-room, to heave them to or to run?—They generally run back for harbours of refuge.

23,233. I am not talking of what they generally do. Supposing they had no harbour to run for, and these vessels have lots of sea-room, but that it is blowing so hard that there is a question as to the safety of the vessel; which is the best thing for saving the vessel and life, to heave to or to run?—I should say heave the vessel to by all means,—not heave them to, but if they will forereach, let them forereach.

23,234. But if you cannot carry sail with which they can forereach, is it then safer to run vessels or to heave them to?—I should say, heave them to; because the sea is generally so heavy it would wash everything away.

Mr. JOHN RUDDOCK examined.

Mr. J. Ruddock.

23,235. (*Chairman.*) You reside at Filey?—Yes.

23,236. Have you followed the sea?—Yes; I went to sea when I was nine years of age, and I am 60 now.

23,237. For how many years did you command vessels?—Only seven, and they were small vessels.

23,238. In what trade were the vessels employed that you principally served in?—I have been 30 years in the coal trade.

23,239. For how long were you mate before you were captain?—Only a few months mate.

23,240. You have been here all to-day?—Yes.

23,241. Do you generally agree with the other witnesses as to Filey being the best place for a harbour of refuge?—Yes. There is not another such place on the eastern coast of England. It is formed by nature.

23,242. Do you agree with the reasons the other witnesses have given us, or have you anything to tell us which we have not already heard?—No; I cannot say I have. I know it is a fine bay. I have delivered 30 cargoes of coals here in six months, coming regularly to the beach.

23,243. (*Mr. Lindsay.*) How many points of the compass is the bay open to?—Only $4\frac{1}{2}$.

23,244. Not from the cliff tops?—Filey Brigg bears east from us. We tried it by the compass, and Filey Brigg bears east from where we are sitting; no, not from where I am sitting—from the watch-house.

23,245. How does Flamborough Head bear?—South-east $\frac{1}{2}$ south; that is $4\frac{1}{2}$ points. It is only open to the sea $4\frac{1}{2}$ points out of 32.

23,246. What is the heaviest gale that blows in here?—From east-south-east to east-north-east.

23,247. Does the heaviest sea come in with these winds?—There is a heavy sea if the gale is heavy.

23,248. With a heavy gale from east-south-east is there a very heavy sea tumbling in here?—There is a heavy sea all over with a heavy gale.

23,249. If only one harbour is to be made you think Filey the best place for it?—Yes; I am sure of it. There is not a place to equal it on the east coast of England.

23,250. Tell me why you think so?—Because it is here where most ships are detained after leaving the ports with a favourable opportunity; eight or ten hours bring them here. Then if the wind blows hard against them they cannot get round the head and lie under Speeton Cliffs. I have laid under the cliffs for many and many days, and then have driven as far north as St. Abb's Head.

23,251. The wind chopped round when you were lying there?—Yes.

23,252. And you were obliged to cut, and run for it?—Yes, we used hemp cables. They slip now. We cut them.

23,253. Is it often the case, in your experience, that vessels anchored under Speeton Cliffs when the wind comes suddenly round are obliged to slip their cables and run?—Yes, and run for the northern ports; sometimes for Leith Roads.

23,254. Is there any place to run for down in the bight of the bay? Do you think another harbour would be desirable?—Hartlepool was not much of a port then.

23,255. Is there any place for them to go to? Say Filey was made into a harbour of refuge, do you think, considering the trade going along the coast, it would be necessary to have another harbour of refuge as well?—It would be all the better if there was one.

23,256. Where would you have that?—I should recommend Redcar.

23,257. You prefer Redcar to Hartlepool?—Yes. Hartlepool is nothing but a breaking-up yard.

23,258. Why do you object to Hartlepool?—Because the water is so shallow, and there is such a strong current coming out of the Tees, setting down upon it. There would be none at Redcar.

23,259. You think it is the stream of the Tees setting out so that causes the unsually heavy sea in that part?—Yes. With an east sea going in, and a strong tide coming out, it makes the sea very heavy at Hartlepool. The water is very shallow, and just at the back of the Salt Scars it is very deep. Redcar will not silt up, and Hartlepool will.

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23,260. How long is it since you gave up the sea —About 12 years.

23,261. Are you a resident of Filey ?—Yes.

23,262. Have you any occupation at Filey ? — No.

23,263. I ask the question because I see you have a medal. What is that for ?—It is for being in the arctic regions. I was with Sir J. Parry and Captain Ross, on board the *Fury*. I was captain of the main top.

Mr. Lindsay.

Mr. Thomas Richardson examined.

Mr. T. Richardson.

23,264. (*Chairman.*) Do you reside at Filey ?—Yes.

23,265. Have you followed the sea ?—Yes.

23,266. For how many years ?—Ever since the year 1820.

23,267. For how many years have you commanded vessels ?—For nearly 30 years.

23,268. In what trade were they chiefly employed ? —In my youthful time, in 1829, I went master of a fishing boat.

23,269. Since then ?—Since then I went master of a collier brig, and for the last 10 years I have been employed in the coal trade and the Baltic trade.

23,270. How many voyages have you made home from the Baltic ?—Ten from Petersburg.

23,271. Have you come home late in the year ?— I have come home very late.

23,272. Bound where to ?—Hull or London.

23,273. I don't ask you where you endeavoured to make your landfall, but where, as a general rule, you actually do make it ?—I always endeavoured to make it at Flamborough Head.

23,274. I want to know where you actually did make it ?—I always made it there.

23,275. You have heard the evidence of the previous witnesses as to Filey Bay being the best place for a harbour of refuge, do you concur with them ?— Yes.

23,276. Are your reasons the same as theirs ?—Oh yes.

23,277. Have you anything in addition to tell us that we have not heard from them ?—Oh, yes. I have been for the last 10 years commanding vessels which have drawn 15 feet water, and which have been driven for eight or ten days up and down this coast for want of a harbour to go into.

23,278. But why did you not go into the Tyne, for instance ?—Because there is not sufficient water.

23,279. Not at half flood ?—No.

23,280. Not at high water ?—Not at high water.

23,281. Could you not have gone into Hartlepool ? —No, that is worse still.

23,282. Supposing we had a harbour here, would you think it desirable to try to improve the three ports of the Tyne, the Tees, and the Wear, or would you like to have another harbour made in the bottom of Tees Bay ? — I should endeavour to improve the three ports.

23,283. For what reason ?—Because I think it would be preferable to having a harbour in Tees Bay ; because when I went to sea I always detested being near Tees Bay.

23,284. Why ?—Because it is an unsafe place.

23,285. Is there a great draught into it ?—Yes, there is.

23,286. (*Sir F. Smith.*) What draught of water were the vessels which you have commanded ?—For the last 10 years I have commanded a vessel drawing 15 feet, laden with coals.

23,287. What water is there over the bar at the Tyne at low water, spring tides ?—At what place ?

23,288. Over the bar at the Tyne. Shields Bar ?— About five or six feet.

23,289. What is the rise of the tide ?—Seventeen or 18 feet ; sometimes 20 feet.

23,290. Would not that be enough for your other brig ?—Not in a gale of wind.

23,291. How much would you want besides your draught ?—It would not be safe for a vessel of my draught to take any of the northern ports ; not any of them.

23,292. (*Mr. Lindsay.*) Had the vessel in which you were knocking about for 10 days, 15 feet draught ? —Yes.

23,293. And you thought she was drawing too much to take any of the harbours in the bight of the bay with safety ?—Decidedly so.

23,294. If they were deepened, so as to give 16 or 18 feet at low-water spring tides, would you have any hesitation in taking the Tyne with your vessel ?—If the three harbours could be improved so as to give access at all times of the tide, I should say, improve them.

23,295. Would you have any hesitation in running for any one of these harbours if there was plenty of depth of water ?—No ; if it was a suitable time to run.

23,296. But would you have any hesitation, under ordinary circumstances, in running for any of these harbours ? Take, for instance, the Tyne. Would you have any hesitation in running for the Tyne during a gale of wind, and during the ebb tide, under ordinary circumstances ?—With an ebb tide.

23,297. You still would ?—Yes.

23,298. You would not consider it safe, even, if the Tyne were deepened to 18 feet at low water, to run for Shields with an ebb tide and an easterly gale of wind ?—I should consider it unsafe.

23,299. Tell me why ?—In running with a laden ship into one of these harbours, with an ebb tide, there is a tide runs out, such as you can hardly force an ordinary vessel against, and that being the case you would be so long detained in the broken water.

23,300. Say the tideway running with the force of three knots an hour, and the wind blowing a strong gale in, and you were obliged to seek refuge ; would you consider it dangerous to take it under those circumstances ?—If I could keep to sea, I should prefer it.

23,301. Say there was to be a second harbour made, do I understand that you would prefer Redcar to Hartlepool Bay ?—Yes. I should prefer Redcar to Hartlepool Bay.

23,302. Why would you prefer Redcar ?—Because I think there is more water.

23,303. Is there any other reason ?—No, I don't know any other reason, further than there being more water.

23,304. Did you hear what the other witnesses stated about the great danger being to laden vessels ? —Yes.

23,305. Do you agree with them ?—I do.

23,306. You consider it of the first importance to provide for the safety of the laden vessels before the light ones ?—Yes, provide for the laden vessels, by all means. There is not so much danger in light vessels.

23,307. If the Tyne be deepened, as they purpose to deepen it, to 15 feet at low water, would that become a good harbour of refuge for light vessels ?—Oh yes.

23,308. How soon would you venture in with your vessel, which draws 15 feet, if the Tyne were deepened to 15 feet ?—I would venture about the last quarter flood.

23,309. Not before ?—No.

23,310. If the Tyne were deepened to 15 feet, and you were off there in a heavy gale, right on shore, wanting refuge, would you risk taking the Tyne against the ebb tide, or prefer bearing up for the Forth ?—I should prefer bearing up for the Forth if the wind were suitable, so that I could go away.

23,311. Rather than take the Tyne, even if it were deepened ?—Rather than take the Tyne with the ebb tide.

23,312. What is the greatest number of vessels you

have ever seen assembled under and round Flamborough Head ?—I have been in company with 400 or 500 sail, dodging about and buoying up together.

23,313. Have you known any cases within your own knowledge in which vessels that have been off Flamborough Head, after bearing up, have been wrecked ?—Yes.

23,314. Will you mention any cases ?—I cannot mention the names of any vessels that have borne up and been wrecked at the time I have been under the Head myself.

23,315. Have you known any instance of large numbers of vessels being scattered and driven back away to the northward ?—Oh yes, frequently; when the wind begins to easter they get under weigh, and reach to the northward and the eastward.

23,316. Have you ever been driven back yourself more than once on the same voyage ?—Yes, twice, but not on the same voyage. I have been twice off Flamborough Head, and bore away for Leith, but the weather moderated before I reached it, and so I kept to sea.

23,317. Do you know whether it is the case that deep-laden colliers caught in heavy weather off the head often get leaky and in great danger, and are in want of a harbour before they can run far back ?—Oh yes, a great many.

23,318. Do you know any cases of your own knowledge ?—I have heard tell of several instances of vessels getting leaky off Flamborough Head, and having to bear up for the northern ports, because they could not keep to sea.

23,319. Do you know any cases of vessels foundering or being run ashore in a leaky condition to save them from foundering ?—I have been coming into Shields harbour with vessels that have borne up to the southward, and have been wrecked as they went in. I have been going in light at the same time that they have been.

23,320. If a harbour were built at Hartlepool, would not that do away with your great objection to its being a breaking-up place by vessels getting foul of each other ?—I never did bear up for Hartlepool.

23,321. Would you have any hesitation in bearing up for Hartlepool if a harbour were made there ; that is, if you were so far to leeward that you could not fetch out of the bay ?—If I was so far to leeward I should be obliged to bear up for the place.

23,322. In such a case would it not be of great use ?—It is quite necessary if a ship gets embayed. It would be very acceptable to vessels in that position.

23,323. Filey would not be of any use to vessels in the bay ?—I should consider that a harbour of refuge in Tees Bay would be of not much use to one here.

23,324. You say that to vessels embayed, and that could not get out, Filey would be of no use ?—If they were embayed in Tees Bay, Filey would be of no use.

23,325. Or embayed in the bight around the high land at Whitby, somewhere between Whitby and Sunderland, in that large bay, they could not get out if there was an easterly gale ?—No, not very well.

23,326. For these vessels a harbour in the bight of the Tees would be very valuable ?—Yes ; but a vessel caught to the north of Whitby could not get round there.

23,327. Do you consider that Filey would take a much larger number of laden vessels than a harbour in the depth of the bay would do ?—Yes, I think ten to one, because there is not such another place all along the coast where so many vessels get together as off Flamborough Head.

Mr. GEORGE RICHARDSON examined.

23,328. (*Chairman.*) Where do you reside ?—At Filey.

23,329. Are you following the sea ?—Yes.

23,330. How long have you been at sea ?—About 28 years.

23,331. How long have you been in command of vessels ?—Thirteen years.

23,332. In what trade have the vessels which you commanded been chiefly employed ?—Chiefly from Shields to London, and other parts of the coast, France, and different places.

23,333. Have you been present during this inquiry? —Yes.

23,334. What, in your opinion, is the best place for a harbour of refuge ?—I think this, decidedly.

23,335. Will you give me your reasons ?—I have experienced many a gale off Flamborough Head, and had to put off below Dimlington to go to the northward of Flamborough for shelter, and then been obliged to put to sea with the wind easterly.

23,336. How far to the north have you been driven for want of a harbour of refuge ?—I have been driven to the north many a time ; once particularly, when I took Shields. Once I have put into Leith : but many a time I have never put into any of the ports, for the weather has been better before I got so far.

23,337. How far to the north have you ever been driven ?—With a laden ship I once got nearly to Leith Roads. I have been under Speeton Cliffs a long time.

23,338. Waiting for the wind ?—Yes ; upon about 10 days on the passage.

23,339. What is the danger of lying under Speeton Cliffs ?—The danger is the wind eastering on us, so that we are obliged to put to sea.

23,340. Supposing you had a harbour at Filey, what would you prefer next in addition to that, our improving the three harbours at the Tyne, the Tees, and the Wear, or making one large harbour down in Tees Bay ?—These last seven years I have been master of a vessel trading from Filey to Hartlepool and the different ports north for coals, and it is very desirable that there should be one in the Tees ; some part about Redcar.

23,341. Why do you prefer Redcar ?—Because I think that at the mouth of the Tees the sand grows up, and alters it very much.

23,342. Therefore it is on account of the silting up at the bottom of the bay that you would prefer Redcar ? —Oh yes.

23,343. For any other reason ?—No ; but it is clear of all shoals. The sands are down at the north end, the bottom of the bay.

Mr. RICHARD WHITE examined.

23,344. (*Chairman.*) You are in command of the coast guard party at Filey, are you not ?—Yes.

23,345. How long have you held that appointment ? —For 19 years at Filey.

23,346. Previous to that, where were you stationed? —I have been at Marske, Flamborough Head, and Scarborough.

23,347. You have been on this district of the coast how long ?—For 40 years.

23,348. You have been present during the greater part of the day ?—I have.

23,349. And you have heard the evidence which has been given to us ?—Yes.

23,350. Have you any remarks to make ?—No.

23,351. Do you generally agree in the opinion that Filey is the best place ?—I do.

23,352. For the same reasons that the other witnesses have argued in its favour ?—Exactly the same.

23,353. You have nothing to offer further in addition ?—No.

23,354. (*Mr. Lindsay.*) During your long experience on this coast, how many vessels have you seen off Flamborough Head and in the bight of the bay, dodging and at anchor ?—Frequently between 300 and 400.

FILEY.

Mr. R. White.

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Mr. Lindsay.

23,355. When you say frequently, how many times in the course of the year ?—That depends on the continuance of southerly winds.

23,356. Taking an average year ?—Perhaps three or four times in the year ; that is, in the winter time chiefly.

23,357. How many of that number would be at anchor ?—Perhaps half at anchor, and half dodging.

23,358. Have you known them often, when at anchor, been obliged to ship ?—Frequently ; a great number of anchors are recovered.

23,359. Does the wind come round so suddenly that they are obliged to leave their anchors ?—Sometimes, and sometimes it comes on gradually.

23,360. Do you know the anchorage in the bight ? —Very well.

23,361. What kind of ground is it ?—Excellent holding ground.

23,362. What description of soil ?—It is clay.

23,363. Any sand ?—A little, but not much.

23,364. Surface sand ?—Surface sand.

23,365. You say you were stationed at Marske for some time ?—Yes.

23,366. You will know that coast very well ?—I know Redcar very well.

23,367. If there is to be a second harbour of refuge ?—I should recommend Redcar.

23,368. Supposing the first they decided was to make a harbour at Filey, and that something more was wanted ; whether do you think the formation of a harbour at Redcar or the improvement of the existing harbours, so as to make them accessible at all times of the tide, would be of the most value ?—I think Redcar. There is depth of water there.

23,369. You think that would be better than improving the three harbours ?—I think so.

23,370. (*Capt. Washington.*) Are you acquainted with the river Tyne ?—Not a great deal. I have not been there these 40 years.

23,371. You are clearly of opinion that if one harbour of refuge is to be made on the coast it should be at Filey ?—Yes.

23,372. You think that would be the means of saving a great number of lives ?—I do, particularly in laden ships.

23,373. You have, I think, been 19 years at Filey? —Yes.

23,374. During that time have many wrecks occurred in the bay ?—Within the last 10 years there have been 14.

23,375. Any lives lost ?—In one vessel ; that is all, I think. The *Sphynx*, 14 years ago, broke up as soon as she struck the beach.

23,376. At that time was there a life-boat here ?— Oh, yes. We took the life-boat about the vessel, but she broke up before the life-boat got there. I believe the crew were all washed overboard before the vessel came to the beach.

23,377. What year was that ?—It is about 12 or 14 years ago ; I don't exactly remember the date. The vessel belonged to Dundee.

23,378. How many lives were lost on that occasion ?—I think there were seven persons on board the brig.

23,379. Has there been a life-boat here long ?— Since the year 1822.

23,380. Has that boat been the means of saving life ?—A great many.

23,381. Do you happen to know what number ?— Since I have been here she has saved 30 lives.

23,382. The boat is under your charge, I think ?— Yes.

23,383. Is she in good order, with everything complete in case of going off to a wreck ?—She is in excellent condition. I don't think there is another on the coast equal to her.

23,384. Can you always get assistance to launch her ?—Always : the fishermen are always very ready to assist in such cases.

23,385. (*Capt. Sulivan.*) I see she is one of the old boats. Have you ever had her swamped ?—No.

23,386. Does she run the water off when she fills ? —In a very few seconds.

23,386*a*. Have you ever turned her over ? Does she right of herself ?—We never did that.

(*Chairman.*) Are there any other parties present, who are interested in this inquiry, who wish to tender their evidence ?

No answer.

Sittings at Filey closed.

BRIDLINGTON.

Tuesday, 26th October 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Sulivan.
Mr. Lindsay.	Captain Vetch.
Captain Washington.	Mr. Coode.

Mr. Evans, Secretary.

Mr. Thomas Prickett examined.

BRIDLINGTON.

Mr. T. Prickett.

26 Oct. 1858.

23,387. (*Chairman.*) You reside at Bridlington ?— I do.

23,388. Are you connected with the port in any official capacity ?—No.

23,389. On whose behalf do you appear now ?—On behalf of the committee appointed at a public meeting of the inhabitants of this place.

23,390. Will you now proceed with any statement you may wish to make on behalf of the committee ?—Perhaps, before the reading of the memorial which I have to present to you, you will allow me, in the first place, to express, on behalf of the inhabitants of the place, the great satisfaction they feel in receiving a visit from the Royal Harbour of Refuge Commission ; and, in the next place, I beg to express the very great pleasure which I feel in presenting to you the memorial which has been entrusted to me by the committee, appointed at a public meeting of the inhabitants, held in the Town Hall, on the 24th of October, 1858, for the purpose of bringing before you the capabilities of Bridlington bay as a harbour of refuge. Perhaps you will allow me to remark that the committee have no sordid views of self-interest in the matter ; they desire that the best possible shelter should be given to this shipping on the coast, wherever and in whatever locality that shelter can be best obtained, but they feel convinced that this fine bay of ours has claims, and claims of a superior nature, well deserving the particular notice and attention of the Royal Commissioners. They have felt it their duty respectfully to set forth these claims in the memorial which I hold in my hand, and which, if you will permit me, I will now read.

To the Royal Commission appointed to inquire into the best situation for a Harbour of Refuge.

The Memorial of the Committee appointed at a public Meeting of the Inhabitants of Bridlington, in the county of York, held in the Town Hall, Bridlington, on the 4th day of October, 1858, William Forth, Chief Lord of the Manor, presiding,

Humbly showeth,—

That your memorialists view with unfeigned satisfaction the labours of the Royal Commission to inquire into so desirable an object as the formation of a harbour of refuge on the east coast of England, and cannot but feel gratified that they have the honour of offering to your Royal Commission, within sight of so enviable a locality as the Bay of Bridlington, incontrovertible facts as evidence of its character, its importance, and its utility for the purpose of sheltering shipping property and of saving the lives of those whose heritage it is to plough the mighty deep.

Your memorialists respectfully submit, that the northern part of the Bay of Bridlington already naturally possesses, bounded as it is by the bold promontory of Flamborough Head, unprecedented shelter in stress of weather in many winds; that in its natural condition it has for many generations been, and annually now is, used as a place of refuge for thousands of both laden and light coasting and other vessels; that, from the prominence of the "Head," it is in the locality made for by vessels bound southward from the Baltic and other parts of the north of Europe; that it is accessible in every storm, and so materially sheltered by the Smithic Sand that vessels anchoring within the bay have that security which no other part of the north-eastern coast affords.

Viewing, then, its natural capabilities, it appears manifest to your memorialists that these, improved by the able engineering art of the present century, would render it capable of affording commodious and convenient shelter for nearly a thousand sail of ships in every storm. The formation of a breakwater on the Smithic Sand appears to them to be one means of accomplishing this desirable end, as it would enclose an area of water, with an entrance from the east and another from the south-south-west, more than sufficient for the present, and equal to the growing, mercantile necessities of our country. Nor must it be forgotten that, even with that shelter afforded, there is still on the west the Harbour of Bridlington, capable of affording additional shelter if required. It will be apparent that a harbour of refuge thus formed could be taken either by the eastern or southern entrance in every wind, and that vessels would also have the same facilities for egress, whenever it might be apparent that they could safely proceed for their respective ports of destination. The enlargement and improvement of the present harbour would be another means of giving the required protection.

BRIDLINGTON.

Mr. T. Prickett.

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Your memorialists have not prepared themselves with engineering plans and estimates of the cost of the breakwater, to the erection of which, as a means of saving life and property, they respectfully direct your attention, believing, as they do, that the interests at stake are not local nor particular, but general and national, and therefore claiming the paternal consideration of Government itself; and further, that such evidence is superfluous, your Honourable Commission being no doubt, by experience of similar works, well acquainted with the probable cost thereof. Neither will any evidence of a statistical character be laid before you, but that only of nautical men well acquainted with the coast, and the immediate locality under consideration in particular.

Your memorialists are highly sensible of the onerous position they occupy in counselling, by the evidence they are prepared to lay before your Royal Commission, your judgments on this important undertaking. Having no local interests to support, but approaching the subject for a national good, with a desire on behalf of humanity that the most suitable place on our shores should be selected, and being firmly impressed with the belief that Bridlington Bay possesses in its natural condition many advantages over other places claiming your consideration, your memorialists would be guilty of culpable remissness if they did not earnestly direct your attention thereto, and show in evidence that the erection of the proposed breakwater would have the effect of affording a safe rendezvous, not only for our mercantile marine, but for no inconsiderable portion of the British navy.

Your memorialists earnestly hope that your arduous labours in connection with this laudable and humane project will shortly come to a close by the selection of the most suitable locality; and they feel confident that the commencement of the erection of a harbour of refuge will be hailed with proud satisfaction by the many thousands of mariners who throng our eastern coast.

Your memorialists, therefore, humbly ask that the evidence they are prepared to tender may be heard, and that, though limited, yet capable of great extension, it may be duly entertained and considered by your Royal Commission.

And your memorialists will ever pray, as in duty bound, &c.

Mr. William Hopper examined.

Mr. W. Hopper.

23,391. (*Chairman.*) How long have you followed the sea?—Thirty-seven years.

23,392. How long is it since you came on shore?—Rather better than 12 months ago.

23,393. How many years did you command vessels?—Twenty-seven years.

23,394. In what trade were the vessels which you commanded chiefly employed?—Principally between the Tyne and the Thames; occasionally I have gone to the Baltic.

23,395. You are aware of the objects of the inquiry?—Yes.

23,396. Give any opinion which you may entertain as to the advantage or necessity of one harbour of refuge on this particular district of coast, that is between the Tyne and the Humber?—I think that Bridlington bay is the most eligible place on this coast for a harbour of refuge.

23,397. Will you state your reasons?—In the first place it is a promontory at Flamborough Head, which protects it from the north-east and north gales, which are the heaviest on this coast; another thing is, that it is accessible at all times, either night or day, and in thick weather it is accessible by heaving the lead; whereas, on the north side of Flamborough Head you cannot run into any port by the lead, because there are not soundings to the north of the Head.

23,398. The anchorage which you advocate under Flamborough Head would be of service to laden ships?—With a breakwater on the Smithic it would materially.

23,399. Have not laden ships, with the wind from the southward, very considerable difficulty in getting round the Head?—Not at all; I have known vessels drift round the Head with the flowing tide under close-reefed topsails, dodging round the Head; they do not like to bring up under Speeton cliff; we have nine hours flood, or more than that.

23,400. Running to the southward?—Yes.

23,401. Are you prepared to state that with the wind at south-south-east, or with the wind round at south, blowing hard, a vessel could get round the Head with a flood tide?—Yes.

23,402. And come round south and get into the bay?—Oh yes.

23,403. Have you ever done that?—Yes; I have many times come round the Head when all the ships were bringing up under Speeton cliff, because I was coming in to the harbour; if there were a harbour in the bay the vessels would come round into it; it is because they get shelter from the south that they stop there; it is not to say, they cannot get round Flamborough Head.

23,404. What depth have you at low water on the Smithic sand?—Two and a quarter fathoms.

23,405. With the wind blowing in from the south-east and south-south-east, is there much sea in Bridlington bay?—At high water there is; there is a strong sea, but at low water it is protected by the sand.

23,406. Can a ship lay there at high water in safety, if it is blowing hard?—If she have good ground tackle she could; I have ridden there when there was too much sea to take the harbour.

23,407. Ridden with safety?—Yes.

23,408. During the course of your experience, have you seen many ships riding out gales of wind from the south and the south-east, in Bridlington bay?

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Chairman.

—Yes, about 20 sail rode out the gale about a week ago; those that did drive, their anchors were unstocked; the Filey people got up evidence showing that they drove with their anchors.

23,409. What wind makes the worst sea in the bay?—East-south-east.

23,410. That blows, in point of fact, right in?—Yes.

23,411. Between the sands and Flamborough Head?—It comes right over.

23,412. That makes the worst sea into the bay?—Yes, at high water; at low water it is sheltered by the sand.

23,413. During the gale the other day, was the wind in that quarter?—Not so much east.

23,414. And none of these vessels drove?—No, only one, a schooner; both her anchors were unstocked; one of the boatmen got them.

23,415. How many anchors had most of them down?—Two anchors.

23,416. What scope of cable?—Perhaps 70 or 80 fathoms on one anchor, and perhaps 40 on the other.

23,417. Is the tide strong in the bay, does it run round strong?—It does, stronger than it used to do; vessels lying at anchor now will tend to windward with a fresh wind, whereas I can recollect when they always rode head to wind.

23,418. What is the strength of the flood tide at the strongest?—Perhaps about 1½ knots.

23,419. Not more?—No.

23,420. These vessels rode out the flood as well as the ebb?—Yes, those which wished to ride; but those that wanted to slip and come for the harbour, came.

23,421. There were ships that rode out the flood as well as the ebb?—Yes, about 20 sail, or thereabouts.

23,422. Have you seen the same kind of thing before on any occasion?—Yes, several times, and never in my life knew of a vessel driving on shore with her anchors down.

23,423. You know the Downs?—Not well.

23,424. You have been there?—Yes.

23,425. You have been at anchor there in heavy weather?—Yes.

23,426. Comparing Bridlington bay with the Downs, which should you call the best shelter?—I would sooner take Bridlington bay than the Downs.

23,427. You would sooner ride out a gale in Bridlington bay, with the wind in, than you would in the Downs?—Yes.

23,428. (*Mr. Lindsay.*) Then Bridlington bay as it is, is an excellent anchorage in all winds?—It is at low water time.

23,429. You say you never knew a vessel to drive on shore in Bridlington bay, with a gale blowing right into it?—No.

23,430. Do not you call that a very excellent roadstead, as it is?—Yes, but still it wants protecting from the south-east winds; vessels ride with a deal of sea.

23,431. If you have never known ships to drive on shore with a gale blowing right in, what is the use of spending the public money for the purpose of affording better protection than what it has now got?—They want to ride a little smoother; they make plenty of water in riding out a gale.

23,432. You want the money, not for the safety of the ship, but the comfort of those on board?—The safety of those on board, because some men have not got nerve to ride it out in the bay; they slip and run for the shore.

23,433. Is the Smithic sand a shifting one?—No.

23,434. What is the depth of the sand?—I do not know.

23,435. What is the nature of the anchorage ground, is it clay?—Yes.

23,436. Blue clay?—Yes.

23,437. With regard to the harbour at Bridlington, what sized vessels can come in in a gale of wind?—Vessels of 200 tons and upwards.

23,438. Laden vessels?—Light vessels.

23,439. What depth of water have you in the harbour?—I do not know.

23,440. Say that one great harbour were to be made, and that it rested between Filey bay and Hartlepool bay, putting Bridlington altogether aside for the moment, whether should you prefer Filey bay or Hartlepool bay, all things considered?—I think a harbour at Hartlepool would be of greater service than one at Filey.

23,441. Tell me your reasons?—Because vessels in going out northward, if caught with an easterly wind, cannot weather south. In coming back they cannot weather Whitby, and they will have a harbour on their lee in Tees bay.

23,442. You think, all things considered, if there is only to be one harbour the Tees bay would be a better site for it than Filey bay?—Than Filey bay, I do.

23,443. What part of the bay do you prefer?—Hartlepool.

23,444. Have you often gone into Hartlepool with the wind blowing strong?—Yes.

23,445. Have you seen much broken water?—Yes. I was there on the 4th of January 1857, and saw a great deal of destruction.

23,446. How was that destruction caused?—It was caused by vessels running in for the harbour. They were struck by the sea, when, perhaps, I would say, they were in 8 or 10 fathoms. They were struck by the sea as I saw them going in; they became unmanageable, and four vessels foundered while I was standing on the pier.

23,447. If Hartlepool is so dangerous to take, on account of the broken water, why should you prefer it to Filey?—Because I think there would be as much damage done at Filey as at Hartlepool.

23,448. Does the water break there in the same way?—Yes, just the same.

23,449. Does it not break at Bridlington bay in the same manner?—No. It is low water when you get to the southward of the Head; you fall in with less sea.

23,450. Consequently with less broken water?—Yes, of course; the soundings get right down to the land.

23,451. If there were a harbour made at Filey and another at Hartlepool, would you have as much hesitation in running for the one at Filey, on account of the broken water, as you would have in running for the one at Hartlepool on the same account?—I should rather prefer taking Hartlepool.

23,452. In a gale of wind?—Yes.

23,453. (*Capt. Washington.*) What number of vessels have you ever known in Bridlington bay at one time?—700 sail.

23,454. Does it frequently occur that large numbers of vessels enter that bay?—Very frequently.

23,455. How often in the year, do you think, upon the average?—Perhaps 20 times, and more than that.

23,456. You do not mean to say that 20 times a year there are 700 vessels there?—Perhaps from 200 to 500.

23,457. You think you have seen as many as 700 at once?—I think I have.

23,458. In what wind would that be?—A north-east wind.

23,459. Do these winds last long?—Yes, a long while.

23,460. How long are vessels detained generally?—A fortnight or three weeks sometimes in the winter season.

23,461. Out of that number of vessels, do many wrecks occur in Bridlington bay?—Yes, several sometimes.

23,462. Do you know, within your own recollection, of any wrecks having occurred here?—No, I cannot speak from recollection.

23,463. How long have you resided here?—All my life.

23,464. If you don't know of any wrecks, does any one?—Yes, other people do; but I cannot bring it to

mind if there have been any. I believe you can get an account of the wrecks for years past.

23,465. Do you know of any lives having been lost in Bridlington bay ?—Yes.

23,466. How many ?—A vessel foundered at the pier head some years ago, with eight or nine hands on board.

23,467. How far off the pier head ?—In last February, I think it was, a vessel foundered here at her anchors.

23,468. Right in the bay ?—Out of the bay ; she was not protected from the Smithic sand ; she was more in the south line.

23,469. Would any breakwater on Smithic sand protect the number of vessels you speak of ?—Yes ; the breakwater on Smithic sand would protect a space of 3,920 acres.

23,470. How do you know that ?—By calculation.

23,471. Have you seen a plan showing a breakwater on Smithic sand ?—No.

23,472. Is there any plan ? Have you ever seen a design for a breakwater on Smithic sand ?—Yes, there is one in the room.

23,473. Besides those immediately on the table ?—Yes.

23,414. Do you know if there has been any boring in the Smithic sand ?—I do not know of any.

23,475. What depth of water is there upon it ?—$2\frac{1}{4}$ fathoms.

23,476. Nothing less than that ?—Nothing less than that.

23,477. There are buoys at each end of it ?—There are.

23,478. Are they ever moved ?—The north buoy has at times moved out of its place. That would be on account of the sea breaking on it.

23,479. It has broken away by the sea ?—Yes.

23,480. What I wish to know is this,—are the buoys ever moved in consequence of the sand extending ?—No, I do not know that they are.

23,481. The buoys lie in about the same place you have always known them ?—Yes.

23,482. And you have known the bay how long ?—37 years. I went to sea 37 years ago.

23,483. And you have no reason to suppose that the sand shifts in any way north or south, inwards or outwards ?—I have a chart in my hand about 100 years old, which shows that the Smithic sand has not altered at all since then. (*Witness handed in a chart prepared by Grenville Collins.*)

23,484. Do you know the year of the chart ?—There is a book of charts about that date, in 1759.

23,485. As late as that do you think ?—Yes, about that.

23,486. That chart shows that there is about the same depth as at present ?—There is rather less there according to the soundiugs on the chart.

23,487. Have you any reason to suppose that any part of the bay is silting up ?—None at all ; I have reason to think it is deepening.

23,488. Do not the cliffs wash down ?—Yes, to the southward.

23,489. What becomes of the stuff which is washed down ?—I suppose it deposits itself in the Humber.

23,490. How does it get there ?—It is swept away to the southward.

23,491. Is the set from the north-east ?—From the north to the south or south-east. With easterly wind it sets away to the southward very strongly.

23,492. Have you yourself recently taken any soundings in the bay ?—Yes.

23,493. How lately ?—About a fortnight ago.

23,494. What did you sound with, lead and line ?—Yes.

23,495. Have you been in the habit of taking soundings ?—I have been accustomed to heave the lead all the time I was at sea. When I first went to sea we used to find our way by the lead and not by guide ports. We were well practised in the lead then.

23,496. You say, of your own knowledge, that the bay is not silting up in any way ?—I say it is not so, according to my knowledge.

23,497. Where do all the vessels you have mentioned as anchoring here find supplies ?—From Bridlington.

23,498. Are there sufficient supplies and facilities for sending provisions and water to the ships ?—Oh yes. We have two markets, one at the quay and the other at Bridlington. We have always plenty of beef and bread for them, if they have to take it warm from the bakers' shops.

23,499. Can the boats always come for it ?—Not always ; not in easterly gales. With the wind from the north-east they can.

23,500. With the wind how much further out than north-east can vessels lie here ?—Until the winds are east and by north they have shelter under the Head.

23,501. I think you said it is your opinion that if a refuge harbour is to be made anywhere along the coast between the Humber and the Staples it should be at Bridlington ?—It is my firm opinion that this is the most suitable place for a harbour.

23,502. If two harbours are to be made, where should the other be ?—At Hartlepool.

23,503. (*Capt. Sulivan.*) Were the 700 vessels to which you alluded nearly all light vessels bound to Newcastle ?—The principal part of them.

23,504. The bay is very much used, I believe, by light vessels bound to Newcastle ?—Very much indeed.

23,505. If they find a harbour on the south side of the Head so valuable to them, would not laden vessels bound south find a harbour on the north side more valuable to them ?—I think they would have no difficulty in getting round the Head into the harbour to the south of it.

23,506. If hundreds of vessels anchor and dodge under the Head for protection from south-east winds, does not that show that laden vessels would prefer a shelter on the north side ?—No, it would not. I think that south of the Head there is a better line to go southward. If you are in Filey bay with the wind to the east you must stop there.

23,507. You say that Hartlepool would be the best place because vessels returning to the north get embayed ?—Yes.

23,508. Do you think that Hartlepool would principally save light vessels bound northward ?—Yes.

23,509. Is it the case that vessels bound southward and laden, more frequently get to Flamborough Head, and there their difficulty commences ?—They very frequently get nearly the length of the Humber.

23,510. A harbour near Flamborough Head would save most laden vessels ?—Yes.

23,511. If the wind is to the east enough to get laden vessels round the Head, do not they often fetch the Humber ?—Yes. If the wind is at the east with a good offing they will fetch the Humber. It just depends upon the offing.

23,512. If they cannot weather the Head with south-east and south gales where would be the best shelter then ?—They want a harbour to the north of it.

23,513. If this bay be so good that it affords protection to all light vessels bound north, if they choose to take it, and often would save life if laden vessels anchored in it, would you lay out more money upon the place, when further north there is no shelter at all equal to this, and vessels have no alternative but to go on shore for want of a harbour ?—I cannot understand that question rightly.

23,514. You say you would lay out money to make a harbour of refuge here ?—I am not talking of laying out money.

23,515. But you would advise the Government to do so ?—I say we want a harbour. I should not advise any one to lay money out.

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23,516. As the bay is evidently at present, from all the evidence before us, by far the best harbour of refuge between the Humber and the Firth of Forth, would you not think that the outlay to make another harbour should be somewhere where there is not such a refuge, and where vessels may be caught without a harbour to go into?—Of course they want protecting here with the south-east and east gales.

23,517. You told us that even with these gales you had never known a vessel drive?—No; that is a proof that the ground is good holding ground.

23,518. Between this place and the Tyne do you know any place where deep colliers can ride out easterly gales in safety?—No. Deep colliers cannot ride here in safety. I have been speaking of light vessels.

23,519. You say you have seen laden vessels?—Not laden vessels. I saw light vessels. There are now laden ones that take shelter here with north and north-east winds.

23,520. With south-east winds?—No, they never come in here for shelter with south-east winds.

23,521. How many vessels have you seen to the northward of the Head dodging under or about Speeton cliffs?—As many as 100.

23,522. If so many as 600 or 700 vessels are caught here by northerly winds would there not on the average be as many laden vessels caught by southerly winds to the north?—No. I think the light vessels accumulate more than the laden ones do.

23,523. The laden vessels come out of the ports in large fleets at the same time and tide?—Yes, they do, and sometimes we have 300 or 400 light vessels come out of Yarmouth Roads together. They get the length of the Head, and come into Bridlington bay.

23,524. The laden vessels come out of the different ports with a slant of wind, hundreds together, do not they?—Yes.

23,525. Do they generally get to the Head before their difficulty commences?—Generally off the Head.

23,526. Then a harbour in the bight of the bay would not be so valuable to these vessels as one near the Head?—A harbour here would be as valuable to them.

23,527. A harbour in the bight of Tees bay would not be as valuable to these laden vessels as a harbour somewhere near the Head?—Certainly not.

23,528. If you had to do all in your power to save life and property would you consider that a harbour near the Head for laden vessels would save more life and property than one anywhere in the depth of the bay?—Yes.

23,529. Is there much more danger in laden vessels than light ones?—Yes.

23,530. Is there very much more loss of life if a laden vessel goes on shore?—Yes, considerably so. She strikes a long way from the shore, and it is very often difficult to get to her safely, and she soon breaks up.

23,531. If there were two harbours, one near the Head and the other in the bight of the bay, would it be the case that the one near the head would be principally used by laden vessels, and the one in the bight of the bay by light vessels?—I think the one off the Head would be used by laden vessels, and the other also, but not by so many, because when the vessels come out of the port they always expect to get a run up to the Head.

23,532. If there was a harbour near the Head for laden vessels, would it save them the risk of being driven back to the northward?—Very great risk indeed. A great many vessels run back for Hartlepool, and sometimes founder before they can get there.

23,533. Leaky vessels?—Yes, leaky vessels.

23,534. Are there many of that kind in the coal trade?—Sadly too many.

23,535. Are there many of that class of vessels in which the men get worn out at the pumps after they get up to the Head?—Yes.

23,536. For all this class of vessels would a harbour at the Head do better than one in the bay?—Of course it would.

23,537. Have you been in the colliery trade?—I have been principally in the coal and corn trade to London.

23,538. Do you know how the old ships come to an end; are they ever so unseaworthy that they are condemned and broken up?—They run as long as they can, and then they are obliged to knock them up.

23,539. Have you ever known old colliers broken up, and sold as old timber?—Yes, several times.

23,540. Is it a rare thing?—I do not know. We often have them broken up here on the beach.

23,541. I do not mean wrecked, but have you known vessels fairly worn out, so that the owners would not send them to sea for fear of danger, but condemned them and broke them up in port?—No. As long as they will serve at all, they will send them to sea.

23,542. Is it the common ending of colliers either that they drive on the beach, and are broken up, or founder at sea?—The old colliers, a deal of them, founder at sea. I should think the greater part of the old colliers in a gale of wind founder at sea.

23,543. Does the fact of there being so many old colliers in the trade make it more important to have a harbour for deep-laden vessels at the Head?—Yes. They come to the Head in fine weather. If they knew a gale of wind was coming on they could pop into a harbour and be saved. Where there is no harbour they are driven to the north and cannot keep the sea, and in running back will founder; and sometimes will run for port, and be lost on the bar, and perhaps the crews with them.

23,544. (*Chairman.*) You stated that you recollected an occasion on which 20 vessels rode out an easterly gale under the Head in Bridlington bay?—Yes.

23,545. Were those laden or light vessels?—Light vessels.

23,546. As a general rule you do not recollect to have seen any laden vessels riding out gales of wind under the Head?—No; we never have laden vessels running into the bay.

23,547. When do the vessels come in?—They come in with the north-east wind.

23,548. And the wind backed round?—It backed round to the eastward.

23,549. Comparing these light colliers with other vessels do they generally ride easy at their anchors?—The light ones do so.

23,550. Very easy at their anchors compared with the general run of vessels?—Yes.

23,551. Do you recollect what masts and yards these vessels had up?—Some of them had the top-gallant yards left, some of them had them struck. I think there was one brig in the bay had her top-gallant masts struck. They sent no topsail yards or lower yards down.

23,552. You have stated that a great number of colliers are bad in their hulls?—A great many of them are old vessels.

23,553. How are they found with sails and rigging?—Some pretty middling; some very bad; I have known them come into the bay with all the sails blown from the yards.

23,554. Do they generally take spare sails and so on?—Some of them, but they are no better than those that are blown away.

23,555. Some of them do not even take spare sails?—I do not know.

23,556. We had it in evidence in one or two places, that ships that are owned by men who have been seafaring men before they were owners, are generally better than other ships; how is that in your experience,—is it so or is it not?—No doubt of it.

23,557. It is further given as a reason that probably the men who had been seafaring men, better understood what ships wanted?—To be sure.

32,558. Should you say that that is the reason?—Of course, decidedly so; there is a great deal of

people who own ships and who do not know the right end of them.

23,559. I have also been told, and not very long ago, that these men who own ships and do not know the right ends of them, that they are not chary about giving their money to find the ships, but that masters occasionally appropriate the money, does that ever happen ?—I do not know ; I think a master would be very much to blame; if he had the privilege to find his own ship, he would surely find her well in stores and in rigging. It is very natural to think so.

23,560. Then within your experience do you ever recollect masters who have been prosecuted for appropriating money which has been given them by their owners to find their ships, and putting it into their own pockets ?—No; he would not be fit to be a master if he did.

23,561. You know Hartlepool well ?—Yes.

23,562. And the land about it ?—Yes.

23,563. Is Hartlepool a place that in thick weather you can run into by the lead ?—No, not if you come from Flamborough Head. You might if you had seen Hartlepool before it came thick.

23,564. But running into Hartlepool after thick weather, could you make it with the lead ?—No.

23,565. Why ?—Because you may as easy get into the Tees as into Hartlepool.

23,566. Cannot you tell by the nature of the bottom when you are running into Hartlepool ?—If you are to the northward you can.

23,567. But not if you are to the southward ?—No.

23,568. On the Yorkshire side of Redcar, to the southward of Hartlepool you find the soundings similar ; therefore, if you are to the southward of Hartlepool you might run for Tees bay, when you fancied you were running for Hartlepool ?—Yes.

23,569. What kind of land is that about Hartlepool to make in thick and hazy weather. Is it land that is easily known when you see it through the haze ?—You can if you see Hartlepool Heugh.

23,570. It has been a question before us, whether, supposing we had a harbour up in the neighbourhood of the Head—whether it be at Filey or Bridlington bay—whether we should not have something else further to the north ; or whether it would not be better to endeavour to improve the three ports of the Tyne, the Tees, and the Wear, so as to enable them to take ships at low water drawing 16 feet ; would you do that, or would you put one large harbour somewhere at the bottom of Tees bay. Which would be the best thing for the purpose of saving life ?—I think one large harbour in Tees bay.

23,571. You prefer that to endeavouring to improve the other three ?—Yes.

23,572. And why ?—Because I think there would be less risk in taking Hartlepool harbour, than there would in taking the harbours to the north.

23,573. Why should there be less risk ?—Because it runs further into a shoaler water. Improve Hartlepool you would get into shoal water, while by improving the other harbours you get into deep water.

23,574. Is it not better to have deep water to run for in a gale than shoal water ?—Not if you want to find it by the lead.

23,575. I am asking which would be the safest place to run for in bad weather ?—I should take Hartlepool.

23,576. Why ?—Because I think it would be a better place to take in northerly gales.

23,577. Why ?—Because as you draw in you find shelter under the Heugh.

23,578. In southerly gales how would it be ?—It would have shelter from the Yorkshire land with the wind from the south.

23,579. Altogether you think that would be better than improving the other three ports, that it would do more to save life ?—I think it would.

23,580. Have you ever in the course of your experience been in risk of losing your life or your ship in running into these harbours ?—No.

23,581. Have you ever been caught in the Tees by a gale of wind on shore and had to work off to windward ?—No.

23,582. What chance would a ship fairly embayed there have of getting off to sea with the wind on shore ?—If it was blowing a gale there would be no chance.

23,583. Is there much indraught into the bay ?—Undoubtedly.

23,584. (*Mr. Lindsay.*) If the Tyne, Wear, and Tees were improved so as to admit vessels at all times of the tide, do you still think that one great harbour at Hartlepool would be of more advantage to the saving of life and property ?—I think it would.

23,585. Why do you think it would be better if the harbours could be so improved to the depth I have named ?—I think the sea would be so tremendously heavy between the two pier heads.

23,586. Why would the sea be so much heavier ?—On account of the deep water and the bold shore.

23,587. Is the sea worse to take in deep water than in shoal water ?—When it breaks it is.

23,588. But is the sea more liable to break in deep water than in shallow ?—It is liable to break at the pier head, and would break there heavily.

23,589. But if the pier head were carried out to the depth of 20 feet at low water, would there be danger still ?—There would be a very heavy sea breaking at 20 feet water—very heavy indeed.

23,590. You think it would be more dangerous to take in gales of wind ?—I think it would.

23,591. (*Capt. Sulivan.*) Do you consider that the tide coming out of these rivers would add greatly to the danger ?—Yes ; the freshets would add greatly to the danger.

23,592. Meeting the sea ?—The tide meeting the sea.

23,593. If the piers at these rivers are dangerous, although they are carried out to deep water, say, to 20 or 25 feet, must not the entrance of the harbour at Hartlepool be at least, in that depth, to be useful, or even deeper ?—Yes, it must.

23,594. Then would it not, being deeper, according to your argument, have a heavier sea ?—I think, at Hartlepool it does not open so suddenly as it does to the north.

23,595. You mean, does not come so suddenly from deep water into the channel ?—Yes ; at Hartlepool it gradually descends.

23,596. We understand that the sea breaks in seven or eight fathoms off Hartlepool ?—Yes.

23,597. Should you fear running through that ?—Not at all ; after getting through the first. That is where all the damage is done.

23,598. What depth have you seen it break ?—I have seen it break in eight fathoms.

23,599. You think it is the first sea by which the damage is done ?—That is where the damage was done in January 4th, 1857.

23,600. Supposing you had a harbour with an entrance in eight fathoms water, and a harbour with an entrance in five or six, do you think that the sea breaking in eight fathoms would make it worse further in ?—The first sea is always the worst when you are running against the sea. When you have got through the first break you are amongst light sea, as it were.

23,601. Supposing the entrance to the harbour was just where the outer wave comes, would that make it more dangerous than if it were two or three runs inside it, though in shallower water ?—Yes, I think it would.

23,602. (*Chairman.*) You say that the worst sea is that which breaks outside all, that is the first and heaviest sea ?—Yes.

23,603. What has induced you to form that opinion. Have you actually tried the thing pretty often ?—I have watched it on the north coast in many of the ports when vessels were taking the harbour. I have

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noticed in taking the Tyne and Hartlepool, that ships get the most damage when the first sea has struck them, and that if a ship gets through that first sea, she would always steer, but when the first sea struck her perhaps it would turn her round on her broadside and knock her down.

23,604. When a ship was once through the first sea you would say she was pretty safe ?—Yes, of course.

Mr. JAMES HERITAGE examined.

Chairman.

Mr. J. Heritage.

23,605. (*Chairman.*) You reside at Bridlington ?—No ; my home at present is at Hull.

23,606. How long have you followed the sea ?—Somewhere about 38 years.

23,607. Have you always been in fishing vessels ?—Nothing else.

23,608. How long have you been in command of one ?—I am 50 years old now, and was 23 when I first took charge.

23,609. On what part of the coast have you principally followed your occupation ?—Within the last 20 or 22 years about here, round upon the Dogger Bank, and all about.

23,610. You know the object of our inquiry ?—Perfectly.

23,611. Give us your opinion about it, as to a harbour of refuge on this coast. Where is the best place for it ?—According to my experience, everything is in favour of this place. The height of our fishing is in the winter time in all kinds of gales of wind. We fish from Flamborough Head right upon the Pits upon the Holland coast, right round about. There are 200 sail of vessels from 40 to 60 tons, sailing out of the port of Hull. We actually fish in this desperate weather. If there is anything upon the sea we mostly pick it up ; that is wreckage and disabled vessels. It has been known in the course of a winter that we have saved many lives. I have known the vessels bring up three or four ships' companies, whose vessels had foundered underneath them. The most of the disasters are in deep ships, collier brigs, off the land mostly, above the Head. If they come out of the northern ports we pick them up. With an easterly wind coming up, they always keep a good berth off, and if the wind should happen to change when they get up, if they cannot get into the Humber, they generally lay their head to sea and we are sure to fall in with them ; we must come to market with our fish. Bridlington is our regular rendezvous. I have come in in gales of wind to land fish. The fact is, twice in my life I have come in here with the wind at east, and rode out the gale of wind with other light ships. I have seen many ships slip from their anchors and go to the port of Bridlington. Some of them have done themselves great damage, but at the same time they have left 20 or 30 sail riding. And when a collier brig has slipped from her anchor leaving a slip buoy on the chain, I have taken it up in the gale and ridden secure with a vessel of 40 tons, and in a gale of wind veering to east and by south. We seldom had much water on the decks. My opinion is, that if there is a harbour of refuge anywhere about here, we should not fall in with so much disaster as we at present do at sea.

23,612. As respects your vessel taking up the buoy, you rode by the buoy rope ?—No, we hauled in and shackled our chain on to the other.

23,613. Precisely ; your vessel was light, I suppose, and rode well, did she not ?—We are always in ballast trim.

23,614. Therefore you ride easy at anchor ?—Yes.

23,615. Is it your opinion, like that of a former witness, that light colliers ride easy at their anchors?—Yes, they ride easy to all intents and purposes, and I believe there are no vessels on the coast that have better ground tackle.

23,616. As respects your own vessels, they are very good boats, are they not ?—Yes, they are.

23,617. There is hardly any weather on this coast in which you could not keep the sea if you liked ?—No ; we actually go out in gales, and it must blow very hard when we cannot fish.

23,618. It must blow still harder when your vessels are in danger?—Yes; but I have seen them in danger sometimes.

23,619. Have you ever, during the course of your experience, been in great danger of being lost in a fishing vessel?—Yes, many times; when it has looked rather comical, when anybody would look straight down the nose at it, and see the water on the deck, not caring much about leaving it. That is in those hurricanes, not gales of wind.

23,620. It must be very bad when it comes to that?—Yes.

23,621. Does that happen once a year, or once in half a dozen ?—I have not experienced it more than seven or eight times in my life.

23,622. You say, it is very desirable to have a shelter for loaded vessels which are caught off the Head ; is it much matter whether it is on the north side of the Head? Does it make much difference ?—No ; there might be a harbour on either side, whichever in your judgment is the best, the cheapest, and the easiest.

23,623. According to your judgment, as long as it was in the neighbourhood you would not care much which side it was ; you would leave that to us ?—To the best of your ability.

23,624. What is the greatest number of these vessels that you ever saw knocking about off the Head at any time, deep laden colliers ?—They vary ; not very great numbers when it is blowing that way; they are driving off; our vessels go a long way, and go through them scattered by threes, and fours, and fives and sixes. The winter days are short, and we soon pass our day.

23,625. No doubt there are great numbers ?—Yes.

23,626. Do the light colliers come running down in great crowds ?—In great bodies.

23,627. They all sail pretty much at one time ; they get together and sail at one time?—Yes; in Yarmouth Roads or other places of shelter they accumulate very fast.

23,628. Within your knowledge, have any disasters arisen at sea from the light vessels running the loaded ones down, or that kind of thing ?—There have been several like that.

23,629. Should you say that happened often, or not ?—Not often.

23,630. Should you say they stand as bad a chance of being run down by steamers as by light colliers ?—I should say, 500 times more.

23,631. (*Capt. Washington.*) I think you told us that 200 boats fished from Hull ?—Yes.

23,632. Of 40 and 60 tons burthen ?—Yes.

23,633. Do you include Bridlington in that ?—No.

23,634. Do any of them belong to Bridlington ?—No.

23,635. Are there fishing boats from Bridlington besides ?—Oh, yes, from all the coast round.

23,636. How many ?—The number I cannot exactly say ; but, I should think, from Staiths to Lowestoffe we should not have less than 2,000.

23,637. Do many of these boats land their fish at Bridlington ? — Yes ; sometimes there is a great batch.

23,638–9. How many have you known land their fish at one time ?—I have seen a great number of smacks in the bay. We usually make for here ; there is no other place in the bay where we can land our fish.

23,640. Do you usually land your fish here ?—Yes; and in fact many of our smacks use Scarborough, because we like to go to the place where we can get the most money for the fish. Scarborough is a place on the other side of the Head, and as soon as the wind comes on the coast, anywhere touching from the eastward, there is a very heavy sea, even when we can carry a gaff topsail. I have been in Scarborough harbour when a beautiful breeze at sea has made the sea there very heavy indeed. You find three times a

heavier sea to the north of the Head than to the south with these southerly winds, because the wind blows right across from Holland. There is no sea comparatively here, it cannot rise. It may break, but it cannot break so heavily as to the north of the Head.

23,641. Do the yawls more frequently land their fish at Bridlington or Scarborough ?—They are often compelled to land at Bridlington or Hull when they cannot look at the other side of the Head.

23,642. They do go up to Hull ?—Yes.

23,643. What number generally land their fish at Bridlington ?—I could not state any number, because there are several months that all the fishermen land here.

23,644. Do you go as far as the Dogger bank ?—Yes, and all about.

23,645. Are they all decked vessels ?—Yes.

23,646. How many men have you in each ?—We carry three men and two lads. The London smacks with the same tonnage would carry nine hands ; but they go upon wages, and if we do not earn a penny we do not have it, and therefore we try to do as much fishing as we can.

23,647. Are the fish landed here, sent by railway ?—Yes.

23,648. Where to ?—To London, Manchester, and all round the country.

23,649. At what time of the tide can you get into the inner harbour of Bridlington in your yawls ?—Our smacks draw from 8 to 13 feet water.

23,650. What is their tonnage ?—From 40 to 60 tons ; 62 or 63 it might be, but we have them cutter built. That is the reason they draw so much water.

23,651. You are speaking of smacks, not yawls ?—Smacks, fishing smacks ; they are generally smacks.

23,652. (*Capt. Sulivan.*) If there was a well-sheltered harbour near the Head, either north or south, would the large fleet of fishing vessels, in the winter particularly, find it of great value to come in and get rid of their fish, without going so far as the Humber ?—It would save us many a wet jacket. The reason we are compelled to go to the Humber is, because this bay is not sheltered from all winds, though sometimes we have to ride it out with the wind on, and we can ride here better than on any other part of the coast. To the northward of the Head we find no shelter at all.

23,653. At present there is deeper water everywhere to the north than you have here. The shoal water in this bay makes it comparatively safe anchoring for you ?—Yes.

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23,654. Suppose a large harbour was enclosed behind a pier at Filey, with perfectly smooth water inside, would not that answer the fishing boat purposes just as well north as south ?—Two or three miles would not make much difference, and if it would suit your approbation to place the money there, it is three parts formed.

23,655. By the Brigg ?—Yes. But again on the other side you must understand that there is a great heavy sea, and if we built harbours and such like, we cannot stop the great heavy sea taking them.

23,656. (*Chairman.*) On which side of the Head do most casualties happen to laden vessels ? North or south ?—By my experience and what I hear from brother fishermen—because we generally know everything that is going on amongst us—most to the south of the Head, above it. If we go off east-south-east from the Head, then we strike the Great Silverpit above it.

23,657. As a general rule, you have assisted more vessels to the south than to the north of the Head ?—In that direction right off, we have picked up a great deal of disasters at sea. I have seen in one gale one of our smacks to bring up the whole ships' companies of two vessels. As a body of men we save a great deal of property and lives.

23,658. Those are vessels that make water and go down at sea ?—Some of them. In these gales we have got enough to do to take them out of the ship, and the ship sinks very shortly afterwards.

23,659. In how many cases of that kind have you taken the men out ?—Only three I have been in myself, but I have been personally acquainted with what has happened.

23,660. How many do you know of ?—Sometimes in the course of a winter, and it is not a pleasant thing to see, I have known something like 20 or 30.

23,661. In a winter ?—Yes ; I have known something like 50 of our fishermen drowned in a winter in these gales.

23,662. Then would you say that within your knowledge, and from the information you have, as many as 20 vessels go down at sea in one winter ?—No ; I have known as many as four in one winter. All the rest were brought up, over three or four that had been completely sunk, and the remainder have been brought up disabled, and have been towed in.

23,663. Disabled but not foundered ?—Yes ; not foundered.

Mr. A. Moore examined.

Mr. A. Moore.

23,664. (*Chairman.*) Do you reside at Shields ?—Yes, South Shields.

23,665. You are a ship owner and a North Sea pilot ?—I am, a pilot and ship owner.

23,666. How many years have you been a pilot ?—Eighteen years, I think ; I was pilot to one of Mr. Lindsay's ships.

23,667. Previous to being a pilot, did you follow the sea ?—I have been 50 years at sea on this coast.

23,668. In what trade were the vessels chiefly employed ?—I was about 12 or 14 years master of a ship.

23,669. In what trade was she ?—From London to Shields.

23,670. The coal trade ?—Yes.

23,671. If you are to have a large harbour on this part of the coast, where would it be most useful for saving life ?—I will tell you my opinion, and it is this, where you are now ; I do not know another place besides it to make a refuge for ships, because it is a place for both light ships and laden ships ; I have in my time put in here in gales, at different times ; I say I have been all my life time down on the coast, and I was obligated to put into this harbour for refuge to save my life and ship.

23,672. On that occasion did you ride a gale at anchor here ?—Oh yes, north-north-east.

23,673. Not further round ?—No, not further round.

23,674. At north-north-east you have capital shelter under the Head ?—Yes.

23,675. And have you ever ridden a gale out with the wind right out from the east or east-north-east ?—No, never from there, only north-north-east.

23,676. You are decidedly of opinion that you ought to have this harbour up in the neighbourhood of the Head ?—That is my opinion ; I have been many a time to Hartlepool, but that is not a place to run to with a gale of wind ; it is all broken water there across.

23,677. How far out have you seen the sea break at Hartlepool ?—I think sometimes in 7 fathoms water ; I have seen it break at Shields at 10 fathoms sometimes, in a gale on the bar.

23,678. Have you ever taken Shields bar in very bad weather ?—I have, with a ship from Hartlepool, drawing 18 feet water.

23,679. Was that during a gale of wind ?—Yes, right in.

23,680. What sail did you run in under ?—The pilot got on board with a steam boat ; the first man that came on board would not take charge, and I said if he did not, I would myself.

23,681. What sail did you run into Shields har-

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bour under on that occasion ?—Single-reefed topsails and topgallant sail.

23,682. What time of the tide ?—Just about the top of the high tide.

23,683. Was it breaking very heavy ?—Heavy ! she drew 18 feet water and only touched once on the bar.

23,684. It cannot have been blowing so hard as it does sometimes ?—It was blowing a gale of wind.

23,685. At the time it was blowing hard ?—Very hard in the tack from Hartlepool, and we were knocking about for about 4 days ; it was blowing hard when we went to Shields, but I had a little experience of the place, and crowded the canvass to carry me over the sea ; as I have heard a gentleman name to you, the first sea is the worst ; if it does not injure me by the next sea I shall be better off.

23,686. You agree with the opinion that the first sea is the worst sea ?—Yes.

23,687. Is it not the case that at Shields when it blows very hard the pilots cannot get out in their steam boats ?—I think it will blow very hard and the sea must be very heavy if the men cannot get out in the boat.

23,688. When they do get out, does it not blow so hard that the pilots cannot board the ships ?—No, they have a life boat on board the steam boat, and so they can get into the ships.

23,689. So that if the steamer once gets out, the pilot is sure to get on board ?—Quite sure.

23,690. You know the Tyne very well ?—I was bred and born there.

23,691. If it were improved, to take ships drawing 16 feet at low water, should you approve of it in preference to having a harbour in Hartlepool bay ?—I would approve of it ; I do not want it in Hartlepool bay, because it is shallow water; but at Tynemouth bar; there is room for improvement in all these harbours here, but Hartlepool is the worst for shallow water ; I ran a risk of my life there once.

23,692. On what occasion was that ?—I could not do any other than run with a laden ship.

23,693. How did that happen ?—With a gale from the south-east, and a ship making water, I thought she would not reach Shields and so went into Hartlepool, and laid her on the sand there ; the ship is alive yet, the *Harrison*.

23,694. Was the ship much damaged ?—She was a good deal damaged ; I had to discharge her, but she was repaired.

23,695. Why could you not reach Shields, the wind being from the north and east ?—As I came on the wind northered upon me, and I was obliged to go there ; I could find no other place.

23,696. If you had a good harbour to run into at Hartlepool, would you then have been very glad to have had it ?—Yes, I should have been very glad, but I do not see (excuse me for saying so) the place where you can make a harbour at Hartlepool ; I cannot see it, without it ran out in about 11 fathoms.

23,697. (*Mr. Lindsay.*) Just imagine yourself in a laden ship from Shields, bound to London, and that you are caught in a hard gale of wind upon the coast, somewhere off Scarborough or Whitby, and that you were able to weather away Flamborough Head; if you were able to weather Flamborough Head, is it the case that you would be able to get into the Humber ? —Some might get as far as the Humber, but I should not say it.

23,698. You and I are old sailors,—do not talk so fast ?—I am very glad we have a sailor man here.

23,699. Say you could weather away Flamborough Head with the gale, could you reach the Humber ?—I cannot answer the question ; it depends upon how the wind is.

23,700. I am telling you the wind is blowing from the east. Say, you were coming along with close-reefed topsails, the mainsail furled, and a reef in the foresail, and that you were enabled to weather away Flamborough Head four miles distant, and that the gale does not change, but continues to blow in the same direction, would you or would you not be able to reach the Humber?—No, I deny it. With a ship four miles off, under close-reefed topsails and a reefed foresail, she could not reach the Humber.

23,701. You would not be able ?—No, I should not.

23,702. With a laden ship with Flamborough Head 10 miles distant could you reach it ?—Oh yes, 10 miles, you would.

23,703. Is it, or is it not the case, that when a ship can weather Flamborough Head she can usually reach the Humber ?—No ; it depends on the distance that she is off the Head.

23,704. I am speaking of vessels caught in the usual track ; is it or is it not in general the case, that when a ship can weather Flamborough Head with a gale from the east, she can reach the Humber?—If only one mile off she cannot do it; but if 10 miles off, she can do it under close reefed topsails or reefed foresail.

23,705. What is the course from three miles to the eastward of Whitby Rocks to three miles to the eastward of Flamborough Head ?—I think about south-south-east $\frac{1}{2}$ east.

23,706. What is the course from three miles off Flamborough Head to Spurn point ?—About $3\frac{1}{2}$ west.

23,707. How many points can you keep away after you get abreast of Flamborough Head three miles distant in steering for the Humber ?—I would keep two points if I could.

23,708. You have only two points to come and go upon with a heavy gale of wind to encounter ?—That is two points lee way.

23,709. But you have two points more to come and go upon after you weather away Flamborough Head than you have before ?—That is right.

23,710. At least two points?—Yes, about two points.

23,711. From your long experience on the coast, tell me your opinion upon this point, say, there were to be only one harbour made between the Humber and the Farn islands, looking at the laden vessels and the light vessels, and the saving of life and property ; looking at the convenience of commerce, from being able to rest and wait a tide or two ; but looking more especially to the saving of life, tell me, where you think that harbour should be placed ?—I have been 50 years employed on this coast, and never got ashore anywhere but was driven to Shields Roads.

23,712. You have not made up your mind about it ? —I can only say that Bridlington Bay is the only place that I see, because it is formed of itself for it. I am not speaking against Hartlepool in that respect, because you might make a harbour there, but they must all be improved.

23,713. I want you to tell me what would be the best position between these places I have named. Where do you think a harbour of refuge would do most to save life ?—Here at Bridlington, because it is both north and south.

23,714. Do you think a harbour at Bridlington would save more lives than one at Filey ?—I do candidly.

23,715. What do you make of those laden colliers coming along a rocky coast, and not able to weather round Flamborough Head ; what is to become of them ? Did you ever hear tell of any getting on shore ?—You may tell of one here or there getting on shore, but not light ships ; they will not get out of a place before there is a fair wind for them to go well up.

23,716. I am speaking now of the laden vessels that leave Shields, Hartlepool, Blyth, and Sunderland, which come along the coast and are caught by south-east winds, and are unable to weather Flamborough Head. What is to become of them ; what position will save most laden ships ?—I say here. With a gale of wind at the east there is not a place. I have come in here with a gale of wind at north-north-east to save my own life and my ship.

23,717. Say a harbour was made here, and a laden ship could not weather away Flamborough Head; would it be any good to her ?—The ship has nothing to do but to put up her helm and come in here. I would make a passage about south and north, but she could not come in here if she could not weather the Head.

23,718. But if a ship could not weather away the Head, what would become of her?—She would have to go ashore at Filey.

23,719. If the Tyne was improved so as to give 18 feet at low water, would you, as an experienced pilot, have any hesitation in running for it in a gale?—Not in a gale of wind I would not; it depends upon the time of the tide.

23,720. Do you mean that, with 18 feet at low water, you would have any hesitation in running for it?—No, but I must know whether it is improved or not before I take charge of property.

23,721. Would you have any hesitation in running for it in a gale of wind?—No.

23,722. Would you have any hesitation to run for it with an ebb tide and a gale of wind?—I think I might contradict my opinion in that respect.

23,723. What would be the extra danger with an ebb tide and a gale easterly?—I think with an ebb tide, if the ship has any draught of water, there is the fear of getting aground, but I do not see there is any difficulty in a ship of 16 to 18 feet going to Shields Harbour.

23,724. I am speaking of the Tyne if it was improved, so as to have 18 feet at low water, and consequently a great deal more at high water; would you have any hesitation in running for it then with a ship during a gale?—No.

23,725. With an ebb tide?—I should like the tide to flow two or three feet.

23,726. Would you have any hesitation in running for it on account of the sea, with an ebb tide?—Yes, I should have an objection to run against the tide. Sometimes you are mistaken; the tide might be falling two or three feet, and the ship might draw about two feet more than there was on the bar.

23,727. (*Capt. Sulivan.*) You said that laden vessels bound south, after passing the Head, could take refuge here if there was a harbour?—Yes, I did.

23,728. Suppose the vessels have got 15 or 20 miles south, with a south-east gale they can fetch the Humber?—No, it is 35 miles before they get there.

23,729. If they had got 15 or 20 miles they would be far enough to the south-east to reach the Humber?—I ask you if she is 10 or 15 miles, whether she could get into the Humber, blowing a gale of wind south-east and by south, I will ask you that.

23,730. Vessels south of Flamborough, and not far enough to fetch the Humber, could take refuge here with south-east gales?—I do not mean to say they could not.

23,731. But with a harbour here?—Yes.

23,732. But the vessels that could not weather Flamborough Head with a south-east gale could not come in here?—No.

23,733. Vessels that had passed the Head and could not fetch the Humber, if there was a harbour at Filey, could they go back to Filey?—I do not know, I think you cannot make a harbour at Filey; I say they could come in here.

23,734. I wish you would answer my question. Suppose there is no harbour here, but that there is one at Filey?—If there is, of course I should go into it.

23,735. Those vessels that could not fetch the Humber with a south-east gale could go back to Filey, and all vessels that have not weathered the Head could go into Filey?—Yes.

23,736. Vessels both north and south of the Head could go into Filey?—Yes.

23,737. But only vessels south of the Head could come into Bridlington?—Both parties could go into Filey, whether light or loaded, if they had a mind.

23,738. And suppose there was a harbour where only loaded vessels which had weathered the Head could get in?—I do say that there is not a place that I know upon this coast that is more convenient for a harbour of refuge than this; I can bring in a three-decked ship round the buoy, and it will cost less expense than Hartlepool, or wherever you have a mind to put it.

Mr. JEREMIAH HUDSON examined.

23,739. (*Chairman.*) You reside at Scarborough?—I do.

23,740. Are you a seafaring man?—Yes, from 13 years of age.

23,741. How long were you at sea?—From 13 years of age, and now I am on the wrong side of 60.

23,742. How many years have you given up the sea?—About a dozen years.

23,743. How many years were you in command of vessels?—Ever since I was 22.

23,744. In what trade were the vessels chiefly employed that you commanded?—The coasting trade, the north of Europe, the American and the Mediterranean trade.

23,745. You sailed to foreign parts a good deal?—Quite as much as upon the coast; and I have been all round Ireland, England, and Scotland.

23,746. You are aware that one object is to find which is the best place for a harbour of refuge on this coast; will you give us your opinion on the subject?—Well, personal interest should have nothing to do with this, and therefore if I say Scarborough is the best it ought to be taken with great caution, because we would all recommend our own place as the best. If you wish to come to the subject as it is, and want only one harbour, take the centre between Spurn Head and Shields, no matter about Filey, Bridlington, Scarborough, or any other place, if that is the most dangerous part. Keep this in view, wherever you make a harbour, that you have it in accordance with the line of the tide; for if you have a harbour which is not in accordance with the line of the tide there is no danger of taking it when the tide comes against the wind.

23,747. I gather from your answer, that you would be disposed to put the harbour of refuge somewhere in the Tees bay?—That is, if you only want one, but if you wish two, by all means the Tees bay for one, and Bridlington for the other.

23,748. And if there was only one, where would you put it?—As near the centre between Spurn Head and Shields as I could find.

23,749. Where is the particular spot you are thinking of?—I have no particular choice myself; somewhere about Cloughton Wick.

23,750. Made in Filey, would it answer the purpose; would that do as a site?—Filey is very good, if you construct so that the outset will leave a clean turn round the harbour, between the harbour and the bay. That is one thing must be considered, looking at the outset; it is the same with Scarborough, you would have to look at the outset. Without you could leave that it would not be safe water one way nor the other.

23,751. Putting on one side local difficulties of construction, would you say that that point of the coast is a good one for a single harbour of refuge?—I should take that which I said, the centre, in preference to all others.

23,752. That would be about Filey?—No, Cloughton Wick.

23,753. Where is Cloughton Wick?—About five miles north of Scarborough.

23,754. Between Robin Hood's Bay and Scarborough?—Yes, between the south of Robin Hood's Bay and Scarborough. There the tide runs along the land, and the sea is as clear inside as outside; a very desirable object to accomplish.

23,755. If there was a second harbour to be made, where would you prefer it?—I should prefer this place and the Tees bay.

23,756. Would you put it at the mouth of the Tees or at Hartlepool?—I should just put it round by the Heugh. I have a good deal of experience; I happen

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to have a steam-boat and we generally go once a week for coals. It does not matter whether the weather is thick or not, when you go, you go by the lead. I was sorry to hear a man say that we could not fetch the Tees bay with the lead, there is no better place to fetch the Tees bay; it is the same as Filey, and Filey is a very good place to make with the lead.

23,757. I understand you to say that Hartlepool in your opinion is easy to make with the lead in thick weather ?—Nothing easier.

23,758. You have sailed in ships from the North of Europe; if you were running from the Baltic in thick weather, and had not had an observation for a day or two running for a harbour, would you have any hesitation in running for Hartelpool by the lead?—Not at all. Not by any means.

23,759. Is it by the depth of water or by the nature of the bottom that you could tell your position ?—The depth of water with the lead.

23,760. The depth of water only ?—Nothing else, because the charts generally give the information about the bottom.

23,761. What I mean is this; of course you know perfectly well that in ascertaining one's position by the lead, there are two things to look to, the first is the depth of water and the next is the character of the bottom, whether it is sand, mud, or whatever it is ?—The chart generally gives the character of the bottom.

23,762. Does the character of the bottom at the north and east of Hartlepool bay differ sufficiently to enable or assist you knowing where you are, in going in with the lead ?—It is a sand with this difference, that when you are south of Hartlepool it shallows gradually, but when north it does not shallow so gradually ; you carry deep water close up to the works.

23,763. But is there not mud in one place and sand in another, or fine sand in one place and coarse in another ?—There may be something of the sort, but nothing material, my reliance is on the lead or the depth of water.

23,764. Is the Hartlepool land easy to make in thick weather, and do you know it well when you see it ?—If you can make it at all, you see on the north side it is high and on the east low.

23,765. If you can see the land at all it is not likely to be mistaken ?—No, a goose could know it.

23,766. Have you ever taken these bar harbours in bad weather, and in gales of wind ?—Sometimes, but I would rather stop out at sea.

23,767. You think the danger of taking the bar harbours is so great that it is much better, if you have a good ship, to keep at sea ?—I always made it a rule if the ship's head would lie off the land anywhere to let her lie under easy sail tumbling easily, then she must be right.

23,768. You said you ran a vessel with coals ?—No, she goes once a week to get coals, the steamer *Fame*, a steamer as big as yours and as fine. She runs along the coast with passengers.

23,769. And she coals at Hartlepool ?—Yes, once a week.

23,770. We have heard a good deal about the sea in Hartlepool bay. Is there a heavy sea ?—Wherever there is an outset going against a strong wind there must necessarily be more sea than there is when you get past the outset. The same in the Tees bay and at Filey and Scarborough, it matters not what the outset is, it is the same in Portland roads wherever I go. Wherever there is an outset going against a wind there must be more sea than when you are clear of it. I see it is truth you want, and it is truth I will tell you to the best of my knowledge.

23,771. How far out do you say you have seen the sea breaking in Hartlepool bay in bad weather ?—Not more than half a mile outside the Heugh. Not more than 10 weeks ago I came out with a very strong gale when the other vessels dared not come out. I had a fair opportunity of seeing it, and we did not see the sea break a quarter of a mile outside the Heugh.

23,772. In what depth of water ?—Not more than 6 or 7 fathoms water.

23,773. Are you in command of the screw vessel at this moment ?—I have one laying at Scarborough, one I want to sell.

23,774. Are you the owner or are you sailing her ?—I am the owner.

23,775. Are you in command of the vessel yourself ?—I would not let her go without me, because I never insure.

23,776. I understood you to say it was 12 years since you came on shore. I understood by that since you resided on shore ?—I did four years, but I could not be idle, so I got a steam boat to amuse myself, although I am a ship sailor myself.

23,777. (*Mr. Lindsay.*) Say that there was only one harbour to be made, and looking especially to the safety of life, whether do you think a harbour at Filey—supposing there were no engineering difficulties in regard to Filey bay ; would a harbour there or at Hartlepool be most useful for saving life ?—There could not be a finer harbour anywhere than you could make at Filey, if you could remove the outset.

23,778. But leaving that out of sight for a moment, I want your opinion as to the position. Do you think a harbour at Filey would do more to save life than one at Hartlepool ?—That depends entirely upon the locality of vessels. Some ships are out here, and some off other places.

23,779. But all things considered, and looking to where ships are usually caught ?—I cannot give any opinion. Filey is a place I am very fond of, but there is that outset. It is proper you should be made to know the thing as it is really. Perhaps you have never been told about it. There were three yawls about to take Scarborough, which were upset by an outset, and nothing else. Now if that happened at Scarborough, what would it be at Filey ? They were upset, and all hands were drowned.

23,780. Is the outset so strong that in east gales of wind, raising up a heavy sea, it would be dangerous to run for it ?—More dangerous by half than to keep out at sea.

23,781. Would you think it more dangerous to take Filey, on account of the outset in a gale, more dangerous than a tidal harbour, supposing there was an equal depth of water ?—I should ; because the outset goes out more strongly than the tide out of the Tyne, unless there is a freshet, which is out of the usual way.

23,782. Is the outset stronger from Filey bay than what it is from Hartlepool ?—Considerably stronger. It is the outset at this place, Bridlington bay, that makes it so valuable. It runs here for an hour and a half before high water ; it runs to the north of the Head, and that enables light vessels, when the wind is coming out from the westward. As soon as the wind comes from the eastward we trip and turn to windward, and the outset carries us round the Head. When the wind is blowing east-north-east or east it forces the water under the land round by the Head. It blows off the bay, and the water runs round into Filey ; having gone in it will get out, and there is no mistake ; when water goes in it will come out. It finds no outlet until it comes along to Filey Brigg. It is precisely the same at Scarborough, as we have a proof before us, every time there is an easterly wind. When it comes along by the Brigg, the end of the Brigg, there is nothing to stop it, and it forces itself out, and that causes the outset, and the danger there is of the outset. I have come through it hundreds of times with the inset. Filey would be as good a place as any in the world when it goes in. It goes in for 12 hours, as well as comes out. This is a subject so serious that the truth should be told, and ought not to be concealed from anybody.

23,783. Do I understand you to say that the outset from Filey bay is so strong that you would rather run for the Tyne during an ebb tide and an easterly gale,

than you would run for Filey ?—Certainly, by all means I would, because I never knew the tide to come out of the Tyne more than 4 miles an hour at any time. Then when we get inside the bar we are in smoother water.

23,784. From your experience, then, what is the greatest rate at which you have found the outset come round the Brigg from Filey bay ?—That I never tried, but you may form some idea if you have ever been in the Race of Portland. The water comes from shallow to deep and then runs from deep to shallow.

23,785. (*Capt. Washington.*) But this outset, where does the water come from ?—It is simply that blown in by the south-east winds. It comes from the sea, round Flamborough Head, and into Filey.

23,786. Is there a similar outset in Bridlington bay ?—No ; but there is a very unsatisfactory sea outside the Head : I suppose you have often heard of vessels coming to the southwards going down off the Head.

23,787. I hope that is not a very common thing ?—It is nothing at all uncommon.

23,788. Have you known of many such instances ?—I have never seen any myself, but I have frequently heard of them.

23,789. Bridlington is a larger bay than Filey, is it not ?—It is one of the finest bays that I have ever seen upon the coasts of England, Ireland, or Scotland.

23,790. Does not as large an amount of water in a south-east gale beat up here as at Filey ?—No.

23,791. Why not ?—There is nothing to confine it here, nowhere. There is the Smithic outside, but there is a considerable distance between that and the land. There is an outlet for it there. If the Smithic was joined to the end of the Head there would be as much danger and perhaps more so.

23,792. If a breakwater was placed in Filey bay, you think an opening must be left to the north to allow this outset to escape ?—I should not like to offer an opinion about that. I have gone through it so many times in all sorts of weather. I tell you, when I heard of your coming here, I proposed to myself that, if you liked, I would offer my steam-boat to go from Whitby to Bridlington, and would explain to you the whole thing, and let you form your own ideas about it.

23,793. Are you acquainted with the Race of Portland ?—Yes, I know enough of it to keep out of it.

23,794. And we understand you to say that the race off Filey Brigg, the outset from Filey bay, is nearly equal to the race of Portland ?—It is in violent gales of wind to the eastward, and spring tides, there can be no doubt about it.

23,795. How far from the shore does it extend ?—West by north it generally runs something like 300 fathoms outside the Brigg, but the buoy is not stationary, it sometimes shifts a little in and out.

23,796. Then you consider this outset to be an objection to the construction of a harbour of refuge at Filey bay ?—I should consider so ; if you make it south of Filey you could do so very safely a little south, but I should not advise you to confine yourself to Filey Brigg.

23,797. Generally speaking, you think that the best place for a refuge harbour upon the coast is about the centre ?—I should recommend that, irrespective of Scarborough or any place ; truth is truth; one ought not to speak for one's own place alone ; if there is to be one single harbour I should recommend it, but if you are to have two, then have this and Hartlepool.

23,798. We have heard a good deal about the danger of taking Hartlepool, on account of the broken water that there is always there, do you think there is any danger on that account ?—I do not believe in it ; Hartlepool is as fine a place as can be, but it has disadvantages as it now is ; the west docks are so constructed that if a ship will only sail down she will sail into them.

23,799. Supposing the bay were sheltered by a breakwater in 8 fathoms ?—It would be as safe as this room is.

23,800. It may be easily approached by the lead, you say ?—Yes, by them that will but take notice ; I never got off Scarborough in a dense fog, but I always heave the lead myself, I dare not trust it to any one to do.

23,801. (*Capt. Sulivan.*) Have you seen the proposed plan for Filey bay ?—I had a book sent to me, and I saw it.

23,802. Now here (*referring to the plan*) is the Brigg ; is it when the ebb coming along the shore escapes over the Brigg that the outset is so bad ?—Yes.

23,803. The outset is over the Brigg ?—Not over the Brigg.

23,804. Round the end of the Brigg inside the buoy ?—Yes.

23,805. I suppose where we saw a very strongly marked ripple on the ebb tide outside the Brigg, that would be the outset ?—Yes.

23,806. Would that be an objection to having an opening in the breakwater there ; if it was made would it make a very strong tide through that opening ?—That is only an opinion, but my opinion is that it would considerably ease the outset, if there was an opening in the pier.

23,807. If there was an opening at the north end of the breakwater, would not the tide sweep out very strongly through that opening ?—Yes.

23,808. Would it not make that opening very bad for ships to take in a gale of wind ?—I believe no ship could take it when the tide was coming out in a gale of wind.

23,809. Supposing that it was closed and that there was no opening there would not that prevent a strong tide altogether in that corner, and make it comparatively still water ?—It is my opinion it would do the same here as at Scarborough. There it comes along the west pier and is conducted to the end and rushes out. I saw it only this day week. At that time with the wind only moderate there was a tide of two or three knots an hour in the inner harbour. We have made a pier at Scarborough, and it comes along the west pier, which conducts it to the other piers, and when it gets there it goes right out. I know last Tuesday it went past the pier end at the rate of two miles an hour. It is very variable and sometimes bothers one. If I attempt to take the pier and calculate in fine weather that it is still water, sometimes I find there is a current going at the rate of two knots an hour past the pier, and I cannot tell what is the cause of it. Another time perhaps I think I will take care and make allowance for it, and then I find it is perfectly still, and there I am three or four knots from the pier, and we have to wheel her alongside at last.

23,810. I do not quite understand the thing. Does the current run round the bay, and does it then pass the pier head ?—Yes.

23,811. Then it does not run into the inner harbour and sweep through the inner harbour ?—Yes, it comes right along. I call the harbour that which is inclosed by the two piers. It comes south of them.

23,812. Does it come past the pier, or does it sweep into the harbour and out again ?—It comes with a rush to the spa.

23,813. Does it come past your pier heads, or does it sweep into the harbour and out again ?—First into the harbour and then it comes past the pier heads.

23,814. I do not mean the bay. I mean the harbour inclosed by the two piers ?—It goes into the bay, into the side of the, bay and then strikes the west pier.

23,815. That is, it goes across the entrance of the harbour ?—It comes out from the bay as far as it can come until it hits the side of the west pier.

23,816. That is, outside the inner harbour. Your harbour is on the east side of the west pier ?—It is.

23,817. Then if it strikes the west pier on the west side it sweeps out opposite to the mouth of your harbour, and not into the harbour at all ?—Yes ; it cannot get into the harbour.

23,818. That is what I have been asking you all

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along. Then the tide coming down along the shore of Filey bay with no opening in the breakwater would run out round the pier heads, you think ?—Yes.

23,819. That being a large space of comparatively still water, do you think that in that place any tide would come that would make it dangerous for vessels coming into the bay from the southward ?—No, it has this advantage, coming in from the southward the most danger is when vessels come in from the north or north-east to go round the outside, and to come from the south-west a finer place cannot be found.

23,820. With an easterly gale ?—I understand with an easterly gale there cannot be a finer place than Filey.

23,821. With what winds would Filey be most valuable for loaded ships bound south ?—Any wind for loaded vessels. For laden vessels it cannot be wrong for them, if they want to come southward, but at anywhere north-east they can always get the Humber if they round the Head. With a wind from the east a ship will always lay south.

23,822. Do you think that a harbour constructed like that proposed in the plan in Filey bay would be at all dangerous for light vessels to take with east or south-east gales ?—Not at all ; because they would come from the south ; and in coming from the north, when the wind is north or north-east, when they cannot take a safe sweep to the south outside to pass the end of the pier, then they would fall into it. We never carry more hands than we require, and sometimes not so many.

23,823. With north and north-east gales, would any laden colliers want to come in ?—No, certainly not ; she could go on her voyage.

23,824. (*Chairman.*) I think you said, that, although there was this strong outset from the Brigg end, you did not exactly know how many knots it ran ?—No, I never tried that, because the boat I have is very quick, and we soon run through it.

23,825. You judged of the strength of the tide from the sea it creates, from the kind of race it creates ?—Yes.

23,826. For laden vessels and south or south-east winds, that can keep inside the outset, it would be quite safe ?—Yes.

23,827. Of the existence of the outset you have no doubt ?—No ; it is there, and all the earth cannot remove it.

Mr. William Weir examined.

Mr. W. Weir.

23,828. (*Chairman.*) Do you reside at Scarborough ?—Yes.

23,829. Are you a seafaring man ?—I have been so for 20 years. At sea I was master of my own vessel.

23,830. Are you still following the sea ?—No ; I am ashore now as agent for Lloyd's, and a shipowner.

23,831. How long have you been ashore ?—About 15 or 16 years.

23,832. Since you have given up the sea ?—Yes.

23,833. For how many years were you in command of vessels ?—About 20 years, of my own vessels.

23,834. In what trade ?—Between London, Scarborough, and any trade. I have been as far as Warkworth, and all ports ; Shields, Sunderland, Blyth, and Hartlepool.

23,835. You were employed in the coal trade, of course ?—The coal trade and different trades.

23,836. You know the object of our inquiry is to fix upon the best spot for shelter, principally for vessels in the coal trade ?—I will give you my best opinion.

23,837. Where do you think is the best place ?—A vessel ought not to go out of a coal port without a chance of favourable weather, and making a fair progress to the south. They come out of Warkworth, Hartlepool, Sunderland, and other ports generally in large numbers, and trying for an opportunity they probably get as far as the Head, when perhaps the wind souths upon them.

23,838. What you say is, that most ships get as far as the Head ?—Yes, with the wind at south or south-south-west they can but beat with it blowing hard ; I have seen them beat up the Yorkshire coast and get as far as the Head, where they bring up for shelter on the north side of the Head.

23,839. Where would you put the shelter ? Which do you say is the place where there ought to be a shelter ?—The most danger is on the leemost bay. It ought to be where it will save most life and property. I have in my pocket an account giving my remembrance in 1807, of seventeen sail of ships being caught on the lee shore off Scarborough sands ; I can give the number to the year 1857 by records ; I can give the numbers up to the year 1857, the number of ships that have been lost. I cannot give the numbers of lives, but I can remember a great many being lost between Filey Brigg and Whitby Rock.

23,840. Will you answer my question ; where do you think is the best spot to put a harbour ?—I will tell you; I say Scarborough Wick, with a breakwater or even rough stones to direct the sea ; light ships can go underneath and let go their anchors.

23,841. Supposing we had this harbour in the neighbourhood of Scarborough and there was to be a second one, where would you put it, or do you think it would be better, instead of making another, to try to improve the three ports of the Tyne, the Tees, and the Wear, so as to enable them to take in ships drawing sixteen feet at low water. In all outsets of all rivers you may carry out the piers as far as you like, but the sand when it comes down the river as soon as it gets as far as the head will settle down and there will always be a bar. As soon as it gets into the sea, it will meet the swell coming against the wall. When you form your channel, you get deep water, but you soon get a bar again.

23,842. You consider it then impossible to improve a bar harbour ?—Yes ; almost impossible.

23,843. That in fact you simply carry the bar out with you ?—When I was 12 years old I used to go as a boy with my father ; I knew Sunderland piers when they were not half so far out as they are at present ; then it was a bar harbour ; they have carried them out as far as they can and it is still a bar harbour, and if they carried them out a mile further it would be the same.

23,844. That to your mind is an insuperable objection to endeavouring to improve these bar harbours, and that it would be only money thrown away ?—Yes ; our forefathers made all the harbours and docks upon dry land, now we attempt to make them in the deep sea.

23,845. Then where shall we have the second harbour ; if we cannot have it in the three ports, where shall we have it ?—I think it is not of much use my saying where it shall be, because you will satisfy yourselves hereafter, but I mean to say why should we have two ; I do not see the necessity for two between Flamborough Head and Tynemouth castle.

23,846. You think that one is quite sufficient ?—I do ; I approve of Scarborough Wick, although I belong to it, I throw that over my left shoulder.

23,847. But of what use would a harbour at Scarborough be to vessels caught with a gale on shore between Whitby and the Tyne? —If a loaded ship be to the north of Whitby Rock and is caught with a foul wind ; if she cannot go to south she can always get a north or north-west course, when she cannot get a south-south-east course.

23,848. You have some returns of wrecks ; would you be good enough to leave them, and just describe them as you hand them in ?—I have a great many here.

23,849. What are they ?—The returns are prepared from the records of an old gentleman, from my own memory and that of my father before me.

23,850. Will you give the first of them to the secretary, if you do not mind parting with them ?—I will

let you have it, if you will return it to me before I go back to Scarborough.

23,851. Let me see it, if you please (*referring to returns which the witness produced*). This is headed, "A list of vessels stranded or wrecked, from Robin "Hood's bay to Flamborough Head, compiled from "authentic records." What are the authentic records from which this is compiled from 1806 to 1857?—Partly from the records of an old gentleman, partly from my own recollection, during three or four years, from the records of the late Mr. Francis Hill, the late Lloyd's agent, and for the last 14 years the records of myself and partner as agents for Lloyd's.

23,852. Will you be good enough, at your convenience, to send to the secretary in London authentic copies of these records deposed to before a magistrate?—Yes; I can swear to the first 17 as well as to the last 14 years.

23,853. Perhaps you will be good enough to let us have them, and any other information you can give?—I will.

Mr. HENRY WYRILL examined.

Mr. H. Wyrill.

23,854. (*Chairman.*) Do you reside at Scarborough?—Yes.

23,855. Are you a seafaring man?—Yes.

23,856. How long have you been at sea?—I have been on this coast for 30 years.

23,857. Are you still following the sea in command of vessels?—I have not been at sea since last November.

23,858. How many years were you in command of vessels?—27 years.

23,859. In what trade were the vessels which you commanded chiefly employed?—In the coal trade the Baltic trade, and for the last 27 years I have been exclusively engaged as a fisherman upon the north-east coast of England.

23,860. How many years' voyage have you made to the Baltic?—I believe I have been there four times.

23,861. That was a long time ago, I suppose?—It was in the early part of my life.

23,862. The vessel you command is employed in the fishing trade?—The vessels I have are all employed in the fishing trade.

23,863. What are the tonnages of your vessels?—I have four from 27 to 60 tons.

23,864. Fishing vessels are capital boats, are they not?—Yes.

23,865. They can keep to sea in worse weather than coasting vessels generally can—what do you say to that?—Decidedly so.

23,866. You are aware of the object of our inquiry, are you not, to fix upon the site for a sheltered harbour where vessels can be sheltered. Give us your opinion about that. Where do you think it should be?—I will do my best to do that as a practical man; and this subject having been inquired into by a committee meeting at Scarborough for the last few months, I found a great difficulty attending the case. There is for and against on all sides, but this great fact must be the foundation of all. This harbour of refuge that would be the most valuable would be the best placed upon the most leewardly place. Which of us has not stood upon deck, in the depth of the snows, and wished for daylight, when, if we had had an hour or two more to drive, we should have been stranded. Therefore, upon that great point I would wish to ground my opinion, that if a harbour of refuge is to be made, it should be in the most leewardly place. That is the best harbour you can have; and, coming to that point, I should say, speaking from experience, that in Scarborough Bight, a little to the north, that is the deepest water, nearest to the shore, of any place along this coast, save and except under Speeton cliffs.

23,867. Will you look at this chart of the line of coast, and supposing the wind to be dead on shore, just put your finger upon the most leewardly point upon the coast between Flamborough Head and the Farn Islands?—(*Pointing to the chart.*) This is the most leewardly point upon the coast.

23,868. The Tees you mean?—Of course.

23,869. That, in your opinion, would be the best place to put a harbour of refuge, as it is the most leewardly point upon the coast?—I say so, provided that all other circumstances correspond and harmonise with it.

23,870. Will you tell me of any other circumstance which, in your opinion, does not correspond or harmonise with it?—Do you mean to inquire the reasons why I object to it.

23,871. Why do you object to the Tees bay, which is the most leewardly point upon the coast?—I object to Tees bay, in the first place, because the Tees and Sunderland are, in general, starting points; ships leaving the ports with auspicious gales, and proceed south. If we read the account of the wrecks upon this coast, we shall find, from the chart of the wrecks that I have, that nine-tenths of the damage done has been upon this coast, or by ships being upon this coast that have had to go back again; therefore upon these grounds, that the Tees is a starting point, and it is a long way to go back, if a ship is compelled to do so. Another thing is this, the mouth of the Tees is not near a safe place, for it is shallow water; and another reason is, that it is at the mouth of a river.

23,872. Suppose, now, that we have these auspicious gales or breezes, which induce the vessels to come out, and they start from Sunderland and the Tees at the same time; when the vessels from the Tees are about off Whitby, where will the Sunderland vessels be, as they come from farther north?—That will depend upon their speed; the time of the tide at which they get out. Different men get out at different times of tide.

23,873. My question was, if you recollect, if the vessels started at the same time. The generality of the vessels from the Tees and Sunderland are, I should imagine, about pretty much of the same speed. Suppose that laden vessels of about the same speed start at the same time, whereabouts do you suppose the Tyne vessel will be when the Tees vessel is off Whitby?—Perhaps as far as Redcliff or Staiths. There will be 20 miles difference between the two ports.

23,874. Then when the Tees vessels are off Scarborough, so as to be able to take this harbour which you would like to make, will the Tyne vessels also be able to take it, or will they be clear of the bight?—It is a great fact that from Whitby Rock to the bottom of Scarborough bight is in a line with the coast northward, and if a vessel weather Whitby Rock making even south-south-west course, and comes from a distance of 10 miles out at sea she can reach the bottom of our bay. To go south of that again she must go south-east by east and weather Flamborough Head. Therefore the fact is, a ship is embayed. She cannot weather the land on either side, nor upon either tack, neither starboard nor larboard, trying with the wind from east-north-east.

23,875. Then the Tees vessel could run into the harbour at Scarborough, but the Tyne vessel off the Staiths she could not, could she?—That would greatly depend upon the offing of the vessel.

23,876. But if she had made a straight course across?—If the wind had been from the north-east, which it is the practice of mariners to keep in general an offing according to the wind. I do not hesitate to say but that a vessel with any offing at all which a nautical man takes, that is seven or eight or nine miles from the land, that is not a great deal with the wind east-north-east would, if the gale increased, reach up to weather Whitby Rock, and consequently to come into Scarborough bight.

23,877. When these vessels are making a passage from a coal port with the wind off shore, do they keep along the land?—Invariably.

23,878. With the wind on from the eastward. Then they make an offing?—Yes, they reckon according to circumstances.

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23,879. With the wind from east they make an offing of 9 or 10 miles, if they can?—Yes.

23,880. That accords with all the evidence we have received at other places. Therefore, if a Tyne vessel sails with the wind off shore, she will make a straight passage across the Tees Bay, will she not?—Yes, she will.

23,881. Then if the wind shifts suddenly and comes from the east, will such vessels be able to get into your harbour at Scarborough, they being off Staiths?—Not under those circumstances. Those sudden changes of wind upon any land would embay a vessel.

23,882. What is your worst wind upon this coast, I mean the most dangerous?—East-north-east.

23,883. How do these easterly gales commence? What kind of weather have you before the easterly gales come on?—Very often we have strong rains, the westerly winds coming out to north-east, with showers of hail. That is the course the gale takes.

23,884. Do these gales give a man who knows the coast and the weather any warning, or do they come upon him suddenly?—Well, I have known them come on as sudden as the electric telegraph, and I have known them give 24 hours' warning to the knowledge of a practical man.

23,885. Would you say it was a common occurrence that they should come on suddenly, so as not to give any warning at all?—No, not the east-north-east part of it. I would say they very often chop round from the westward to north, giving no warning, but they invariably go round to east in heavy showers, and therefore they do give a little warning.

23,886. Therefore, if vessels have started with an off-shore wind, and are close in shore, as a general rule have they time to make an offing, if they take notice—if the master looks sharp, and knows the weather and obeys the warning given him?—I should say so, by the general rule of things.

23,887. (*Capt. Sulivan.*) From your experience do you consider that the great danger is to laden vessels bound south?—Yes, nine-tenths of them.

23,888. Would you have special reference to laden vessels in selecting a site for a harbour of refuge?—Decidedly so.

Mr. Edward Templer examined.

Mr. E. Templer.

23,889. (*Chairman.*) Do you reside at Bridlington?—No.

23,890. What is your occupation?—I am a North Sea pilot, and a coasting pilot.

23,891. How many years have you followed that occupation?—Five years.

23,892. Previous to that, did you follow the sea?—I have been at sea for 38 years altogether.

23.893. Have you commanded vessels for any time?—I have commanded them for about 27 years.

23,894. In what trade were the vessels you were employed in chiefly engaged?—Generally in the coal trade. I have been up the Baltic a few times, but generally I have been in the coal trade.

23,895. Was it lately that you have been in the Baltic?—I have not been lately, only when I was on board a French frigate there, I was the pilot of one of them.

23,896. The other day you mean, in the late Russian war?—Yes.

23,897. What is your opinion about a harbour of refuge, and where it ought to be put?—Well, it is of no benefit to me. I am resident at Sunderland, and get my living out there; but I am a North Sea pilot, and generally come with ships from 17 to 18 feet water. My opinion is that the best place would be in Bridlington Bay.

23,898. If the wind is south-south-east or in that direction, can a vessel get round the Head into Bridlington Bay with a flood tide?—Oh, yes.

23,899. It is the practice for vessels to anchor under Speeton Cliff in great numbers during southerly winds, is it not?—Very few. They have to be very small vessels if they anchor under Speeton Cliff, as they are within a stone's throw of the shore.

23,900. Do I understand you to say that vessels do not anchor under Speeton Cliff, except in small numbers?—Very small numbers, and very small vessels I may say, unless they be dodging about under canvas all ready to get out.

23,901. I wish you to be very particular about this matter, because the evidence is in direct contradiction with what we have received elsewhere. You tell me that the vessels which anchor under Speeton Cliff are only small ones; am I to understand you that a considerable number dodge about there trying to get round the Head?—Yes.

23,902. What do you call a considerable number; how many?—Sometimes as many as 30 or 40, or 50 sail. I cannot say that I ever saw many more, because there is not room for many more to do it.

23,903. What is the largest number that you have ever seen at anchor under Speeton Cliff?—I cannot say that I have ever seen more than 15 or 20 sail.

23,904. What was the tonnage of those vessels?—The largest could not be 200 tons register, because nothing but small vessels go there.

23,905. If a vessel gets up under the Head, could she with a flood tide, under close-reefed topsails, and her courses, get round into Bridlington bay, supposing it to blow so hard as to oblige her to carry that sail?—Yes, as the tide runs there.

23,906. You could do that kind of thing, being a pilot, and knowing the place well; but do you say that masters in general commanding these vessels could do it as well as yourself?—Anybody that knows the locality, and knows the coast we are on.

23,907. You mean that anyone who has been accustomed to command vessels upon this coast would do it?—Yes.

23,908. Are they in the habit of doing it. Have you seen them work round the Head in that weather, bound to the south with a south wind?—Oh, never, because after they get round there is no refuge—not with a south wind.

23,909. Is the tide on shore round the Head stronger than it is in the offing?—Yes.

23,910. Is it much stronger?—Three times as strong.

23,911. Then when the flood-tide is running to windward with a strong south wind, would it not be better for a man who has to make his passage, to work his vessel to windward in the neighbourhood of the Head, to avail himself of the tide instead of standing right out in the offing?—Yes, with the wind down as far as south-south-west we do avail ourselves of the tide, but I am speaking of winds from the south, the south-south-east, and the south-east; we gain nothing by getting close round it, because there is no refuge, but if it was from the south-south-west, or even from the south, I would get round there with the strength of the tide, get into the corner of the bay, and get jammed up there upon the other tack.

23,912. I am not talking of vessels wanting to get into the bay for shelter, but of those who are making a passage working to windward, and who would remain in the neighbourhood of the Head to avail themselves of the strong weather tide, which you tell me is three times as strong there as it is in the offing?—Yes.

23,913. Is that done. Do they do it?—We do do it.

23,914. Do you do that with the wind from the south?—Yes, with the wind from the south-south-east.

23,915. I am not saying about that. Suppose you had a harbour in Bridlington bay where would you have a second one placed; or would you endeavour to improve the three ports; or would you put a single harbour some where else?—I would endeavour to improve the Tyne, the Tees, and the Wear.

23,916. Why improve them with the single harbour

at Hartlepool?—Because there is no place off the Tyne for a single harbour, and no place off Sunderland for a single harbour, not with safety in Hendon bay. There is no particular place at the mouth of the Tees, There is none can be made without a very narrow entrance.

23,917. For which reason you would endeavour to improve them all?—These northern ports and places of refuge to the south of them.

23,918. As you say these harbours would not be easily improved, why would you not have a large one at Hartlepool?—I say that Hartlepool is no better than our own place—Hendon bay; I shall not approve of Hartlepool no more than Hendon bay.

23,919. Of course you have taken these bar harbours in bad weather?—I have.

23,920. Can you give me any instance of loss of life and property in doing so?—I have never had the misfortune myself, but I have seen a many that have been caught in taking them, but I never took many but Sunderland, which is the place I belong to, not in a gale of wind from the east.

23,921. In taking Sunderland with a gale of wind from the east, were you ever in danger of losing your ship; if so, give me all the circumstances connected with it?—When I am going to Sunderland with a gale from the east, we are in danger, in great danger, because when we go for it, as the saying is, we only go to get there, just to get in it, and if we do not get in, we are sure to go to the back of the pier, and strike it or something.

23,922. I want you to tell me whether you have ever been in danger of being thrown behind the pier and losing your ship in going in?—I never had such a thing occurred to me; I have been in danger, but never went to the back of the pier.

23,923. Have you seen the thing ever happen?—Oh yes, too many times.

23,924. (*Mr. Lindsay.*) As a pilot, would you hesitate to run for the Tyne, if you had plenty of water, with an easterly gale, during the ebb tide?—The ebb tide is a bad time to run for it, because it makes the sea heavier; the tide running against the sea causes a rush.

23,925. Which you think would cause a great danger in running for the Tyne upon an ebb tide?—There would be as much danger as running for our own place, and there would still be danger, even if there was more water, as the entrance is narrow. There is not a ship can go into a narrow entrance for a refuge, I do not care how big or how small a ship may be; big ships have no business there, but small ships: it is never known how they get in.

23,926. With a narrow entrance would you have any hesitation in running in a gale of wind and a flood tide?—Not exactly so much as the other; not so much with the flood tide as with the ebb, if the entrance is narrow.

23,927. It is on account of the narrow entrance you would hesitate to run for this harbour?—That is my main objection, it is too narrow an entrance for a refuge.

23,928. But with a harbour at Filey, or any other part on the coast where there is no tide and no river, with the same width of entrance, would you have the same hesitation in running for it as you would for the mouth of the Tyne, supposing the width of entrance to be the same?—You mean about Filey. If there was a narrow entrance at Filey it would be just as doubtful running for it as I should for the Tyne or Sunderland, because I do not think it possible to make a harbour at Filey with a very narrow entrance. That is my opinion, knowing the locality of this coast.

23,929. (*Capt. Washington*). I think you said you think Bridlington Bay to be a right place for a refuge?—Yes.

23,930. Will you give your reasons for it?—My reason is there is the Smithic sands right before it, if there was a breakwater built upon the top of it we have a complete refuge for any amount of shipping that has a mind to come in. There is plenty of water for line-of-battle ships or any vessels. There is plenty of room, and a road to the south and to the north too.

23,931. That would be very good for light vessels, but would it be good for laden colliers?—It is laden colliers that I am speaking of. It is a good refuge now for light vessels as far as until the wind comes to the north-east when it is time to run out. To my idea there is plenty of water. We should have a road in and a road out. It is of no benefit to me, for I do not belong to the place.

23,932. Is a fleet of light vessels often caught here with a north-east wind?—Yes.

23,933. Where do they go to; can they ride here then?—They must get their anchors and see if they cannot get off for the Humber. If they are caught short, they must ride in the bay.

23,934. That is your reason for wishing for a breakwater upon the Smithic sands?—Yes, because within it is a refuge for any ships, I do not care how big they are.

23,935. Have any wrecks taken place in Bridlington bay?—I have known ships to come on shore, but there is more of them comes ashore when they have slipped and are driving for this bit of a hole, which they call here a harbour. That is, where more of them come ashore from that than anything else.

23,936. They can generally get their anchors up and make for the Humber?—Not generally; I have been riding in a very heavy gale of wind out here with both anchors down; if we had not had a particular eye to it we should have been caught many a time.

23,937. It is good holding ground if you can ride out an east-south-east gale?—It is good holding ground.

23,938. Does the Smithic sand give any shelter at low water?—Yes, the soundings are two and a half, three, and three and a half on the north end. Supposing there was a harbour made here, if I had got to the southward between the Humber and here, I could always come by my lead to this place, if it was ever so thick.

23,939. Because it is a shallow bay?—It is not shallow; there is plenty of water for any ship. It is the best coast we have right down to Scotland; altogether what I call the most harmless coast that you can go into between this and the Humber.

23,940. Do you think that range enough between the Humber to the Staples?—Yes, I think it is quite sufficient.

23,941. You are pretty well acquainted with the Tees bay?—Not much acquainted with that; I have not been in Hartlepool more than three times in my life.

23,942. Do you hear of many wrecks in Hartlepool bay?—Yes, a great many.

23,943. Do you happen to know that 22 lives are lost there every year and have been for the last six years?—Yes, that is true.

23,944. Do you know that 44 lives were lost in Hartlepool bay in the gale of the 4th of January 1857?—I do not know how many, but a great number.

23,945. Do you think it would be worth while to try and put a breakwater to prevent that loss of life?—I will not say anything against that, but it would have to be a very narrow entrance. The reason why there are so many lives lost about the Tees, is on account of the light vessels running to the ports they are bound to. Say I belong to Sunderland, and am making for it with a wind at south-south-east, I can keep off the land and I must run for it, because if another man gets there and I do not get in, I am unshipped. That is what leads to the great mass of losses which take place. That is why ships run into danger.

23,946. The shipowners require you to make the passage as fast as you can?—Yes.

23,947. They will not admit of delay?—No. If

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another man gets down they would ask me why I could not do the same.

23,948. You know the coast pretty well, I believe?—Yes.

23,949. Suppose you were in one of the laden ships, working up with south-west winds, and got as far as Flamborough Head, and then the wind came round to south-east, would you at once bear up for a refuge harbour?—No; I would contend as long as I could, if I thought by so doing I could make my passage; but of course if I am caught with a regular gale, and cannot contend against it any longer, I must go to some place of refuge.

23,950. How long would you contend, 24 hours?—I might contend through two or three days, according to the weather. Perhaps I could not contend more than two or three hours.

23,951. Would you be able to hold your own, do you think, or would you drive to the northward?—If there was a harbour of refuge I could get hold of, I would take care not to drive to the northward.

23,952. You would run at once for refuge?—That is, if the place was safe, and there was plenty of room to run in.

23,953. Do not you think it desirable that there should be such a refuge?—Yes, for laden vessels and heavy vessels.

23,954. You think that such a place might be provided in Bridlington bay?—I am certain of it.

23,955. You think that vessels would be able to contend with the gale, and get round the Head?—I am certain of it.

23,956. (*Capt. Sulivan.*) If there was a good harbour in Bridlington bay, and another in Filey bay, both made safe from every wind, and you had got up to the Head with a heavy south and south-south-east gale, which had brought you to under close-reefed topsails, and you had your choice of either bearing up for Filey or trying to get round the Head into Bridlington bay, which would you do?—If there was one in Filey bay I should take Filey. If there was one in both places I should take the first, provided I could not get round.

23,957. When a ship is off the Head in a southerly gale, particularly under close-reefed topsails, is it not very doubtful whether she would get round?—If she can get to Filey the next flood she can always get round.

23,958. How is it we have evidence of very many vessels that are caught north of the Head, under Speeton Cliffs, being driven back to the Forth afterwards?—Because they knew, when they got round the Head, that there was no place for them.

23,959. If they have been driven all the way back, is not that a proof that they cannot hold their own off the Head?—There was no place for them if they tried; it was very little use contending, when they knew that if they got round there was no place for them.

23,960. Do you believe that any man in his senses, under close-reefed topsails under Flamborough Head, with a gale from the southward, would try to thrash round into the harbour in Bridlington bay, if he could put the helm up, and run into a good harbour in Filey bay?—If there was one; but suppose I was caught to the southward?

23,961. Now if you were five or ten miles to the southward of the Head, you would then get into Bridlington bay easily, could you not?—Yes.

23,962. But could you not also easily run back that 10 miles to get into Filey bay?—No, not if it was foggy weather; if it was thick, I could come in here by the lead, but could not get into Filey.

23,963. Is it generally thick weather with southerly gales?—Mostly; more so than with any other wind on this coast.

23,964. If you could see a breakwater, to enable you to get under it at Bridlington bay, could you not make Flamborough Head as easily as running for the breakwater?—Yes, if it was made here.

23,965. Even in thick weather, could you not make Flamborough Head as easily as you could a breakwater on the Smithic sands?—If it was thick weather, I could not go down to Filey by my lead, and no man could who knows anything about the coast; but you can come down into this bay in any weather you like.

23,966. You have already one refuge south of Flamborough Head, at the Humber, have you not?—Yes.

23,967. You have have no refuge from Flamborough Head to the Tyne, have you?—No.

23,968. Would you think it desirable to put a second refuge south of Flamborough Head where already you have the Humber, and leave the whole coast north of Flamborough Head without any refuge at all?—A second refuge to the southward besides the bay.

23,969. Yes; if you built a harbour in Bridlington bay, you would have two south of the Head, the Humber and Bridlington; and if one were built to the north, it would be hardly any distance from here?—If there is a harbour in Bridlington bay, it is a refuge for the largest ships we have in the world.

Mr. Robert Scales examined.

Mr. R. Scales.

23,970. (*Chairman.*) Do you reside at Bridlington?—At present.

23,971. How many years have you followed the sea?—Ever since I was 18 years old,—for about 50 years.

23,972. For how many years have you been master of a vessel?—Somewhere about 20, off and on, at times.

23,973. In what trade have the vessels you commanded been chiefly employed?—Fishing vessels.

23,974. What size?—From 60 to 70 tons.

23,975. At what distance from here are the fishing grounds?—Off as far as the Doggerbank, about 42 or 43 miles.

23,976. Do you ever go further?—In summer time we go to the north end; that would be about 60 miles from Flamborough Head.

23,977. You have heard the evidence which has been given us, that Bridlington bay is the best place for a harbour of refuge; do you agree with that opinion?—I have been here 8 years, and I think it is the best place upon this coast for a harbour of refuge.

23,978. What are your reasons?—My reasons are, because I can run out of the deep sea for a breakwater here, and if my vessel would live at sea, as soon as I got round the pier I should be in safety; but if I had to go on a lee shore I have to go to all the danger.

23,979. You know Filey?—Yes.

23,980. You know the Brigg?—Yes.

23,981. Is there a great outset there?—Yes.

23,982. Do you know that from your own knowledge?—Yes, and it makes a very cross sea off the Brigg end; I have a great right to know it.

23,983. Why?—Because I have been upset in going through it, and my companions were drowned away from me.

23,984. Can you tell me how many knots it runs?—I should say from $2\frac{1}{2}$ to 3 knots in strong spring tides, where the buoy is. I have seen the buoy go nearly over head.

23,985. (*Capt. Washington.*) I think you belong to Bridlington?—I belong to Filey. I was bred and born in Filey, and have lived there for 50 years.

23,986. Do you fish out of Filey?—Out of Bridlington at present.

23,987. Have you fished here for many years?—Eight years.

23,988. You are frequently in Bridlington bay?—Frequently in Bridlington bay.

23,989. Tell us the largest number of vessels you

have seen riding in Bridlington bay at one time ?—400 or 500 light colliers.

23,990. Tell us how many laden colliers you have seen lying north of the Head dodging ?—Upwards of 150 or 200 with the wind at south-south-west, riding and under sail.

23,991. Many of them riding ?—I have seen a good many riding.

23,992. What number, 50 ?—I have seen 100 riding.

23,993. Did you hear the evidence the last witness gave that he had never seen above 20 riding ?—Well, I have seen 100.

23,994. You have seen how many in Bridlington bay ?—500 or 600.

23,995. Did any of those vessels ever go on shore ?—I have seen some vessels run ashore from missing the harbour, but not drive ashore from their anchors.

23,996. It is good holding ground ?—Yes, I never saw anything else.

23,997. Did you ever know any lives lost in Bridlington bay ?—Not since I came into it.

23,998. There is a life-boat, is there not ?—Yes ; there was a vessel here to the southward of the harbour. The master did not come up the harbour, but brought her up. She was a billy-boy, and this happened last March, I believe. In attempting to ride, she pulled the bits out, was knocked all to pieces, and all hands were drowned after she touched the shore in less than five minutes.

23,999. Does the life-boat often go off ?—She goes off when she is wanted.

24,000. Have you been off in her ?—No, I am too old for that job ; I am not allowed to go in her.

24,001. By whom is she manned ?—By volunteer sailors.

24,002. Are there always plenty of volunteers ?—Yes, plenty.

24,003. Except the vessel you speak of, have you known any lives lost in Bridlington bay ?—Not from ships.

24,004. Where did you say the refuge harbour ought to be placed ?—I think Bridlington bay is the likeliest place, but I do not pretend to say it is the best ; it is only my idea of the thing.

24,005. Do you ever run to Scarborough or the ports to the northward ?—I have run to Scarborough.

24,006. Is that a safe place to take ?—Yes, with the wind at south-east and east-south-east.

24,007. Is there a great outset ?—Yes.

24,008. Is there the same at Filey Bay ?—There is more.

24,009. Does that ever damage boats or ships ?—Yes. I have been upset in it, and my companions drowned away from me. My father was drowned there too with other eight men, all in one day ; so I have a right to know it.

24,010. Do you say that was owing to the outset from Filey Bay ?—Yes.

24,011. How was the wind at that time ?—About east-south-east.

24,012. Was it blowing strong ?—Yes, when my father and the others were drowned, but not when my partner was drowned.

24,013. Was your father running in under sail ?—No, he was going in without sail, as I have heard ; I was not born at the time.

24,014. You can speak from you own knowledge of that outset, however ?—I have had experience of it for between 40 and 50 years, and have been in it in all kinds of weather.

24,015. Do you know the coast farther north ?—No, not a great deal farther north. I have never been in any of the harbours much north. From Scarborough to Yarmouth, Lowestoft, and that way, herring fishing and cod fishing, that has been the chief work of my life.

24,016. For the fishing vessels what would be the best thing which could be done ? To make a good harbour at Filey, to afford shelter from winds from the north-east and east-north-east ?—You could not make a large harbour there, not one to take to in bad weather.

24,017. Why not ?—Because if you were to make a very large harbour there, my opinion is that ships could never get into it, because I have seen the sea break all the way from Filey Brigg to the mainland ; nothing but broken water with the wind east-north-eart, and an ebb tide; that is my opinion. If you make a harbour of that kind you must be in before the bad weather comes. I do not think it is to be got into after a heavy gale does come.

24,018. But why, if a breakwater was run out into 7 fathoms, leaving an opening to the southward, why should you not run into that ?—If you run a breakwater there, a mile or two long, it leads you all that to leeward into more broken water. Nearer the Brigg is the deeper water. When we used to come round with the tide, we used to run so far southward. Running away upon the land clear of Filey Brigg would bring us into deep water, but if you leave us a mile to leeward, we have our death before our eyes.

24,019. How far does this outset extend from the end of the Brigg ?—It stretches about two miles.

24,020. North-east ?—About east from the south end.

24,021. Does it stretch beyond the buoy ?—That is only part of it where the buoy is. The north part of it bears about north-east from Filey Brigg, and the south part about east. It is called the north-east set. It is the tide which comes away from the south shore, runs round, and comes out upon the Brigg, and falls out of the shallow water into the deep water. It takes a north-east set, and then from that a north-west set in.

24,022. Is there a slight outset from Bridlington bay ?—There is some outset from Bridlington bay, but there is chiefly a passage between the Head and the tide. The tide sets out from here about east, or east and by south, and meets another tide about north-east, which puts it farther away from the Head.

24,023. If a breakwater were placed in Filey bay, you think there must be a northern opening to let that outset escape ?—Yes, I do. There must be an entrance at the north as well as at the south side ; that is my opinion.

24,024. (*Capt. Sulivan.*) You say that there would be no space for a vessel to run in round the end of the breakwater ?—No, I did not say so.

24,025. That it would be too far to leeward ?—Yes.

24,026. If the breakwater ran in the direction of Flamborough Head from Filey Brigg, how far would it be from the shore opposite ?—If it ran in a direction from Filey Brigg to Flamborough Head it would be in the same direction.

24,027. What distance would it be from the main shore, would it be above a mile ?—Yes.

24,028. Would that not afford plenty of room for a vessel to run round ?—Yes, but you would be amongst broken water in the inside.

24,029. Would not the breakwater throw off the broken water and give smooth water inside ?—It would, but the tide must go round the breakwater ; if you got it at the north end it would come out at the south end.

24,030. At present does the outset set over the south end of the Brigg ?—Yes, you know that you can walk off the Brigg into seven fathoms.

24,031. Is it there the outset is so dangerous, over the Brigg ?—No, it is without that, you have to go to the east from that, two miles, before you can get round it.

24,032. That is the outset ?—Yes, you must come there before you can get into Filey bay.

24,033. This would extend north of the east of Filey Brigg ?—The north end, north-east ; the south end, east.

24,034. Vessels coming from the eastward of Flamborough Head would come round the south end ?—Yes.

24,035. If there was a passage left through the breakwater somewhere about where the buoy is, in five or six fathoms water, would that be safe for

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vessels to take from the eastward or north-east?—It would be safe in some cases, but I have seen it when it would have knocked any ship nearly down, not a ship's length off. Filey Brigg stands in about four and a half fathoms, and if you go four ship's lengths from that it is 16 fathoms.

24,036. The buoy is off the extreme end of the Brigg?—It is at the inside of the Brigg,—what we call the Brigg. As soon as ever you get within that buoy with a flood tide you have lost the flood.

24,037. Because it runs southward?—It runs away to the south-south-west.

24,038. With an ebb tide would you have any hesitation in taking an opening in the breakwater, if it was made outside where the buoy is?—It depends how the wind is. Is it one thing or another?

24,039. Blowing hard from the east?—I would not take it.

24,040. Would you have any hesitation in running round the south end of the breakwater if there was one made, with a gale of wind from the eastward?—I would not run into it at all, for if I ran round the south end of it I should run into nothing but broken water that came away from the breakwater end, if it was ebb.

24,041. A flood tide?—You cannot get a flood into the Filey bay. There is no such thing.

24,042. It is all the better, is it not?—It won't warp up so much at the south end; but if you make a breakwater from Filey Brigg, the tide which goes down the north side must be dead when it comes there, and I think that will warp up. If it is stopped there, it must come round the south end of the breakwater.

[*Sir F. Smith, Capt. Vetch, and Mr. Coode, who in the early part of the day had visited Flamborough Head, now took their seats.*]

24,043. (*Capt. Vetch.*) Can you tell me how many fishing boats you have out at Bridlington?—Three yawls.

24,044. Belonging to the port?—Yes.

24,045. How many have you seen take shelter in this bay at a time?—I cannot say exactly; perhaps 25 or 26 in the harbour, and 40 or 50, perhaps, in the bay belonging to Filey, Scarborough, Bridlington, Yarmouth, Cromer, and other places upon the coast. There are off here 600 or 700 sail of fishing craft, and if it came a northerly wind the chief part would be in danger.

24,046. Have you any Brixham boats come here?—Yes, England, French and Dutch boats.

24,047. When the wind is northerly how many vessels have you known lying in Bridlington bay?—500 or 600 perhaps, while I have been here; perhaps more at other times.

24,048. Do they get good shelter?—There is good shelter with the wind away from north and east, as far as east-north-east.

24,049. Vessels which are waiting for a wind to go north do not get wrecked?—I have seen collisions when they have driven from their anchors and run foul of one another when the wind has shifted sometimes. One minute it is blowing a gale from the north-east, and in a few moments from the south-south-west.

24,050. They find this a very convenient waiting place for vessels bound north?—Yes; I never saw no other.

24,051. (*Mr. Coode.*) Have you known vessels to drag their anchors in Bridlington bay?—Never to drag them on shore. I have seen one get foul of another, but I never knew a ship to drive on shore with an anchor.

24,052. Have you known ships drive out?—No, I never did.

24,053. Have you known them drag their anchors from one part of the bay to another?—Perhaps a ship's length or two, but nothing more than that.

24,054. What is the rate of the strong tide you speak of at Filey?—From 2 to 3 knots.

24,055. That is at the top of springs?—Yes.

24,056. What rate is it at the neap tides, do you think?—Perhaps 1 or 1½ knots. I never measured it. It is only a rough calculation.

24,057. Was it a fishing boat or a vessel that you spoke of being upset at Filey?—It was a fishing boat.

24,058. What size was she?—One of our cobles coming from Filey Brigg.

24,059. (*Capt. Sulivan.*) Do you recollect the loss of a vessel called the *Coburg*?—No.

24,060. Have you ever heard of such a vessel being lost here?—Here in Bridlington?

24,061. Including the neighbourhood?—No.

Mr. Henry Knott examined.

Mr. Henry Knott.

24,062. (*Chairman.*) You are a lighthouse-keeper at Flamborough Head?—Yes.

24,063. (*Sir F. Smith.*) How long have you been lighthouse-keeper?—17 years.

24,064. In the course of that time, have you kept any register of the number of vessels that have passed in either direction?—No.

24,065. Have you made any memorandum or kept any journal of the number of vessels which have been detained off the Head?—No.

24,066. Have you any good and clear recollection of vessels being detained off Flamborough Head?—Yes.

24,067. In any large numbers?—In Bridlington bay I have known 700.

24,068. What were they detained by?—By north and north-east winds.

24,069. Light ships?—Light ships and laden ships too.

24,070. Coasters, or employed in the foreign trade?—Coasters generally.

24,071. Sometimes in the foreign trade?—Sometimes.

24,072. Vessels from Hull, or do you know where they came from?—No.

24,073. Have you often any vessels detained on the other side of the head?—Yes.

24,074. In any great numbers?—Well, 50 or 80.

24,075. Never above 50 or 80?—No.

24,076. Were they bound south?—Yes.

24,077. Laden or in ballast?—Generally laden.

24,078. They were detained in consequence of southerly winds?—Yes.

24,079. Whereabouts were they?—Under Speeton Cliffs and in Filey bay.

24,080. Were they anchored there?—Some, and some beating about.

24,081. They could not get any refuge in Filey bay, could they, in the bottom of the bay?—Well, I have seen them ride at anchor in the bottom of the bay.

24,082. Exposed to south winds?—Yes.

24,083. Still riding?—Riding.

24,084. Not able to get round the Head?—No.

24,085. Do you keep any register of the persons who visit the lighthouse?—Yes.

24,086. Have you had many visitors lately?—Yes, during the summer.

24,087. Have you had many persons lately making an inquiry of you at the lighthouse with reference to the passing of vessels?—No.

24,088. Not lately?—No.

24,089. Not in the course of the present week?—No.

24,090. (*Mr. Lindsay.*) Have you known many laden vessels off Flamborough Head which could not get to the southward? What is the greatest number you think you have seen congregated off there?—Off the Head?

24,091. Yes, off the Head, scattered about as far as you could see?—Perhaps a score.

24,092. Have you never seen more than a score of vessels off Flamborough Head?—Oh yes.

24,093 What is the most?—400 or 500 sail off the Head, knocking about.

24,094. During what winds do most vessels congregate about the Head?—With the wind from north-west there is often a great many, and so when it is from north-east.

24,095. Do you keep any record of the wind?—Yes.

24,096. How does the wind usually veer in this quarter? Does it go from south to north or north to south?—When it is an easterly wind it frequently goes south, south-south-west, and west; sometimes the other way.

24,097. Have you known the wind from west, south-south-west, and south-west, to blow hard and suddenly?—Not suddenly.

24,098. Is not the heaviest wind you have on this coast from north-east to south-east?—Very heavy at times.

24,099. Do the north-east winds usually veer to the south-east, or is it the other way?—The other way generally.

24,100. Generally from south-east, going south-south-east and east?—No, it backs to south.

24,101. When it is blowing hard from the south-east, does it not often veer to east and the northward of east?—Frequently.

24,102. When it veers round in that way does it usually blow much harder about east and east-north-east than what it does at south-east?—Yes; from east-north-east and east-south-east I have noticed it blow heavier.

24,103. Is it the case that in such gales the wind oftener veers from east-south-east to east-north-east, or the other way? Say the wind is blowing strong at east-south-east, does it often go to east and then to east-north-east, and blow hard?—Yes.

24,104. Or does it blow hard east-north-east and go east and to east-south-east?—Sometimes it goes one way and sometimes another, but it generally goes from east-south-east to east, and then to east-north-east.

24,105. (*Capt. Washington.*) I think you said you had seen as many as 700 vessels lying in Bridlington bay?—Yes.

24,106. Did you count them?—Yes, several times I have counted them.

24,107. And counted that number?—Yes.

24,108. How many times have you seen as many as that in the bay?—Perhaps only once in a year.

24,109. What is the average number you have seen here in southerly winds?—500 or 600 frequently.

24,110. Have you seen 200 as often as ten times a year?—Yes.

24,111. In answer to a question you said you had seen fully 500 vessels off Flamborough Head. Do you mean laden or light?—Both together.

24,112. Do you remember how the wind was?—No.

24,113. How long do you say you have been the keeper of the lighthouse?—17 years.

24,114. Where did you come from?—The South Foreland lighthouse.

24,115. Do you think there are more vessels passing Flamborough Head than the South Foreland?—A great many more, but they are not so large.

24,116. No list of vessels in sight has ever been kept at the lighthonse?—No.

24,117. Would there be much trouble in doing it?—I suppose not.

24,118. Those that pass by day?—Yes.

24,119. (*Capt. Sulivan.*) Is it the case that by day the men at the lighthouse are employed part of the time in cleaning the glass of the light, and that the other time they are employed about their gardens and other things; that they are in fact off duty as it were by day?—Yes.

24,120. Would it add greatly to the work of the lighthouses if there was anything like the duty of counting the vessels that passed cast upon the keepers?—Very much.

24,121. Without great additional work you think they would not be able to do it?—It would be an addition to the work but it might be done.

24,122. Is it at present considered that the light keepers when they have cleaned their lamps have the day to themselves?—Yes.

24,123. Have you in southerly gales ever seen a vessel trying to thrash to the southward, and after all having to bear up?—Yes.

24,124. Is that a common thing?—In heavy southerly gales I have often seen it.

24,125. Have you seen vessels collected between the Head and Speeton cliffs obliged to go to sea and be driven to the northward?—Not from Speeton cliffs, but I have from Bridlington bay with the wind from the east.

24,126. You said you had seen vessels dodging to the northward? Have you seen those vessels driven out of that bay by the wind going to the eastward and obliged to go to sea and driven back to the northward?—I have never observed that.

24,127. If you include vessels at anchor and those off the Head trying to get to the southward, what is the greatest number of laden vessels trying to get south that you have ever seen at one time?—I have never counted them but have seen sometimes a large fleet trying to get to the south.

24,128. How many?—Say, perhaps, 100 sail.

24,129. Would you call that a large fleet?—I have seen many more in a light wind, but I am alluding to a strong wind.

Mr. Samuel Brown examined.

24,130. (*Chairman.*) Do you reside at Hull?—I do.

24,131. How many years were you a pilot?—49.

24,132. How many years have you given up going to sea as a pilot?—Eight. I retired in the year 1850.

24,133. (*Mr. Lindsay.*) Were you a North Sea pilot?—No; a Humber pilot the whole of the time.

24,134. Have you anything to tell us with regard to harbours of refuge which we have not heard to-day?—My opinion is there is no harbour along this coast, of any, from the Humber to the Forth, that is equal to Bridlington bay. There is no other except the Tees which can possibly render real service to the shipping interest.

24,135. Your opinion is that if there is to be only one harbour of refuge it should be Bridlington bay, and that if there are to be two, the second should be in the Tees bay?—Those are the only places that I have any idea of.

24,136. Will you tell me why you think a harbour in Bridlington bay would do more to save life and property than one in Filey?—In the first place it is naturally one, and by artificial means it might be made a real harbour of refuge. For instance there are 500 sail of vessels coming to Bridlington bay from the north and south. I have seen 500 sail and more. If there was a breakwater there would still be a safeguard for them; they would have no occasion to move then. They would stay here in safety. That is the only reason I have for speaking upon the subject, and I think a very just one.

24,137. That is the only reason why you prefer Bridlington to Filey?—Filey bay? I would not acknowledge it at all. I was standing upon the cliffs this summer, spending the day with some friends there, and they were speaking of some gentlemen coming round inspecting a harbour of refuge. I told them that it was all nonsense to see anything of the kind in the bay, and by that means I suppose I have been summoned here to-day to give my opinion upon that subject. I wish to leave it to your better judgment as to where a harbour of refuge is to be. I was told before I came from Hull that the chairman of the

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Commission knew more than I did, and I allowed it to be so. Another thing they told me was that the Government never intended to allow a harbour of refuge, except Her Majesty's ships could go in. I could not understand it. I should have supposed that a harbour of refuge was made for the ships which were located on the coast, those which were upon the coast every month, and day in fact.

24,138. (*Capt. Vetch.*) I think you place a high value on the merits of Bridlington bay?—Yes; there is none except the Tees bay and Bridlington Bay which would make a good harbour of refuge.

24,139. Is there anything which might be done to improve Bridlington bay, and make it still better?—The fact is, there is no improvement at all; it is merely a safeguard with one wind. The north winds are continually blowing, and when there is a sudden change of wind upon the vessels which are lying in this bay there is no shelter for them whatever if it comes from the eastward, east and east-south-east, east-north-east and south-east. It might be made a good harbour of refuge with south-east gales, as well for loaded as for light ships.

24,140. What do you think could be done to improve it—erect a breakwater on the Smithic?—Over the Smithic bank, and extending away to the south-south-west. But then you would be locked in, and you should have two entrances, one to the north and the other to the south.

24,141. Then it would be a complete harbour from all winds?—It would.

24,142. The next harbour you propose between this and the Firth of Forth, where would that be placed ?—In Tees bay. There might be a breakwater formed. There is no other harbour that I see. It is an iron bound coast right from the Head to the Forth.

24,143. You think the Tees mouth would be the best place for another harbour ?—That is the only place that has any expanse.

24,144. (*Sir F. Smith.*) Do you think a harbour of refuge on this coast is very desirable ?—It certainly is, for the safety of life as well as property.

24,145. You say you would recommend a harbour to be made in Tees bay ?—I recommend so far as to say that that is the only place for an extensive harbour, with a breakwater across from Hartlepool Haugh away to Redcar.

24,146. You think you could not make a harbour at Redcar big enough ?—No, there is no extent whatever.

24,147. What depth of water would you have in the harbour you proposed here ?—From five to six fathoms, and two and a half on the Smithic.

24,148. At low water spring tides ?—Yes.

Mr. Thomas Fishcroft examined.

Mr. T. Fishcroft.

24 149. (*Chairman.*) Do you reside at Bridlington? —Yes.

24,150. How many years have you followed the sea?—Since 1809; 49 years.

24,151. What vessels have you been employed in chiefly?—All sorts, down from 98 tons to a small smack.

24,152. What vessels have you commanded?—A little brig and two smacks.

24,153. For how many years?—Perhaps I had the brig three years, one smack for seven years, and the other one for two years.

24,154. How are you employed now?—I am a pensioner.

24,155. You have come on shore ?—Yes ; five years.

24,156. (*Sir F. Smith.*) What part of the coast are you most familiar with?—All the way nearly as far as Coquet Island.

24,157. Give me your limits?—Anywhere from Yarmouth or London.

24,158. You think a harbour of refuge is required? —By all means; this is the first place that I know of.

24,159. On the eastern part of the coast where would you form a harbour if you had the money at your disposal?—I would form it here.

24,160. In preference to any other place?—In preference to any other place.

24,161. In preference to Hartlepool say, or Redcar? —Yes.

24,162. In preference to Filey?—Yes ; I have taken nearly all the harbours along the coast in gales of wind.

24,163. What do you think of the plan proposed at Filey?—I do not think much about it.

24,164. What is your objection?—In the first place, there is no man, as a sailor, who would run for Filey in thick weather, because there are no soundings whatsoever—no regular soundings. I have been trailing along the ground myself, and I know that there you never have two casts alike. I would almost defy any Filey man that there is to find it himself in thick weather. But Bridlington, a child might find it, because any man who is a sailor, knows that all along Holderness Binks, running along the coast from the Humber, is regular soundings. As easily as possible you may run into what water you think proper.

24,165. By having a harbour of refuge here you would always find it. In thick weather cannot you run by the lead into Hartlepool bay?—I could find it.

24,166. Better than you could Filey?—Oh, ten to one. I should say ten to one.

24,167. What do you think of Redcar?—You may find Redcar. With piers upon the Salt Scar you would make a harbour of refuge there ten to one better than Filey.

24,168. Did you ever anchor in Filey bay?—Yes, I have with a smack, with a gale of wind from the west-north-west.

24,169. Do you know much about Filey bay?—I do not know so much as they do.

24,170. How often have you anchored there?—Once or twice. We were coal-laden, and could not save the tide, and so made into the bay, and bore up. As soon as the tide turned we came out.

M T. Woodhouse.

Mr. Thomas Woodhouse examined.

24,171. (*Chairman.*) Do you reside at Bridlington? —No.

24,172. Where then?—Flamborough.

24,173. Are you connected with this port as a ship owner?—I have a small vessel that is occasionally here.

24,174. Have you followed the sea?—I was brought up as a fisherman, and went to sea for twenty years.

24,175. Did you command any of the fishing smacks?—No; I was brought up in those fishing cobles, fishing about Flamborough Head. I was never further.

24,176. You know the purpose for which we have met: to find out where is the best situation for placing a shelter for colliers, chiefly laden colliers. Give us your opinion upon the subject?—When I followed the fishing business I have seen loaded colliers with the wind south-south-west and south off the Head, particularly up under Speeton Cliff. I have noticed the vessels for a week together. We have gone off into the sea and come in through the fleet. I have noticed the vessels for a week together being laid under Flamborough Head, while if there had been a breakwater on the Smithic Sand the vessels would have taken advantage of it, and reached under the breakwater, because there is no hindrance to get there perhaps; and the light vessels would be on the south side on the Holderness coast, and if the wind increased they would run back under Flamborough Head, and lay to.

24,177. What is the largest number of colliers you have seen lying under Speeton cliffs?—When you say Speeton cliffs to Flamborough Head, at Speeton cliffs I can not say exactly, but I should think from 100 to 150 sail. That would be the farthest.

24,178. What was the size of the vessels?—Four or five keels, up to 17 or 18 keels.

24,179. What would be the tonnage of a vessel carrying 18 keels?—There are 21 tons to a keel.

24,180. When these vessels were lying under Speeton cliff, were there a considerable number dodging about off the Head?—Yes, you might reach through them day by day, and notice the vessels laid there. I have seen for a week the same vessels, sometimes vessels from the Baltic that we noticed most, from seeing the timber on their decks.

24,181. What is the largest number of vessels you have seen knocking about off the Head in this way? Can you form any idea of the numbers?—Do you mean loaded or light ?

24,182. Light.—The loaded vessels generally got collected together with the wind from the southward, south-south-west, and south. Some of them get worked to windward on the south land; and if the wind continues from the south they will bear up and come under the Head again for shelter.

24,183. As to the number of these loaded vessels you have seen together: how many is it, should you say, at a rough guess, on the south side in going out to sea?—On both sides I should not have seen more than 200.

24,184. You do not include the vessels that were running down, the light vessels?—No.

24,185. Has it ever occurred to you to have to assist these loaded vessels out at sea in bad weather?—It never happened to me, but I have had occasion to assist them from the beach when they have run in.

24,186. (*Sir F. Smith.*) When the vessels were unable to beat round Flamborough Head, with the wind blowing strong from the south, would they be obliged to haul off if they could not weather it?—If they could not get round they hauled out under the Head.

24,187. If the wind got at all to the eastward what were they obliged to do? — If that happened they would reach to sea.

24,188. But, blowing a gale, would they keep at sea with heavy loaded vessels, or bear up?—The loaded vessels would keep at sea and would not run to a tidal harbour, at least I should not.

24,189. You fancy they would not get in. But if there had been a refuge under their lee, would they have run for that?—Upon the north side the sea has a great fetch and it is dangerous taking one of those harbours in a strong sea.

24,190. In any case would they run for Filey if a harbour of refuge were made there?—Of course they would run to any place when the ship is in want of shelter.

24,191. Even to Filey?—Yes, Filey or any place. When you have a stormy night you would run to the first place you could get to.

24,192. (*Capt. Washington.*) Have you ever known vessels drive from their anchors in Bridlington bay ?—Yes, I have occasionally. I have known very large fleets of light vessels brought up in Bridlington bay when sudden gales have come from the eastward. I recollect in 1819, when I was a boy, I was herring catching here. There was a very large fleet, but I cannot say the number, of light vessels riding here. The wind shifted from north to east, I do not remember the point of the compass, but they were obliged to get under weigh, and they ran for Bridlington harbour until they filled it. Some vessels got within others' quarters, were jammed out, and ran for the Humber. We wanted to go about the herring business, and we had to land our boats up to the top of the harbour, and drag them through the streets to launch them. If there had been a harbour of refuge they would have been all laid up comfortably.

24,193. How many vessels will the harbour hold?—I am sure I cannot say.

24,194. How many have you seen in it?—I do not know. I do not mind the quantity. It was smaller then than it is now.

24,195. As it is at present, have you ever seen 50 sail in it ?—Oh yes, 50 or 100; I am sure I cannot say. It is only seldom I come to Bridlington.

24,196. Where do you fish from?—I do not fish at present. I was brought up a fisherman at Flamborough. I live at Flamborough, but have been at sea for more than 20 years.

24,197. You know Bridlington harbour pretty well?—Yes.

24,198. Can anything be done to improve it for the vessels which ride out in the bay when they have occasion to take it?—There might be a very good harbour made in Bridlington bay, where vessels could take it in all weathers and at all times of tide.

Mr. JOHN CAMPLEMAN examined.

24,199. (*Chairman.*) You are the harbour-master at Bridlington?—Yes.

24,200. How long have you held that situation ?—About 13 years and a half.

24,201. Previous to going to that situation were you at sea?—Yes.

24,202. How long at sea ?—About 27 years.

24,203. For how many years did you command vessels?—Only about four.

24,204. In what trade were the vessels chiefly employed in which you served?—Between here and Sunderland.

24,205. In the coal trade?—Yes.

24,206. (*Mr. Lindsay.*) What water have you at the entrance of the harbour at low water?—At low water we have not much.

24,207. Have you any?—It is dry sometimes. Forty yards out of the Pier-head I have seen it a deal lower than it is to-day.

24,208. What is the rise and flow of the tide?—About 18 feet rise and flow. We have 16 feet of water at the entrance of the harbour at spring tides on the average.

24,209. What is the largest vessel you have seen enter Bridlington harbour?—We have a vessel now in of 268 tons, which has been ashore. I think the largest vessel may be 350 tons.

24,210. What is the greatest draught of water?—We have had them 15 feet.

24,211. What sized vessel can find refuge in gales of wind?—We have had vessels of 70, 80, and 200 tons.

24,212. Have vessels of 200 tons run for it in easterly gales ?—She must be light, not a loaded vessel.

24,213. What is the largest loaded vessel that ever found refuge in the harbour in a gale?—I think the largest drew 14½ feet. They do not get in safely at that water.

24,214. She came in in a gale?—Yes, in a gale of wind, and leaking.

24,215. It was neck or nothing for her ?—Yes. There are several more of that kind.

24,216. What number of vessels of 150 tons register would the harbour hold?—It would not hold above 80 of that tonnage. We have had 120 in it.

24,217. What sized vessels?—They would average about 70 or 80 tons.

24,218. They would be very closely packed, I suppose?—Yes, pretty closely packed.

24,219. Is there much sea comes into the harbour in an easterly gale?—It is very nearly as bad as it is on the beach : we are completely open to the south-south-east.

24,220. You have run up a wooden jetty or pier inside. Was that meant as a breakwater?—It rather protects the north side of the harbour, but very little.

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24,221. Ships in here with a gale blowing right in are not safe, are they?—They have to come round under the rocks and all sorts of things. Some parts of the harbour are better than others, but none of it can be called good.

24,222. Do you deepen the harbour?—We took 700 tons out from a great bank close to the entrance of the harbour.

24,223. Has anything more been done in that way since you have been harbour-master?—No.

24,224. Any building going on?—The south pier has been made.

24,225. Was the whole of the south pier constructed during that time?—I think it had been about a year or a year and a half commenced when I came.

24,226. Has the construction of the south pier done anything to protect the vessels in the harbour?—No; I believe they were better off before it was made. It brings more sea upon them.

24,227. Do you know how much money was spent in building that pier?—I cannot exactly say.

24,228. Is it your opinion that the harbour is worse now than before the pier was built?—Yes.

24,229. It is more uncovered, and consequently it is worse?—Yes, it is more spacious; but it is worse in regard to sea.

24,230. Has there been any deepening going on while you have been here, except the 700 tons?—Just before I become harbour-master there were 5,000 or 6,000 tons taken out.

24,231. But has anything been done during the last 13 years?—I believe the contractor for the pier had an agreement to do something of that kind, but I think it was done away with.

24,232. What dues do you charge on vessels?—Vessels that pay passing tolls we charged 6*d.* for the ship altogether. That is called an ancient toll.

24,233. Who gets it?—The commissioners, of course.

24,334. Is that all the charge you make for refuge vessels?—Yes, coal laden vessels; but vessels with any other cargo pay 3*d.* a ton on the registered tonnage: a vessel coming in loaded with grain, or timber, or anything but coal.

24,235. Stop a minute. Say that a vessel comes in here for refuge, and is not going to deliver her cargo, but is fairly driven for refuge into the harbour, what charge do you make?—Any vessel loaded with anything but coal, 3*d.* on the registered tonnage. If she comes in in ballast, if the last cargo she had in was not coal, 2*d.* on the registered tonnage.

24,236. A refuge vessel loaded with coal coming in here is only charged 6*d.* on the vessel?—Yes.

24,237. But if a vessel laden with any other cargo comes in here for refuge, she is charged 3*d.* a registered ton?—Yes.

24,238. But if she comes in in ballast it is 2*d.* a registered ton, unless on the former voyage she was laden with coal?—Yes.

24,239. Is that correct?—Yes.

24,240. What do you charge on vessels coming to deliver their cargoes?—6*d.* on their registered tonnage.

24,241. With all descriptions of cargo?—Yes.

24,242. Including coals?—Coals pay 1*s.* 6*d.*; but that is for the coal and the ship too, 6*d.* for the ship, and 1*s.* for the coal.

24,243. What is the amount of the revenue?—It is very bad now. The last quarter was up two or three days ago, and it was only 65*l.* for the whole quarter. It will average about 500*l.* a year.

24,244. Is that derived from the tolls which you charge on ships coming in with cargoes or for refuge?—Whatever is discharged, there is a toll upon it.

24,245. The whole of that is raised by a tax upon the shipping which comes into the harbour?—Yes.

24,246. You alluded to the passing toll. How much of that comes to you?—I believe that the passing toll is about 3,000*l.* a year.

24,247. Which comes to Bridlington?—Yes.

24,248. Who gets that?—The Commissioners. They borrowed money to build the south pier, and they take that money to pay it.

24,249. Then the 3,000*l.* a year which you get from the passing toll is all consumed in paying the interest on the money which was borrowed to build the south pier?—That is it.

24,250. In fact, from what you say, this 3,000*l.*, instead of being used to do any good to the passing trade, has done a great deal of harm?—It has got the place into debt, and the only security which the Commissioners have for the money is the Act of Parliament. The Act has not above another 10 years to run before it is expired, and it will take nearly all that time before they get the money in.

24,251. There is no portion of the 3,000*l.* goes for harbour purposes?—No.

24,252. It is all consumed in interest?—In interest and in liquidating the debt.

24,253. Do you know how much they have in hand towards liquidating the debt?—I expect that before the 10 years have expired the debt will be completely liquidated.

24,254. You think the accumulation of funds will, before the Act expires, be sufficient to pay off the debt that was contracted for the building of the south pier?—I think so.

24,255. Now, tell me about the bay; is it good holding ground?—It is good holding ground. A great number of ships have been lying there during the last 10 years, and I have an account of them in these two books [*holding up two books*].

24,256. Do you keep an account of all the ships that anchor in Bridlington bay?—Yes.

24,257. For what purpose do you keep it?—Merely for my own curiosity; so that I can refer to anything.

24,258. Is it no part of your duty to keep this account?—No. I have put down in it nearly all the casualties that have occurred within these 10 years.

24,259. Say, that there is only one great harbour of refuge to be made between the Humber and the Farn Islands, where would you have that harbour?—I should prefer Bridlington bay, because I consider that in all roadsteads to which light vessels go—and we often have from 500 to 600 in Bridlington bay—there ought to be some protection when the wind suddenly shifts round to the eastward.

24,260. Do you think a harbour of refuge for laden vessels would do more good in Filey bay or at Bridlington bay?—If it was made for laden vessels in Bridlington bay it would also protect light ones from easterly winds, and so answer two purposes.

24,261. Do you think Bridlington bay would be a better site than Filey for loaded ships?—Decidedly so, for this reason, that while it would protect loaded ships it likewise would protect light ones, when the wind chopped round to the east. If the wind chops round to the east, particularly at low water time, it is no use endeavouring to get under weigh. We must ride on, and do the best we can until high water. Then, if it is a gale, the ships must slip their anchors and make the best of it. If there was a protection it would protect loaded ships, too.

24,262. If a second harbour was made, where would you put it?—I should say Hartlepool.

24,263. Say, there was to be one harbour made at Bridlington bay, and that it rested between the making of a harbour at Filey, and one at Hartlepool, which should you prefer then?—I should prefer Hartlepool still.

24,264. Do you think a harbour at Hartlepool or the improvement of the Tyne, the Wear, and the Tees, so as to make them accessible at all times of tide, if that were possible, which of these do you think would do most to save life and property?—I should advocate the improvement of the existing harbours: for if they could be improved they would do more to save life and property. A few hundreds or thousands of pounds would do a great deal more as to this place. If we had anything like a harbour at all we should

have as many loaded ships with southerly winds as we now have light ones with northerly. Now, if a man comes in here with a laden ship he will almost go anywhere before he will come a second time. It needs some improvement, and that very badly.

24,265. Do you mean the bay ?—No, the harbour.

24,266. Tell me what you want in the harbour ?—I propose a breakwater outside the present harbour.

24,267. In what water would you have it ?—Three fathoms at low water.

24,268. And what length of breakwater ?—About a mile and a quarter.

24,269. (*Capt. Washington.*) I think you did not mean that any due was levied on vessels which took refuge in Bridlington bay ?—No.

24,270. Only those that enter the harbour ?—That is all.

24,271. You produce a book containing an account of the vessels. Do you confirm the statement made by Mr. Knott, that 700 vessels have been anchored in Bridlington Bay at the same time ?—Very probably. I have known two or three cases in which there were 600. I cannot count them so well as Mr. Knott can from the lighthouse.

24,272. As often as 10 times a-year have there been 200 vessels in the bay ?—Oh yes.

24,273. How do they get supplies ?—They have plenty of supplies of everything.

24,274. Is there any difficulty in getting them off from the harbour ?—No, they come ashore in their own boats.

24,275. Has it not often happened that the boats can land on the north side of the bay, under the cliffs, when they cannot come to the harbour ?—No. Some of them might land at Flamborough merely for the name of the thing.

24,276. Do they ever land under Sewerby ?—Some land at Flamborough for their own amusement, not to say they cannot get into the harbour.

24,277. Are the boats ever prevented from coming into the harbour for two or three days ?—Very rarely. I have known the boats come when the wind was blowing from the east, when the wind was heavy to the north-north-east. They have come for supplies, and have very likely brought a water cask in the boat. Anywhere else on the northern coast you could not have gone off in a life-boat.

24,278. Are there means and appliances for repairing vessels at Bridlington ?—No ; very indifferent. There are very few repaired to perfection. There is a vessel now that has been ashore. They get some temporary repair, and then are towed away to the north.

24,279. There is no patent slip, and no dock ?—No.

24,280. Amongst the vessels you have seen riding in the bay, have many of them come on shore ?—Sometimes three or four. I should say, perhaps half-a-dozen in a winter ; sometimes more and sometimes less. Last winter we had only one; but it was a fine moderate winter.

24,281. Are there any lives lost in Bridlington ?—Not often. Last winter there were three or four, the winter before, two.

24,282. In your opinion, what is the best thing that could be done for the benefit of the bay and harbour ?—It wants something to be done immediately. If we could get anything that would bring a little more water into it, and make it smoother, if we had the means, but we have not the means.

24,283. (*Capt. Sulivan.*) Did I understand you to say that in 10 years you will no longer have any passing tolls paid to this harbour. Yes ; the passing tolls expire after that time, I believe.

24,284. You said that vessels with cargo pay 6*d.* per ton for coming into your harbour to discharge ?—Yes.

24,285. But you afterwards said that colliers pay 1*s.* 6*d.* ?—That is for the coal as well.

24,286. They pay both on the coal and on the vessel ?—Yes.

24,287. On other cargoes does the 6*d.* cover all ?—No ; the article pays besides.

Mr. JOHN WALLIS examined.

24,288. (*Chairman.*) Do you reside at Bridlington?—Yes.

24,289. What is your occupation ?—I am a seaman.

24,290. Are you employed in the coasting trade?—The coasting trade, and for seven or eight years in fishing.

24,291. Do you command a vessel of your own ?—I do; but she is a small fishing vessel.

24,292. You are also coxswain of the lifeboat ?—Yes.

24,293. (*Sir F. Smith.*) Have you often a great number of vessels in the inner harbour ?—Frequently a great number.

24,294. What number have you now ?—At the present moment not more than five or six. That would be the remnant of what we had in our last gale.

24,295. Vessels of small tonnage ?—Generally of very small tonnage.

24,296. Is the holding ground good ?—Very good anchorage ground.

24,297. What is necessary to make this a safe and efficient harbour of refuge?—A breakwater on the Smithic Sands.

24,298. What length should it be ?—It may be extended to any length.

24,299. What is the least length that would do ?—I should not say less than two or three miles. That would be necessary for the increase of the trade.

24,300. In what depth would it be ?—On the Smithic, on the part of the Sand where I consider it should be, it would be from 2½ to 3 fathoms water.

24,301. Is it very much exposed there to the beat of the sea ?—Not much exposed. There is a great row of shallow ground on the outside.

24,302. Does not that form a tolerable breakwater now ?—Yes ; it is a famous breakwater at low water time.

24,303. There would be no difficulty in getting into the harbour if it was formed ?—It is a rare case that we find it difficult now, but it would be perfectly safe if we had a breakwater. At low water time we find very little difficulty in getting into the harbour even now. It is not once in a hundred times that we have such a gale but what we can get off in one of our boats —18 feet boats.

24,304. (*Capt. Washington.*) You have no difficulty in getting off in the boats?—It is comparatively easy at low water time; that is, because the bay is sheltered by the Smithic Sand and the shallow water outside of it.

24,305. We have heard a good deal of the outset out of Bridlington and round Flamborough Head. What direction does it take ?—It sets out about east and by north, curves round to the northward, following the formation of the Head. It sets down into the open gut, and takes a course along the land, and goes out about a mile and a half. About the lighthouse it extends to about a mile and a half from the land. The ebb tide sets out a very considerable distance, and causes a large set to come up, which is thought the first of the flood. That is what gives loaded vessels such an opportunity of holding their ground at the Head. It is the eddy causes the tide : it causes nine hours flood to the northward of the Head.

24,306. Then about a mile and a half from the shore is the principal ground on which loaded vessels can hold their own to the north of the Head, without being drifted away. Does any tide set into the bight of Filey bay ?—Very partially; very partially as a flood tide.

24,307. You heard one of the witnesses say there was a great outset out of Filey?—Yes, there is. I have worked in Filey both in fishing and in herring catching, and there is a very strong outset—a strong

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outset, owing to the ebb. It sets out to the northward, the same form as the ebb tide. It strikes out to the eastward, and then changes its course to the northward, as it clears the Brigg End. With an ebb tide the set is comparatively light, but it gains strength as it goes on.

24,308. The same at Filey as at Flamborough?—Nearly so.

24,309. Do you think it runs so much as three knots an hour?—Spring tides it does. I tried it this last spring of the year, and made it run about three knots, or rather better.

24,310. Is it not such a set as would cause it to be attended with danger for any ship taking the bay?—We find it very dangerous with open boats in what we call ordinary weather; but in gales of wind I think it would be dangerous even to decked vessels.

24,311. Are you acquainted with the coast from the north, as far as Hartlepool?—Even to the northward of that, but not generally. I have been there occasionally as a fisherman and as a mariner, by being the mate of large vessels.

24,312. Have you ever had occasion to run for Hartlepool?—No, never in extreme weather. I have in fine weather.

24,313. In your fishing vessels?—We run to Hartlepool, Seaham, Whitby, Filey, Scarborough, and every port along the coast. I have been in all these places this last summer.

24,314. Do many vessels land their fish at Bridlington?—Great numbers; a great number of trawling smacks. I have seen as many as 14 and 15 land here of a tide.

24,315. Where do they find a market for the fish?—They generally send it to London as a market, or to Hull. If they do not find a market the fish is sent direct to Hull, Birmingham, Manchester, and other places.

24,316. (*Capt. Sulivan.*) If a harbour of refuge was constructed at Filey, would it become a valuable harbour for fishing vessels that could not fetch the Humber with south-east gales, and wanted a quick market for their fish?—I have a great aversion to pier harbours. I have not seen any to the northward of the Head which have been effectual. Seaham, Hartlepool, Whitby, and Scarborough, are all difficult to take at their entrances in bad weather.

24,317. I was not speaking of harbours made on shore. I mean if the bay was enclosed by a breakwater, so as to make a safe anchorage from all winds, would it then be used as a place for fishing vessels?—I have no doubt it would be used for fishing vessels; and I think it would be a great boon to them.

24,318. Supposing a harbour to be made all that could be wished, would it be valuable for the large fishing boats coming in to find a market for their fish, if it blew hard from the south-east or southward and they could not get to the Humber?—I think it would, if there was no other. But there are more eligible places than Filey. Still, even there it would be better than Scarborough or Bridlington now are.

24,319. (*Capt. Vetch.*) Do you know it to be a fact that the fishing boats which frequent this coast frequently carry their fish to Grimsby?—I know a great many of them that use Grimsby.

24,320. What proportion do you suppose of the whole? At present there will be 60 or 70 will rendezvous at Grimsby.

24,321. These send the fish direct to London?—Yes.

24,322. (*Mr. Coode.*) Have your fishing vessels got "wells"?—No; dry bottom vessels, all of them.

24,323. You said that you measured the tide at Filey?—Yes, just in the rough. We all form some idea of the difference between springs and neaps. I find an unusually strong tide whenever I have occasion to bring up in a fog there.

24,324. How did you measure it?—I merely threw a bit of line and noticed at what speed it was going, simply to ascertain where we were in the foggy weather.

24,325. Did you time it with a watch?—Yes.

24,326. Had the watch a seconds' hand?—No. It was merely a rough guess. We have frequently done so, because fishermen often go to sea without a compass, and we have to let go the anchor in a fog and calm weather to see which way we go by the set of the tide.

Mr. JOHN LYON examined.

Mr. J. Lyon.

24,327. (*Chairman.*) Do you reside at Bridlington?—Yes.

24,328. How many years have you been at sea?—Eighteen years.

24,329. For how many years have you commanded vessels?—About three and a half years.

24,330. In what trade have the vessels been chiefly employed in which you served?—I have been nearly all over the world within the last three years. I have been in the trade between here and Hartlepool, Shields, and those places. Previously, I went to America and different parts of the world.

24,331. In the foreign trade?—Yes.

24,332. Since you have commanded a vessel have you ever had occasion to know the want of a shelter on this coast?—Yes, many a time.

24,333. Give me an instance.—We have run many a time for Hartlepool for shelter, being laden. When we could not reach there we ran from here to Hartlepool, and sometimes to Shields. It depends; when we cannot get the length of the Tyne we consider Hartlepool the best.

24,334. Do you know anything of the Tyne?—Yes.

24,335. Well?—Yes.

24,336. The Wear; do you know it?—Yes.

24,337. The Tees also, do you know it?—Yes.

24,338. Would you consider it better to have one harbour at Hartlepool, or to try and improve the existing ports, so as to take ships of 16 feet draught?—I should approve of the existing harbours being improved, because there is never a vessel on the east coast of England can take a harbour of refuge on the north coast, not to bring it out into deep water.

24,339. Why is it impossible?—Because the whole North Sea has a fair fetch upon it, and it has a solid break; and if you bring your piers out the sea just breaks out there. I have seen ships in the January gale knocked down like cobbles by it in 10, 15, or 20 fathoms. If there had been a harbour of refuge here the ships could have come in with safety.

24,340. Then we will put Bridlington out of the question. Suppose there is to be a harbour made here, where would you put the harbour for the rest of of the coast?—I should choose the improvement of the other harbours.

24,341. Have you ever run into one of those harbours against a strong freshet with an easterly gale?—Many a time. Not really heavy gales, but with a deal of sea several times during the last winter and the winter before.

24,342. What was the vessel you commanded?—A little schooner of about 50 tons.

24,343. You ran her into the Tyne against a freshet?—No, not the Tyne.

24,344. The Wear?—No, Hartlepool.

24,345. But there is no freshet at Hartlepool?—There is a little at Old Hartlepool.

24,346. That is the reason there is not so much sea?—The Heugh runs a long way out.

24,347. You think Hartlepool a good place to run to?—Yes.

24,348. Better than the bar harbours?—Yes. The same with Filey; the North Sea breaks completely upon it. It is impossible for a vessel to take them. There are the Scotch vessels; we have 50 sail, may be going northward and 800 southward. When it comes a gale of wind from the north-east what are

the Scotch vessels to do? They must come to the Head and Bridlington Bay.

24,349. (*Sir. F. Smith.*) Does the sea break foul in Hartlepool Bay with an easterly wind?—Not inside the Stone buoy. Where the damage is done is outside, in the deep water.

24,350. What would be the effect of having a curved breakwater, curved outwards to the sea, with an entrance at both ends? Would that prevent the inconvenience from the breaking of the sea?—I do not think you will ever get anything for a ship to go in in safety. All the way to the north the North Sea has a solid break upon it.

24,351. What do you think of Redcar?—It would be very well with some winds, but I do not think it would be better than Filey in others.

24,352. Is it as good as Hartlepool?—No.

24,353. Is it better than Filey?—I think it is.

24,354. You would prefer the improvement of the harbours of the Tyne, the Wear, and the Tees?—A long way better. But if there is to be a harbour of refuge it wants to be here.

Mr. JOSEPH CATLEY examined.

24,355. (*Chairman.*) How long have you followed the sea?—About 20 years.

24,356. Do you reside at Bridlington?—Bridlington quay has been my home all my life.

24,357. Have you commanded vessels any time?—Yes, for 11 years.

24,358. In what trade?—Some time in the coal trade, and some time from ports in the Baltic.

24,359. You have been present at the proceedings to-day? Do you generally concur in the evidence given to us that Bridlington bay is the place where the harbour of refuge should be placed?—I do.

24,360. Are your reasons the same as those given by previous witnesses?—I think they are nearly so.

24,361. Is there any point which you think they have not brought under our notice, or any point in which you differ from them?—My view is, that it is accessible at all times, however heavy the gale may be from the eastward. The oldest person in the place cannot remember the sea being too high for ships to come into Bridlington bay. But it has been the case north of the Head. I can give two instances connected with my own experience which would tend to prove that a harbour of refuge in Bridlington bay would be of great service. I will be as brief as possible. Many years ago I was in a vessel coming from Riga in the month of January, laden with linseed. We had a long and dangerous passage. We made Flamborough Head on a very cold winter morning, just as the day broke, the wind blowing a gale, chiefly from the east, perhaps east-south-east. The sea was very heavy indeed. We laid the ship with her head to the southward. We were bound to London, and thought we would, if possible, take the harbour for refuge, because the weather was so tremendous we did not like to continue at sea if we could get a place of safety. It did not continue sufficiently clear for us to see the Humber, and we were obliged to keep her head southward. It so happened that Providence ordered it so that the weather abated, the wind became more favourable, and we arrived safe in port. But if there had been a harbour of refuge in Bridlington bay at that time, we should not have laid the ship's head to the southward. We should have made for it as soon as we saw the Head, and taken refuge until the weather abated. That is one instance. Another was a few years afterwards in a collier coming down from Maldon, also in the month of January. Forty sail being in Yarmouth roads, the wind north-east, blowing heavy, thick, and snow showers. It cleared up in the morning, and we got away, with another one called the *Carlisle*. When we got on the deeps the wind increased. It was moderate when we left the roads, but when we got there the wind increased and rather eastered. We thought we would run for the Humber, and would not come for Bridlington bay, or anywhere northward. It came so deadly thick with snow. It had cleared up a short time. We could see nothing, and we thought it very unsafe to run for the Humber under such circumstances. We laid the ship out at night, and let her go with her head off. We had two close-reefed topsails and a reefed forestay sail. She was a light ship, in ballast. There was a very heavy sea. We let her go with her head off, and kept her going all night. After she had gone for a certain time we thought the shore far enough off for the depth of water. We wore her with her head on, and let her go in until we shoaled the water again, still keeping to windward as much as we could. We kept on all night. In the morning it was still thick, with snow, blowing heavily, and a heavy sea. We could not go to the northward of Flamborough Head, because we knew that we could not depend upon the soundings in thick weather like that: durst not attempt it, like she was, because if we had gone there we could have seen nothing until we were right on the land. We thought if we kept to the southward and dragged down the Holderness coast we could depend upon the soundings; and if we had to come on shore, we knew that we had a sandy beach in Bridlington bay. We kept her coming down, and as day came on we got a cast of the lead. We just wore her head in and got a cast of the lead 20 fathoms, and a little further, another of 18 fathoms, and a little further still one of 13 fathoms. We let her go until she came to 7 fathoms, and then the sea nearly broke on board, and we knew that we were in Bridlington Bight by the regular soundings and the sandy bottom. The day cleared a little, and we saw the top of a church. Some of the men said it was Bridlington church. I said it was not, because it was a square church. We found afterwards that it was Hornsea. We consulted and thought among ourselves, and determined to keep her to windward until the tide time. It was low water here at half-past ten o'clock, and it was then half-past six. We laid her to, taking in the fore-sail and keeping the two close-reefed top-sails, waiting for the flood-tide, in order that we might go into Bridlington harbour, knowing that if we anchored in the bay we might lose our anchors. We found that she drifted in and reached just within the Smithic, close within the sand and broken water. We got two rungs of cable, and when we came into what we thought the smoothest part of the water, we let go the small bower with a bite of 60 fathoms. The anchor weighed seven hundred weight and a quarter. She never looked at that, but drifted right away, and then we let go the best bower of 80 cwt., with 70 or 80 fathoms of rope chain, and she brought up. During this time the day had cleared up, and we could see the people on the cliffs, on the shore, and on the north pier. The sailors said they never saw such a thing.

24,362. How was the wind?—East-north-east, and it eastered as we came down.

24,363. How long did the gale last?—It abated in the night. We thought we might be on shore before the morning; and, being acquainted with the place, we thought we would cut the cables and risk the harbour. We did so, and got safe in with a little damage.

24,364. How long did you lie on the Smithic sand?—From low water in the morning till high water in the night. That was 17 hours.

24,365. Blowing very hard indeed?—Tremendous hard.

24,366. What yards had you aloft?—We had all up: we had no foretopgallant mast, or topgallant yard; but the main topgallant was up, and we had plenty of work for the hands without sending the yards down. I think if there had been a harbour of refuge in the bay, we should have ridden there secure, and not lost our anchors; and we could have found our way into it,

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thick as it was, but could not have done so at Filey, or those places northwards. We durst not attempt them under such circumstances.

24,367. (*Capt. Sulivan.*) In the case of the ship coming from the Baltic voyage which you have described, had there been a harbour of refuge at Filey, when off Flamborough Head could you have taken it?—I would not have attempted it, unless I saw that it was necessary to save my life, because of the tremendous sea to the north of the Head. When there was so heavy a sea in the regular offing, I knew there must be the same on the shore, when the sea falls into shoaler water.

24,368. Have you ever been to Plymouth?—I have passed it but have not been in.

24,369. You know the breakwater there is exposed to the whole Atlantic Ocean?—Yes.

24,370. Are you aware that ships of all classes run in with the west-south-west gales in perfect safety?—I have been told so.

24,371. If you could make a breakwater enclosing a good anchorage, why should not vessels run round and anchor as well as at Plymouth?—Do you mean in this bay?

24,372. I meant at Filey?—There would only be one entrance there.

24,373. You do not know that?—I go by Mr. Coode's plan.

24,374. Why should you not run in there as at Plymouth?—I do not know the sea at Plymouth; but there is a tremendous one at Filey, and would be at that breakwater.

24,375. Do you suppose there is a worse sea there than the sea in the English Channel, with south-westerly gales right up from the Atlantic?—I cannot say that. I have been 11 days off Falmouth with the thick weather, but never close in shore. I have been from Alderney and Guernsey to Swansea.

Mr. William Clark examined.

Mr. W. Clark.

24,376. (*Chairman.*) How long have you been at sea?—14 years.

24,377. Do you belong to a vessel now?—No; I have been fishing a little this summer.

24,378. What have you been before then?—I have been a seafaring man.

24,379. Have you been a mate?—I was mate of the *Oscar*, of Scarborough.

24,380. How many years?—Three.

24,381. Where have the vessels you have been in chiefly traded?—Principally between London, Shields, Hartlepool, and different places in the north.

24,382. Have you been present to-day?—Yes.

24,383. Have you heard the evidence in favour of Bridlington bay?—Yes.

24,384. Do you agree with the other witnesses?—Yes.

24,385. Have you any reasons to give for agreeing with them, in addition to those we have heard?—I think a vessel would be able to go into Bridlington bay when she would not be able to look at Filey at all from what I have seen of it.

24,386. Since you have been knocking about on this coast have you ever been in danger of losing your life or of your vessel being lost?—Oh yes.

24,387. Often?—Yes, often. I have been caught in a heavy gale of wind off here about eight years ago. The wind was away from the north-north-east, right off the pitch of the Head. 16 ships went down near us. We could not show a stitch of canvas.

24,388. Was the vessel light or laden?—Light.

24,389. Where were you going to?—We were bound to Hartlepool.

24,390. From where?—From London.

24,391. Where were you caught?—Right off the pitch of the Head.

24,392. Could you not get into Bridlington bay?—No, nor Filey neither at such a time. We could have gone in, if we could have got the ship's head, but the wind came so heavy we had to take all the canvas in.

24,393. What weather did the vessel make?—She was a very easy ship at sea. She did not make bad weather, but there was great danger. It was so dark you could not see from one end to the other; we had not anything set. She was a brig.

24,394. Did the sea break on board very much?—No, she laid very high, but we had a great deal of danger of other ships ruuning into us, because we had no command over the vessel.

24,395. Have you taken any of these bar harbours in bad weather?—Not in any bad weather, I have not.

24,396. (*Sir F. Smith.*) You have fished off the Dogger Bank?—Only this year.

24,397. What is the greatest number of boats you have ever seen there when the gale came on?—This last south-westerly gale there was about 200 sail off there.

24,398. The wind from the east?—No, from the south-west.

24,399. Did you run for shelter on any occasion?—No, we were obliged to hang on to our nets until the gale was over.

Mr. Benjamin Sawdon examined.

Mr. B. Sawdon.

24,400. (*Chairman*). Do you reside in Bridlington?—Yes, I have done so all my life. I have been a shipowner the last 40 years.

24,401. Have you ever been at sea?—No.

24,402. You have been present during this inquiry, you have heard the evidence of the previous witnesses, will you give us any additional statement you may wish to make on the subject of harbours of refuge?—I concur in the general remarks as to the excellency of this bay, which I think might be protected by a floating breakwater, a model of one of which I have brought with me if you wish to see it. I have also had considerable opportunities of viewing Filey Bay. I resided five years on the summit of Reighton Head, overlooking the whole bay. I was constantly on the shore, being out of all business. I came to the conclusion, from particular observation, that if the present plan for a harbour of refuge at Filey was carried out that bay must in consequence silt up.

24,403. Is there anything else you would like to offer? For the moment we will put the question of construction on one side?—I should like to state that I think the harbour would silt up. I have been in the habit of observing Reighton Bay between Speeton and Reighton. There is a deposit of 5000, 10,000, or 20,000 tons of gravel, which is evidently brought along by the sea (with the east and south-east gales), which runs almost at right angles with the shore, sweeping that vast mass before it, and there it lodges. I can find no reason why it lodges there, except the wave that runs down Filey Brigg, by its excessive recoil meeting the wave that flowed past Speeton, depositing the gravel there. As a proof of the wave recoiling from Filey Brigg I may mention that it is all swept clean of sand, and that it is rarely that there are even a few loads of gravel upon it. As you proceed down to the bottom of the bay the wave that has rolled down Filey Brigg recoils from it, sweeping the beach in Filey bay perfectly clean and leaving nothing but a thin coating of sand on the clay, and lodges the entire deposit at the foot of the Reighton and Speeton cliffs, but chiefly at the foot of the Speeton cliffs. I conceive that if the proposed plan is carried out that the recoil would no longer go down Filey Brigg

because Filey Brigg would be perfectly protected from the wave that now runs along it. The recoil wave being removed, the consequence of that, the regular and natural consequence must be that the superior wave running down Filey and Speeton cliffs would still go on, as there is sufficient inclination, and lodge all that there was before in the wave in the bay of Filey.

24,404. As respects the question of construction, what do you wish to say about the floating breakwater? —I think a floating breakwater of a construction that would induce the wave to run over it, and not to flow under it, would be sufficient to cause the roadstead to be very quiet indeed, and the expense would not be excessive.

24,405. Have you gone into any details of plans and estimates upon an extended scale?—I have a plan with me, and a wooden model.

24,406. Have you formed any estimate?—I have made an estimate, by which I believe the work might be constructed for, I think, 150,000*l.* a mile, and would make a very efficient breakwater.

24,407. Have you drawn up any statement in support of your views?—No, I have not done that; I only turned my attention to it in the last few days, after I heard the Commissioners were coming here.

24,408. Because you must be aware that it is a very difficult subject to undertake at a very few days' notice. It is a subject that has been considered very carefully by the best engineers in the country. Would it not be wise, if you wish to bring any such scheme under the consideration of the Commissioners, to give yourself a little more time to think it over?—I believe my plan is upon sound mechanical principles, and I should not alter it if I were to delay it longer.

24,409. I understand you to say you have only considered it for a few days?—About 10 days I have had it in hand. I think that is sufficient to determine in my mind the style of the construction and the calculation of the expense; when once the expense was decided upon was not difficult.

24,410. I think you can hardly expect the Commissioners to go into the details of a scheme of that kind, one which has been only under your own consideration for 10 days. But if you will give it a little further consideration, and at a later period send us up any well-considered plans and estimates on the subject, I can only assure you that they will receive our most attentive consideration?—I shall be happy to do so.

24,411. (*Sir F. Smith.*) I believe you are a shipbuilder, are you not?—A shipowner.

24,412. Not a shipbuilder?—No.

24,413. Have you turned your attention to timber constructions in any way?—I have built ships, and attended a good deal to building.

24,414. Have you attended practically to the construction of works of the kind you are now bringing forward?—Not to floating breakwaters, certainly, because they are not of common occurrence. I do not know where there is one.

24,415. That is a reason the more for taking a little time to bring forward a scheme of so much magnitude, because if your plan is a good one it would not apply to Bridlington only, but would extend over the whole country and to every description of breakwater. I would recommend you, as an old constructor myself, to think well over it, and even to take the chance of improving it. You will find it is not difficult to improve upon a first idea.

24,416. Will you tell me the length of the shore from Flamborough Head down to the bottom of Filey bay?—It will, I think, be about eight miles.

24,417. I understood you to say that there is a quantity of shingle, gravel, and sand?—Very heavy shingle indeed.

24,418. It comes round Flamborough Head?—The wave that strikes it does, and sweeps down the coast almost at right angles.

24,419. Where do you suppose the shingle comes from —I have no doubt that a very large portion of it is what falls from the rocks of Flamborough and Speeton. I am thoroughly sure that it is so because the largest shingle is flint.

24,420. Is not Flamborough Head greatly composed of chalk?—The foundation is entirely of flint; the lower courses are of flint; the principal part is chalk.

24,421. Where does the shingle come from, if the lower part is flint?—The shingle is flints that have come from Speeton or Flamborough cliffs.

24,422. Then they are reduced to shingle by the action of the wave?—Yes.

24,423. In that short distance of eight miles?—No, they are all shapes and sizes, some as large as half a cwt., others of various sizes.

24,424. Those must all have rolled with the sea, making from under the Head and under the Speeton cliffs?—Some may; some may not have come so far.

24,425. But how far are they moved?—They may come from Speeton, which is the adjoining cliff. There is a length of five miles of cliff, and I will not specify from which they come.

24,426. But the whole mass has rested at a particular spot?—Yes, it has, and I thought for the reason I have mentioned I come to the conclusion that it was arrested at that spot by the recoil from Filey Brigg, because we have an exactly similar deposit on the south side of Bridlington, arising from particular causes.

24,427. You imagine that if the wash over Filey Brigg was stopped there would be no means of resisting the accumulation, and it would spread over Filey bay?—I believe it would.

24,428. Do you know whether any soundings have been taken to see the extent of the accumulation?—No. There are many thousands of tons constantly being led away to all parts of the country for roads.

24,429. Sufficient to keep it down?—I have not seen it for five years; when I last saw it, it was a great thickness.

24,430. It must be very convenient to have that deposit. In point of fact, it does not amount to a great evil at present?—Not at all; it is a benefit.

24,431. It is a benefit resting where it does, for if it came along Filey bay it could not be carted away? —In all probability it would spread over the bay.

24,432. It would not come to the shore as it appears to do now?—I think it would not, but would in all probability spread itself more over the bay generally, but that is mere speculation.

24,433. You imagine that this silting up would be the result of the accumulation of this shingle working round into the bay by the stoppage of the resisting force which now arrests it?—Yes, not only the shingle but vast quantities of sand lodge in that quarter.

24,434. Has that accumulation never been examined to know its progress?—I am not aware it has been examined, though I have drawn the attention of several persons to it.

24,435. Then I conjecture that if an opening were left between the end of the breakwater proposed to be made, in order to form a harbour of refuge, so that the water could wash over Filey Brigg, you would have the same advantage that you have now? —When it was first mentioned that an opening might be made there, it did, for a moment, occur to me that such would be the case, but I cannot think that such would be the case. The wave that would run in at that opening would rush against the solid body of water, and would not go sweeping down at right angles with the whole Brigg. It would rush into the bight of the bay.

24,436. You think the action would be totally different?—It would take a different course, and would have a different action.

24,437. You give that opinion on full consideration? —Yes.

24,438. (*Capt. Sulivan.*) Do you know the north-west extreme of the chalk cliffs of Speeton?—I think it is about opposite the beacon.

24,439. How far from that is this accumulation of

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shingle and sand ?—A little further to the west, perhaps three quarters of a mile further west.

24,440. You spoke of the wave running at right angles to the shore. If that is the case, how does it move the shingle ? You mean running parallel ?—No; not running parallel, it would naturally tend on shore, but as the wave rolls from the east the end must be directed to the Speeton cliffs. I will not say it is at right angles.

24,441. It must run along the shore to take the shingle ?—It does run along.

24,442. You mean the line of the wave ?—Yes; the line of the wave travels along in the same line in which it comes from the deep sea.

24,443. (*Mr. Coode.*) In which direction is the recoil you speak of from Filey Brigg ?—It recoils across the sand in front of Filey.

24,444. What do you mean by recoiling across the bay ; in what direction?—In the south direction.

24,445. With what particular winds ?—East, south-east, and north-east.

24,446. With north-east winds it recoils from the Brigg ?—Yes.

24,447. If it does so, would not the force of the wave be entirely lost if it recoils upon itself ?—It recoils across the Head.

24,448. Will you point out the direction the recoil of the wave would take ?—The wave that rolls in from the sea, if even it was a little inclined to the north, the end of it comes a little upon the end of the Brigg. It still comes sweeping along the Brigg and round to the top of the bay. So clean is it swept away that the Filey people have to come down the bay to fetch gravel for their roads.

24,449. Is not Filey bay more exposed to the south-east than to a north-east sea. Does not the heaviest sea come from the south-east ?—Yes.

24,450. Then would not the tendency of the shingle be to travel towards the north-west ?—It never does travel there.

Mr. John Wilson examined.

Mr. J. Wilson.

24,451. (*Chairman.*) Do you reside at Bridlington? —I do.

24,452. How long were you at sea ?—About four years.

24,453. Only four years ?—I am a shipwright by business. We had vessels belonging to us, and I went to sea to take charge.

24,454. Do you own ships at present, or have you given up that ?—I have given up that.

24,455. You have been present during the inquiry will you now give your opinion to the Commissioners as to the necessity or advantage of a harbour of refuge on this district of the coast, and where it should be placed?—My firm opinion is, in Bridlington bay.

24,456. Are the reasons upon which you found your opinion the same as those which have been given by the previous witnesses?—Quite so.

24,457. Is there any point which they have not brought under your notice which you would like to bring forward? anything which they have omitted?—I think there is nothing except about the vessels which have been to the southward; vessels which have been lying under the Head and dodging under Speeton cliffs; vessels come from the northern ports, some from Sunderland, some from the Tyne, some from Blyth, and some from Hartlepool. Those that come out of Hartlepool have the advantage of those from Shields and Blyth. They must have had a change of the weather and have got further to the southward. They all dodge under the Head, and I have noticed that many have got as far as Spurn Point, and then came back and dodged under Speeton cliffs.

24,458. It is for those vessels that have got so far south that you think a harbour in this bay would be advantageous?—Quite so.

24,459. Are you prepared to say that the number of vessels to the south of the Head is greater than that of the vessels to the north?—I consider that the greater part if they are not to the south of the Head have an opportunity of beating to the southward, if there is a harbour of refuge in Bridlington Bay.

24,460. Then you are of opinion with the pilots who gave evidence that, even in very heavy weather, ships can make round the Head and could get into Bridlington bay?—Yes, I have had a great deal of experience down north respecting the harbours. I made the channel at West Hartlepool. I was superintendent of the dredging department of the works, and I am well acquainted with both Hartlepool, Sunderland, and Shields.

24,461. You were too short a time at sea to be able to give nautical experience ?—True.

24,462. You do not consider your nautical experience much ?—Not more than as already given.

Mr. John Pockley examined.

Mr. *John Pockley.*

24,463. (*Chairman.*) Do you belong to Flamborough ?—Yes.

24,464. Have you been fishing all your life ?—Yes.

24,465. Have you been present here to-day ?—Yes.

24,466. You have heard the evidence of previous witnesses. Is there anything you have to offer to us in favour of a harbour at Bridlington bay, if that be your opinion, which we have not heard from them ?—No, I only have to state that I think a harbour in Bridlington bay would be a very great advantage.

24,467. It would be an advantage to Bridlington—that we can see very well ; do you think it would be of general advantage to the trade which is passing on the coast ?—I do not mean advantageous to Bridlington ; I mean it would be of service to the public.

24,468. Do you confirm the statements of previous witnesses in your own line of life, as to the number of vessels which you find off Flamborough Head in bad weather. Did you hear that evidence ?—Yes.

24,469. Has it ever occurred to you to take the crews out of vessels that were sinking ?—Never.

24,470. In what sized vessels have you generally followed your occupation of fishing ?—Generally in our small open boats ; but I have been in these large vessels and have commanded one.

24,471. You have fished from the shore chiefly ?—Yes ; a few years I spent in one of the larger boats. I commanded one.

24,472. What size is the boat you command ?—She is only a small one, perhaps ten tons, a small open-topped boat.

24,473. Do you know Speeton cliffs ?—Oh yes.

24,474. What is the largest number of vessels you have ever seen anchored there ?—I do not think I ever saw above fifty or sixty.

24,475. What is the largest number you have seen knocking about off Flamborough Head ?—I cannot speak positively ; perhaps 100 or 150.

24,476. You never acted as pilot to any vessel ?—No.

24,477. Has it ever occurred to you in your fishing to fall in with Baltic vessels making their passage home ?—Many times.

24,478. Do they often make Flamborough Head ?—Yes.

24,479. (*Sir F. Smith.*) Are you aware whether vessels coming from the Baltic call off Flamborough Head for orders ?—I am not aware of that.

24,480. Whether bound to London or Hull ?—I am not acquainted with it at all.

24,481. You do not know that it is the case ?—No.

Mr. GEORGE WILLIAMSON examined.

Mr. G. Williamson.

26 Oct. 1858.

24,482. (*Chairman.*) What is your occupation?—Fishing, at present.

24,483. Do you belong to Bridlington?—Yes.

24,484. Are you aware of the circumstances connected with the loss of the *Coburg*?—Yes, I was in the life-boat both times.

24,485. Detail them to the Commissioners?—The *Coburg* was going down from the southward, with the wind about east-south-east, I suppose, and the tide about half-flood, She had not sufficient water to come into the harbour, and consequently she came to the beach. A life-boat was manned, but by not having a rope ready we had to come on the shore and be hauled down by the south pier side. The second attempt we succeeded in saving the crew. A more disgraceful thing never was known, I should say, than the way in which we were behaved to by the master and some one in this place.

24,486. That is irrelevant to our present inquiry. We cannot enter upon that. Was it blowing hard from the east-south-east when the vessel ran in?—Very hard.

24,487. Was she a light vessel?—A laden vessel.

24,488. She was run upon the beach?—Yes.

24,489. When was that?—In March, 1858.

24,490. (*Capt. Sulivan.*) Where was the vessel bound to?—To some port in France; I believe with steam coal.

24,491. And put back in bad weather?—Put back in bad weather. She could not weather the Spurn Point.

24,492. Could she have weathered Flamborough Head?—No; one of her topsail sheets was gone.

Mr. ARTHUR STRICKLAND, examined.

Mr. A. Strickland.

24,493. (*Chairman.*) Are you a resident in Bridlington?—Yes.

24,494. Will you now state anything you wish to offer?—Merely you were asking the harbour-master some questions about the income and expenditure upon the harbour. I was for many years chairman of the harbour commission when they were building the harbour and different works, and I was also employed at the time of soliciting the last Act of Parliament, which we got for the harbour. The state of the case about the income is that it is now mortgaged to the government. We got an Act of Parliament for 30 years, on condition that we should finish our works by that time and pay off the mortgage. Some time ago he came to an arrangement with the loan office, and the income is now to be dedicated to that purpose. The works have been stopped for some years.

24,495. (*Mr. Lindsay.*) How much money was expended on the south pier?—I think 30,000*l.* was the contract price.

24,496. Was that all that was expended on the construction of that pier?—I think 32,000*l.* was the whole.

24,497. Did you borrow the whole of that upon the security of the passing toll?—Yes, upon condition that the passing toll ceased with our bill.

24,498. What interest are you paying?—I think four per cent.

24,499. You will still have a considerable balance out of 3,000*l.* per annum. It does not take the whole of 3,000*l.* to pay the interest of 30,000*l.*?—I think there is a good deal of loan to pay upon the other pier.

24,500. How much money have you borrowed upon the old pier?—I am sure I cannot speak as to that just now, but I think there is not much surplus left of the present income. We came to an arrangement some years ago, that instead of paying a large quantity of interest we should pay a certain sum every year so long as the 30 years lasted.

24,501. You pay a certain sum every year to liquidate the original debt?—Yes.

24,502. How much do you pay every year towards that?—It is somewhere near the income. Only a few hundred pounds is left of our income. 500*l.* or 600*l.*

24,503. The whole of the income, including the passing tolls that you receive from ships, is all expended in the payment of the interest, and in the liquidation of the original debt, save and except 700*l.* or 800*l.*, which is used in the maintenance of the harbour?—It is somewhere thereabouts.

24,504. (*Chairman.*) Do you think that the Commissioners have at all prejudiced the interest of trade here by charging heavy dues either on imports or on exports?—No, I think not.

24,505. Have they the power to alter the rates if they think proper?—Yes, to a certain extent. Vessels that pay the passing toll have the use of the harbour free except the 6*d.* that there is to pay. But that is a duty of Queen Elizabeth's time; except that by our present Act, any vessel that has paid the passing toll has the free use of the harbour. The passing toll ceases with our Act.

24,506. (*Mr. Lindsay.*) Following the question which has been sent up here, and has been asked by the Chairman, may I ask, do you think the Commissioners have at all prejudiced the trade of the harbour by not endeavouring to get more water, and by not taking more of the mud and sand away than they appear to have done?—It is not prejudice; it has been poverty that has been the cause. Our harbour ought to have been much deeper by the original contract with the people who took the building. The deepening of the harbour is part of the contract, but the contractor did not like that expense, and somehow or other, between the engineer and the contractor, they shuffled out of it.

24,507. During your long experience have any great efforts been made to get more water in the harbour than there is now?—You can only get more water by deepening the harbour.

24,508. Have any great efforts been made to deepen it in your experience?—When we built the south pier we nearly doubled the size of the harbour, and part of the intention was to lower it at the same time. I believe that the income fell short and the lowering never got done, at least in a very slight degree.

(*Chairman.*) Are there any other parties present who are interested in this inquiry who have any evidence to tender to us?

No answer.

Sitting at Bridlington closed.

HULL.

Friday, 27th October 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Sulivan.
Mr. Lindsay.	Captain Vetch.
Captain Washington.	Mr. Coode.

Mr. Evans, Secretary.

Mr. Patrick Bruce examined.

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Mr. P. Bruce.
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24,509. (*Chairman.*) In what capacity do you appear here ?—I am secretary of the Chamber of Commerce.

24,510. Will you proceed with any statement which you have to make relative to the subject of our inquiry ?—It is a statement of my own, before presenting a memorial. The Hull Chamber of Commerce felt that the question of harbours of refuge was one of great importance, and consequently devoted considerable attention to it, and appointed a committee for the purpose of procuring evidence to lay before the Royal Commissioners when they should sit at Hull. Several merchants and shipowners have procured the opinions of their captains on the nautical view of this question, and have come to the conclusion, that for the trade in which the Humber is chiefly concerned—the Baltic and North of Europe trade—the position in which a harbour of refuge would be of the greatest use is in the neighbourhood of Flamborough Head, as there vessels, both out and home, are frequently driven to make that point. As our captains were daily arriving and sailing out of this port, it was impossible to know which of them would happen to be at home during the time the Commissioners were sitting ; and as I only received intimation of this sitting yesterday afternoon, I have been unable to procure the attendance of so many as would otherwise have appeared. It also happens that some of our most experienced captains are at sea, one especially, who, it is believed, can give the Commissioners important information concerning the whole coast—Captain Brown. He is now in the Baltic ; but as he is a person of great experience and high character, the Chamber of Commerce will be very glad if the honourable Commissioners will examine him in London upon his return. Other witnesses will most probably be shortly in attendance, as I have sent to inform several of the sitting of the Commissioners.

24,511. Does that conclude your statement ?—Yes. I have given a list of witnesses whom we have got so far, but in all probability there will be some half a dozen more. I may also venture to state, that it is important that some of the gentlemen who are named should be examined as soon as possible, as their vessels are sailing to-day or to-morrow morning.

Mr. John Gravel examined.

Mr. J. Gravel.

24,512. (*Chairman.*) Where do you reside ?—At Hull.

24,513. How long have you followed the sea ?—Since 1817.

24,514. How long have you been in command of vessels ?—Twenty-one years.

24,515. In what trade have the vessels which you have commanded been general y employed ?—Chiefly in the whaling trade, but also in the Baltic and the coasting trades.

24,516. Can you give me any idea of the time you have been employed in the whaling trade ; how many voyages you have made ?—I was 20 years at it before I commenced as master of a vessel, in the coasting trade. It will be 30 years and better in the whaling trade ; 35 years.

24,517. How many voyages have you made home from the Baltic ?—About 10.

24,518. How many years would you say you have been employed in the coasting trade ?—Six years.

24,519. Trading between what ports ?—Between Hull and London, between Hull and Rotterdam, between Rotterdam and Leith, with Hartlepool, Sunderland, Stockton, and others along the coast, and round the west side too.

24,520. Have you come home from the Baltic late in the year ?—Yes, at the back end.

24,521. How do you make your passage after you take your departure from the Scaw or Naze, as the case may be ?—It depends where you are bound to.

24,522. Bound to Hull ?—Bound to Hull, Flamborough Head.

24,523. Do you endeavour to make Flamborough Head ?—Yes.

24,524. Have you generally made the land so far to the south as Flamborough Head in your voyages ?—Yes.

24,525. Which is the northernmost point where you have made the land ?—We made the Bell Rock once.

24,526. Never to the north of the Bell Rock ?—No.

24,527. How many times so far north as between Berwick and the Bell Rock ?—Not more than once.

24,528. In coming home from the north from whaling voyages what landfall do you endeavour to make ?—We in general make the Shetland Islands.

24,529. From the Shetland Islands ?—Buchan Ness.

24,530. From Buchan Ness ?—Flamborough Head or the Farn Islands.

24,531. Are you aware of the object of this inquiry ?—Yes, I have a little information.

24,532. It is for the purpose of establishing a harbour of refuge, in the first place, on the north-east coast of Scotland, between the Firth of Forth and the Pentland Firth ; and, in the second place, on the east coast of England, between the Humber and the Tweed, or the Farn Islands. Will you, in the first place, give me your opinion as to the advantage or necessity of a harbour of refuge on the district of the coast which I last mentioned, namely, the north-east coast of England ?—I should say Filey.

24,533. That is the place where you would like to put it ?—Yes.

24,534. You have no doubt that something of the kind is necessary ?—Oh yes ; it is quite requisite. It ought to have been done years ago.

24,535. Will you give me your reasons for considering it necessary ?—We have no place to run to but the Firth of Forth. If we do not reach the Humber, we have no place of refuge but the Firth of Forth, all the other harbours being bar harbours.

24,536. Have you ever taken any of those bar harbours in bad weather ?—No.

24,537. Is your opinion of those harbours such, that, with a good ship, you would always keep the sea in preference to endeavouring to take them in bad weather ?—You cannot at all times keep the sea ; the weather is so boisterous in the winter time that it is almost impossible to keep the sea. With a smart vessel you run the risk of losing your masts.

24,538. Which would you rather do, run for the Tyne, or keep to sea if you can ?—I would by no

means run for the Tyne, unless I wanted to lose the ship.

24,539. Give me the reason why you would not run for the Tyne ?—Because the wind which causes a heavy sea is the one which causes so tremendous a sea on the bar, I am informed ; it would, perhaps, be almost impossible for you to hold out until high water to cross the bar. It is only just at the top of high water that you durst attempt it.

24,540. Your opinion of the Tyne is such that you would much rather keep to sea as long as you can than try the Tyne ?—If it were possible.

24,541. What do you think about Hartlepool ?—One is as bad as the other.

24,542. Give me your reasons for considering Filey the best place at which to put this harbour of refuge? —I am not certain how far it is sheltered, but I think it is nearly as far round as east-north-east, and then you have such a bold shore on the port hand. By running the breakwater out from the Brigg you have such a bold shore under Speeton Cliffs that you can make bold with it. There would be no danger in taking that harbour if it were formed properly. You have a light on Flamborough Head to guide you in, and undoubtedly there would be another light on the pier.

24,543. We will put the facility or otherwise of building a breakwater on one side altogether, and look merely to the position of the harbour on the coast. Have you any other reasons to give me why you prefer that point of the coast in preference to one further north or further south ?—It is more sheltered, and not only that, but there is a sandy beach, and in case a ship goes on shore you most likely land the crew in safety.

24,544. Why do you prefer a harbour to the north of Flamborough Head instead of to the south ? Suppose we put a breakwater on the Smithic Sands and made Bridlington Bay a good harbour of refuge, would you prefer the north side of the Head to the south ?—Yes.

24,545. Why ?—Because if I was on the south side of the Head and was obliged to go into Bridlington Bay for shelter, I could go into the Humber if I chose. If I was round the north side and wanted to go to the north, I should be ready to get under weigh, but I might have some difficulty in getting round out of Bridlington Bay.

24,546. If a ship can get into a harbour at Filey Bay, can she not get up under Speeton Cliffs, probably with the assistance of a flood tide ?—Yes, and a south-west wind.

24,547. We have had it in evidence that even with a very strong wind from the southward, when ships will be under close-reefed topsails and courses, that with the assistance of a flood tide they can always get round the Head, and so can get into a harbour in Bridlington Bay ; what do you say about that ?—Very few attempt it.

24,548. Is the reason because, after they have got round they have no shelter to go to ?—They have no shelter, and when the flood tide is done they are driven back again.

24,549. Suppose there was shelter if you could reach the other side of the Head, do you not think that with the assistance of the flood tide, which runs nine hours out of the twelve, a ship could run round and get into such a harbour in Bridlington Bay ?—She would not be able to work many miles beyond Bridlington Bay.

24,550. But she could get into Bridlington Bay with the assistance of the flood tide round the Head ? —She might; but the wind would be dead in the bay, and under Flamborough Head you are under the lee of the land.

24,551. Therefore, supposing you had a breakwater on the Smithic Sands, you still think it would be deficient in the shelter which the high land gives on the other side ?—Yes.

24,552. Tell me, if you were to have a harbour of refuge on the north-east coast of Scotland between the Firth of Forth and the Pentland Firth, where would you like to put it ?—At Peterhead.

24,553. Why would you prefer Peterhead ?—It is chiefly the landfall of all ships from the Baltic and Archangel.

24,554. Bearing in mind that the object of these harbours of refuge is to save life, is not Peterhead on such a point of the coast that a vessel can hardly go on a lee shore ; indeed, she can either weather off on one tack or the other ?—There is the Moray Firth if she can weather the Head, but I should prefer it before any other port on the coast.

24,555. Peterhead, you consider, would be the greatest convenience for the Baltic trade and the trade north ?—Yes.

24,556. Probably it would be considered by most people to be the point at which a harbour would be most convenient for those particular trades ; but taking into account the saving of life, is that the point of the coast where you think a harbour would be best placed for vessels to run to in stress of weather, and to save themselves from shipwreck ?—I do not know where there is another.

24,557. What would you say to Wick ?—I think you go worse.

24,558. Wick is worse ?—Much worse.

24,559. Why ?—Because Buchan Ness is so much further to the eastward, the eastwardest point of the coast, so that if you can get into the harbour you have a good drift north or south.

24,560. So that if a ship, in bad weather, run for a harbour of refuge, you would consider it an advantage that if she missed it she would not go on shore ?—She cannot, if acquainted with the coast, because there is the Moray Firth.

24,561. Have you been north, about through to Pentland Firth ?—Yes, some few times.

24,562. Have you run through it in a south wind and very bad weather, and what are the difficulties of the navigation of the Pentland Firth ?—Very few.

24,563. And what are those few ?—I do not see anything in the way, much. By referring to the chart, I do not see anything in the way but what the tide must take you clear of.

24,564. Do not the tides run very strong ?—They are very strong tides.

24,565. If you wanted to make a passage through the Pentland Firth, and were running down for the Firth, how would you deal with the difficulty of the tide, with a strong south gale ?—I should be guided altogether by the time of the year, by the time of flood, and by whatever way I wanted to go, west or east.

24,566. Would you time your entrance into the Firth according to the time of tide ?—Yes, if possible.

24,567. And so escape the difficulty of a weather tide in a gale of wind ?—Yes.

24,568. What would you say to being forced down to the Firth against the tide, whether you liked it or not ? Do you think it would ever blow hard enough to prevent you waiting for a tide ?—I do not see any difficulty in getting to a harbour in some part of the Orkneys, let the wind blow as hard as it liked. If you have a position and a good chart, one of the latest, there is no difficulty in taking most of the harbours in the Orkneys, especially if it is not thick weather.

24,569. Supposing you wanted to make your passage through the Pentland Firth, would you in heavy weather, really heavy weather, round your ship to, and heave her to, to wait for a tide, or would you time your entrance into the Firth by shortening sail in time, and so, availing yourself of the proper time to make a passage, get through the Firth without fear, or would you run into a harbour at Wick, supposing it were there ?—If I had a fair wind through the Firth, I should make use of it let the tide be as it might. There is no difficulty in going through the Firth, I am fully persuaded, if you can only see the lights.

24,570. I think you said that you had never been through in bad weather ?—Not in very bad weather, but there is a very heavy sea on at spring tides.

24,571. Would you run into the heavy sea which

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the weather tide makes ?—I should have no fear, because we run no danger.

24,572. In what size vessel would you do it ?—A ship of 1,000 tons.

24,573. I mean how small, because it is more dangerous for a small than a large vessel. Would you go through in a schooner of 100 tons ?—That would depend on what she was laden with.

24,574. Would you go through the Pentland Firth laden with railway iron ? That is as bad a cargo as you can carry, is it not ?—Yes ; I have had it.

24,575. With a cargo of that kind would you venture into the Pentland Firth, blowing a gale of wind, and with a weather tide running ?—Yes, if I had a good vessel under my foot.

24,576. (*Mr. Lindsay.*) Would you have any hesitation in running for the Tyne if it were deepened to 20 feet at low water ?—To tell you the truth, I never was in the Tyne. I speak only from what I have seen and read in the coasting directions ; but I have been in Sunderland, Hartlepool, and Stockton, back to the Staples, into Holy Island, and all along there, but I never was in the Tyne. I have read some fearful accounts of it, and I have heard some.

24,577. But you do not know anything of your own knowledge ?—No ; no further than just passing it.

24,578. You expressed the same opinion about Hartlepool ; would you have any hesitation in running for Hartlepool in an easterly gale of wind, if there was a harbour of refuge made there ?—If there was a harbour of refuge in Hartlepool, I should wish to avail myself of it; but my opinion is, that no harbour of refuge has any business to be where there is a port.

24,579. Why do you hold that opinion ?—Because I think you are blocking up an outlet and inlet of ships.

24,580. Then it is your opinion, that if a harbour of refuge is made at the site of a port, in easterly gales of wind, when the ships are seeking refuge, it may be so blocked up with vessels trading to that port that the refuge ships would not be able to find anchorage ground and safe shelter ?—Not the whole of them.

24,581. You think that is one great reason against a harbour of refuge at a port ?—There would be such a number of them running for a harbour of refuge, that the ships which were intending to come out might be in that harbour, and the ships at sea running for it would fill up the harbour completely, unless it was very large indeed.

24,582. Is that one of the reasons why you prefer Filey, because there is no trade to it ?—Yes, one of the reasons.

24,583. But putting aside the question of the trade of any particular place altogether, whether do you think a harbour at Filey or a harbour at Hartlepool would do most to save life and property ?—I should say Filey.

24,584. You still think Filey ?—Yes, according to my judgment.

24,585. Will you tell me why you think so ?—I think that generally a greater number of ships are jammed off the head than anywhere else. That is where we, in general, find the blockage. There are more ships off the Head than anywhere else.

24,586. Do ships often get baffled off the Head, and find a difficulty in getting to the southward ?—Frequently. It is very frequent that they leave either Hartlepool or Sunderland, and get down to the Head, and then are taken short on a southerly wind. They would not like to run for Hartlepool or the Tyne, but if they had a harbour of refuge at Filey they would certainly take advantage of it.

24,587. Going back to the east coast of Scotland, from your experience do you think that a harbour of refuge is necessary on that coast ?—Well, I do not scarcely think that it is so requisite as on the coast of Yorkshire under Flamborough Head, because you have the Firth of Forth south, you have the Moray Firth north, you have the Pentland Firth further north still, and you have the Orkney and Shetland Islands, so that you have plenty of room to get shelter. You can always get shelter in the Moray Firth with a southerly wind.

24,588. Therefore, under the head of saving of life, you do not think that a harbour of refuge is anywhere nigh so necessary on the east coast of Scotland as it is on the north-east coast of England ? Under the head of saving or property you do not consider it is necessary there ; but under the head of giving facilities to commerce, such as a port of call and place for ships to run into, to get stores and various other things, do you think that a harbour of refuge under that head is necessary on the east coast of Scotland ?—I think it is very necessary they should have one.

24,589. Under the head of convenience to commerce ?—Yes, for ships short of provisions, and for a vast of things. There is no place for them to run for. They go to the Forth, but you cannot get up the Firth of Forth without running a good many miles up.

24,590. Is that one of the reasons why you give the preference to Peterhead ?—Yes ; you can get your supplies so much more readily, and it is the very land vessels generally make for.

24,591. (*Capt. Washington.*) I think you said that ships get jammed up under Flamborough Head. What number may you happen to have seen collected north of the Head at one time ?—A hundred sail, or close upon it. I have never counted them, but I have seen them running by scores to get in under Speeton Cliffs.

24,592. In case of a wind coming in from the south-east, would a refuge in Filey Bay be useful to these vessels ?—Yes.

24,593. Would they make for it at once, or would they try to contend against the wind ?—I don't see that they can contend with a south-east wind if bound south, very well. If they were to dodge off with the wind blowing strong, and could not fetch down with the wind south-east, they would have some difficulty in fetching the harbour, unless it was very moderate, or they had the flood tide to assist them.

24,594. You think that a shipowner would not complain of a master going to a harbour of refuge under these circumstances ?—No. If shipowners study their own interest, they will not.

24,595. Generally speaking, do you consider that it is for the shipowner's interest that a vessel in bad weather should take a refuge harbour, or should keep to sea ?—It depends on circumstances. I believe myself that many a ship is lost for want of taking a harbour in time. I had proofs only the other week —last Tuesday morning week—in running for the Humber.

24,596. What occurred then ?—Several vessels got ashore on the Holderness coast. If, when they had found the wind was coming in upon them, they had at once bore up for the Humber, as they ought to have done, they perhaps might have been saved. They sometimes hang it out too long. It is all right for a man to do his best endeavours, but we sometimes hang it out too long, until we cannot get into a harbour.

24,597. With the wind at south-east, would a master prefer running into a harbour of refuge at Filey rather than running back to his own port, knowing that at his own port he could not get in unless it was high water, but having a harbour at Filey, which he could run into at any time of the tide ?—I have not a doubt that any master of any ship would prefer it.

24,598. Would he be borne out by the owner ?—I consider I am both owner and master when at sea, to do what I think proper. If I have any judgment at all, I shall do the best for the owner if I do the best for myself.

24,599. Have you frequently seen many ships at the north side of Flamborough Head ?—Yes.

24,600. Have you ever known any of them wrecked

in Filey Bay ?—Very often ; but I have not been much upon the coast.

24,601. Have you ever known lives lost in Filey Bay ?—No.

24,602. On what part of the coast between the Humber and the Staples do the most of the wrecks take place ?—I think the Tyne.

24,603. At the entrance of the Tyne ?—I think that is where we have heard of a great many more than in the Tees Bay ; but Tees Bay is far from being a pleasant place to take.

24,604. I am speaking of the Tees Bay generally ?—It is not either a nice place to run for. Running between Hartlepool Heugh and Redcar, I think, in a very heavy sea you will find the sea very high there, with the wind easterly right across.

24,605. Do you know on what part of the coast most lives are lost ?—I think on that coast of the Tyne, and lower, about Hartlepool and there. We have had some instances of a few lives being lost at the Head, but not many, I think.

24,606. If many lives are lost at the entrance of the Tyne, do you think that some efforts should be made to improve that entrance ?—I do not know. I think the chief cause of lives being lost is their running for the bar when there is not water. Perhaps those very vessels have borne off from Flamborough Head, and were there a harbour there would not have run for Shields or Hartlepool, but would have embraced the first opportunity. I am speaking of what I should do myself.

24,607. Those are vessels which are actually caught at Flamborough Head ?—Yes.

24,608. But there is a long district of the coast between the Tyne and Filey ?—Yes, there is.

24,609. Where there might be a good many vessels which could not get to Filey in a southerly wind. Where would you give them refuge, if not at the Tyne ?—If they had not the Tyne, there is nothing left but the Forth for it. I would not attempt to go either into Hartlepool or Shields with a vessel of any draught of water with the wind easterly, if I could only claw round the Staples and get the Forth.

24,610. Not in their present state, you mean ?—The wind easterly causes a fearful sea on the bars.

24,611. I think you said you did not know where most lives are lost on the coast ?—Not exactly ; I have not taken particular notice, but I think in general it is about Shields.

24,612. Are you aware that 22 lives are lost every year at Hartlepool, and have been so for the last 20 years ?—No, I was not aware of that.

24,613. Do you remember the gale of the 4th of January 1857 ?—Yes.

24,614. Do you know that 44 lives were lost in Hartlepool Bay on that day ?—No, I do not recollect that.

24,615. Under these circumstances do you think it desirable that some efforts should be made to place a refuge harbour in Hartlepool Bay ?—I have no objection to a second one.

24,616. I mean a second one ?—I have no objection to a second one there, but I say Filey is the principal.

24,617. We will suppose Filey made. Then where would you place the second ?—In that bay, in preference to Shields.

24,618. You think two are desirable on this district of the coast ?—I do not think it would be any worse for two. It would be much better, if the owners do not find fault with their taking the harbours too frequently.

24,619. You do not think there will be much fear of that ?—No, I do not. I think that any man who understands his business will not take a harbour as long as he can keep the sea, if he thought there was any chance of making the voyage, particularly if he was an interested party.

24,620. As a general question, would you be of opinion that a refuge harbour should be placed where it can save most lives ?—Yes, at Filey.

24,621. (*Capt. Sulivan.*) Is it the case that the greatest loss of life occurs in laden ships more than in light ships ?—I think so.

24,622. Those lives which you have heard of being lost in Hartlepool Bay. Do you think that the laden ships which were wrecked there have in many cases been in such a position before they ran back that a harbour at Filey would have saved them ?—Yes.

24,623. Do you believe that with a south-east gale, if there were a harbour at Bridlington, that laden colliers—always keeping them in view, and not larger vessels, more powerful and better found—could thrash round the Head when they could only carry two close-reefed topsails, and get into Bridlington Bay ?—No, they could not.

24,624. Do you think it would induce men more prompt to take a harbour of refuge if, when off the Head, they knew they had one close under their lee at Filey, but that if they left it until they had been driven back to leeward of that, they had a long way to run back, and perhaps no place to go to at all ? Would that induce them more promptly to take the harbour which was at hand ?—No doubt it would.

24,625. You said that you had objections to a harbour being at a port of trade, on account of its being crowded ?—Yes.

24,626. You also told us that a second harbour in Tees Bay would be valuable ?—It would.

24,627. Would that be more especially valuable for light ships which have run past Flamborough Head, and have got into that bay ?—It would answer both for light and laden. If the laden had not got so far south as the Head it would turn their attention to it.

24,628. Do you believe that if a harbour were made at Hartlepool—a secure smooth-water harbour in all weathers—it would induce a much larger class of vessels to go to Hartlepool to trade—that these vessels would occupy the outer harbour very much in filling up the cargo beyond the depth with which they could come out of the docks, and so crowd in a great measure the deeper part of the harbour, and prevent its taking so many vessels for refuge ?—My opinion is that no harbour of refuge ought to have any connection with any port whatever, though it might be made as close in the neighbourhood as possible.

24,629. But I ask whether you think that a harbour made outside the docks at Hartlepool would cause a larger class of ships than can now leave the docks to trade there, trusting to using that harbour for filling up the cargoes, beyond what they could take in the docks, in the deep anchorage before they go to sea ? Would the effect of having a harbour at Hartlepool, under the ordinary circumstances of trade, be to take a larger class of shipping there than can now leave the docks, say after 17 feet, because they would have a sheltered anchorage outside to fill in their cargoes, and therefore so make the refuge harbour their loading-up harbour ?—I see now. I should say you would have a great many large ships in Hartlepool calling there.

24,630. Would that class of shipping tend very much to fill up the best depth of water inside the breakwater ?—No doubt. If I had a large ship I should prefer Hartlepool to Shields, if there was a harbour there for her.

24,631. Do you know Redcar ?—I have only very little knowledge of it, except just seeing it in passing.

24,632. If a harbour is to be made in the Tees Bay, and there are facilities for making it in Redcar equal to Hartlepool, would that answer the purpose of a harbour, without connection with trade ?—I have never looked at it very minutely, but, from what I understand, I think Redcar is preferable to anywhere else in that bay.

24,633. You say that the Pentland Firth is not a dangerous place to take, and that you would not hesitate to take it at any time of tide ?—No.

24,634. Are you aware that the tide runs there

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from 9 to 11 knots an hour ?—Not 11. I think you are wrongly informed.

24,635. We have it in evidence, on reliable evidence, that it runs from 9 to 11 knots. We have it also in evidence that a captain of a half-laden and good ship, with a light cargo, bound to the westward, with a rattling breeze and a press of sail, thought he could run over the tide, but failed to do it, and was drifted eastwards by the tide directly he got in. Do you think that with such a tide as that, and an easterly gale, it would be safe for the ordinary class of traders to attempt to run into it, or that they could stem such a tide if a half-laden and well-found ship could not ?—I should not hesitate a moment about taking it.

24,636. Do you believe you could stem a flood tide in that Firth ?—Yes, I am certain I could. If I had a strong breeze and could carry a maintop-gallant-sail, I should not be afraid of the strongest flood tide which you have.

24,637. If men who have traded there have told us they never could, and have utterly failed when they have attempted it, you would think they were giving wrong evidence ?—I should be rather doubtful on the subject. I should not wish to contradict them, but I think with a strong gale from the eastward the flood would have to run very strong if I could not run over it.

24,638. Even if it were a seven or eight knot tide, and you could run over it, would that tide against such a gale make a dangerous race for the ordinary class of vessels ?—Not half so much as in Sumburgh Roost.

24,639. What is the strength of tide in Sumburgh Roost ?—Six or seven knots.

24,640. Can you give any reason why, with the tide stronger in the Pentland Firth, it would not make the race so strong ?—Because it is more sheltered. There is the whole fetch of the North Sea and the Western Ocean into Sumburgh Roost.

24,641. Is there not a run into the Pentland Firth ?—It would be just at the first entrance.

24,642. Is not that the most dangerous place ?—It might, the first onset ; but I should not be at all afraid of it with a good breeze of wind.

24,643. (*Capt. Vetch.*) I think you said that you had been at the Shetland Islands ?—Yes.

24,644. Have you ever put in there ?—Frequently.

24,645. At Lerwick ?—Yes.

24,646. Have you ever taken a vessel through Sumburgh Roost ?—Frequently.

24,647. How far does it extend south of Sumburgh Head to the Fair Isle ?—Do you mean the Roost ?

24,648. Yes ?—Not quite. I think the strongest part is nearer the land.

24,649. How often have you been through the Roost ?—I cannot tell you. Above twenty times, perhaps thirty. There is always the alternative : you can get easier to the south of Fair Isle ; you can go the other side.

24,650. There is no necessity for going through the Roost ?—There is a necessity for us in the whaling trade. If I was in a corn ship bound from the Baltic, I should have no occasion to come between Shetland and the islands ; I could come down to the Orkneys and Fair Isle.

24,651. How many knots does the Roost run ?—I am not certain, but I think six or seven knots at spring tides.

24,652. You have always the option of going south of Fair Isle ?—Not if I am from Lerwick. If I am bound from the eastward, intending to land men at Lerwick, I must land them in Shetland, if possible, and consequently I come into the strength of the tide by going up on Fitfull Head or along there.

24,653. How often have you been through the Pentland Firth ?—Not above two or three times.

24,654. That would hardly afford a good criterion as to the difficulties of the passage ?—No ; but I am judging about the ship. If the tides run no more than eight knots, as I am informed by the coasting directions, I should not be afraid to run with a strong gale from the eastward, if I could carry the maintop-gallant sail.

24,655. But upon the experience of three voyages I should hardly consider you were qualified to speak ?—Sometimes one man will glean a good deal of information in a short time, which another will not get in a number of years.

24,656. Have you ever put into the Orkney Islands?—Yes, at Stromness.

24,657. Coming south of the Pentland Firth, do you know Wick very well ?—Not very well. I have been in once with a steamer from Lerwick.

24,658. What time of the year ?—The month of June.

24,659. Had the herring fishing commenced then ?—Yes. Then the sea was so heavy I could not bring up with the steamer. I saw one of the boats come on with the gale, and everything was swamped.

24,660. You have seen a number of fishing boats there ?—No; I did not take particular notice of them, but I know there are a great many.

24,661. Are you aware that there are 1,400 ?—No, I am not ; but there are a great number sometimes.

24,662. Considering that Wick is such a bad harbour as it is at present, and that there are 1,500 arrivals and sailings of vessels, at and from the port would you consider, that being such a bad place, and such an immense amount of fishing going on, that to save life and property some shelter should be afforded at Wick ?—Oh, certainly. It would be better for the fishermen to have a shelter, but you find no ships scarcely steer for Wick as a landfall.

24,663. I am asking the question as to the saving of life and property. Would you, as a man of feeling, consider that some shelter should be given ?—By all means, to such a number of fishermen.

24,664. Were you in the harbour ?—No. I was in the bay, just round the point.

24,665. How often have you been to Peterhead ?—No further than just passing it.

24,666. You have not been in ?—Not in the bay.

24,667. Merely passing off ?—Yes.

24,668. You cannot speak as to the competency of establishing a harbour there ?—No further than this—I know it is a principal landfall of almost all the eastern trade.

24,669. Coming to the south, you find the Forth a good harbour of refuge ?—Yes, but it is a long way up.

24,670. But suppose you were coming to the south, you would find that a good harbour ?—Yes.

24,671. Coming to the Tyne, I think you say you have not been in there ?—No, I never dared it.

24,672. There are two large piers now going out into deep water ?—I have read an account of it.

24,673. As to the number of wrecks at the mouth of the Tyne you are rather frightened, I think ?—The long list of the great number of wrecks which take place at the mouth of the Tyne, and the disasters there, make us fearful ; we in general give it a wide berth.

24,674. Do you not consider that the great number of wrecks and disasters which take place at the mouth of the Tyne must be owing in a great measure to the great number of vessels which go there ?—No doubt.

24,675. You have been into Sunderland, I think ?—Yes.

24,676. It is a rather difficult place to take, is it not ?—It is.

24,677. Coming down to Hartlepool you have a rather exposed anchorage on the north side, under the Heugh, open to considerable sea, is it not ?—Yes.

24,678. Have you ever been at anchor off Redcar, on the south side of the bay ?—No, never there.

24,679. You think that in Tees Bay, between Redcar and the Heugh, some refuge would be desirable. I suppose that is because it is in the bight of the bay, and if a vessel gets there she cannot get out

again ?—Rather than attempt Shields pier they would run for that harbour of refuge, if they were anywhere between the Head and Hartlepool. If they are caught in there they cannot get out, the wind being right on the land.

24,680. Some shelter, you think, would be necessary ?—Yes.

24,681. You do not know whether it ought to be at Redcar or Hartlepool Heugh ?—Either of the two. I do not know which.

24,682. Have you ever been at Whitby ?—I once passed it.

24,683. You do not know whether that would be a useful place for shelter ?—No.

24,684. You think coming down to Flamborough Head that some shelter is desirable on the north side of the point ?—Yes. That is the most likely place, because with a strong wind from the south-west ships hardly ever attempt to go round.

24,685. Would there not be a difficulty in getting out of Filey Bay and going south, if the wind did not exactly favour—a wind blowing into the bay ?—If the wind blows into the bay moderately, you might work out, and most likely you would have tugs to give the ships a tow out.

24,686. Between St. Abb's Head and the Humber, you think Filey Bay would be the most useful place for a harbour of refuge ?—Yes.

24,687. If two harbours are to be made, which would be the next best site for a harbour. between the Humber and St, Abb's Head, or between the Humber and Shields, if you please ?—I would say a place which holds out such inducements as Tees Bay, I see none but Tees Bay.

24,688. Tees Bay, then, is the next best to Filey, in your opinion ?—Yes.

24,689. (*Chairman.*) I think you said that you were acquainted with the Orkney Islands ?—Not so much as the Shetland.

24,690. Have you ever been in Long Hope ?—No, never.

24,691. You know it by the chart ?—Yes, very well.

24,692. And of course by the sailing directions ?—Yes.

24,693. And if you have a good chart and good sailing directions, I presume that, after your experience at sea, you consider you know a place pretty well if the chart and sailing directions are good ?—Yes ; I should be guided by them, and should not hesitate a moment if I wanted a harbour.

24,694. With the knowledge you have of Long Hope by the chart and the instructions, should you have any fear in running for it in dirty weather ?—Not at all, as long as I can see the marks.

24,695. As long as you can make out the land where you are, would you feel any difficulty in running for it ?—Not at all.

24,696. Speaking of the general run of coasting vessels when they are in ballast, if you were in very heavy weather, and really were alarmed about the safety of the ship, would you rather heave them to or run them, supposing you had plenty of sea room ?—I should run them.

24,697. Ships in ballast ?—In ballast.

24,698. I will put the same question with respect to laden vessels. With a laden collier, which would you rather do, heave to or run ?—Are you alluding to my having a fair wind for my port ?

24,699. I am putting you in this case : that you are in a very heavy gale of wind, when you are much alarmed for the safety of the vessels ; so heavy a gale as that, would you rather, in a laden collier, scud or heave to ?—In both instances I should rather lay to than run. I understood I was running for a harbour.

24,700. No ; I am now putting you in such a position that you see a risk of losing the ship from the violence of the gale ?—By all means heave them to in both cases.

24,701. With a light vessel, or a vessel in ballast, would you, for the safety of the vessel, rather heave to or scud ?—Lay to. I should say I was in double danger in running.

24,702. Would that apply to the general run of laden vessels on the coast ?—Yes ; I would lay to rather than scud, unless I had a harbour I was scudding for.

24,703. I put the harbour out of the question. You are now upon the sea, and a gale of wind so heavy that you must look to saving the lives and ship ; would you scud or heave to ?—Heave to in both instances.

Mr. Thomas Farr examined.

24,704. (*Chairman.*) Do you live at Hull ?—Yes.

24,705. How long have you followed the sea ?—Twenty-eight years.

24,706. And how long in command of vessels ?—Sixteen years.

24,707. In what trade have the vessels been chiefly employed which you have commanded ?—Coasting, Baltic, and South Australian trades.

24,708. How many voyages have you made home from the Baltic ?—About 20.

24,709. How many voyages have you made north about through the Pentland Firth ?—About eight times in favourable weather.

24,710. How many years have you sailed foreign ?—Four years in the coasting trade, the remainder of the time in the coasting, Baltic, American, and Australian trades.

24,711. In what trade were the coasting vessels employed ; in the coal trade ?—I was in the coal trade out of Hartlepool and Middlesborough about three years.

24,712. The object of this inquiry is to select the most suitable site for a place of shelter for the coasting trade, chiefly on the district of the coast between the Humber and the Farn Islands ; where would you put it ?—In Filey Bay.

24,713. Give me your reasons ?—There are many laden vessels accumulate off Flamborough Head. They come out of the ports with favourable winds from the south-west, and get out as far as the Head. When they get there, they find the wind away from the south-east, and have no harbour of refuge to go to, the bar harbours being so very bad that they cannot take them. They sometimes stand out to sea, when they are very liable to be run down by the light ships going to the north, of which there are many instances.

24,714. In southerly winds do the vessels accumulate off Flamborough Head very much ?—In great numbers.

24,715. Those vessels are chiefly laden ?—Laden, chiefly.

24,716. Is it for their use especially that you think this harbour should be made at Filey ?—Yes, principally for laden ships.

24,717. Have you ever worked round Flamborough Head in bad weather with a flood tide ?—No ; I have attempted it, but never could do it.

24,718. Have you attempted it more than once ?—Two or three times.

24,719. Do you recollect what sail you were under ?—Under close-reefed sails. I always drove back again.

24,720. In what description of vessel ?—In a brig, and schooner too.

24,721. Upon any occasion, carrying close-reefed topsails and courses in your brig, have you got round Flamborough Head with a flood tide ?—I could not get round it any distance, but was always driven back before I could get far enough up to come to anchor.

24,722. Have you ever been at anchor under Speeton Cliffs ?—Twice.

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24,723. Do vessels anchor there often for shelter? —Very often.

24,724. What is the largest number which you have seen there?—Upwards of 50 sail.

24,725. What is the largest number which you think you have seen dodging about under the Head? —From 300 to 400 sail.

24,726. How many voyages did you say you had made from the Baltic?—About 20, perhaps more. I was a good deal in the Hamburgh trade as well.

24,727. Did you come home late in the year?—Sometimes late in the year.

24,728. Tell me where you have made your landfall, not where you have endeavoured to make it, but where you have actually done so?—Generally Flamborough Head.

24,729. You have generally succeeded in making Flamborough Head?—Yes, or Tynemouth.

24,730. Never to the north of Tynemouth?—Nothing to the north of Tynemouth.

24,731. From your knowledge of the Baltic trade would you be disposed to say that, generally speaking, vessels can succeed in making Flamborough Head as their landfall, bound, say, to the south of the Head? —Yes, in general so. It depends entirely upon the wind.

24,732. But in the fall of the year there are certain winds—south-west winds—which are generally prevalent, are they not?—Yes.

24,733. If you took your departure from the Naze with a south-west wind, would you not be driven north of Flamborough Head?—A good bit.

24,734. You have generally been fortunate?—Yes; I have generally made Flamborough Head or Tynemouth.

24,735. What is the longest voyage you have made, or rather, what is the longest voyage you have made after you have taken your departure from the Scaw or the Naze?—Three weeks.

24,736. What time of the year?—It would be in the month of November.

24,737. Was the weather very coarse?—It was very bad.

24,738. Were the people pretty well done up when you got across?—Pretty well.

24,739. Therefore, in cases of that kind a harbour of refuge at Filey would be a great boon to vessels bound south?—Yes, a great boon.

24,740. You cannot absolutely call it necessary for the saving of life, I suppose, although it would be a great boon?—I think it would be a great boon, and save a great deal of life too.

24,741. I mean in those particular cases where they make long voyages home, and are pretty well beat by bad weather?—I can remember ships that have been driven away and foundered after they have made Flamborough Head. If there had been a harbour there they would have taken shelter.

24,742. In those instances there are direct cases in which there would have been a saving of life?—And property too.

24,743. Do you think that there are many instances of that kind? How many in the course of a year? —I cannot say exactly, but I should say a dozen.

24,744. There might be a dozen annually of that description?—Yes, of that description.

24,745. Where vessels have made the Head, or been driven to sea and foundered?—Yes, with south-south-east winds.

24,746. As respects the district of the coast between the Firth of Forth and the Pentland Firth, if anything were to be done on that coast for the preservation of life and property, where would you do it?—I should say Peterhead, but I have not had much experience, never having been caught in bad weather there.

24,747. Perhaps you prefer not to give an opinion? —I would rather not.

24,748. (*Sir F. Smith.*) Can you give the Commissioners the names of the vessels which foundered after they got as far as Flamborough Head?—I cannot exactly. There was one or two Scotch ships I was in company with when they foundered with all hands. I cannot give the names.

24,749. Can you discover them, and give them to the secretary?—I think it is possible I may.

24,750. We shall be obliged if you will, specifying in what year it occurred?—It would be about 10 years ago.

24,751. (*Mr. Lindsay.*) You say that if only one harbour were to be made on the coast, you would give the preference to Filey?—Yes.

24,752. Do you think that if Filey were made, one harbour would suffice for all the wants of the trade? —No, I do not.

24,753. Then, presuming a harbour to be made at Filey, and something more was to be done, whether do you think a harbour in the Tees Bay, say at Hartlepool, or the improvement of the Tyne, the Wear, and the Tees, so as to make them accessible at all times of the tide, if that were possible, would do most towards saving life and property?—I think in the Tees Bay.

24,754. Would do more to save life and property than the improvement of the existing harbours?—Yes, a great deal.

24,755. You would give the preference to Redcar over Hartlepool?—Yes, on account of there being more water and less sea.

24,756. Have you any other reasons?—Only that there is plenty of room to accommodate as many ships as are likely to use it.

24,757. (*Capt. Washington.*) How often have you been to Redcar?—I have been past it a great many times, not been in.

24,758. How near?—Within half a mile of the rocks.

24,759. How far do the rocks extend off the shore? —About three-quarters of a mile.

24,760. Have you ever been to Hartlepool?—Yes.

24,761. How often?—Perhaps a dozen times.

24,762. Is it a pretty good place to take?—Not very. A man lost his ship the last time I took it.

24,763. Under what circumstances?—Running from the Head, a deep laden ship, with a gale of wind from the south-east.

24,764. Why did you run to Hartlepool?—Because I could not keep the sea, and had no other place to run for.

24,765. Where did the gale catch you?—Off the Head.

24,766. How did the Head bear?—About south, I think.

24,767. At what distance?—About two or three miles when we were caught in "the vast" of it.

24,768. How long ago is that?—Twelve years ago.

24,769. That is about the same time you tell us you know of 12 vessels foundering?—Not 12 vessels —two. It would be about 12 years ago. I can give you the proper time.

24,770. You keep a log-book generally?—Yes.

24,771. When you bore out from Flamborough Head and ran for Hartlepool, having no other place to run for, was there any refuge at Hartlepool?—None at all.

24,772. Did you get it?—Yes, I succeeded; but with some difficulty.

24,773. Which harbour was it?—The old harbour. The new harbour was not open then.

24,774. Is that harbour a pretty good one to take at high water?—I don't find it very good.

24,775. Did you get damaged?—We did, a great deal. One boat went right over the windlasses, and ran ashore high and dry. The men went into the rigging, and we saved all their lives, and got the ship off again.

24,776. Is that the only time you ever had to bear up?—I bore up twice. Once before we got in very well; there was not so much sea. I bore up from Whitby.

24,777. Where did you go then?—To Hartlepool.

24,778. The wind at south-east, or how ?—About east-south-east.

24,779. Does it commonly draw eastward, backing round against the sun?—Yes, commonly. Coming out of the coal ports with the wind about south-south-west, and getting up to Filey or the Head, we find it coming from the south. Then it goes about south and south-east. You keep dodging under the Head expecting a slant of wind, but instead of that you stop, the gale increases, and you are obliged to stand to sea ; having no harbour to run to, ships are obliged to stand out and keep to sea. Many light ships run down, and perhaps they run over you often, or you founder at sea, with the ship in heavy weather breaking away the stanchions or covering boards, and going down.

24,780. With the wind at east-south-east cannot you fetch any place, cannot you make any bay at all? —No.

24,781. If the wind gets round as far as east-north-east, can you do so then ?—With favourable weather.

24,782. I mean blowing heavily, blowing a gale, with the wind getting round to east-north-east, can you make any bay, or can you round to ?—I should round to if it was blowing a very heavy gale.

24,783. The last witness said he would generally lie to, rather than scud. Do you agree with him ?—I would lie to if I had any harbour to run to. It would be no use scudding if you had no place to scud to.

24,784. There is the Firth of Forth ?—But it is a long way, and a ship might go down before you run as far as that.

24,785. You agree with Captain Gravel that the owner would bear you out in going to a refuge harbour ?—It would be his interest.

24,786. You think it would ?—Yes.

24,787. You are satisfied that a ship suffers more by thrashing about against a gale of wind than she does in losing time by going to a harbour of refuge ? —I am confident of that.

24,788. (*Capt. Sulivan.*) You say you would prefer Redcar to Hartlepool ?—Yes.

24,789. From what you have seen in heavy weather do you think a ship would get into Redcar with less danger from the sea outside, than into Hartlepool ?—I think she would.

24,790. Would it be equally safe to run for and make in bad weather, do you think ?—I think equally as safe.

24,791. With easterly gales, could ships running in feel their way along the Yorkshire land by the Redcar Rock ?—I don't see anything to prevent them.

24,792. To the entrance ?—To the entrance.

24,793. Would Hartlepool have the advantage, when the wind shifted, of being further to windward, to come to the southward again ?—Yes, of course it would.

24,794. If one harbour were made at Redcar, would it not be necessary very often to tow ships to windward, to give them a start ?—At times it might, but still it would be fair when the wind got from the east. They still would have the advantage then.

24,795. Do you agree with the last witness that it would be a great advantage to have a harbour of refuge free from the trade of a large port ?—I think it would. In that respect I agree with him, on account of so many light ships that would be running down for the port, and the harbour would be full of laden ships.

24,796. Ships bound to the port, as well as those taking it for refuge ?—Yes ; because they can only get in at a certain tide of the time. They must get in and come to anchor at a certain time of the tide.

24,797. We have heard of many large ships drawing 20 and 20 feet of water in the northern ports, laden with coal. If Hartlepool had a harbour outside, do you believe that a large class of ships that now use these docks would go into them and take part of their cargo there, and then go and fill up outside, and so keep the deepest water at the anchorage ?—I don't think they would find much deep water to keep ; not much of that depth of water in the bay at all.

24,798. But if a harbour were constructed, having a depth of five, six, or seven fathoms, or whatever it might be, do you believe that a large number of ships that cannot now frequent the harbour, in consequence of not being able to come out with more than seventeen feet water, would go in then, come out half loaded, and complete their loading outside ?—It might be the case.

24,799. Would that help very much to block up the refuge anchorage ?—I think it would.

24,800. Would that be a reason, if all other things were equal, for your preferring a harbour where there was no large trade ?—Yes.

24,801. For the general purposes of trade, if it is found by engineers that as large a harbour can be made at Redcar for the same money, and with at least the same depth of water, as can be made at Hartlepool, would you say that the outlay at Redcar would be preferable ?—I do ; perfectly so.

24,802. (*Capt. Vetch.*) In your voyage from the north southward, have you ever taken refuge under Speeton Cliffs ?—Twice.

24,803. Did you find it a safe place ?—With certain winds. I have ridden there with the wind as far as south and by east.

24,804. But you are always in danger of the wind coming round upon you, are you not ?—In the winter time.

24,805. You never took refuge in Filey Bay ?—Not in the bay ; at the cliffs.

24,806. You could not have got out of it again ?—In fine weather I should say there was no fear of getting out, carrying all sail.

24,807. Therefore it is necessary, in order to make Filey Bay advantageous to the trade, that a breakwater should be made there ?—Yes, it is.

24,808. If a breakwater were made, should you think it very useful ?—Very useful indeed for both life and property.

24,809. You have been saved by going to Hartlepool ?—Yes.

24,810. You find that rather exposed at present ?—Very exposed.

24,811. If a breakwater is made there, say into seven fathoms water, would you find that a great convenience when caught in gales of wind in the bight of that bay ?—If caught in the bight of the bay it might be of great advantage, of course. But still it is a nasty place. It is a nasty bay to go into on account of the outset from the Tees and the strong tide.

24,812. But if you were caught in the bight of the bay you could not help it. You must go in or go ashore ?—Yes ; but still one at Redcar would answer the same purpose.

24,813. You would prefer Redcar ?—Yes.

24,814. But still, on one side or the other, you would not be in safety without shelter ?—No.

24,815. Therefore the same necessity exists there as in Filey Bay ?—Just the same.

24,816. When ships get down to Whitby and cannot get south to the Head, have they any alternative but to run for Hartlepool ?—They must either go there or to the Forth.

24,817. Between Flamborough Head and Tynemouth, which site do you consider would be most useful for vessels to get in refuge ?—Filey.

24,818. Supposing there are to be two, which would be the next place you would select ?—Redcar.

24,819. (*Mr. Coode.*) You said you had seen from 300 to 400 vessels accumulated north of the Head ?—Yes, north of the Head.

24,820. Dodging about or at anchor ?—Some were dodging about and some were at anchor under Speeton Cliffs ; some were under canvas.

24,821. Have you known vessels detained there for any length of time ?—I have been detained myself five or six days.

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24,822. Has this happened more than once ?—Several times.

24,823. That has happened to you ?—Yes.

24,824. (*Chairman.*) In a former part of your evidence I put the question to you, how many vessels you thought annually foundered at sea, having made Flamborough Head and having been driven off by stress of weather, and I understood you to say 12. Did I understand you right or not ?—I said about two.

24,825. It was a mistake of mine, then ?—That is, simply the vessels coming in from the Baltic and making the Head. I don't mean others going up to London or through. I should say more than 12 of them.

24,826. If colliers were included, you would be disposed to say more than 12 ?—Yes.

24,827. Speaking of the vessels generally that are employed in the coast trade, in a gale of wind which is so heavy as to put them in danger of their lives and vessels, in your opinion would it be safer for them to heave to or to scud ?—I would heave them to.

24,828. Vessels in ballast ?—In ballast I would scud to get down to a harbour.

24,829. Supposing you had plenty of sea room, and it was blowing so heavy that it was a question of saving your life, owing to the sea being so heavy, I ask you as a question of seamanship what would you do ?—I would heave to, by all means.

24,830. With a vessel in ballast ?—Yes.

24,831. With a laden collier what would you do ?—I would heave her to.

24,832. With respect to the general run of the coasting trade, besides colliers, what would you do ?—I would heave to under those circumstances.

24,833. You would always heave to, in preference to scudding ?—In preference to scudding with a heavy gale like that.

24,834. (*Sir F. Smith.*) Have you for any length of time been considering the subject of harbours of refuge ?—Very lately. I have not given much attention to it. When I was on the coast I often used to wish we had harbours of refuge down here.

24,835. But I suppose your attention has been directed to this subject in consequence of your knowledge that a Commission has been moving about the country to ascertain the best points ?—Yes.

24,836. And you have well considered it ? Have you consulted with other masters of vessels on the subject ?—I have ; many.

24,837. Do they generally concur in your opinion that Filey is the best place ?—The best site upon the coast.

24,838. Not only for the trade of the Humber, but for the general trade of the country ?—Yes.

24,839. Both coasting and foreign ?—Yes ; both coasting and foreign.

24,840. (*Mr. Lindsay.*) Do you know if there is a large trade from Sunderland and the Tyne to the northern ports ?—Yes.

24,841. About what proportion of the vessels eaving the Tyne and Sunderland do you think go north ? Will one-sixth of them go north ?—I should scarcely say that. Not so much as that, I should think.

24,842. Will one-eighth of the number loaded in the Tyne go northwards ?—I should say about one-eighth.

24,843. Would a harbour of refuge at Filey or Redcar be of any use to them ?—None.

24,844. (*Capt. Washington.*) Do you say you are well acquainted with the Tyne ?—I have been into the Tyne several times.

24,845. Lately ?—Not lately.

24,846. How lately ?—Perhaps seven or eight years ago.

24,847. Have you been at sea for the last eight or ten years ?—All the time since I was eleven years of age.

24,848. Because most of your answers refer to what took place 11 or 12 years ago ?—That was when I was on the coast. I have been in the South Australian trade since. What I referred to was when I was in the coasting trade.

24,849. Then most of your evidence is in reference to the state of the coast about 10 or 12 years ago ?—Yes.

24,850. To your recollection of it 10 or 12 years ago ?—Yes.

24,851. At that time did you often go to the Tyne ?—Perhaps I have been there five or six voyages ; not more.

24,852. You were frequently on the Tyne ?—I have been frequently in the Tyne, but more in the Tees and at Hartlepool than in the Tyne. I have likewise been at Sunderland.

24,853. And in the Tees ?—Yes, in the Tees too.

24,854. Is the Tees a pretty good place to take ?—Very bad indeed.

24,855. The river I speak of ?—It is a very difficult place indeed to take.

24,856. You went there because you were bound there ?—I was bound to Middlesborough and Stockton.

24,857. Do you think the masters of ships nearly always try to get the ports they are bound for, if they can ?—If they possibly can, they will do so.

24,858. Even if a better harbour were made, a little out of their course, they would not run for it if they could help it ?—Not if they could help it. They would not do so unless they were obliged.

24,859. If there was a chance to get to any of the ports, they would still go ?—If they knew there was plenty of water, of course they would attempt to get into the ports.

24,860. Seeing that that is the common and regular practice, do you think it would be desirable to improve the entrances of these harbours ?—I don't see how they could be improved in respect to laden ships.

24,861. Neither you nor I are engineers ; but supposing it possible to improve the entrance to the Tyne, so as to get 12 or 15 feet at low water, which would be something like 26 or 30 feet at high water, do you think it would be worth a great effort to accomplish that ?—I think a harbour of refuge would be preferable.

24,862. You do ?—Yes, I do.

24,863. Preferable to improving the bar harbours or river harbours ?—Yes.

24,864. You say you have lately been in the Australian trade ?—Yes, for four years. I was in a steamer out of Hull.

24,865. Where did the steamer go ?—To Rotterdam.

24,866. During the time you were in the foreign trade, what port did you go to chiefly ?—To London.

24,867. You came up the British Channel ?—Yes.

24,868. Did you ever get into the Bristol Channel by accident ?—I have been in it, but only once.

24,869. Were you ever caught there ?—No, never.

24,870. You never were in want of a harbour in the Bristol Channel ?—I always came right up, and went right down.

24,871. You don't know whether there is any want of a harbour at any part of the Bristol Channel, say near the Land's End ?—I do not. I could not give an opinion upon it.

24,872. You have said, in answer to a question, that you have been considering the subject for some time ?—I have, seeing it noticed in the newspapers.

24,873. When were you asked to give evidence here ?—Last night, at seven o'clock.

24,874. That's all ?—That's all.

24,875. By whom ?—By some more captains.

24,876. (*Capt. Sulivan.*) You say that vessels are fond of congregating at Flamborough Head. Is it not that some are so bad that they often become leaky there, that the men are constantly kept at the pumps in heavy weather, and are thus worn out, and that before they can reach any port they are in great danger of actually foundering ?—Yes, it is the case.

24,877. You can state with confidence that that is

of frequent occurrence?—Yes, I can state with confidence that it is of frequent occurrence. I have been caught that way myself.

24,878. (*Capt. Vetch.*) How often have you been caught by a south wind off Flamborough Head, so that you could not go south?—I should say perhaps a dozen times, and perhaps more.

24,879. How many years did that occur in?—That would occur in four or five years, perhaps.

24,880. In the winter season?—Principally in the winter season.

24,881. You would be detained twice or three times each year?—Yes; I bore up from Flamborough Head in one voyage.

24,882. On these occasions, which did you generally do—run for it, or get under the cliffs?—I got under Speeton Cliffs, but, with the wind from the east of south, I was obliged to go back.

24,883. From your general knowledge of the coast, tell me how often would a vessel in the coal trade be intercepted off Flamborough Head, so as to be unable to proceed further south; how many times in a year?—If following the trade during the whole of the year, do you mean?

24,884. No; upon the average?—Perhaps six times. She could make 12 or 13 voyages.

24,885. (*Chairman.*) In answer to a question put to you, you stated that you had once been caught under these circumstances, that your ship was nearly foundered from being in a bad condition?—Yes.

24,886. Will you detail the circumstances to the Commissioners?—It was blowing a gale from the southward. The ship was an old one, belonging to Shields. She was very leaky, and we were constantly at the pumps. We were obliged to run her back and take Tynemouth. We took Tynemouth that time in a gale of wind.

24,887. Was it blowing very hard?—It was blowing a complete gale of wind when we went in.

24,888. What time of the tide was it when you went in?—It was just at the top of high water.

24,889. Was there a very heavy sea?—Very heavy.

24,890. What sail were you under?—Under two close-reefed topsails.

24,891. Was the vessel in great risk running in?—Yes, she was in great risk running in.

24,892. Were the men in the rigging?—They were in the rigging tending the braces, for fear of the decks being swept.

24,893. Was the man lashed to the helm?—Yes; the sea moved the long boat right over the chocks, and right upon the windlasses.

24,894. Were you pooped running in?—Yes, we were pooped. The sea took the long boat right on the windlasses.

24,895. More than once?—Only once. The boat remained there till we got in.

24,896. On any other occasion have you run into these outer harbours in bad weather?—I run into Hartlepool once under similar circumstances.

24,897. Were the people on the rigging?—Yes.

24,898. Is it the practice in gales of wind, when running into these harbours, to send the people into the rigging, and lash the man to the helm?—If the sea is heavy, and it is a small ship, it is wisdom to do so.

24,899. In running into these harbours, where do you find the worst seas; because it was described to us the other day that when the sea breaks outside, the sea which breaks in the deepest water is the most dangerous. Is that your opinion?—I should say it is, or the second after that. There are in general three very heavy seas. In coming over these bars, I consider that the second is generally the worst.

24,900. Running into Hartlepool Bay in heavy weather, we were told that the sea breaks in seven or eight fathoms?—I have seen it break in 10.

24,901. In running into that bay, which is the most dangerous sea, the first sea or a subsequent one?—I should say the first sea is as bad as any.

24,902. It strikes the ship with a greater volume of water?—With a greater volume of water, and is liable to heave her out of the course.

24,903. When you are through that first sea, do you then consider the danger pretty well over?—Not in general. We are in danger until we have got through all the three seas.

24,904. Until you get out of the broken water?—Yes.

24,905. With reference to ships in the coal trade, are many of them very badly found aloft; I mean in sails and rigging?—There is no doubt that some of them are very badly found.

24,906. We were told the other day that the owners who have been at sea themselves generally find their ships better than other owners. What do you say to that; is it the case, or not?—I have not taken particular notice of them.

24,907. Have you taken notice who the ships belong to which are the worst found?—No, I have not.

24,908. But that there are many of them very badly found you have no doubt?—There is no doubt of that.

24,909. Do they generally go to sea sufficiently manned; I don't mean well manned as regards the character of the men, but sufficient in point of numbers?—I should say they do.

24,910. Now as respects the hulls, what would you say about them? Is the hull of a collier, generally speaking, as good as that of a vessel in the foreign trade of the same description?—Some of them; some are not.

24,911. Are some of them very bad?—There is no doubt of that; very bad.

24,912. They are generally well found with pumping gear, are they not?—Yes, generally so.

24,913. Does their leaking at sea arise in some degree from their necessarily being laid on the ground in the harbours they frequent, leaking as vessels generally do that are much on the ground?—Some of them, there is no doubt, may leak a good deal from coming over the bars, and perhaps striking the bars. There is, no doubt, a good deal of leakage caused by that.

24,914. When a collier is worn out, is she broken up for firewood?—I never knew one.

24,915. You never knew of one being broken up?—No.

24,916. Then where do they go to; do they founder, or go on to the beach; is that their end generally?—I cannot say what becomes of them.

24,917. Are the vessels in the coal trade kept in the trade by their being frequently thoroughly repaired?—I believe they are.

24,918. It is the practice to keep repairing them and keep them going on?—That is it.

24,919. Will that in some degree account for their never being broken up?—Perhaps it may.

24,920. To a certain extent?—Yes, to a certain extent.

24,921. (*Capt. Sulivan.*) Would you say that these old colliers get thorough repairs, or would you say they are patched up?—Partly repaired and partly patched up.

Mr. Joseph Maycock examined.

24,922. (*Chairman.*) Do you belong to Hull?—Yes.

24,923. How many years have you followed the sea?—Forty-one years.

24,924. Of that time how many years have you been in command of vessels?—Since 1840, — 18 years.

24,925. In what trade have the vessels which you commanded been chiefly employed?—The coasting trade; nearly all in the coasting trade.

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24,926. In the coal trade?—Well, I have been a few voyages in the coal trade, from the Humber to London, and one or two voyages to the northward.

24,927. You have been present during the course of the inquiry this morning?—Yes.

24,928. Give us your opinion as to where a harbour of refuge should be placed,—on the district of coast between the Humber and the Farn Islands?—Well, I should say Filey; that is the best place.

24,929. Give us your reason?—If strong winds come round the Head. I have been detained myself with a laden collier under the Head, with even a wind at south-south-west, and durst not go round in a gale of wind with a small vessel of 100 tons register. I have been riding under Speeton Cliffs for several days with the wind south-south-west, and durst not go round with the flood tide, and with the ebb tide I could not.

24,930. Have you ever tried to get round the Head with a flood tide?—Yes.

24,931. You know the coast and the tides well, I suppose?—Yes; I have been riding under Speeton Cliffs, with a dozen others maybe, at nightfall on a winter's night. There have been perhaps 200 sail of us under the Head, and perhaps 100 sail brought up right along Filey Bay—brought up there with the wind at south-south-west often.

24,932. How many vessels have you seen dodging off the Head?—Oh, quantities; I cannot say. 200 sail of ships under the Head looks a good deal. I would say 200 sail, or 300 sail perhaps; the largest ships further out, and the small ships close in; the small schooners and smacks as close to the land as they can get.

24,933. What are the ports you have chiefly traded between on the English coast?—I am now in the Antwerp trade; I have been in the Rotterdam, and the London and the Leith trade a good deal. I run a steamboat for 10 months between here and Aberdeen.

24,934. Have your vessels been sailing vessels or steamers generally?—Sailing vessels for the last eight years.

24,935. Between Leith and Hull?—Yes.

24,936. What description of vessels?—A schooner, about 100 tons register.

24,937. When you get upon the Durham or Northumberland coast, with the wind off shore, how do you endeavour to make your passage?—With the wind from the south-west, crawl away along Tees Bay; with the wind south-east, get up under the Head; if it is blowing hard from the south-west, I durst not go round sometimes.

24,938. Do vessels making the passage with the wind off shore keep close in?—Always.

24,939. What is the reason; to take advantage of the tides and slants of wind?—Yes, sometimes when the wind is in the west; and in summer time a ship that is close in with the land will get along, when ships in the offing are driven back.

24,940. If a man wishes to make a passage he keeps close in?—Yes.

24,941. With the wind east on the shore, how do you make your passage coming from the Firth?—Steer for Flamborough Head, and keep pretty well out.

24,942. If the wind was scant would you still keep an offing with the wind on shore?—Oh yes.

24,943. What would your offing be from the Farns to Tynemouth?—I think something like 25 miles.

24,944. How far off shore would you keep with a scant wind from the eastward?—I should keep sight of the coast.

24,945. I mean with a scant wind—a wind you could not lay your course—and you would have to take the first occasion you could to get on; which offing from the coast would you keep in making your passage to the south?—10 or 15 miles while you get as far as Tynemouth. I would keep farther off after that, because I should want to get across Tees Bay, and not go round by the bight.

24,946. What are the worst winds on this coast and the most dangerous ones?—The wind from the east-south-east and east-north-east is as bad as it can be.

24,947. From what quarter does it blow hardest?—It blows heavy from the south-west sometimes on the Durham coast.

24,948. Are the changes of wind on the coast sudden?—Yes, very frequently; sometimes blowing a gale of wind from the east-south-east with rain, the weather will clear up, and the wind fly round to west-south-west or to south.

24,949. Does it generally go round from the southward to the northward with the sun?—Not always; it will back sometimes.

24,950. When you are pretty close in shore with lightish winds, does a breeze on shore ever come on very suddenly, and blow hard from the eastward?—Not very often; that is not a very usual occurrence. Perhaps the wind from the north will easter pretty sharply, and go to the north-east or further south, eastering round that way, but does not fly to the east all at once.

24,951. Does a change of wind of that kind generally come on so, that a man who knows the weather and the coast would easily have a few hours' warning?—Not in the winter time.

24,952. But time to get an offing?—Not with some ships. Not with a laden collier, that crawls about six knots an hour.

24,953. So that, if he is on shore, trying to make the passage, he may be caught on a lee shore by a sudden shift of the wind?—Yes.

24,954. And does that often happen?—It does sometimes, and very frequently too.

24,955. (*Mr. Lindsay.*) If there were to be a second harbour made after Filey, where would you prefer to have it?—To the southward of Tynemouth, do you mean?

24,956. Between the points named. You say you would prefer Filey, if there was to be only one harbour. If there was to be another between Filey and the Farn Islands, where do you think it is most required?—I will say Redcar, the same as Captain Farr.

24,957. You would prefer Redcar, as a site, to Hartlepool Bay?—Yes.

24,958. What is your reason for preferring Redcar?—There is more water at Redcar, and ships coming from Tynemouth come out at high water. I have seen them come out at high water with a gale blowing from the south-east, for instance. If you cannot get back, you must reach to the south. If there were a harbour of refuge at Redcar, you would bear up and get into Redcar, when you could not get back to Tynemouth.

24,959. Say, that the money that was to be expended could be distributed in improving the existing harbours, so as to make them accessible at all times of the tide, do you think it would be better expended on one harbour, or in the improvement of the Tyne, the Tees, and the Wear, looking to the saving of life and property?—I am sure I cannot tell. I think I should say, a harbour of refuge in preference to the improvement of the present harbours.

24,960. You think one harbour of refuge at Filey would be a greater advantage than the improvement of the existing harbours?—Yes.

24,961. Why do you think so?—Because I think, that in the time of freshets and heavy rain there are strong tides coming out over these piers. If you run the piers or jetties further out, you will still have the tide or freshets down the river with heavy rains.

24,962. Is there any other reason that strikes you?—I don't know that there is. It is mainly on account of the freshets which at times come out that I object. If you look at the harbours I have seen, you will see they make bars with heavy freshets. Over Aberdeen bar the sand will wash up a great deal with the freshets from the Dee.

24,963. Would your opinion be still the same if it

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were possible to deepen these harbours to 16 or 20 feet at low water ?—I am not an engineer, but I think that is not possible.

24,964. Say it is possible, would your opinion still be the same with respect to one harbour of refuge ?—I should give the preference to one harbour where no business was done, rather than to one where there is a large coal trade, like Shields.

24,965. Do you know anything of the navigation along the east coast of Scotland, to the north of Aberdeen ?—No ; I never was below Buchan Ness in my life.

24,966. You are not able to offer any opinion as to the necessity of a harbour of refuge there ?—No ; I have seen Peterhead, that is all. I have never been in under it. I have been in a good many parts of the Firth of Forth.

24,967. Have you ever been in the British Channel ?—No.

24,968. (*Capt. Sulivan.*) Did you hear what the last witness stated as to the danger of laden colliers springing a leak in heavy gales from the south-east at Flamborough Head, so that the crews would be worn out at the pumps ? Can you confirm that statement ?—It is frequently the case. I should say that ships are lost by the men being worn out from heavy pumping. They cannot pump any longer, and the ship must go down. If there was a harbour, or even a beach to run on, no doubt they would run to the beach and try to save their lives.

24,969. Is the danger to the crews of laden vessels greater than to the crews of light vessels ?—I don't know. With easterly gales, a light ship cannot beat off, when a laden ship might.

24,970. I mean when they are wrecked. Is there more danger of loss of life in laden vessels driven on shore than in light vessels driven on shore ?—If I was going on shore, I should like a light vessel best.

24,971. Is there more danger to a laden ship than to a light one ?—Yes.

24,972. (*Chairman.*) You heard the question put to the two former witnesses as to which was the safest thing to do in heavy weather, to heave to or to scud. What is your opinion upon the subject, first with respect to a vessel under ballast ?—If there was a harbour before you ?

24,973. Putting a harbour out of the question, but giving you lots of sea room,—plenty of sea room for running, but no harbour to run to ?—Well then, heave to the ship, and make her as comfortable as you can. Let her lie as easily as possible.

24,974. Do these vessels always lie to easily ?—Not often. Sometimes a ship lightly ballasted will fall off very heavy, perhaps may cant her ballast, and have a deal of water in her hold. I have known vessels shift their ballast about, and then you must do what you can. They are rather unmanageable.

24,975. If they get a good deal of water in the hold, does not that act as shifting ballast, and make them very dangerous ?—There are many of them go to the bottom, and all hands are lost, through that.

24,976. Taking into account that if a vessel falls off into the trough of the sea, and may ship a very heavy sea, would you still say it is safer to heave her than to run ?—Yes ; you must do what you can ; perhaps get buckets down below, and do what you can with the pumps. It has been done that way.

24,977. As respects laden vessels ?—I should heave to, no doubt about that, with a laden ship.

Mr. Thomas Dawson examined.

Mr. T. Dawson.

24,978. (*Chairman.*) Do you belong to Hull ?—Yes.

24,979. How long have you followed the sea ?—Thirty-eight years.

24,980. For how many years have you been in the command of vessels ?—Twenty-two years.

24,981. In what trade have the vessels which you commanded been chiefly employed ?—For the first seven years I served my time in the London trade, from the Humber to London. After that I went to the Baltic and to Rotterdam.

24,982. Have you been employed on the coast at all since ?—Last year ; I have been from here to Newcastle.

24,983. Always in sailing vessels ?—No ; I was for a long time in a steam vessel.

24,984. How have your passages been made home from the Baltic, by steam or sail ?—Both.

24,985. Have you made many voyages home under sail ?—Yes.

24,986. How many ?—Perhaps 50 or 60.

24,987. A considerable of them late in the year, I suppose ?—Yes ; early and late.

24,988. Bound for the port ?—Yes, generally.

24,989. When you are bound for the port, I don't ask you what landfall you have endeavoured to make, but what landfall you have actually made ?—I have made as far north as St. Abb's Head and Flamborough Head.

24,990. But never to the north of St. Abb's Head ?—No, never.

24,991. Generally speaking, where have you made the landfall ?—Generally at Huntley Foot, and nearer the Head.

24,992. Have you been present this morning all the time ?—Yes, I have.

24,993. You have heard the evidence of the previous witnesses ?—Yes.

24,994. Now will you give us in your opinion where a harbour of refuge on this district of coast ought to be ?—Well, my opinion is at Filey, decidedly.

24,995. Will you give us your reason ?—I think it is a point where ships are generally collected. A great many ships are generally collected together under the Head, and now there is so much steam on the coast they are very much exposed to the danger of being run down, for one thing, and to get round the Head there with strong winds is impossible.

24,996. You think even with a flood tide it would be impossible ?—Quite so for sailing ships.

24,997. Have you ever tried it ?—I have ; and I have tried it with steam aid. I have had to run back even with steam.

24,998. With a flood tide ?—Yes, with a flood tide.

24,999. Then supposing a harbour of refuge were put into Bridlington Bay, you think that ships to the north of the Head would never be able to get to it in bad weather ?—They never would obtain it.

25,000. A harbour at Filey then would be of most use to laden vessels ?—Decidedly.

25,001. Is it a fact, as we have been told, that the light vessels generally endeavour to run for their own ports by preference ?—Yes, I believe they will.

25,002. They will run a great risk for that ?—They will run a great risk to get to their own ports in preference to running for a better port that is not their own.

25,003. You think so ?—Yes, I do.

25,004. Supposing they had a refuge harbour down in Tees Bay, do you think they would gradually come to use it, or would they still have a great preference for their own ports ?—I believe that Hartlepool would be a great inducement for them to run to as a loading port. They would say, if we cannot get a cargo for the north we shall always obtain a cargo of coals here.

25,005. So that one great inducement to run for their own ports is getting their vessels laden again without having to leave the port ?—Yes.

25,006. And in that way Hartlepool would work well, for there is plenty of coal there ?—Yes.

25,007. Have you ever run into any of the bar harbours in bad weather ?—Yes ; I was in Hartlepool two years since.

25,008. Was the weather such as to place you in any danger of losing your life or your ship ?—No. It was not so exceedingly bad as that, but neverthe-

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less it was blowing hard. I had got off the Head and was becoming rather short of coal, so I bore up for Hartlepool, and went in.

25,009. You were in a steamer ?—Yes.

25,010. There would be comparatively no difficulty in that case ?—A steamer does not dip so on the bar as sailing vessels do, but still they are liable to ship a sea.

25,011. They are more in hand, I presume ?—Much more.

25,012. Have you ever made Hartlepool in dark weather ?—I have.

25,013. Is it easy to make out—that is, the Hartlepool land—when you once see it ?—No.

25,014. Is there any land on the coast which might be mistaken for it ?—Perhaps not, but the high land lies much further back than at any other place, so that you are actually down upon the land before you are aware of it.

25,015. The difficulty of making Hartlepool is the low land lying so much in front of the high land ?—Yes.

25,016. Hartlepool Heugh, there is no mistaking that, is there ?—No ; there are objects you may know.

25,017. Have you ever run for Hartlepool by the lead ?—No. I never was there but once.

25,018. Have you ever taken any other of the bar harbours in very bad weather, in a sailing vessel ?—No. I have been once or twice into the Tyne, but that was when it was moderate weather.

25,019. (*Sir F. Smith.*) Supposing Filey should be formed into a harbour of refuge, what other place do you recommend for an additional harbour ?—I should not give the preference to Hartlepool. I should give the preference to the south side of the Tees.

25,020. (*Mr. Lindsay.*) You said the south side of the Tees Bay. Had you any particular part in view? —There has been a place named.

25,021. Redcar ?—Yes.

25,022. You would prefer that to Hartlepool for a second harbour ?—Yes.

25,023. Do you think a harbour there would be of greater service than the improvement of the Tyne, the Tees, and the Wear, so as to make them accessible at all times of the tide ?—Yes. I don't think any of these bar harbours would keep open any time, that is to say, subject to the sea throwing up bars, particularly with freshets.

25,024. But if it should be discovered that there is little chance of their silting up, and that a sufficient depth of water could be maintained at all times of the tide, do you think one harbour at Redcar would be of more advantage than the improvement of the existing harbours ?—I do.

25,025. What is your reason for thinking so ?—The immense number of ships, for instance, that are trading there usually block up the harbours, and the present accommodation inside would not be sufficient to contain them.

25,026. You think that when vessels run for refuge the harbours would be so much occupied by the trading vessels that there might be danger of them not getting good shelter ?—I have no doubt that they would do a great deal of damage in running in. Perhaps they might get into the river, but perhaps they might not.

25,027. As you have made so many voyages to the north, have you formed any idea as to the necessity for a harbour of refuge between Aberdeen and the Pentland Firth ?—I am not acquainted with that case.

25,028. So that you are not prepared to offer an opinion upon that point ?—No, I am not.

25,029. (*Capt. Washington.*) I did not quite understand where you said there would be danger of ships running into each other ?—In a river such as the Tyne.

25,030. You know the Tyne well ?—No ; I have been in there twice.

25,031. How lately ?—Five or six years ago.

25,032. In a steamer or sailing vessel ?—A sailing ship.

25,033. You know there is a very large amount of trade there ?—There is.

25,034. You know that 45,000 vessels go in and out every year ?—Yes.

25,035. That being the case, do you think it desirable to make an effort to improve it far up the river ? —I should have a great desire to do it if it were practicable.

25,036. But you are not an engineer, and will not give an opinion as to the practicability ?—I have seen a vessel ashore on each side going in. There was a large ship—a foreign ship I think, a Spaniard or Italian, or something of the kind—just upon the Middens, and another upon the Sound upon the other side, in attempting the bar.

25,037. That being the case, if you have seen wrecks at the entrance, is it not still more desirable, if practicable, to endeavour to improve the entrance ? —Yes.

25,038. Yes ; but it is the narrowness of the entrance where the danger is on these bars ?—They have less steerage, and they must go to the back of the pier or on the rocks, a thing which frequently occurs in going over bars.

25,039. You know Tynemouth ?—Yes.

25,040. You know that the bar lies somewhere inside the Head ?—A very little distance.

25,041. Suppose there were covering piers, I don't mean parallel piers like Sunderland, but curved piers thrown out from Tynemouth Head and from the south side, so as to cover the present bar entirely ?—Yes, the bar would still follow it.

25,042. That is your opinion,—the bar would follow it ?—Yes.

25,043. Then you are a bit of an engineer, I see ?—I have seen it the case in all bar harbours ; when they have entered the pier the bar has followed.

25,044. To what bars do you allude ?—All the Baltic harbours almost, except St. Petersburgh.

25,045. Except Cronstadt, you mean ?—Yes, Cronstadt.

25,046. I don't think you ever went up to St. Petersburgh ?—Yes, I did.

25,047. With what draught of water ?—Eight feet and a half.

25,048. You said there would be difficulty in a number of vessels running into a bar harbour, in getting them out of the way, and they would run on one another ?—Yes.

25,049. I think I have heard there are some 200 steam tugs in the Tyne ?—There are a great number.

25,050. Could not one get hold of a vessel and tow her up the Tyne to a berth ?—Yes ; but that depends upon the tide, whether there was sufficient water to tow her up. There is a dock, I believe, made since I was there.

25,051. But at any time of the tide that they can get over the bars they can surely tow up the Tyne ; there is more water inside the bar than upon it ?—No ; only part of the way.

25,052. Up into good shelter, you might go above Shields ?—Well, there is good way there.

25,053. Is there not room for a good many ships ? —Yes, there might be in a large fleet of colliers, such as 1,500 sail come down from Yarmouth Roads all at once. You must judge a great number of vessels take the bar.

25,054. Did you ever see 1,500 come down at once ?—Yes ; bound for different ports.

25,055. Bound for the northern ports ?—All for the northern ports.

25,056. Should you say that if a harbour of refuge was placed on the coast there must be room made for 1,500 vessels ?—By no means.

25,057. How many do you think it would be necessary to provide for ?—There ought to be sufficient room for 1,000 sail.

25,058. There should ?—I think so. There is more

than that on the coast sometimes, but not often at the same place on the coast at one time.

25,059. If light vessels were running down from Yarmouth Roads, would they go into refuge at Filey?—Not if they could get into northern ports, certainly not if they found they could keep up; if not, they would not attempt to get into Filey.

25,060. With the northern ports in their present state, if they were not improved, what would vessels do in bad weather, blowing heavy from the south-east?—Run down, of course, to their ports.

25,061. Then it would not be necessary to provide for 1,000 vessels in Filey Bay?—No.

25,062. How many would do for all there?—Half that number.

25,063. Five hundred?—Say 500 of all sizes.

25,064. Have you any notion how many acres a vessel requires to swing at her anchor?—Not many acres.

25,065. Perhaps you have never thought on the subject?—No; I have not.

25,066. You are in command of a steamer at present, I think?—I am.

25,067. Is a steamer better to take a bar harbour with than a sailing vessel?—Yes.

25,068. It is more under command?—Oh yes, more under command, and the sea has not the power of throwing her round so quickly as a sailing vessel.

25,069. You say you could not on one occasion get round Flamborough Head in a steamer?—Yes.

25,070. What was her power?—100 horse; a screw boat.

25,071. What tonnage?—260 tons.

25,072. And 100 horse-power?—Yes.

25,073. Trading between what places?—I have been to the Baltic last, Rotterdam usually.

25,074. Where was she coming from when you could not round Flamborough Head?—From the Baltic.

25,075. With a south-west gale?—South and south by east.

25,076. You made the land to the north of Flamborough Head?—Yes.

25,077. And did I hear you say you had made to the Huntley Foot occasionally?—Yes.

25,078. Has that often happened?—Very often.

25,079. Is Huntley Foot about the highest land on the coast of Yorkshire?—Yes.

25,080. And a common landfall?—Yes; I think they could from there or the Head, generally.

25,081. From Huntley Foot to Flamborough Head is the general land fall to vessels bound for the Humber?—Bound to the Humber and even to the south; even to London a great many of them make the land there.

25,082. You are speaking of the fall of the year?—Yes.

25,083. In summer they must make for Orford Ness?—Yes.

25,084. (*Mr. Coode.*) You said you would give the preference to Redcar over Hartlepool, but I do not think you stated why. Will you give your reasons?—I think that Redcar would be more accessible than Hartlepool in bad weather.

25,085. Why do you think it would be more accessible than Hartlepool in bad weather?—If you run down to Redcar you will meet no broken sea; but in Hartlepool you will have broken water for a considerable distance, even at 10, 12, or 14 fathoms.

25,086. Do I understand you that the broken water is farther off Redcar than Hartlepool?—Yes.

25,087. Is that a matter you speak of from your own experience?—Yes; the tide coming out of the river, there meeting the sea, always creates a heavier sea than would otherwise be the case. There is no tide from Redcar.

25,088. When you say out of the river, I presume you mean out of the Tees?—Yes.

25,089. Has it ever happened to you to see a large number of vessels detained off Flamborough Head, attempting to get to the southward?—Yes, I have seen a great many at times.

25,090. What is the largest number?—From 200 to 300 sail.

25,091. Have you seen that more than once?—Oh yes, it is not an uncommon occurrence there at all.

25,092. (*Capt. Washington.*) Now about this wonderful tide out of the Tees which causes the broken water; I should like to know how far off it really does cause broken water?—It causes it from two to three miles probably,—often as far as that.

25,093. I am really asking for information. In what wind is this?—From east-north-east to east-south-east.

25,094. When the tide comes out, in what direction does it set?—It sets off, and then tends to the northward.

25,095. It first sets about east-north-east?—Yes, about that.

25,096. And then goes where?—North.

25,097. Have you had occasion to take the Tees lately?—I never was in it.

25,098. We were told at Redcar the other day, where I suppose they know something about the river Tees, that the course into the river at the best of the weather was south-south-east, that the entrance led out north-north-west?—That is very likely.

25,099. With a strong tide going out north-north-west, and the wind east-north-east, what could there be to make broken water extending a long way off the harbour?—The land which is thrown out from time to time accumulates, and lies in a long flat bar for a considerable distance off; so it keeps increasing, in my opinion, and will do it. There is a great deal of shifting sand about to the north of the Tees, and if you make a breakwater of Hartlepool it will soon fill up.

25,100. And by that offer an impediment to the tide?—I think it would.

25,101. I think you said you had not been into the Tees?—No, I have not.

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25,102. (*Chairman.*) How long have you followed the sea?—Thirty-one years.

25,103. Where do you belong to?—Aberdeen.

25,104. How many years have you been in command of vessels?—Eighteen years.

25,105. How long were you at sea altogether?—Thirty-one years.

25,106. Where have the vessels generally traded that you have commanded?—The first two years that I was master was in the coasting and Baltic trade. I was 11 years in the North American trade, and after being ashore a bit, I have been once in the Australian and five years in the trade between Aberdeen and here.

25,107. In sailing vessels always?—The last three years I have commanded a steamer.

25,108. Then you have been north through the Pentland Firth?—Yes, a good deal.

25,109. How many times during the 11 years you were in the North American trade?—We used to go perhaps three or four times every year.

25,110. If there was a place of shelter made for ships on the coast of Scotland between the Pentland Firth and the Firth of Forth, where would you put it?—There are two spots; Fraserburgh or Aberdeen Bay is the place for it, in my imagination.

25,111. Will you give your reasons for both?—My reason for Fraserburgh is, that it is the place that would be taken most advantage of by sailing vessels on the coast, and that, I suppose, is essentially all that need be said. Aberdeen lies at the bottom of a deep bay, and is a place of considerable trade, bothered with a bad bar harbour, where vessels of

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any size cannot go in. A harbour of refuge there would be a very great advantage.

25,112. From what winds would Fraserburgh be a place of shelter ?—All round from south-east as far as west-north-west.

25,113. What would you say about Wick ; do you think Fraserburgh a better place ?—I have had a little experience of Wick Bay, having discharged timber there, and I have been obliged to get towed out. I have even laid a fortnight upon the coast through the weather.

25,114. Supposing there were two breakwaters put at Wick, so as to make it secure when you are in, what would you say then ?—I should say that Wick requires it very much for local trade and herring fishing.

25,115. But for the passing trade ?—For the passing trade, for the North American and Greenland and such trades, passing vessels would not take advantage of it.

25,116. It was stated in evidence the other day that Wick would be very advantageous for vessels that were homeward bound ; timber vessels which had come through the Firth with heavy deck loads, and had got down to Kinnaird's Head, and then met with heavy weather from the south-east and south, that they would be very glad to have Wick to run into ? —I would not think twice about it, but would make for Cromarty. I should have smooth water, and no danger in running there, while if you make the best harbour of refuge at Wick that you can, there would be great danger in running to it.

25,117. Does not that take you in a long way leeward ?—It would do so.

25,118. With a wind to get to the southward ?—Yes.

25,119. For a vessel bound to the southward you are clearly of opinion that Cromarty answers all purposes ?—Most decidedly.

25,120. You would have great hesitation in thick and blowing weather in running down upon Wick ? —Decidedly.

25,121. Why ?—In thick weather I could not be sure where I was. In running down upon a lee shore, there would be considerable danger from the number of vessels which would be enticed to run for a harbour of refuge, while in running for Cromarty I should be quite safe of getting to the Firth, or of having better weather.

25,122. If not Cromarty, do you think Long Hope would answer all purposes ?—Yes.

25,123. So that between Long Hope and Cromarty you are sufficiently provided for ?—Most decidedly.

25,124. If you were making the passage through the Pentland Firth, from this side, and were running down there with a heavy gale of wind, what would you do about the flood tide, because you would not run into it with a flood tide, would you ?—That would depend upon the state of the weather, and whether it was daylight ; if it was daylight, I would go through against the flood. I would go south of the island, and go inside St. John's Point.

25,125. You are sufficiently well acquainted with it to go south of the island ?—Yes.

25,126. But, generally speaking, men who are not so well acquainted with it as you,—do you think they would do it by knowing the place merely by charts and directions ?—I think not.

25,127. It would only do for a man who does know the place well ?—Who knows the place well.

25,128. Putting yourself in the position of a man running for the Pentland Firth, who had only been through it once or twice, and could not hug the land and get into the eddies like you ; would you, under these circumstances, lose a fair wind by running into a harbour of refuge at Wick, or would you endeavour to run into the Firth at a proper time of tide and make the passage ?—I should stop until the tide slackened, and take the Firth.

25,129. But supposing it was blowing a very heavy gale, how would you manage to stop ?—I should heave to.

25,130. (*Mr. Lindsay.*) Considering what you have said, that you have Cromarty on the one side, and Long Hope on the other, do you think that a harbour of refuge is necessary at Fraserburgh ?—I have been running all the summer to Fraserburgh, and often in height of summer I have found a number of ships detained under Kinnaird's Head. Some eight or nine years ago I was dodging through from North America with the *Hero*, of Dundee, and she went ashore at night. I went to Cromarty three years ago, coming round from Glasgow with the same little boat I have now ; we had been off the night before, the coals were getting short, and we wanted to go in and get coals ; going into the harbour we got 300*l.* or 400*l.* damages in both cases. If the harbour had been there, the accident would not have occurred.

25,131. But looking to the passing trade, and to the saving of life and property, and considering that you have Long Hope and Cromarty, do you still think that, considering the advantage to the passing trade, and the safety of life and property, a harbour is really wanted for the trade at Fraserburgh ?—I think it would be a very great advantage. For instance, vessels from the Baltic with the wind at south-west and south, that could not get to Peterhead, they would run up to Fraserburgh. They would decidedly go there on dark nights, when they are liable to get accident, to which the coasting trade is especially liable. Vessels are continually detained at Fraserburgh that can get neither up nor down ; and I think a harbour there would be of very great advantage.

25,132. Do you think a harbour at Fraserburgh would be of more advantage than one at Peterhead ? —I decidedly think so.

25,133. Why ?—They could mostly always get smooth water to get into, which is a great advantage.

25,134. Any other reason ?—The danger is past when they get round Buchan Ness. A vessel can get off two points, and rather than run any risk they would run up the firth and beach.

25,135. If it rested between Peterhead and Wick, which would you prefer ?—I should decidedly say, I don't see any advantage of a great harbour of refuge at Wick at all; but the local harbours are much in need of improvement.

25,136. Then if it rested between the two, I understand you would prefer Peterhead ?—I don't see any advantage of putting a harbour down at Peterhead at all.

25,137. Then you don't think a great harbour of refuge would be of any advantage at Peterhead or Wick ?—No ; I think if you are to have one on that coast, it should be put at Aberdeen in preference to Peterhead, decidedly.

25,138. For the north-east coast of England, if only one harbour was to be made between Flamborough Head and the Farn Islands, where would you place it ; what spot do you think best for it ?— I don't care about giving much of an opinion on that question. My experience is, however, that you require harbours. Filey is a site of very great advantage for a harbour, but it is not the site that I should say would be the best for this coast.

25,139. What site should you say should be the harbour for this coast ?—I think about Redcar would be of great advantage, if the ground was such that a harbour could be made.

25,140. Tell me why you think the position at Redcar would be better than Filey, all things considered ; bearing in mind both laden ships and light ships ?—Redcar is a dangerous part; it is of the greatest danger from the Head up to the Tyne. If it could be made, however, that would take away the danger. I have seen vessels go ashore there with the wind east-north-east and north-east. I have been in company with vessels that have gone away with the wind at east-north-east upon the coast, and have known

vessels go ashore, which they would not have gone ashore had there been a harbour on the spot.

25,141. Have you any other reasons ?—No ; that is all.

25,142. Is your sole reason for preferring Redcar as a position for a harbour of refuge on the east coast because there are dangers there called Redcar Rocks ?—I mean to say that the harbour proposed within the rocks would be far too small for this coast, but there is a clear beach to the southward of that that I allude to. I should say to the north of Whitby would be a very good place.

25,143. Then you give it as another reason, on account of the clear beach for a harbour there ?—Yes ; from the appearance of the beach in passing I should imagine the ground was pretty good.

25,144. Supposing that for the same expense they could construct a harbour at Filey, which would have the same area that could be obtained at Redcar, do you think that a harbour at Redcar would do more to save life and property than a harbour at Filey ?—Most distinctly I say so from experience.

25,145. You are most distinctly of that opinion ?—Decidedly.

25,146. Whether do you think a harbour at Redcar, which seems to be the spot you think would do the most to save life and property,—whether do you think a harbour at Redcar, or the deepening of the Tees, the Wear, and the Tyne, so as to admit vessels at all times of the tide, would do most to save life and property ?—It would be a great advantage to deepen these rivers, and would save a vast number of vessels, but at the same time I consider that a harbour of refuge is very much wanted on this coast.

25,147. Then your first consideration would be one great harbour at Redcar, and your next consideration the deepening of the rivers I have named ?—No ; I think a harbour at Filey is very much wanted.

25,148. Then your opinion is, first, you would prefer a harbour at Redcar ?—Yes.

25,149. Secondly, a harbour at Filey ?—Yes.

25,150. And, thirdly, the improvement of the other harbours ?—Yes.

25,151. (*Capt. Sulivan.*) I think you said that one reason for a harbour of refuge at Fraserburgh was that the Baltic ships came over with south and south-west winds and got under Kinnaird's Head, and that it would be very valuable to them ?—Yes.

25,152. Is the great want of a harbour of refuge the danger to vessels on a lee shore when they can't get off and must go on shore, if there is no harbour to take them to ; is that the great want of a harbour of refuge ?—That is one great want, along with the danger to which vessels are exposed in sailing to ports along the coast.

25,153. The vessels you describe off Fraserburgh would only be in danger from a wind on shore ?—South-west, right off.

25,154. Would you think a large outlay of Government money reasonable to afford a convenience to vessels in off-shore winds, when they could not by any possible means want it for purposes of refuge to save life and property ?—I see so much wreck upon that part of the coast, that if the Government expends sums of money to save wreck it would be a great advantage.

25,155. Do you know how the wrecks take place there ?—They are often from the wind sweeping into north-east and catching vessels. Since you were down here, three vessels were wrecked the other day at Fraserburgh.

25,156. Can you fancy any wind off Kinnaird's Head that a ship could not go safe on one tack or another, and have the open sea to leeward of her ?—The wind from the north-east comes in very heavy upon the coast.

25,157. With the wind from the north-east could a vessel help fetching Cromarty ?—I knew a vessel bound for Quebec last year that was here, with the wind at north-east ; she got to Cromarty, but they dragged up all the way and thought they would be on shore ; they were in very great danger indeed.

25,158. You said you would run for Long Hope ; would you venture, from your knowledge of the Firth, to run across the race of Pentland Firth for Long Hope with a south-east gale and the tide running to the east ?—Well, the south-east wind would require to be very strong ; I should prefer a still tide.

25,159. Would it be safe for the ordinary run of coasting vessels to attempt to cross the Pentland Firth with a tide running east to get to Long Hope ?—It would not, with small coasters.

25,160. One of the last witnesses has stated that with a good breeze he could always run through the Pentland Firth against a flood tide. Do you believe that the ordinary run of coasting vessels, even under press of canvas, could depend on running against the stream of the Pentland tide and getting through ?—No ; it would take a very smart vessel to make against that tide,—very smart indeed. Going to North America with a good smart vessel I have tried it, but we never could do it.

25,161. Was the vessel in good sailing trim ?—Yes, a vessel of between 400 and 500 tons ; a timber ship.

25,162. How laden, then ?—Ballast.

25,163. In ballast ?—Yes.

25,164. If you, with a good sailing timber ship in ballast trim, could not run over the tide, do you believe a laden vessel, from the Baltic to the west coast could possibly attempt it ?—Oh no, I don't think that, unless they are well acquainted with the navigation, and get into the eddies and cheat the tide.

25,165. (*Capt. Vetch.*) Supposing a number of trading vessels from the several coal ports were proceeding south, and the foremost had reached near Flamborough Head, and were there caught by a south-east gale and obliged to put back, how many of these do you think (supposing that there were 200) would get into Filey safely, if there was a harbour made there ?—I think it would be of little use making a harbour that would not hold 200 vessels.

25,166. Would all these vessels be in a position to take this bay coming from the northern ports towards the Head ? With a south-east gale coming on there, and being unable to weather the Head, they must put back, some to one port and some to another ; how many of these on an average do you think would be able to take Filey ?—Well, I should say not above 30.

25,167. Do you think the rest would be able to get refuge if there was a harbour at Redcar ?—The other portion would be likely to get there.

25,168. Supposing there was a shelter provided at Sands End Ness, would many get in there ?—Perhaps 100 sail.

25,169. What is the greatest number of vessels you have ever observed off Flamborough Head, unable to proceed south ?—Do you mean dodging ?

25,170. Yes. Suppose they are caught and cannot get to the south, how many have you ever observed at one time ?—About 150.

25,171. Does that frequently happen in the year ?—Generally in the spring of the year.

25,172. How often do you think, one year with another, it takes place ?—Well, very often indeed.

25,173. How often in a year ?—Vessels go to sea and keep dodging off. They will not all take shelter that might, if there were a harbour.

25,174. I mean in such a gale as would make them all desirous of getting into shelter as soon as they could manage it ?—At south-east, if the wind easters, vessels are far better to have an offing ; but some masters prefer going to the cliff and waiting. It is a matter of opinion.

Mr. JAMES PORTER examined.

25,175. (*Chairman.*) Do you reside at Hull ?—Yes.

25,176. You are a pilot ?—Yes ; a coasting pilot.

25,177. For what district of the coast ? How far ?—From Leith to the Downs.

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25,178. A Trinity House pilot ?—No ; I am not a licensed pilot,—a coasting pilot.

25,179. How long have you followed that occupation ?—About seven years.

25,180. Previously how were you employed ?—Master, mate, and man 34 years.

25,181. For how many years master ?—About 11 years.

25,182. In what trade were the vessels employed ?—In the coal trade from Yarmouth, Sunderland, Shields, Hartlepool, and different ports.

25,183. You have been present during the whole of this inquiry ?—Yes.

25,184. Will you now give us your opinion as to where a harbour of refuge should be placed, and the reasons for your opinion ?—I should prefer Filey.

25,185. Now the reasons ?—The reason is that a ship coming from the north and bound south, will get up round the Head ; sometimes they will not get so far ; sometimes they will fall in with a gale of wind abreast of the Head ; and of course, if there was a harbour there, a great many of them would go in before they would run into Shields or Hartlepool, for when they got there it might not be tide time, and they might not be able to get in.

25,186. You have heard the account which has been given that vessels in blowing weather cannot work round Flamborough Head even with a flood tide. Does that accord with your experience ?—That depends upon what sort of a vessel it is. Colliers cannot get round ; but a smart ship can.

25,187. Can any others of the coasting trade ?—Very few.

25,188. Does the flood run nine hours ?—No.

25,189. How many ?—Not more than 6 or 6½.

25,190. Flood and ebb run very nearly the same ?—Yes.

25,191. Is there any advantage in point of strength with either tide to work round the Head ?—You might in a flood tide ; you could not with an ebb.

25,192. But what I mean is, does a ship working round from the north have more advantage from flood tide than a ship working from the south would have from the ebb ?—Very little ; it is much the same. The little advantage you have is working in under the land.

25,193. You have heard what has been said as to vessels making the passage with off-shore winds. Does that coincide with your experience ?—Yes ; because when you are close to the land the sea is smoother, and you get along quicker.

25,194. For slants of wind, do you count on getting them ?—Yes.

25,195. And more advantage by the tide ?—Yes.

25,196. Is there anything like tide and half tide on this coast, as in the Channel ?—You may get an hour or two's advantage by working into the offing.

25,197. Therefore a man who knows that takes advantage of it ?—Yes.

25,198. In sudden shifts of wind, how is it in your experience, in light winds, off-shore winds, in winter time does the wind come from the eastward and blow hard suddenly ?—It often changes in winter and blows very hard, but in winter you don't keep so close to the land.

25,199. When sudden shifts take place, do they come without warning, or if a man knows the weather pretty well can he generally get off shore in time ?—He will if he is pretty well acquainted with the weather.

25,200. Are these gales ever preceded by calms, so that a man could not get off shore, even though he knew the weather ?—Yes.

25,201. And is that common ?—I should say very common. Sometimes you are close in with calms. Very often I have been caught with calms.

25,202. Have you ever been caught with a gale coming on suddenly, preceded by a calm, which prevented you getting an offing in time ?—No.

25,203. (*Sir F. Smith.*) Supposing the Legislature felt an earnest desire to incur any amount of expense for the saving of life on this coast, how would you recommend that the money at the disposal of the Government should be employed ; what number of harbours would you recommend, and what points would you select ?—I should select Filey.

25,204. That would stand number one ?—Yes.

25,205. If there was to be another one ?—I should prefer Redcar.

25,206. Then how would you dispose of the rest of the money ?—I cannot tell you that.

25,207. You think that is enough, do you ?—I should say so.

25,208. You think there would be very little loss of life if a harbour of refuge were made at Filey, and another at Redcar ?—I think there would not be anything like so many lives lost. At present laden ships have to run back, and light vessels get down to Huntley Foot; but if there was a harbour at Filey they would go there rather than ride in Bridlington Bay.

25,209. You are of opinion that the establishment of two harbours of refuge would tend to diminish the number that now run to the Tyne, and therefore diminish the loss of life ?—Yes.

25,210. (*Mr. Lindsay.*) Would deepening the existing harbours or making a harbour at Redcar, in your opinion, do the most good ?—They never can deepen the harbours enough for a heavy ship to go in.

25,211. Say that the harbours could be deepened for loaded ships to run for them at all times of the tide, do you think that that, or a harbour of refuge, presuming one to be made at Filey, would do most to save life and property ?—I should say a harbour at Redcar before that.

25,212. Would Shields be before that, in your opinion ?—Yes, I have run into Shields, and have seen 17 vessels run on shore at the same time we were going in.

25,213. Was that because there was no water on the bar ?—No ; the sea was so heavy that the ships took the bar before there was water.

25,214. If there had been plenty of water on the bar, would these ships, in your opinion, have been driven on shore ?—Yes, about the same, the sea was so heavy.

25,215. Were they all driven on shore on account of the sea ?—Yes ; the sea hove all of them round. When they got into the trough of the sea they could not steer there.

25,216. Were none of them driven on shore because they touched the bar in going over ?—No; they were all light ships.

25,217. All on account of the heavy sea ?—Yes.

25,218. Have you been at anchor in Filey Bay ?—A good many times.

25,219. It was said to us yesterday that there is a very heavy outset round the Brigg, is that the case ?—Yes.

25,220. Would you, as a pilot, consider that you would be running a risk in taking the place in a heavy easterly gale with the outset ?—Oh, that will not prevent any ship from taking it. The outset will not hurt anything ; it would not be more than a knot and a half.

25,221. Therefore you don't see any objection to the construction of a harbour at Filey on account of the outset ?—No, it would be no hindrance at all.

25,222. No hindrance at all, in your opinion ?—Yes.

25,223. What kind of holding ground have you down at Filey Bay ?—It is very good holding ground. It is a kind of clay.

25,224. From your experience and knowledge of the bay, do you think it has been silting up, or has it been deepening, or has there been any change ?—I don't think there has been any change, not in my experience, and I have been in it backwards and forwards almost 30 years.

25,225. How many ships have you seen at anchor at one time under Speeton Cliffs ?—I may have seen 50 or 60. I have seen 200 or 300 knocking about the Head and at anchor.

25,226. Which could not get round with a southerly wind ?—That could not get round.

25,227. Have you ever seen vessels slip and run from their anchorage under Speeton Cliffs ?—Yes, several times. I have done it myself.

25,228. Under what circumstances ?—A gale of wind going to the southward and eastward. I have gone up the Leith roads to Flamborough Head.

25,229. Which way does the wind usually veer in these gales—does it usually go from about east-north-east to east-south-east, or from east-south-east to east-north-east ?—It will generally veer to east-north-east ; when the wind is south-south-east it generally veers round to north-east.

25,230. From south-east and east-south-east to north-east ?—Yes ; when it veers it will blow against the sun very heavily.

25,231. Does it veer when it is at east-south-east or east-north-east ?—I think east-north-east are the heaviest gales we have.

25,232. Does it generally end there, or does it draw round to the northward ?—Sometimes it will.

25,233. But is that generally the case ?—When it does go round, it does draw to the northward.

25,234. It goes to the northward and then lulls ?—Yes. I left Sunderland last Saturday night with a ship drawing 21 feet water.

25,235. Where was she bound ?—To Aberdeen.

25,236. What winds are the heaviest on this coast ?—North-east winds.

25,237. (*Capt. Sulivan.*) Have you piloted vessels of the Tees and Hartlepool along this coast ?—Yes.

25,238. If there was a harbour at Filey, and a vessel had got hold of the Head, even in thick weather, would she have any difficulty in feeling her way along the Cliffs with her lead into the harbour ?—No, not any at all, because you may go very close to the land.

25,239. Then even in thick weather, if she got hold of the Head, she could almost always keep close enough to the land to keep sight of it, and so lead her into the bay ?—Yes.

25,240. If there was a harbour at Redcar, would the land be a guide down along the Yorkshire coast to the entrance to the harbour ?—Yes ; because when you were running with the wind you would haul in close on Huntley Foot.

25,241. With a southerly wind you want no harbour of refuge ?—Oh yes.

25,242. Is not that a wind off the coast ?—Only a point or half a point.

25,243. Supposing a vessel embayed to the westward of Whitby, if caught so bearing up to a harbour of refuge in the Tees bight, could she by the lead, with the weather thick, go along the shore to the harbour at Redcar ?—Yes.

25,244. Would you have any hesitation in running for it, as a pilot ?—Not at all ; you are forced to run for these harbours in very thick weather at times, blowing heavy too.

25,245. You spoke of this outset in Filey Bay ; if there was an opening left near the buoy, near Filey Brigg in the breakwater, so as to have a passage that way as well as to the south for convenience of vessels, should you fear the outset making too strong a tide in the opening for vessels to weather it ?—I think it would be, the other part of the harbour being open.

25,246. The tide would come in to the southward ?—Come in to the windward.

25,247. To the southward along the coast, you mean ?—Yes.

25,248. And sets out through the channel ?—It would come out through there.

25,249. At present it runs strong over Filey Brigg, does it not ?—Yes, until the water gets clear of the rocks.

25,250. If there was a detached breakwater without on the Brigg, so as to leave free vent for the tide over the Brigg, and still a passage near the buoy to the northern end of the Brigg, in case of a vessel wanting to go out that way, do you think that the effect would be to strengthen the current and prevent vessels from running out by the buoy ?—Oh no, not at all.

25,251. Or with an easterly gale, if they got a little way north, would there be too heavy a sea for them to run in by the buoy ?—Oh no.

Mr. James Oldham examined.

25,252. (*Chairman.*) In what way are you connected with the port of Hull ?—I have resided in Hull nearly all my life. I am acting as a civil engineer in Hull.

25,253. Have you any statement which you wish to make with reference to the proposed breakwater and harbour in Filey Bay ?—Yes.

25,254. Will you proceed ?—Before I make a statement as to any calculations I may have gone into, I wish to state that when the question of harbours of refuge began very much to excite the public mind a few months ago, I turned my thoughts to what might be done upon our coast—upon the coast of Yorkshire in this neighbourhood—and finding that a plan had been proposed by Mr. Coode, one of the Commissioners, I gave to that plan considerable attention. Knowing Filey well, I went more particularly into it, and examined the nature of the plan and the various circumstances that would be necessary to carry out such works. I ought to state here that Mr. Coode is a perfect stranger to me. I don't know him personally. I know him only by name and reputation, and therefore I had no predilection for that gentleman's plan, beyond knowing what it referred to, and considering its merits in a public point of view. I never saw Mr. Coode before, when you yourself introduced me to him this morning, and therefore you will acquit me of any predilection for any pet scheme of any one's whatever. Having said thus much, I would now state that I have gone into some calculations as to the probable cost of carrying out such works as Mr. Coode has proposed for a breakwater in Filey Bay. I find that in consequence of the geological formation of the neighbourhood and the rock immediately adjoining Filey beach, that you have, perhaps, greater facility for carrying out such works there than any other place that I am acquainted with. A portion of the works, as you are aware, may be said to be nearly constructed—I think, to the extent of about one-fifth of the proposed breakwater, commencing at high water at the end of the projecting cliff. I have made a calculation as to the probable cost that you may be at, and I will state the result of those calculations. I saw two sections in reference to this work. I found these sections were first produced by Mr. Coode for a harbour at Wick. One of these sections, as you are aware, shows retaining walls, one on the sea much heavier and higher than the one within the proposed harbour inside of the pier. I have made a calculation as to the amount of stone that would be required for the foundation part of it, and that would be required to form the retaining walls, and the result of my calculation is, that, taking the total length of the breakwater to be 3,200 yards, it would cost at the rate of 253*l.* 18*s.* per yard lineal : that would produce a sum of 809,840*l.* ; but, taking into consideration that a large portion of the breakwater is already there as a nucleus to work upon, I make a deduction from the amount I have stated of 30,000*l.*, being, I think, a fair deduction to make; that would show the total cost of the work, according to my estimate, 779,840*l.* I have seen, in Mr. Coode's evidence, that the amount he calculated the whole cost at was 860,000*l.* ; that would, therefore, leave a sum for contingencies of 80,160*l.* I should say that the material, lias and coraline formation, which exists at that point, would be very easily obtained, and works might be constructed for carrying out the breakwater with the greatest facility imaginable. I can see no engineering difficulties in the way whatever. I shall be happy to

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answer any questions in detail. I have understood that the section I have alluded to was proposed by Mr. Coode and approved by Captain Vetch, although that gentleman is not committed to work it himself. I understand Mr. Coode is in favour of the section having retaining walls, and it is on that I have more particularly grounded my calculation.

25,255. (*Sir F. Smith.*) You have given us a very clear statement and very full details. Looking at the circumstances, have you any doubt that the section to which you have referred is the best calculated to effect the object in view ?—I have no doubt it would effect the object most efficiently.

25,256. You think the same amount of protection could not be obtained by a different section without further expense ?—I certainly believe that it would cost more money to carry out any other plan which would be as efficient.

25,257. Are you of opinion that the material proposed to be used is sufficiently durable to suffice for the purpose, without sending for granite or any other hard stone ?—Judging from past experience, having known Filey for very many years, I have no doubt upon that point. I can refer you to stones that were quarried many years ago, perhaps well on to 30, with the intention of being conveyed to Bridlington, for a pier there, I think. Many of these stones are lying now upon a sort of spoil bank, with the marks of the tools upon them. They are there as entire as the day they were placed upon the bank. Many of them are of enormous size. I remember one many years ago, and it impressed itself so firmly upon my mind that I can remember exactly the weight. I found it to be 54 tons. You may obtain them of any size. I believe they will be exceedingly durable, and fit for all purposes that you can require stones for.

25,258. Have you seen these stones lately ?—I was down last week, expecting the Commissioners would sit in Filey last Wednesday. I went for the purpose of witnessing the proceedings there, but you did not meet ; and I took the opportunity of going on to the reef, where I saw some of these large stones. I did not make a minute examination ; they were so thoroughly grown over with sea-weed, that without some trouble they could not be examined.

25,259. They are in a very perfect state ?—Yes.

25,260. If you were informed that Mr. Coode, in drawing his estimates, had contemplated the probability of bringing granite from Cornwall, you would think that altogether unnecessary ?—I think it would be.

25,261. In fact, you have a very high opinion of the qualities of the stone on the spot ?—Yes ; my opinion is, that it is all you can require, judging from the state of the stones I have examined, lying there as they have been all these years.

25,262. Did you ever meet with any position in which the facilities for the formation of a breakwater were greater than they are at Filey ?—I don't think any can be greater ; few places will equal it. I know of no place better fitted for carrying out such works.

25,263. You imagine that the mass of material required is to be obtained without difficulty ?—Certainly there would be no difficulty. The stone would be comparatively easily quarried, and could be by slight machinery placed upon trucks, and run down by railways with the greatest ease possible.

25,264. In your estimate you have allowed for removing the superincumbent mass of deposit ?—Yes.

25,265. In point of fact, you think there will be no engineering difficulty ?—None whatever ; no possibility of retardation, except by gales of wind from the north-east. There will be certain interruptions occasionally, but nothing more than would be ordinary in the winter season.

25,266. (*Capt. Vetch.*) I merely wish to ask, with respect to the necessity of bringing granite or any other hard material from a distance, do you not conceive the stones now on the soil and ready at hand are quite sufficient for all the face works ?—That is my opinion. I should not have spoken with so much confidence, had it not been for the fact of my having known the place for so many years, and noticing these very stones that have been exposed to every kind of weather for all these years retaining their surface impression and form. I have consequently perfect confidence in the durability of the stone.

25,267. You are aware that there are beds of limestone in the vicinity ?—Yes.

25,268. Which would make building lime ?—Yes.

25,269. Also cement stone at no great distance ?—Yes, I am aware of the qualities of the stone.

25,270. Therefore there is every facility for such a work ?—Quite so.

25,271. (*Capt. Sulivan.*) Do you feel confident that contractors would take that work for the sum you have named ?—I dare say they would. I can say that I have already spoken to a contractor on the subject. I gave him a statement of the amount of work, and asked him generally whether he would undertake such a piece of work at such a price. "Oh," he said, "I would be delighted to have it. "I would undertake it to any extent."

25,272. (*Mr. Lindsay.*) I don't understand you exactly. What description of pier would it be,—altogether rubble stone ?—No ; the lower part—the foundation—would be of rough stone, forming a bank, on which would be constructed the upper part with retaining walls, one on each side. You have a section before you.

25,273. The section to which you refer is that in the Parliamentary Paper, No. 262, of the session of 1857, plate No. 3 ?—Yes.

25,274. (*Sir F. Smith.*) You are quite prepared to admit the expediency of adopting that section ?—I am.

25,275. In its entirety ?—Yes.

25,276. You think it would be necessary to have as much material above high-water mark as is shown there ?—Yes, I do.

25,277. You think without that you would not keep the bay in a still state ?—I think it would be a great assistance to ships approaching the harbour to have a good wall, a dark line to be visible, instead of having a low embankment of breakwater with the sea rolling over. You would have a much worse chance of seeing your approach than where you have a good dark line of wall.

25,278. You have known Filey Bay for a great many years ?—I have.

25,279. Have you any reason to apprehend that there would be any silt formed within the line of the breakwater of so serious a nature as to render the harbour less valuable ?—I think not ; and my reason for being of that opinion is, on account of the great extent of clean rock to the northward of it. Where we find a drift of sand or silt coming up, you will always have it in other parts of that neighbourhood.

25,280. We were told yesterday that there is a great set of the beach from Flamborough Head round along the shore, and that that beach was stopped from coming into the bay by the current coming over the Brigg. Do you imagine there is anything serious in that ?—I think nothing.

25,281. You think that the harbour, if formed, will remain free from silt or anything to interfere with it ?—I think so. I think whatever may come from points farther north is set off in consequence of the great extent of Flamborough Head. I think it is kept off in consequence ; in fact, since I have known Filey, I have perceived no alteration in the beach, no silting or excess of deposit taking place.

25,282. You think that the stopping the passage over the Brigg would not admit the shingle coming from Flamborough Head, into the anchorage ?—I certainly think not, because if it had had such a tendency you would have perceived it now to some extent, and under certain circumstances of wind or

weather; but I have never seen any accumulation there. I have seen a little sand upon the immediate beach, but nothing more.

25,283. (*Capt. Vetch.*) You prefer a breakwater with an upright wall which would rise from 12 feet below low-water mark?—Yes.

25,284. Beyond that you would prefer throwing down rubble and building upon it?—Yes.

25,285. So far as 12 feet below low-water mark you have a good foundation, have you not, for the works?—Yes.

25,286. (*Capt. Washington.*) I think you mistake the question about the drift spoken of. Yesterday it was stated in evidence at Filey that the material had been washed down from the Speeton and Bampton Cliffs, and that there was a collection of about 20,000 tons, if I understood right, of flints, and other débris of the cliffs, which had formed a large deposit upon the beach?—Yes, immediately at that point; but you don't find the same going on when you come to the lias formation, that we have at Filey Brigg and to the northward of it. At Speeton, Reighton, and other parts, it is soft chalk, which is constantly washing down, but you never find it coming northward. It always has a tendency to go south, if it can get.

25,287. In a south-east gale, why should it not be drifted to the northward?—Some portion may tend a little that way, but it is drifted back; it certainly does not accumulate in Filey Bay. I have never known it appear there. I have no doubt it does accumulate to a great extend under the rocks under the shelter of Flamborough Head, and near the Head, but I cannot imagine it forming in any quantity further northward.

25,288. If I understood the witness yesterday correctly, he said he it was stopped where it is by the sea coming from Filey Brigg—the sea from the north-east—and that if the sea was stopped passing over the Brigg, then a south-easterly direction would prevail, and would carry that collection up into the head of the bay. Are you of that opinion?—No, certainly not; because, admitting that there is a very heavy sea and fall of tide at present running over Filey Brigg, I think it is spent long before it could reach that point. I cannot think it is the fall of the water over Filey Brigg that can keep back the deposit.

25,289. Do you know that deposit?—Oh yes; I have seen it.

25,290. What is the nature of it?—Clay and flints, and chalk stone. It is a chalk formation, and very apt to fall down in frosty weather; in fact it goes very rapidly in frosty weather.

25,291. About what is the size of the stones on the beach?—Many of them are large masses thrown down as the cliff became undermined, but many are broken down to very small pieces, such as you would repair roads with. But the cliff is broken down chiefly in consequence of the frost in winter.

25,292. Does some of the deposit lie below high-water mark?—Some of it, I daresay, does.

25,293. What is to prevent that being drifted in a south-east gale to the northward along the beach?—I don't think you would get a force of current close in that would affect it.

25,294. I think it is not a question of current, for no tide that we know of would move such stones?—It is a question of the strike of the sea.

25,295. Would not the strike of the sea drive it to the northward?—I have never known it drive it northward.

25,296. It was stated to us that there is that collection, that it is kept in check at that point by the sea from the north-east, and that if the sea were prevented coming from the north-east, the strike of the sea from the southward would prevail, and drive it into the head of the bay?—I cannot see it in that light. I don't believe it would go northward.

25,297. (*Capt. Sulivan.*) You know the chalk end at Speeton Cliff?—I do.

25,298. Have you ever known an accumulation of flints and débris from these cliffs driven three quarters of a mile, I think we were told, northward, and on to the Filey sands, and there accumulating?—No.

25,299. I understood the witness who gave that evidence to say that it was the same south-east sea that swept round the shore swept round to the westward in front of Filey, inside of the Brigg, and then recoiled, and met the sea coming along from Flamborough Head, which caused the deposit to rest where it had accumulated. Do you understand that?—I quite understand it, but I think it is a very complicated idea.

25,300. The end of Speeton Cliff is something like two or three miles south of Filey, I think?—Yes.

25,301. And you have the action of the sea in a direct line from Flamborough Head?—Yes.

25,302. If there was such an action in the inside of Filey Brigg, meeting that direct action, could it by any possible means go back so far to the southward as to cause a deposit only three quarters of a mile from Speeton Cliff?—I don't believe it at all.

25,303. If there was any tendency of south-east and east winds to shift the shingle from the chalk along the Filey beach, must it not have taken it much farther than the point I allude to, before it could have met any influence from the sea at Filey Brigg?—Certainly it must. I don't believe any evidence given on that point.

25,304. Do you know, of your own knowledge, whether the flints and débris from the chalk have travelled northward of the end of the cliff?—I have not known it or seen it.

25,305. (*Mr. Coode.*) You have referred to two sections in the parliamentary blue book, one being on plate No. 3 of the Report of 1857, and the other on the sheet of Wick, in the same Report. Will you tell us on what section you have based your calculations?—Upon that in plate No. 3.

Mr. JOHN BELL examined.

25,306. (*Chairman.*) Are you the Mayor of Great Grimsby?—I am.

Mr. J Bell.

25,307. You wish to make some statement of your own relative to Grimsby, and the advantages which you conceive will arise from making a harbour of refuge in that locality?—I wish to do so.

25,308. Will you now make any statement you please?—In the first place I have to apologize to the Commissioners for the hasty manner in which the statement I have to submit has been drawn up. It was only this morning I got an intimation that a meeting of the Commissioners was to be held in Hull to-day, and of course I have had very little time for the arrangement of the facts that have been put together. I think these facts will show very pointedly and very satisfactorily the advantages which the port of Great Grimsby—connected as it is with the river Humber, of which indeed, it may almost be looked upon as a part—would offer as a harbour of refuge, and the capabilities which it possesses for fulfilling all the requirements of such a harbour. The report which I hold in my hand embodies the principal facts which will be brought before you, and which we are prepared to substantiate by the evidence of certain persons, nautical men, who are well conversant with the locality and the particular requirements of the coast. They are here to bear out the statements which are embodied in this report. Not being myself connected with the sea in any way, occupying a very different grade in society, I don't pretend to enter minutely into these matters myself; but I have hastily drawn together some few observations, which, with the permission of the Commissioners, I shall

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suggest that the town clerk who accompanies me, should be allowed to read.

(*Chairman.*) Before we go further, there is one part of the remarks which you have made, Mr. Bell, to which I should be inclined to take a little exception, and that is as respects the notice, because I find we have been in communication with you upon the subject since the 22d of October.

(*Mr. Bell.*) Although the letter was dated the 25th I only received it this morning.

(*Chairman.*) I had a letter from you, dated Great Grimsby, the 16th of October, to this effect :—"I am "desired by the Town Council of this borough to "draw your attention to the advantages possessed by "the harbour and port of Great Grimsby in reference "to the formation of a harbour of refuge, situated as it "is at the mouth of the Humber and the German "Ocean, and accessible at all times. The Town Council "beg respectfully to solicit you to appoint a meeting to "be held at Great Grimsby for the purpose of hearing "evidence on the subject, which I have no doubt you "will find to be of great importance in reference to "all the subject." That is signed by yourself. In reply to that letter I find our secretary wrote from Whitby on the 22d of October, saying, "I have to "acknowledge the receipt of your letter of the 16th "instant, addressed to the Commission, and in reply "thereto I am instructed to acquaint you that Grimsby "is not within the limits assigned to this inquiry, and "therefore the Commissioners cannot hold a meeting "there, but they will be happy to receive a deputation "from Grimsby to attend at Hull for the purpose of "expressing their sentiments, as they have already "been informed." Were there any previous letters in which notice was given from the Bristol Channel ?

(*Secretary.*) Yes.

(*Chairman.*) We wrote to you before from the Bristol Channel, stating that we were likely to come to Hull.

(*Mr. Bell.*) There might have been letters to the directors of the Dock Company, but that is different from the Corporation.

(*Chairman.*) I am afraid the letter has miscarried. I thought we were particular.

(*Mr. Ross*, the secretary of the Manchester, Sheffield, and Lincolnshire Railway Company.) A letter was written from Bristol to the railway company. It promised that three days' notice should be given of the meeting at Hull. We have not received such notice at all. We only heard by telegraph this morning from the Mayor of Grimsby that the Commissioners were to sit at Hull.

(*Chairman to Mr. Bell.*) It was with reference more particularly to your remark that the notice was not served, and therefore that you were not prepared, that I made these observations. Although it has not been in my power to give all the notice I could have wished to you, yet the matter has been in agitation, and you had ample time to consider it. From Bristol we wrote to the chief civil authorities of all the towns which we considered within our limits, and therefore the reason the Mayor of Grimsby was not written to was that we clearly considered Grimsby without the limits of our inquiry. What was running in my head was that very letter of which you spoke. I felt sure that some communication had passed between Grimsby and the Commissioners from Bristol. We shall now be happy to hear your statement read.

Mr. GEORGE BABB examined.

Mr. G. Babb.

25,309. (*Chairman.*) In what way are you connected with Grimsby ?—I am town clerk.

25,310. Will you now proceed to read the statement ?—We intend to produce evidence to substantiate it. The statement is as follows :—

"In the report of the Commissioners appointed to inquire into Tidal Harbours, made in the year 1846, the following paragraph in reference to Grimsby occurs :—'Grimsby, from its position near the entrance to the Humber, will, when the proposed extensive works are carried out and the proposed railway is completed, offer great facilities to the trade with the Baltic and the north of Europe. It will be a ready coaling place for the steamers, and will become the principal resort of the fishing vessels employed on the Dogger Bank, as well as on the more distant grounds of the north-east fisheries. This part of the Humber and the neighbouring anchorage of the Hawk roads offer the only harbour of refuge in easterly gales from Harwich to the Firth of Forth, and during these winds 300 ships have taken shelter there at one time. Every interference, therefore, with the set of the tides, or any removal of shingle which would injure Spurn Point at the entrance of the river Humber, should be most jealously watched and guarded against.' Since the date of the above report the commerce of this country had largely increased, and consequently a much larger number of vessels are now engaged in the mercantile service. It would, therefore, now be no exaggeration to say that during severe gales as many as 800 vessels find shelter and safe anchorage between Spurn Point and Grimsby. The projected works alluded to in the above report have since been successfully carried out, and at an expenditure of nearly 1,000,000*l.* the port of Grimsby possesses every advantage which can be desired. The new dock is entered from the Humber by a tidal basin of 15 acres in extent. It is capable of containing 50 vessels, while the dock will accommodate 500 more. The dock is entered by two locks, furnished with double sets of gates, opening with the greatest ease by means of hydraulic machinery. The large lock, which was constructed at the request of the Government, so as to be capable of admitting the largest class of war steamers, is 300 feet in length and 70 feet in width. The smaller lock is 200 feet long and 45 feet wide. The depth of water at high water of spring tides is 26½ feet. The docks are provided with spacious ways, traversed by means of a railway, enabling rapid communication with all parts of the kingdom. The ample shed and warehouse accommodation is provided with cranes worked by hydraulic machinery, ensuring the most rapid loading and unloading of vessels. Excellent coal drops, for enabling steamers to be coaled in the shortest possible time, have also been constructed at considerable expense, and the best class of steam coal in the kingdom is brought by railway direct to the drops from the South Yorkshire collieries, &c., and delivered free on board at a moderate price. A large graving dock, which can be entered at any time by vessels of any size, has been built, with workshops and every requisite for the economical and rapid repair of vessels. It would be easy to point out many other advantages which Grimsby possesses, were it necessary, but it cannot be believed that the fact of its great natural and artificial advantages will be denied. The operation of the river Humber between Spurn Point and Grimsby forms at present the best natural harbour of refuge on the east coast between the Thames and the Firth of Forth, having an excellent anchorage in blue clay, and being effectually protected from the storms of the German Ocean by the promontory of Spurn ; but little has hitherto been done to improve the natural advantages which it possesses, beyond buoyage and lighting, which is provided by the Trinity House of Hull, who collect dues for these services from all vessels sheltering within Spurn Point. With these material advantages, it cannot be doubted that it is capable by artificial means of being made the most perfect harbour of refuge in the kingdom. There are several points on which breakwaters might be constructed with advantage to the harbour without interfering prejudicially with the set of the tides, as, for instance, at Cle Ness and the Bull Sand. It is

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matter of surprise that, with such advantages as a shelter for vessels, this portion of the Humber should be allowed to remain quite unprotected in the event of a war, although the natural position of the coast, both the Yorkshire and the Lincolnshire side, renders its protection easy and comparatively inexpensive. It would not be difficult to combine the provision of breakwaters for the better sheltering of vessels with batteries for defence against hostile navies. In case of a war, the port of Great Grimsby, with its places for rapid entrance at all times, its facilities for coaling or repairing vessels, its capabilities of being extended to an almost unlimited extent, offers advantages for the formation of a government depôt which no other port on the east coast can give; and that this has received the attention of Her Majesty's advisers is evident from the fact of their having required the entrance gates of the new dock to be made sufficiently capacious to admit the largest class of war steamers, although no further steps in that direction, which would appear to have been thus indicated, have yet been taken. The Commissioners are therefore respectfully requested to hear the practical evidence which will be offered upon this subject. During easterly gales, from 500 to 800 vessels frequently anchor in the Grimsby and Hawk roads. The number of vessels which have run into the Grimsby docks for repair, arising from cases of collision out at sea, loss of anchors, &c., during the years 1855-6-7, was as follows:—In 1855, 189; in 1856, 141; in 1857, 118."

25,311. (*Sir F. Smith.*) Are you prepared with any drawings and projects, any engineering plans and completed estimates?—No, I believe not.

25,312. Then I am to understand that you are not prepared with any specific project, for which you have made an estimate, or of which there are drawings?—No.

Then I don't see how we can consider a proposition in so crude a state.

25,313. (*Mr. Lindsay.*) I think I understood you to say that between Spurn Point and Grimsby there is the finest anchorage on any part of the coast?—Yes, it is so stated in the report.

25,314. That ships can find safe shelter in every gale of wind?—I believe so.

25,315. Did you ever know of vessels driving from their anchors?—I am not sufficiently acquainted with nautical matters to know anything of the subject.

25,316. I will take it upon two points: first, on the point that as it exists it is the safest anchorage along the whole of this coast; and secondly, that vessels can in all winds find safe shelter here. If such be the case, what more can Government do towards saving life and property?—There might, as stated in this report, be certain walls constructed, which it is supposed would be of service.

25,317. Would they tend to make life and property more safe than they are now, when once ships have anchored in Grimsby roads?—I apprehend they would, to a certain extent. They would afford additional protection, additional safety.

25,318. If the anchorage at present, as a harbour of refuge, is one of the finest that exists along the whole line of this coast, do you think that Government would be warranted in spending public money for its improvement?—It may be capable of improvement, I think.

25,319. But if it is the finest already, that which is the finest cannot be improved for the purpose for which we are inquiring,—as a refuge for saving life and property?—It may be finer than others, and yet capable of being improved,—of being more protected.

(*Chairman.*) In referring to the report of the Select Committee of the House of Commons, and to those portions of it which define the limits within which our inquiry is confined, I find at page 6, in paragraph 7: "Secondly, the north-east coast of "England. It appears in the evidence taken, that "between St. Abb's Head and Flamborough Head, a "distance of about 150 miles, every harbour along the "coast, without any exception, has a bar at the "entrance," and so forth. Now, in point of fact, our limits are defined there to be St. Abb's Head and Flamborough Head. I should regret very much if the circumstance of the notice having been worded in this way, as to a harbour of refuge on the coast of England between the Tweed and the Humber, has at all misled you at Grimsby, and induced you to come over here with the idea that Grimsby was a locality in which by any means we could recommend that a harbour of refuge should be made. The real truth is, that all the evidence which we have had before us has gone to this effect, that the Humber is one of the finest harbours of refuge in the world; and it would be quite out of the question, in these circumstances, to recommend the construction of any large and expensive works in the Humber, when there is so much required round the coast of Yorkshire, and in the bight of Tees Bay, where a large proportion of wrecks and a great loss of life certainly takes place. Therefore we cannot receive any evidence as to the formation, or go into any evidence as to the desirability of the formation, of a harbour of refuge at Grimsby, while we shall be most happy to hear anything which the deputation may have to offer to us on the general question. It will be for you to acquaint us whether you would wish to call evidence upon the general question. If you like to retire and consult, we will take one of the Hull witnesses, and then if you will be kind enough to let our secretary know what decision you have arrived at, we shall be obliged to you. I have only again to express my hope that the wording of the notice, for which I, as Chairman, am personally responsible, has not misled you, and my great regret if that has been the case.

(*Mr. Bell.*) Is the Commission prepared to receive any project for additional defence of the Humber?

(*Chairman.*) No. The object of the Commission is limited purely, almost entirely, to harbours of refuge; first, for the purpose of saving the lives of men who are employed in the merchant ships of the country; secondly, for the saving of the property which is on board these ships; and, after all that, then may come to a certain extent the consideration whether such harbours would be of use for the military defence of the country. But that is so entirely a secondary question, that, in your own case, I cannot recommend you to urge it.

Mr. WILLIAM BROWN examined.

Mr. W. Brown.

25,320. (*Chairman.*) You are resident in Hull?—Yes.

25,321. What occupation do you follow?—I am a ship-broker and shipowner.

25,322. How long have you been connected with the port of Hull in these capacities?—For the last 15 years.

25,323. You have been present to-day?—I have been here part of the time.

25,324. At any rate you are aware of the object of our inquiry; that it is for the selection of the most eligible site for a harbour of refuge in this district of the coast. Will you be kind enough to give us your opinion on the subject?—My opinion is, that a harbour of refuge is greatly required between the Tyne and the Thames. In the early part of my life I was seven years upon the coast, and, in fact, never was off it, serving my apprenticeship in the coasting trade. I think myself that the best harbour of refuge that you could commence with would be the improvement of the Tyne in particular. If you could improve the Tyne so as to enable ships to go into it at all times of the tide, I think, from what I have seen of it, that there would be a greater saving of life and property

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than by any harbour of refuge that you could establish in that neighbourhood.

25,325. You would consider it the preferable course to endeavour to improve the three harbours, the Tyne, the Wear, and the Tees, to making one large harbour at any particular point?—I should not so much approve of the Wear and the Tees as I should of the Tyne, and for this reason: Tynemouth Castle, for instance, is a very prominent feature, and can be seen a long way at sea in cases of gales of wind. It enables the seaman to make sure of his point much better than when he has to run down upon a lee shore where the land is low, and where, consequently, he is not able to find his port, unless he knows his exact position, which it is very seldom that a man knows in a gale of wind. But if he knows the land in the neighbourhood—for instance Tynemouth Castle—he cannot mistake it, because it is so prominent an object that he must know in a moment that it is Tynemouth Castle. It is the same with Flamborough Head.

25,326. You advocate Tynemouth because it is a good landfall in bad weather?—That is the principal reason why I should advocate it.

25,327. You don't profess to have any great nautical knowledge?—I was 20 years at sea.

25,328. I beg your pardon; I did not catch that. How long at sea?—Twenty years.

25,329. In what capacity?—Seven years entirely between Newcastle and London in the coasting trade.

25,330. Have you ever taken these bar harbours in bad weather?—Yes, many times.

25,331. Is it not attended with very great risk?—Yes, at present.

25,332. Do you believe in the possibility of improving these bar harbours to any great extent, so as to diminish the risk?—It is my opinion that if a pier were run out from the south side of the Tyne it would deepen the harbour there, and I should say would be one of the best harbours of refuge. I am not sufficiently an engineer to know whether that could be done; but if the harbour could be deepened, if the present bar could be deepened, so as to enable ships to enter at all times of the tide, I am satisfied it would lead to a greater saving of life and property than any port upon the coast, because such a great number of vessels frequent it, and are in port always at Shields harbour.

25,333. What deepening of the water should you think sufficient over the bar at low-water spring tides? What would be the smallest depth at the entrance of the Tyne which you would say would make it a safe harbour for vessels to run into in a heavy gale on shore?—Not less than 20 feet.

25,334. With the lift of the sea would 20 feet be sufficient?—Perhaps not for all; but I think it would for several purposes.

25,335. For the general run of laden colliers?—Yes.

25,336. What does a laden collier draw?—I should think upon an average not more than from 14 to 15 feet, but there is a different class of vessels in the trade now to what there used to be.

25,337. Would you not say 16 feet?—We have heard a good deal about it. I have known them 16 feet, but I should take the average, because they are building them flatter on the flow, and they don't draw so much water.

25,338. Would you consider four feet allowance for the lift of the sea sufficient in a gale of wind?—I have seen the lift five feet there.

25,339. Have you ever taken one of these bar harbours in very heavy weather?—Many times.

25,340. Was there any particular time you can tell us of,—what was the worst time?—I cannot call it to mind; it is now many years ago.

25,341. Did you ever nearly lose your ship or your life in doing it?—I have struck Shields bar once or twice, but never to risk my life. I have seen 20 to 30 sail on shore together.

25,342. Has it ever occurred to you to put people in the rigging and lash the man at the helm in going in?—No, I have never been so bad as that, although I believe it has been done.

25,343. Supposing you had a good harbour in the Tyne, what else would you require to make the coast comparatively safe?—I should say one put in the middle of the coast, or near that, for ships detained north of Flamborough Head, anywhere near to Filey Bay.

25,344. You recommend first the Tyne and then Filey Bay?—Yes.

25,345. Why Filey Bay?—Because, generally speaking, it is a difficult matter to get vessels, particularly laden vessels, round Flamborough Head. I have been there many days with fleets of ships; with strong south winds it is a very difficult matter to get vessels round the Head.

25,346. Supposing you had these two harbours, how would that meet the case of vessels embayed in Tees Bay?—Tees Bay may be all very well for vessels which are close in shore, or anything of that sort, but I don't like the Tees at all with a gale of wind from the eastward. It looks to me to be nothing but a sheet of foam right down it, there is so much broken water when the wind blows hard from the eastward.

25,347. Have you ever been in Tees Bay in very blowing weather?—No; I have been riding in Hartlepool Bay.

25,348. How far out should you say the sea breaks?—I can scarcely say, but I think it is a long way. I should not be at all surprised if it broke in three fathoms water out from the bight of the bay in a very heavy gale of wind.

25,349. In what depth of water do you think it would break?—I should not be surprised if it would break in 14 or 15 feet, in round numbers, in three fathoms. With a heavy sea on, it looks like broken water all over.

25,350. (*Mr. Lindsay.*) As a shipbroker, have you had much conversation with the masters of ships upon the subject of a harbour of refuge?—Very little.

25,351. You have not conversed with them much about it?—I have conversed with them about it perhaps two or three times, but very lately.

25,352. Very lately you have conversed with them. Have you heard them express a decided opinion whether it would be better to have one harbour, if only one was to be constructed, close under Flamborough Head, off Filey, or somewhere in Tees Bay?—I have not heard a great deal about it, but the opinion which has been most generally expressed to me was always in or about Flamborough Head. They thought that if there was to be only one, we ought to have it in this neighbourhood, as we know the difficulties of getting round the Head with light vessels. Bridlington Bay is a very good place for light vessels, with the wind as far as north-east or east-north-east. In almost all winds they ride very well there.

25,353. You referred to the deepening of the Tyne; I think you said it was your opinion that if the Tyne was deepened to 20 feet at low water it would be the means of saving a considerable amount of property and also of life. Would you have any hesitation in running for the Tyne, if it was deepened to that extent, in a heavy gale of wind, and with an ebb tide?—Not at all.

25,354. Would you think you were running much greater danger in doing so than you would incur by running for a harbour where there was no tidal influence?—No, decidedly not, because you will get a true tide when once you are inside the pier. There would be no difficulty. You would have a true tide when you once get in within the breakwater, or whatever you may term it.

25,355. Would there or would there not be danger as you approached the entrance,—extra danger, I mean?—Not in clear weather, I think, as long as you know all the positions.

25,356. I mean is there any danger from the ebb

tide going out ?—I don't think there would be. The ebb tide does not run so strong, but what with a strong wind a vessel can always steer in it.

25,357. Then the danger in approaching the bar harbours—these tidal harbours and bar harbours—is in fact not so much from the ebb tide going out, in your opinion, but the real danger is of striking on the bar from too little water ?—That is, in fact, the only question.

25,358. Now is it not the case that the masters of ships, when they have left a port, and are caught by heavy gales of wind, and are obliged to seek refuge, will prefer running for their own port, even at a greater risk, rather than take a harbour of refuge?—Invariably a man who knows his business will always run for his own port, if it was a safe one.

25,359. Even if there was a somewhat greater risk in taking it, do you think they would ?—I have very little doubt about it.

25,360. Now let us suppose this case : A harbour of refuge is made at Redcar, easy of access, and a harbour made at Tynemouth, the entrance deepened to 20 feet at low water, and say that the Tyne ships are caught by a gale of wind, and that they could fetch either Redcar or the Tyne, is it your opinion that these ships would prefer, running for the Tyne, rather than take the harbour at Redcar ?—I think in that case, if they were south of Redcar, I think it is natural if they were pretty close to a good harbour. I don't know that they would give the preference to their own port if they had a southerly port in view.

25,361. You think that if they could fetch Redcar as easily as the Tyne they would prefer Redcar ?—If they were south of it they would take the first, I should think.

25,362. Does that arise from its being farther south, and therefore farther on their way ?—Yes, of course. They are so much farther on they way south, if they take that harbour. It is natural for all men at sea, particularly in a gale of wind, to take the first safe port they can get into.

25,363. Let us suppose the mouth of the Tyne at Redcar, and Redcar at Tynemouth, and let us suppose all the positions are changed, and that vessels were caught south of Redcar, and were obliged to seek refuge, do you think they would then run into Tynemouth ?—I think they would still take the first southerly port they could fall in with, and the fact of its being situate at the mouth of a tidal river would not lead them to fear any extra danger in taking it with a heavy gale of wind. There is no danger. There is only the tide running three or four knots an hour at the outside ; any vessels can easily get in.

25,364. Do you think there is any danger to ships in taking the harbour with the ebb tide running out at the rate of, say four knots an hour, and a heavy gale blowing in ?—No, I do not see any danger at all,—not any extra danger.

25,365. Putting aside the Tyne altogether, and any improvement of the existing rivers, if it rested between Redcar and Filey, and there was to be only one harbour, which would you prefer, all things considered, for saving of life and property upon this coast ?—I should prefer Filey myself, knowing more of it. I should certainly prefer it. It is a fine deep bight, and I think it might be made an excellent harbour. It has a nice sandy beach, and it is a place of great resort for vessels dodging about under the Head.

25,366. Do you know the east coast of Scotland ?—I have gone down it. I have been through the Pentland Firth a great number of times.

25,367. From what you know of that coast do you think a harbour of refuge is necessary somewhere between Aberdeen and the Pentland Firth ?—I can scarcely be a sufficient judge, not having been much upon that coast ; but I should think, from the natural state of the place altogether, from having so many firths, that there are plenty of harbours of refuge along the Scotch coast.

25,368. You think that, looking at the natural harbours which are there already, it is not necessary to provide other harbours of refuge upon that coast ?—There are so many firths and good places that I think it is hardly necessary to have any harbour of refuge.

25,369. But say that the Government should hold a different opinion, and had resolved to construct a harbour of refuge on that line of coast, upon what site do you think it could be most advantageously placed ?—Well, I think it should take the most prominent feature, some place like Buchan Ness, or something of that sort, as being the easiest point which all vessels make for. Thus, for instance, coming from the Baltic vessels bound to Scotland will make Buchan Ness ; coming through the Firth they make Buchan Ness. It is a prominent point for which most ships make, and for that reason I think a place of that description must be a place of greater resort than any other. Consequently, you have a right to suppose that there is the greatest danger there.

25,370. You say you have often gone through the Pentland Firth ?—Yes.

25,371. Do you consider the Pentland Firth to be a dangerous navigation ?—Not at all. I have gone through it on very dark nights, and blowing a gale of wind—turned through it, in fact—with a wind from north-east coming this way.

25,372. Would you be afraid to run for the Pentland Firth in a heavy south-east gale and a flood tide ?—No ; I have done it.

25,373. What description of vessels were you in ?—Ships of between 400 and 500 tons.

25,374. Were you able to stem the tide ?—No ; I have been stuck in one position for three hours.

25,375. Did you consider yourself to be in any great danger there,—in unusually great danger ?—Not at all, as long as it kept clear enough.

25,376. Does the tide set fair through the Pentland Firth ?—It does if you run through the two islands. There is no danger. I think there is more danger in running along the land in the narrow channel between one of the islands. I think there is greater danger there, considerably.

25,377. Suppose a vessel is carrying every press of canvas she can carry, and that she enters the Pentland Firth,—that the gale is very strong, and the current running contrary, which is still stronger, and she is in that position you were brought to—a complete standstill—would there be any danger of that vessel being driven out of her course and on shore by the tide ?—No, not at all, as long as it was clear. You may always keep a ship end on, and as soon as the tide eases you then get through.

25,378. From your experience you think that even if caught in that position, with the tide running so strong that you were unable to make head against it, you still do not think there would be any danger of the tide throwing you on the rocks on either side ?—No ; I have been in that position both ways. There is no danger so long as it is clear.

25,379. Do you know Wick ?—I have seen it in passing, but I should not like to give any opinion about it.

Mr. WILLIAM CAIRD examined.

25,380. (*Chairman.*) How long have you followed the sea ?—Thirty-two years.

25,381. How long have you been in command of vessels ?—For 20 years.

25,382. Do you belong to Hull ?—No ; I am not a native of Hull, but I have been living there for the last 16 years.

25,383. Do you reside at present at Hull ?—Yes.

25,384. In what trade have the vessels which you commanded been chiefly employed ?—In the first part of the time, for 20 years I was in the north country trade, winter and summer ; after that I was in the foreign trade, the Mediterranean and the French trade.

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25,385. What do you mean by the north country trade?—Carrying coals for the different ports in Sussex.

25,386. From the coal ports?—Yes, and to the different ports of France from the north. I think I have made 300 voyages nearly, altogether, in the 24 years.

25,387. Have you been here all day?—The best part of the day I have.

25,388. Then give us your opinion as to where the harbour of refuge should be?—I have been so many times in trouble, and generally off the Head, with the wind coming away from the south and south-west. I had one ship, the *Brunswick*, and nearly lost her and my brother; he lost her off the Head. It is, as you come off the pitch of the Head; there is generally a very heavy sea on when it is blowing south. Something generally happens to the old ships there. They split their covering boards. Many a ship is lost off the Head that is never heard tell off. My brother lost the *Brunswick*, and a Scarborough ship saved him; he was lost eventually in a brig called the *Hope*, I think she was lost off the Head. I have seen ships go down off the Head.

25,389. Therefore you consider off the Head to be the most central part of the passage in bad weather, and the one where vessels suffer the most?—Yes. I have been many a time running back from the Head to Shields bar, where many a misfortune has happened. I have seen ships run back for shelter to Sunderland and Hartlepool. I have been in company with 400 sail, and the greater part of us bore up. All the ships that were not fast sailers—clipper ships—would keep the sea; but the fast sailing vessels,—and there are some fast sailers among the colliers, have been forced to put into harbour to take the bars, which has been a great misfortune. When we have been going in, I have seen three or four go on shore at the same time.

25,390. Supposing with a harbour at Filey Bay, what would be the next best thing to do,—to get one in Tees Bay or to improve the three harbours of the Tyne, the Tees, and the Wear?—I never like the river. At the mouth of Tees Bay I nearly lost my ship there, and I think you don't like to go again to a place after that. If there is a heavy gale, there is broken water for a long distance from the shore.

25,391. Is not Tees Bay a place which it is very difficult to keep out of, sailing from the northern ports?—It is not. You often get in unless you are lying up along the shore. Sometimes they make a short cut and come close in.

25,392. That would not be prudent to do in doubtful weather?—I have done it, but not unless the weather was good. If I thought the wind was likely to get on the land I kept an offing.

25,393. Have you ever run a great risk of your life in running for these bar harbours?—I have several times seen ships close against me receive damage,—run on to the Black Middens and some to the Head. We perhaps were in the centre and we got through. The sea has been breaking over all of us; that has always happened on an ebb tide. There is much more sea then, and there the danger is. The danger is not so much with the flood tide as it is with the ebb. With the ebb tide the sea rolls up, and that causes all the mischief.

25,394. If you can recollect any particular instance in which your ship was nearly lost going out of the Tyne, tell us the circumstances?—I have kept clear of the ground every time. Once I was going out in a schooner. I thought it was not good weather to go out in, but one of the pilots came and said it was quite smooth outside. "Well," I said, "do you think "we can get over the bar?" He said, "I am sure "you will; there is no danger in going away with the "studdingsails set." I took his word for it, which I never made a principle of doing since. Before we came on to the bar the fellow was frightened. There was a strong wind and a heavy sea on. She struck the bar three times. I just saw the land opening as she went over. The fellow was frightened out of his wits. I said, "You are a pretty "fellow to take command, to be frightened when you "get into danger. I asked you particularly whether "there was any sea on the bar, and you said it was "smooth, and now I find this heavy sea." And so the vessel was nearly lost. We struck three times, and she looked very queer, but still I did the best I could to keep on.

25,395. Still, I think we have not got your answer, your opinion about Filey Bay; after that, what is the best thing to be done after Filey Bay? What can we do?—I consider that you want one harbour of refuge. No person runs back without he is forced; but if there was a harbour of refuge made at Filey Bay they would never hardly run back, for they would be so much farther on their road at Filey. I consider both for shipowners, for insurers, and everybody, it would be much better. I have thought that from my boyhood, and my father before me. We have been speaking of Filey, and wishing for it. I have put into Scarborough. Many a time I have gone in there when I was in the north country trade, but it is a bad place to run into.

25,396. (*Mr. Lindsay.*) Referring to these vessels that were unfortunately caught in the bay with an easterly gale, and did not get so far south as Filey, do you think a harbour of refuge at the Tees, or the deepening of the existing harbours so as to admit vessels at all times, would do the most good?—I would deepen the harbour rather than have another.

25,397. Say it was resolved to have another, and not to deepen the existing rivers, would a site down in the bight of the bay be most valuable for the second harbour?—I don't like bays; I have always made it a principle to keep out of bays whenever I possibly could do so.

25,398. But say that you were unfortunately caught in the bay, and could not help yourself, at what point of the bay do you think a harbour of refuge would be of most value?—I would sooner take Redcar than any of these places.

25,399. Rather than Hartlepool?—Yes; I should not have so much sea in going in.

25,400. Do you know anything of the coast of Scotland?—Not further than Peterhead. I have been in both harbours.

25,401. Do you think a harbour of refuge is needed down along that coast?—Not so much as it is between Flamborough Head and Tynemouth.

25,402. Do you think it is wanted at all?—My opinion is, it is not so much wanted. I don't see any occasion for it.

25,403. But if it was decided to make a harbour there, do you feel competent to say where upon that part of the coast you think it would do the most good between the Pentland Firth and Aberdeen?—I have found the harbours so very good. I have run for Montrose, and I have often wished we had as good harbours here as that to run to.

25,404. In fact, it is your opinion, looking at the vessels trading along the coast, that a harbour of refuge is not wanted there at all?—Not so much wanted as one in Filey Bay.

25,405. (*Chairman.*) What vessels have you generally commanded, brigs or schooners?—Both smacks, schooners, brigs, and ships.

25,406. Of course you have a good knowledge of the vessels upon this coast?—Yes, I have had too much of it in winter time. I was very much knocked about in many gales. Generally you find after it has been wet it draws the wind off the land. Now a little off the land to south-south-west or south-west, you keep holding up to the Head. There it souths by east and south-south-east, blowing strong, and you get a change directly. In all the voyages I have ever made in winter time—I will not say in summer time, for it is quite different in summer—I have always been stopped there. In summer you don't want a harbour of refuge so much as in winter. In summer you never look for it, but in winter nine

times out of ten I have been caught off Flamborough Head.

25,407. When the wind is hanging to the south and west, you crawl up under the Head, and when you get there the wind southerns?—Yes, directly we come off the pitch of the Head, where there is the nasty sea that troubles us.

25,408. Upon which side of the Head is the worst sea?—Upon the south side.

25,409. Are you sure of that?—Yes; as you come round you find yourself getting into this sea. I have been there several times. I have seen ships, I don't know their names, but I have seen them baffled both inside and outside, and us expecting ourselves to founder off the Head. I believe many a one has foundered there that has never been heard tell of.

25,410. Have you ever tried to work round the Head with a flood tide and a strong breeze?—Yes.

25,411. And how have you got on?—I have been in some ships that could not look at it, and I have been in others that could work round.

25,412. By taking advantage of the tide?—Yes.

25,413. As respects ships in ballast in a very heavy gale of wind, if you were really in alarm for your ship and life, owing to the heavy sea, and you have lots of sea room, would you rather heave the ship to or run her?—If I had a harbour.

25,414. But with no harbour at all to run for?—I should lay her to as comfortably as I possibly could. I have sometimes in heavy gales. I had a schooner that I expected to founder. I found the best plan not to lay her to, but to keep her with a little canvas just sailing,—just sailing, so as to keep her away, so that she should not lose her way.

25,415. But when it is blowing as hard as I am speaking of, it is difficult to do that; you can't have sail enough to keep the ship drawing through the water. You must either run her or heave her to with a trysail?—I should heave her to in the best manner I could; but I have seen some ships heave to that could fall off. Fore and aft vessels are all right, but brigs will fall athwart the sea, and it becomes dangerous: they shift their ballast. I had a brig that shifted her ballast, and we had to bear up and get her ballast righted again.

25,416. These vessels when you heave them to in that way, do they fall off into the trough of a sea, and so run a risk of the ship being swamped?—Yes

25,417. And take in a great deal of water below?—Yes.

25,418. Now as respects laden vessels how stands the matter? Would you heave a laden collier to or run her?—I would rather heave her to.

25,419. Coasting vessels generally? A common coaster, with an ordinary cargo, what would you do with her?—If I could not sail her I should heave her to. I have seen the time when I had one which was cutter built hove to for 21 days. In the Western Ocean I have seen some of the large ships, those American liners, that had been hauled to under close-reefed topsails, driven away from us, while we kept making way all the time.

25,420. You are well acquainted with the vessels employed in the coal trade?—Yes.

25,421. What sort are they, compared with vessels employed in the foreign trade, as respects their hulls?—They are not so well found.

25,422. I am not talking about their being found, but as regards the state of the hull in point of strength?—There are some in very good and some in very bad condition.

25,423. Now how they are found with respect to spare sails, running rigging, standing rigging, and so forth; are they well provided with all these?—It is just according to what owners they have. Some belonging to poor owners are poorly found, because such owners cannot afford to do more; others belonging to owners who can afford it are well found. I think in the coal trade generally there are more badly found than well found.

25,424. We have had it in evidence before that ships owned by men who have been at sea are, as a general rule, better found and looked after than those owned by other persons. How stands the matter in your experience?—I cannot say. I have seen some owners who have never been to sea, and have known them very particular about having their ships well found.

25,425. The reason assigned was, that men who had been to sea understood better what was wanted. What do you say to that?—I sailed under an owner who had been to sea, and he was very particular, but very close. I have seen some sometimes turn to and take care that we should not have all new. He would put the end of an old rope to a new one,—anything for saving. I have seen some of those do this who have been sailors.

25,426. Are there any large numbers of vessels owned by poor owners?—Yes. The lowness of freights makes it difficult for men under these circumstances to find the vessels so well as they could otherwise have done.

25,427. Are you acquainted with the Mutual Insurance Clubs in the different seaports on the coast?—Yes.

25,428. Does it ever happen that vessels are so bad that those clubs won't insure them?—They can generally insure better in the clubs than elsewhere.

25,429. Are the vessels so bad sometimes that the clubs won't take them?—Yes, if there are good surveyors who look over the ship, and will state whether one is well found or not.

25,430. As respects colliers being broken up, have you ever seen any broken up and sold for firewood?—Very seldom; I think the most part go down off the Head and different places.

25,431. Is it not the practice in the coal trade to repair the vessels from time to time, and so keep them running longer than is the case in other trades?—I have seen some where the men were obliged to keep pumping the whole time they were at sea.

25,432. Are you prepared to say that is a matter which requires looking into for the safety of life?—It does; both that and loading too deep.

25,433. (*Mr. Lindsay.*) Following up that question, do you think that colliers are sufficiently manned? Do you think there are enough hands on board?—Generally. I have seen some very weak manned, but generally they are sufficiently manned.

25,434. Do you, or do you not, think it is the case that when these vessels are caught with heavy gales of wind, and are knocking about for four or five days, or perhaps a week, the crew get so thoroughly done up in working the ship and in performing the other duties which devolve upon them, that they are really not able to take effectual means in order to save the ship when danger comes, especially if the ship is a leaky one, and that consequently many of them founder? Is that, or is it not, the case?—I will tell you a circumstance. I happened to be in a ship before I was master, and we were unfortunate. We got down as far as Robin Hood's Bay and were forced to go back again. We could not get off the land, and we found her driven in towards Hornsea. There was no alternative but to let go both anchors and cut away the masts. Had the men done as I wanted them to do, and had got canvas on the ship, she would have come into the Humber; but the fact was they were "done up," as you say, and of course we could not get them aloft. That being so, we were forced to let go both anchors and to cut away our masts, and the ship rode out the gale between Filey and Spurn Point. That would be about 30 years ago. Between Filey and Spurn Point there would be at that time 35 ships ashore.

25,435. Do you think there are a great number of ships founder or are driven on shore on account of the crews being so thoroughly done up that they neither can work the ship, get sail on if necessary, nor pump her if it be required?—I think there are.

25,436. And therefore you advocate a harbour at Filey a good deal on that account?—Yes; I consider Filey is a good place for them, and it would save a

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great many sailors from being worn out, and from thrashing and knocking about, as they many a time have to do, off the Head. Sometimes I have been 10 days standing about to and fro, and could not get round the Head.

25,437. And you think that a harbour at Filey would be of great advantage to such vessels as these? —Yes.

25,438. Following this question out to another class of vessels, the voyage, I understand, from the Baltic in the fall of the year is often a very severe one. Is it the case that these Baltic ships, when they reach Flamborough Head, are sometimes caught and cannot get to the southward of it?—Yes.

25,439. Does that happen in the winter time?—It does more particularly in the winter time.

25,440. Would your remarks apply to the Baltic ships as well as to the coasting ships, about the crews being thoroughly done up and not able to work the pumps or put on sail, so that consequently the ship is sometimes driven ashore and sometimes founders? Do your remarks apply both to these Baltic ships and to coasters?—You will understand that there are more classes of ships than one. There are some classes of ships that would go off the land at any time. They are what we call clipper-built, but there is quite a different class of ships altogether to these.

25,441. Are many of these vessels to which you refer in the Baltic trade clipper-built?—There is not a great many of them there.

25,442. Is the tendency that way?—They generally build the fastest ships for the Mediterranean.

25,443. But is the tendency that way, to build faster ships for the Baltic trade?—I believe they have got much faster ships than they used to have, but not so fast as those which go to the Mediterranean. The fastest ships we have are engaged in the Mediterranean fruit trade.

25,444. Are there any of these fast ships in the coal trade?—I believe they go from here down north and get a cargo of coals for the Mediterranean.

25,445. Is it the case that when the Mediterranean trade is depressed, and perhaps is not paying, some of these ships are employed in the coal trade?—Yes.

25,446. And is it the case that when the Baltic trade is not paying, the ships engaged in that trade are then employed in the coal trade?—Yes.

25,447. Consequently we have in the coal trade at times a great many superior ships which are often employed both in the Mediterranean and the Baltic trade. Is that the case?—Yes.

25,448. (*Mr. Coode.*) Do you know any instances of vessels foundering when running back from Flamborough Head for the northern ports?—Yes.

25,449. How many do you think you know of?—I should think six or seven. I have seen them as we have been running back ourselves. We have seen them go down in heavy seas.

25,450. Do you allude to six or seven at one time, or are those all the cases that you know of?—During my whole time I have seen six or seven.

25,451. Have they been lost with all hands?—Yes.

25,452. Have you been detained long off Flamborough Head? You spoke of 300 or 400 ships being detained there. Have you been detained there any length of time on more than one occasion?—Yes, on several occasions.

25,453. What should you consider the ordinary detention off Flamborough Head, waiting to get to the southward?—I have been detained 10 days, and have then run back for Shields harbour, and have been another fortnight there.

25,454. Have you been detained for anything like 10 days on more than one occasion?—I should say 10 or 15 times.

25,455. Do I understand that 10 or 15 times you have been detained as much as 10 days?—Yes.

25,456. You spoke of the broken water in Tees Bay. Did you apply that to the whole of Tees Bay right across from Hartlepool to Redcar?—Yes.

25,457. Is the water as much broken on the northern side of the bay as it is on the southern side?—Not quite so much. I was there in a heavy gale. I did get; in but there were, I think, at that time seven ships all run back from the Head, which had sailed from different ports. I thought I would not go down as far as Tynemouth; I would take the Tees. We just got in, and about six went ashore at that time.

25,458. Do I understand there is less broken water off Hartlepool than off Redcar?—It seems to break always when there is a heavy sea and it is blowing heavily. It seems to break right across.

25,459. I understand you to say that there is less broken water on the north side of Tees Bay than at Redcar?—Yes, certainly less.

25,460. Do you mean to say, that the broken water extends further off the south side of the bay, or that there is more broken water there?—There is more broken water.

25,461. More on the south side of the bay?—Yes.

25,462. That is, more off Redcar than there is off Hartlepool?—Not quite so high up as Redcar; it does not break very much off Redcar. It breaks very much on those rocks.

25,463. I am speaking of the broken water in the offing, say, in three, four, or five fathoms water?—I have seen it break off in eight fathoms in the gale in which I ran into the Tees; I think it broke in eight fathoms.

25,464. Should you say the sea broke heaviest off Hartlepool or Redcar; or do you know enough of the coast to be able to give an answer?—At that time the broken water seemed more to the southward than the northward. I think I only ran about three times into the Tees, but they were all in gales.

25,465. (*Chairman.*) We have had it in evidence that in running in through broken water the outside sea is the most dangerous. Now what is your feeling about it?—It is generally the first sea you come to. I once was in a Sunderland ship, and we were arguing which was the best harbour, Sunderland or Tynemouth. I was not the master of that ship; I was the mate. We put back from Flamborough Head, when it was blowing a gale of wind, and when we got down and ran past Sunderland, says I, "Why do we run "past Sunderland? If you think Sunderland is the "best port, why don't we take it?" The master said, "There is more room in Tynemouth;" so we took it, rather than take his own port, though he thought there was not so much sea there. Sometimes over Shields bar you will have more sea a good deal, but as you go towards the Black Middens coming in you would not have so much sea as on the other side. Many are afraid of the Middens, but I have seen the greatest damage done in going into Tynemouth harbour by ships being afraid of the Black Middens and going too far the other way. They then strike on the sand and strike on the Black Middens, which, if they were not so much afraid of it, they would have got by, and gone safely in.

25,466. I think your answer is hardly a direct one to my question, which is one of much importance in the construction of breakwaters, because you will observe that it touches the question into what water breakwaters must be carried. I will therefore again put the question. Say you were running into a place like Hartlepool Bay, would you consider the first sea, which naturally is the heaviest, and has the greatest volume of water, to be the most dangerous one?—I have generally found that just as you get on the bar the first sea jumps up all at once, and it generally comes right over you. Say you have got over the first sea, the second is not so bad.

25,467. That is the result of your experience?—Sometimes I have seen a second sea heave a vessel right athwart. Sometimes I have seen the first sea break right over a ship and dash over everything, and I have seen another ship take that sea a good deal better, and then the next sea has taken her and driven her right athwart, and sent her right on to

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the sand, so that there is no regular rule as to the force of the first or second sea.

25,468. Still, how would you be disposed to view the question generally?—I think the first sea is generally the worst.

25,469. (*Mr. Coode.*) We have heard a good deal of a man's desire always to run for his own port. Do you think that applies most to light vessels bound to the northern coal ports, or to laden vessels bound to the south, and obliged to run back?—When they are obliged to run back, many of them like to run home. You see they want to be at home. I have known some sailors, as well as masters, if they could not contend with the gale, run for their own ports. That is how so many have been lost. We have lost more whilst bearing up and running for harbours than in any other way. It has been the deep-laden ships that have gone down. There have never been as many light ships lost as laden.

25,470. It is your opinion that a harbour should be provided more for laden ships than light ones?—Filey would suit the laden ships as well as the light ones. I have been in a light ship and have had to cut away her masts, when if there had been a harbour of refuge at Filey we should not have had to cut them away. That vessel was too light; we could not clear the land on either tack.

25,471. Is it then your experience that a harbour of refuge is required most for laden or for light ships?—I consider for both. There is many a time when you cannot get a light ship off the shore.

25,472. For which do you think it is required most, for light ships or for laden?—The laden ships are mostly lost.

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25,473. (*Chairman.*) To what place do you belong?—To Hull.

25,474. How long have you followed the sea?—Twenty-one years.

25,475. Of that period how many years have you been in command of vessels?—Sixteen years.

25,476. In what trade have the vessels chiefly been employed which you have commanded?—Principally in the coasting trade.

25,477. What description of vessels have you generally commanded?—Schooners.

25,478. Between what ports have you run?—The Baltic and down to Scotland principally.

25,579. Have you gone south out of the river Thames?—Oh yes, a good deal.

25,480. How many voyages have you made home from the Baltic?—I am sure I could not say; I have been going off and on there these last 16 years.

25,481. Should you say you had made 20?—I should say more, 30.

25,482. You have come home at all times of the year?—All times of the year.

25,483. What is the landfall,—not that you endeavoured to make, but that you have generally made in coming across from the Baltic?—I generally like to make Flamborough Head. I like to make that, but we cannot always make the point we wish.

25,484. Where have you generally made the land?—Generally the Yorkshire coast.

25,485. Have you ever made it as far north as St. Abb's Head?—Yes.

25,486. How often?—Twice.

25,487. To the northward of that ever?—No.

25,488. Have you ever been north about through the Pentland Firth?—Yes, I have been that way four voyages.

25,489. Have you ever run through the Pentland Firth in a gale of wind from the southward?—Yes; the last time we came through was with a gale of wind from the northward.

25,490. Do you know Scrabster roads?—No.

25,491. You know it by the chart and the sailing directions, I suppose?—Yes.

25,492. Would you have any hesitation in running in there by means of the chart and sailing directions?—No.

25,493. Was it blowing very hard when you ran through from the northward?—Very hard.

25,494. How was the tide?—The tide was through with her.

25,495. How did you manage that?—The tide was the same as the wind.

25,496. How did you manage to get into the Firth at the right time of the tide?—The tide was flowing, and we came through at the time of the tide.

25,497. Did you look out for the time?—We dodged some little time and shortened sail, and ran in with the tide.

25,498. Would you have run in with a weather tide?—No, I should not have liked to do that; I would rather have stopped outside.

25,499. You shortened sail, so as to suit your arrival to the time of tide?—Yes.

25,500. That being the case, would it ever have occurred to you to have run into Scrabster roads, and have lost a fair wind, for fear of the tide setting out?—No.

25,501. With a lee tide there is no danger?—Not the slightest.

25,502. What style of coast is it for a vessel to run for? Is it clean and bold?—It is very fair if you keep a look out. I do not see why you should get a ship ashore there.

25,503. Do you know Long Hope?—I have not been in there.

25,504. Do you know it by the chart?—Yes.

25,505. And by the sailing instructions?—Yes.

25,506. Should you have the slightest hesitation in running into Long Hope in bad weather, if you could make out the land?—Not the slightest.

25,507. Of course you would not attempt to do so across a weather tide?—On a southerly gale and a weather tide you would not attempt to run across the tide to it; but with favouring circumstances, by means of the chart and the sailing directions together, you would have no hesitation in running into it?—Not the slightest.

25,508. You have been present here to-day?—The greater part of the day.

25,509. Give us your opinion where we should place a harbour of refuge on this part of the coast?—I should say Filey.

25,510. Let us have your reasons?—On the first onset, it is just under the Point, Flamborough Head being the place where all ships meet. I have been detained there several times in the winter, dodging about there with a fleet of 300 or 400 ships.

25,511. The number of vessels that collect there is very great with southerly winds?—Yes, I have seen 400 sail there.

25,512. Perhaps you are not so thoroughly aware as we are that the object of these harbours of refuge is chiefly to save life, and therefore that we are not entitled to recommend harbours of refuge which are merely a convenience for the passing trade; that is a secondary consideration, the object being to save life. Are you prepared to say that a harbour of refuge placed near the Head or at Filey would save life?—I should say it would save as much life at Filey as at any other place on the coast.

25,513. Describe to me how it would save life specially?—On the first onset, ships get down there and lie knocking about,—ships which are generally not very well manned; the people get fagged out; they are done; and if there were a harbour of refuge there they would be able to go and get recruited and come out again; whereas now, if they are caught in a very heavy gale from the eastward, and are not able to make a harbour or anything of that sort, it would be a mere impossibility to keep the ship at sea, for the men would not be strong enough to make sail or take it in, as the case may be.

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25,514. So that in the winter, after pumping and working the ship, and knocking about in a heavy gale for three or four days, it is a question which essentially concerns the safety of the ship and of the men that they should have some place in which to take shelter ?—The ships are so lightly manned that in case one hand fails a vessel is disabled.

25,515. At present all they can do is to run back to their own ports ?—If they can get there.

25,516. If they do attempt to run a laden ship into those ports, the bar harbours are dangerous ?—Very dangerous.

25,517. Have you ever tried them ?—Yes, when it has been blowing very heavily.

25,518. Was there any accident to your ship?—None at all. She was very heavy, but a small vessel, and I had battened everything down.

25,519. You felt when you did it that you were running a great risk ?—Yes.

25,520. Did you put the people in the rigging ?—No, none in the rigging.

25,521. Did you lash a man to the helm ?—Yes, and the rest were on the alert.

25,522. Standing by ?—Yes, standing by.

25,523. You have heard the evidence given by the last witness as to the class of vessels which are in the coal trade, as to their not being very well found, either aloft or below ?—There are all classes in the coal trade, very good and very bad.

25,524. Which preponderate in number, the good or the bad ?—I should say there are more good ones than bad ones.

25,525. Many more ?—Not many more.

25,526. (*Chairman.*) I may remark that I put these questions with considerable hesitation; but still I think it is clearly our duty to do so. I can feel for a man who is working his way up in life; who starts with a small share in a vessel, and is not able to find her very well. I can sympathize with such a man; and in making our tour round the coast, we have had before us many gentlemen who have started as seafaring men, and have now placed themselves in most respectable situations in life in that way. I therefore feel considerable hesitation and considerable pain in putting these questions. Still, it is clearly our duty to elicit the truth on this subject, inasmuch as it is evident that it so nearly concerns the question of life. I have thought it right to make these remarks, because I should be very unwilling to have it supposed that we were bearing hard upon men in such a position : I mean shipowners of small means, who are struggling to make their way in life.

25,527. (*Capt. Vetch.*) You know the coast very well from Newbiggin to Flamborough Head ?—Yes; I have been along it many times.

25,528. You have seen many wrecks, or heard of many wrecks having taken place ?—I am aware of them, but have not seen them.

25,529. You do not know at what parts of this line of coast the greater number of wrecks take place ?—No.

25,530. If you were asked, where should you say that these wrecks take place in the greatest number ?—Principally, I think, from the Humber down to the Tees.

25,531. That is a long extent, but on what part of the coast between the Humber and the Tees do the wrecks take place in the greatest number ?—From the Head to the Tees.

25,532. That is a long distance. How many miles is that ?—Sixty.

25,533. On what part of that line of coast do the greatest number of wrecks take place ?—From Hartlepool to the Head, about 30 miles.

25,534. You would place a harbour of refuge where there is most danger, would you not ?—Yes.

25,535. Where most wrecks take place ?—Yes.

25,536. I want to know, if you can tell me, where that place is; is it at Whitby, or Redcar, or where ?—I should prefer Filey myself.

25,537. I am not asking you what place you would prefer, but I am asking you, if you know, to tell me where the greatest number of wrecks take place on that coast ?—Between Redcar and Flamborough Head.

25,538. That is no answer to the question at all. I wish to know from the witness where on that line of the coast, between Newbiggin and Flamborough Head, the greatest number of wrecks take place; at what particular locality ?—I could not give any particular distance.

25,539. Then you think every place along there is equally dangerous, and every place equally safe ?—I must think they are.

25,540. (*Mr. Coode.*) How long did you trade with coal from the northern ports to the south ?—I was in a small vessel about 10 years up and down the coast.

25,541. Constantly occupied in the coal trade ?—Principally from Leith up to London.

25,542. And in your voyages from Leith to London where did you consider you met with the greatest danger ?—Generally on the east coast we fell in with it.

25,543. Any particular part of the east coast ?—Generally from Shields to the Humber.

25,544. Any particular point within that range ?—Flamborough Head used to pick us up principally.

25,545. Did you consider you met with the greatest dangers off Flamborough Head ?—Yes.

25,546. Have you any doubt about it ?—No doubt.

25,547. And you think it is proper to place a harbour of refuge nearest to the point of greatest danger ?—Yes.

25,548. (*Chairman.*) When a vessel is in ballast, and in a very heavy gale of wind indeed, would you rather heave her to, or run her with plenty of sea room and no harbour, where it is a question of saving life ?—I should lay her to first.

25,549. A collier brig in ballast, would you lay her to ?—If she would lay to, and did not make too much water, I would.

25,550. How would she make water—by straining ?—Yes; by straining and shifting her ballast. Where a vessel is lurching heavily the ballast may shift on one side.

25,551. That would be very dangerous, would it not ?—Yes.

25,552. What sail do these collier brigs generally lay to under when they cannot carry a close-reefed maintopsail ?—We generally get a jib and lash it up to the mainmast.

25,553. And make a kind of storm trysail ?—Yes.

25,554. Do they bear the sea pretty well, or fall into the trough of the sea ?—Some will lay to pretty well; others very badly.

25,555. Still it is safer, one ship with another, than running ?—Yes; I should always like, if possible, to lay them to.

25,556. Why is it safer than running ? Why should not you put one of these vessels before the wind with a close-reefed maintopsail and foretopsail ?—I should have such a distance to come back again.

25,557. Then it is because of the distance, not of the safety. I am talking of when it is blowing very hard, and you are afraid for your lives and your ship ?—I should keep her laid to.

25,558. A laden collier, what should you do with her ?—Lay her to.

25,559. How do they lay to ?—They lay to much better than light ones.

25,560. They bow the sea better ?—Yes.

25,561. And ship less water ?—Yes.

25,562. As to the general run of vessels in the coasting trade, would you lay them to ?—Yes, if I could.

Mr. David Palmer Halliday examined.

25,563. (*Chairman.*) How long have you followed the sea?—Thirty-nine years.

25,564. Of that time how many years have you commanded vessels?—Twenty-three years.

25,565. In what trade have the vessels been chiefly employed which you have commanded?—General foreign and coasting trade to all parts of the Continent, from the Baltic Sea to the White Sea, and a good deal on the coast. In fact, the first thing I commanded. I was four years master of a vessel between here and the northern ports and the Forth.

25,566. You say you have sailed in the foreign and coasting trade about the same number of years?—Yes, generally in the winter season on the coast.

25,567. Have you made any voyages to the Baltic?—Many.

25,568. How many times have you come home from the Baltic?—I should say 20 times or more.

25,569. For what port bound?—Between the Humber and London.

25,570. Do you belong to Hull?—I have been a resident here for 33 years.

25,571. I do not ask you at what point you endeavoured to make the land, but where you did make it generally?—I have generally made it near the Humber or somewhere about Flamborough Head. One time I made it as far north as Sunderland. I think that is the farthest.

25,572. Have you ever made St. Abb's Head?—No.

25,573. Ever made the Farn Islands?—No.

25,574. What is your landfall coming home from Archangel?—It depends how we have the wind. If we are likely to have it westerly, we make for Aberdeen, Duncansby Head, and those places; if from the eastward we keep well up for Flamborough Head; we steer for Flamborough Head.

25,575. Supposing you had a fair wind, would you run for Duncansby Head?—It depends on your position, whether you are to the eastward or the westward. I should not run away down to the westward if I was in a position to the east, I should steer for Flamborough Head.

25,576. In a fair wind you would come straight across for Flamborough Head?—Certainly.

25,577. How many voyages have you made from Archangel?—Five.

25,578. Where did you make the land?—Once we made Berwick.

25,579. Did you ever make Kinnaird's Head or Buchan Ness?—Once Buchan Ness, the rest of the time about Flamborough Head.

25,580. Out of five voyages you only once made Buchan Ness?—That is all.

25,581. Have you ever sailed north about through the Pentland Firth?—No.

25,582. You have been present here to-day?—I have been here some time.

25,583. Give us your opinion where we should provide shelter for vessels on this coast, and which is the best place?—As far as I am acquainted with the coast, Filey Bay is the likeliest place, or somewhere between Filey Bay and the north part of Whitby; somewhere along the coast there, for various reasons. In the first place we have not only colliers, but also strangers, who come to that point bound for various ports—the East and West Indies, or those places—who load at Shields. When they come out of Shields, Hartlepool, and those harbours, in general they make for Flamborough Head, andif they can get any further they do; if not, they have to drive about there. Again, ships coming from the Baltic, a great number of them, come in the present day to Hull. In summer and winter they make for the Humber, if they can reach it; but if the wind is south and south-west, which winds prevail on this coast the greater part of the year, they perhaps cannot fetch that point, and they have to dodge about at sea, and to make a progress as well as they can. Again, in the winter time, when there is more occasion for a harbour of refuge, it is a general custom for large ships in particular to make Flamborough Head or somewhere on the north coast in preference to going in near Yarmouth sands. Consequently Filey Bay, lying in the vicinity of Flamborough Head, is, I think, a more eligible situation for a harbour of refuge than any other point, on account of the number of vessels that congregate about there.

25,584. Do vessels bound for the river in the fall of the year make Flamborough Head?—There are a great many masters who are not to say acquainted with the coast, or even with the North Sea, and the ships are driven about to all parts. In consequence, a great number of them prefer making the Yorkshire land in the winter, on the back end voyage from St. Petersburgh, for instance.

25,585. We had it in evidence the other day, from a man in command of a Baltic ship bound for the river, that he always endeavoured to make Lowestoft, and carried his soundings across the banks, and that he could always in thick weather be sure of knowing where he was. Should you say that is at all a common practice?—Well, it is with many, who are well acquainted, like himself, with the coast, and who have been accustomed to the soundings and that sort of thing, but there are a great numbers who are strangers and have not confidence in the soundings.

25,586. A man who is a stranger would not try that?—There are many who prefer making the land about Yorkshire. I have had many tell me they would endeavour to make it over there. In a great many instances they can make the land thereabouts very well.

25,587. If south and west winds prevail so much as they do, these ships get driven away?—It is not out of choice, but in consequence of being forced to the westward. They will then keep, and reach to the north-west and west, get in with a westerly wind, and go coasting along. Often they have to take a pilot.

25,588. What is the largest number of vessels you have ever seen dodging about Flamborough Head?—I should say from 200 to 300.

25,589. Is that a common occurrence?—Yes; many times it is when a fleet comes out of the northern ports, and the ships congregate and cannot make further progress. They dodge about there, and the light and small vessels, with a heavy wind from south and south-south-east, or south by west, or south-south-west, will go in and bring up in gales. They will dodge about during the day-time under canvas under the Head. By the water being smooth and the ships laden they can hold their own, and it is safest for them to stand off, in order to avoid coming into collision with each other. If it comes on to blow from the eastward, they have no harbour they can make, without they go further to the north.

25,590. So they would get up as high as the Head and dodge about it for a slant of wind?—If the weather is moderate, they can carry canvas and work away, and proceed as far as they can. No man will heave to unless he is forced.

25,591. Have you ever worked round Flamborough Head with a flood tide and a strong breeze?—I have done it, but the great evil is, when you get there you go back with the ebb tide.

25,592. Supposing there was a harbour in Bridlington bay, would a vessel get round into it by means of a flood tide?—Many a time they could not do so.

25,593. What is the largest number of vessels you have seen lying under Speeton Cliffs?—I should say 50 or 60.

25,594. Is that a common occurrence?—Yes; many times I have seen that. I have never counted them, but as far as I could tell there must have been from 20 to 70.

25,595. Bearing in mind that a harbour is designed especially to save life, would you be disposed to say

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that the hardships which collier vessels undergo off Flamborough Head are such as to make it a question of life, and not alone of convenience?—It is both, because ships get up this far, and in consequence of having the wind southerly they keep persevering as much as they can. If there was a harbour at Filey, they would go in and be safe, but for want of it they persevere. The result is, they will get a moderate distance from there, and perhaps cannot go back, if it happens to become worse from the eastward, east-north-east, or that way, blowing a gale of wind on the coast. There is nothing for them in that case but to go on shore or run away for their own ports, and it is in attempting to take their own ports that so much loss of life and property takes place.

25,596. For your part, if you had a good ship, you would much rather keep the sea than try the bar harbours?—Yes; I once got to the Head in going to Plymouth. If there had been a harbour I might have been safe in it, but there was not one; and I drove to the Firth of Forth, and laid there nine days in a north-east gale.

25,597. Do you know Hartlepool?—Not much. I have been there twice.

25,598. (*Capt. Vetch.*) I think you said you had seen as many as 200 vessels at Flamborough Head waiting to go to the southward?—Yes.

25,599. And that you have seen 50 or 60 of these taking shelter under Speeton Cliffs—was that in moderate weather?—Yes. Suppose the wind gets a little stronger, and gets more to the eastward, they are obliged to cut and run; they must get their anchors up and cut away as soon as possible. It is only the small vessels which bring up there on this account, because they are handy, the men are ready, and they can get up the anchor in a short time. If there is a larger number of men, you cannot get them together to get the ship away.

25,600. Then the large vessels do not come under the cliff?—Not to bring up.

25,601. When they can no longer lie at Speeton Cliffs what becomes of them?—They must get under weigh, go to sea, and do the best they can; get into their own ports, if possible.

25,602. During the time you have been on this coast, have you formed any opinion as to where the greater number of wrecks take place?—I fancy that the greatest number take place in the vicinity of the coal ports. The ships put back, and the lighter ones go down to make these ports; and then, there not being sufficient water, and a strong sea running, they get lost.

25,603. When they are obliged to back from the Head in the southerly winds, do they get into the bight of Tees Bay?—Not often.

25,604. When they get there they cannot get out?—Just so. So 19 out of 20 endeavour to keep out of that bay.

25,605. Do they ever get into Whitby?—Small vessels do, but very few will go in that are not acquainted with it; they must be small ones. There is only 10 feet of water.

25,606. Some get into Hartlepool?—Some into Hartlepool, and some into the Tees.

25,607. Others get into the Tyne and Tees?—Yes.

25,608. Where do you think along the coast, in these prevailing winds, in which ships are obliged to put back, where do you think the greatest number of wrecks take place,—at the entrance of the Tyne, the Wear, and the Tees, where the greatest number are struggling to get in?—Yes.

25,609. You think the best place along this coast to save life and property would be Filey Bay?—Yes.

25,610. Have you seen the proposed plan of a harbour there?—I did see one, some months ago.

25,611. I wanted to ask you whether, with a gale in which ships are under Flamborough Head, they might all put in there with ease and safety?—I should say they might, if the place is made sufficiently capacious.

25,612. If they had a good deal of offing they would find it difficult?—Not at all. It is a very prominent headland is Flamborough Head, and there is a good deal of room.

25,613. Being in, would there be some difficulty in getting out?—When a man is in safety, he takes the chance of getting out.

25,614. Upon the whole, you think that Filey Bay would be the best place for refuge that you know of along your line of coast?—I do; I think it is the most eligible place.

25,615. Suppose that to be the best, which do you think to be the second best place for a harbour of refuge?—A harbour of refuge might very well be made at Redcar, but I think that, if it is practicable, the deepening of the present coal ports would be the most desirable.

25,616. You think that to improve the Tyne would do more good than to make a harbour of refuge at Redcar?—Yes; if it can be done.

25,617. Supposing that these river mouths of the Tyne, the Tees, and the Wear cannot be made into good and sufficient harbours, what then is the place that for your part you would recommend?—I should recommend, I think, Redcar in preference to Hartlepool.

25,618. Redcar would be next to Filey?—Yes.

25,619. (*Mr. Coode.*) Why should you prefer Redcar to Hartlepool?—I think it would be an easier port of access.

25,620. Easier of access?—Yes.

25,621. Why so?—On account of the Heugh, which is an unsatisfactory kind of a place frequently to get round. There is a heavy sea breaking along there. I think more on there than there is off Redcar. The greatest number of ships I should suppose would run from the south east if they were going there. Ships going down, light ships in general, will often be going along the Yorkshire coast, and they would have much less sea in taking that port than they would at Hartlepool.

25,622. Have you had sufficient experience of the Tees to be able to say that there is really less sea off Redcar than off Hartlepool?—I have been in it perhaps 15 times.

25,623. In gales of wind?—In bad weather, but not in excessive gales.

25,624. Is it within your experience that there is more sea on one side of the bay than on the other?—I think there is more on the Hartlepool side than on the other. With the wind at south-east the sea rolls down along, and it all settles into Hartlepool bight. With the wind from the north-east it comes round the Heugh and settles there.

25,625. Do you think with the wind at north-east there is more sea at Hartlepool than at Redcar?—Yes; I think so. A swell breaks round the Head, the distance is so short.

25,626. Is that a dangerous sea?—Yes; I should say it is.

25,627. You were asked questions as to the difficulty of getting out of a harbour, if it was made, at Filey. Do you think there would be more difficulty in getting out of Filey than in getting out of any place along the coast?—Not at all.

25,628. Would there be less?—Less. It lies upon a headland that looks out to the eastward, and consequently, if you had fine weather, or even an easterly wind, you would have a choice of going to the southward. Now if you come out of the Tees Bay you must lay out south-east with the wind east-north-east, and then you are close-hauled, whereas if you are in Filey Bay your course is east and by south to Cromer.

25,629. You consider you would have less difficulty in getting out of Filey?—Yes. Again, if you come out of Filey Bay down to the north your course is north, whereas if you are in Hartlepool or Tees Bay you must steer out at north-north-east.

25,630. Have you ever been through the Pentland Firth?—No.

25,631. You mentioned a case in which you were driven from Flamborough Head to the Firth of Forth?—I have been driven back several times, but that once in particular.

25,632. Driven back from where?—From the neighbourhood of Flamborough Head or Scarborough. Once it was three weeks after making Sunderland before we got into the Humber. That was with a ship of 700 tons.

25,633. Where were you bound from?—From St. Petersburgh to Hull. We got to the Yorkshire coast three times and were driven back as far as St. Abb's Head.

25,634. Did you keep the sea the whole of that time?—Yes.

25,635. What points were you driven back from?—Once we got from the north up to Flamborough Head, once up to between Scarborough and Whitby, and once nearly up to Huntcliff. We got up to the Yorkshire coast each time.

25,636. Do you know any instance of vessels foundering in running back?—I have heard of instances of ships foundering, but I have not known them particularly myself. One ship from Sunderland foundered on her first passage from London with coals.

25,637. Was she bound from Sunderland to London?—Yes.

25,638. Where did this vessel founder?—Somewhere off the Head. Somewhere between the Head and Yarmouth. Somewhere in the offing; but how far south she had got I do not know. It is a good while ago, and I do not remember.

Mr. Sidney Cooke examined.

25,639. (*Chairman.*) Are you resident at Hull?—I am.

25,640. How long have you been a pilot?—Eleven years—a coasting pilot.

25,641. Are you licensed by the Trinity House?—No.

25,642. For what district of the coast are you a pilot?—From Leith roads to the Downs.

25,643. Previous to being a pilot did you follow the sea?—Since 1825. Twenty years ago I was a master, in fact.

25,644. Since you were first a master, in what trade were the vessels chiefly employed that you commanded?—In the northern trade, from and to London, and in the foreign trade.

25,645. The foreign trade; in what direction?—Different parts. To the East and West Indies, and to the Baltic.

25,646. How many voyages have you made from the Baltic?—Six or seven.

25,647. When have you made the land coming across from the Baltic, not when have you endeavoured, but when did you actually make it?—If I was bound to London I generally made it at Lowestoft.

25,648. If you were bound to Hull?—Generally at Flamborough Head.

25,649. What is the northernmost point on the coast at which you have made the land coming across from the Baltic?—Huntley Foot.

25,650. You have been present during the greater part of to-day?—During the greater part of it.

25,651. Where, in your opinion, ought a shelter to be found for vessels on the coast?—I should say Filey is the most suitable place.

25,652. Do you generally agree with the reasons which have been given us as to Filey by other witnesses?—Yes, generally. I form my opinion from my own practical knowledge of the coast.

25,653. And does your own practical knowledge of the coast induce you to agree with those reasons which have been given us by previous witnesses for preferring Filey?—I only heard one or two witnesses. I have not heard many.

25,654. Will you state anything which you wish to add to what they have told us?—The value of a harbour at Filey would be for laden vessels leaving the northern ports, in consequence of vessels of great draught of water coming to sea to save the spring tides. They do not look at the wind, and sometimes soon after they get out a gale of wind catches them. These vessels, if the wind comes to the eastward, have to stand to the southward. They get down as far as the Head, and probably, before they can weather it, it comes on to blow very heavily, and there is always a sea from the north-east with a north-east wind. The result of that is, that the vessels cannot make any headway. They cannot fetch back to where they left, and if they cannot get round the Head there is nothing but the shore for them. Sometimes they go on shore at Whitby and sometimes further to the north, and sometimes they fetch as far as the Heugh and go on shore there.

25,655. Do many vessels go into Tees Bay?—I think more between Huntley and Filey than get as far as the Tees.

25,656. Between Huntley and Filey more get on shore on that part of the coast than in the bay?—Yes, generally the vessels approaching the north; as they go north with an easterly gale, they find they are able to wear off, and go on the other tack.

25,657. Do you know Hartlepool?—Yes, I have been frequently there with vessels of all nations.

25,658. Is there much broken water in Hartlepool Bay?—Yes, it breaks in from the north-east with an easterly wind.

25,659. North-east?—Yes.

25,660. In what water does it break?—Five or six fathoms.

25,661. How far out is that?—It is about two miles out.

25,662. Would you not like a harbour in Bridlington Bay that vessels could run into?—I should say it would be of great use for laden vessels near the Head at Filey.

25,663. If you had a harbour in Hartlepool Bay, would light vessels run into it, instead of going to other ports?—It would be nearer the port they were going to.

25,664. They would prefer going to their own ports?—Yes, I think they would.

25,665. What kind of land is that about Hartlepool to make in thick weather?—Well, I think it is good to make.

25,666. If you see the land at all about there, can you in fact mistake it at all for other land?—No, not if you see Huntley Foot.

25,667. Can the Heugh be mistaken for any other place?—No, it cannot easily.

25,668. Does not the land, being low down in the water, and at the same time being high at the back, make it difficult to make at night?—Yes; sometimes in the fogs on the coast you cannot distinguish the lights from the foundries from the lights of Hartlepool.

25,669. What are the soundings about Hartlepool? Can you run in by them?—At about nine fathoms it is time to bring up or to go off.

25,670. If running in from the sea, could you tell if you were running in to Hartlepool, or if you were running to the north or to the south of that place?—No, not very well.

25,671. Is there any change in the character of the bottom north or south of Hartlepool?—There is nothing to trust to, if you do not see something.

25,672. You mean the land by "something"?—Yes, I mean some mark.

25,673. Then as to the soundings about Flamborough Head, in thick weather do they tell you that you are near the Head?—There is rough ground about there.

25,674. If you are running across the North Sea, are there any soundings that would carry you across to Flamborough Head in thick weather?—No, I am not aware that there are.

25,675. Have you ever worked a vessel round Flamborough Head against a close-reefed-topsail

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breeze with a flood tide ?—Yes, I have worked round when other vessels could not get round. I have been on board fast vessels, and worked round into the Humber with the wind east-south-east, when colliers and sailing vessels frequently could not get into the Humber.

25,676. But it is not a thing a laden collier could do ?—No, it is not.

25,677. Have you ever lain in Bridlington Bay ?—I have, when bound to the north with light vessels.

25,678. How was the wind ?—From the north, as far as north-east.

25,679. Have you ever lain in Bridlington Bay with the wind right in and blowing hard ?—Yes.

25,680. Did you ever lose an anchor ?—No, I never lost an anchor. I always managed to get out with double-reefed topsails. I used to beat out.

25,681. (*Capt. Vetch.*) I think you have given it as your opinion that more wrecks take place between Flamborough Head and Huntley Foot than between Huntley Foot and Blyth ?—Yes; vessels driven on shore by the wind, that cannot go further. Many vessels run for a pier and get lost with leading in, while vessels that cannot get further are driven on shore.

25,682. Looking at the wreck chart, you will see that considerably more vessels are lost between Huntley Foot and Blyth than between Flamborough Head and Huntley Foot ?—Vessels run there when they come down and it is low water, and they take the bar. Those vessels I mean that are wrecked, it is by carrying all the sail they can carry, and by doing all they can, and yet are driven on shore.

25,683. If those vessels that are wrecked north of the Heugh cannot get into harbours on account of their bars, would not that be a good reason why some provision should be made for saving them ?—Yes, undoubtedly.

25,684. And therefore, supposing that one harbour of refuge is made at Filey Bay, where do you think the best place would be to put the other and more northerly one, if there is to be a second one ?—I should say Sands' End Ness roads, at the north of Whitby. Vessels get embayed there and cannot get out—3½ miles from Whitby.

25,685. That is good holding ground, is it not ?—Yes, it is.

25,686. It is a good roadstead, with westerly winds at present, is it not ? It is well sheltered on three sides, I think ?—Yes, it is.

25,687. You think that would be the next best place to Filey ?—Yes, I do, for vessels that get embayed there and cannot get out.

25,688. (*Mr. Coode.*) I think I understand you to say that of all the vessels wrecked between Flamborough Head and the Farn Islands, you consider that the greatest portion of those that are actually driven on shore are driven on shore between Huntley Foot and Flamborough Head, and that the wrecks to the north of that arise, in the main, from vessels getting wrecked in attempting to make the harbours ?—Yes, that is what I mean.

25,689. Have you ever seen many vessels congregate about Flamborough Head ?—Yes, under Speeton Cliffs.

25,690. What is the greatest number that you have seen congregated there in your experience ?—I have seen from 400 to 500 laden vessels.

25,691. Have you seen such a number as that—400 to 500—on more than one occasion in the course of your experience on this coast ?—Yes; I have frequently seen that number in the course of the last 11 or 12 years.

25,692. Have you ever known many vessels driven back from Flamborough Head to the northward ?—Yes; I have known them driven back in great numbers.

25,693. Would you say that that is a matter of common occurrence ?—Yes, it is.

25,694. Did it ever happen to you yourself to be driven back in the way you have described ?—Yes, I have frequently been out, but I never went into port, but have fetched off into the offing when other vessels have gone in. The vessels that I have been in have been fast vessels—foreign vessels—vessels that sailed well.

25,695. And as to the colliers, what has become of them ? Have they gone to sea ?—They have gone on the beach, many of them.

25,696. Have you ever known of instances of vessels foundering in going back ?—Yes, that I have.

25,697. Can you tell us the names of any of those vessels that have foundered ?—No; I cannot recollect the names of any of them at present; but I have known numbers of vessels that have foundered and been capsized. There were two, I think, timber-laden ships, were capsized off Flamborough Head, a little to the northward of Scarborough.

25,698. When was it that that occurred ?—It was almost about four years ago, I think.

25,699. Were any lives lost upon that occasion ?—No; I think the people were all taken off.

25,700. Now, if it were left to you to select that site on the coast where a harbour of refuge would save the greatest amount of life and property, what position would you choose ?—I should say Filey Bay, because there is the greatest necessity for shelter there for saving life and property.

25,701. Have you been long of that opinion ?—Yes, I have.

25,702. How long have you entertained it ?—For 11 or 12 years. Since I have had charge of the vessels of all nations, from 12 to 14 every year of different nations within the last 11 years.

Mr. Robert Elder examined.

Mr. R. Elder.

25,703. (*Chairman.*) Do you belong to Hull ?—I am a resident in Hull.

25,704. Do you follow the sea ?—Yes, I do.

25,705. How long have you been at sea ?—For about 35 years.

25,706. Out of that period for how many years have you been in command of vessels ?—For about 28 years.

25,707. In what trade have the vessels which you have commanded been chiefly employed ?—I served my time in the coasting trade and to the Baltic—the coal and Baltic trade. After that I was in the American trade, the East Indian trade, the Chinese trade, and the African trade.

25,708. So you have been principally employed in the foreign trade ?—Yes, the principal part of my time I have been in the foreign trade. I have commanded steamers here for the last seven or eight years.

25,709. Where have the steamers run to ?—To Antwerp, Hamburgh and St. Petersburgh.

25,710. So that, in fact, you have not been much on the coast ?—I have not latterly.

25,711. How many voyages have you made from the Baltic in sailing vessels ?—Twenty or more.

25,712. At all times of the year ?—Yes.

25,713. Where has been your landfall ?—In the summer season I generally used to endeavour to make it between Lowestofft and Orford Ness; in the winter season Flamborough Head, and perhaps Dimlington, to the northward of the Humber, because we carry the soundings more regularly there. It is sometimes advisable to do that.

25,714. Were you then bound to the Thames ?—Yes, and sometimes to Hull.

25,715. Have you ever made the land to the north of the St. Abb's Head in coming from the Baltic ?—No, not from the Baltic. I have made it as far north as the Coquet Island and Tynemouth.

25,716. How many voyages have you made north about through the Pentland Firth ?—I should think a dozen.

25,717. Have you ever run in in a gale of wind blowing hard ?—I have gone through it both by day and by night. The last time I came through it I

came through it in a gale of wind. I was bound from Liverpool to St. Petersburgh.

25,718. Did you run into it with the lee tide ?—I did. I had the tide in my favour, a flood tide.

25,719. How did you manage that ?—I made the lights ; it was clear and I got through very well.

25,720. How did you time your arrival in the Firth ?—I was obliged to run in. The gale was very heavy. I made the lights when I got there.

25,721. The tide happened to favour you ?—Yes, it did. Had it been against the tide it would have been more dangerous, but then I could have hove to, and have waited for daylight, but as the tide was it was all right for us, and I got through very well.

25,722. If the tide had not been in your favour you would have had no hesitation in heaving to and waiting for the tide. You could have kept out of the Firth ?—No. I once tried twice to get through in the same voyage, and had to come round the islands. I could have gone round the Orkneys, but knowing the place so well there was no danger.

25,723. Have you ever been into Long Hope ?—Yes.

25,724. What kind of a place is it ?—It is a very fine harbour.

25,725. Is there any difficulty in running into it for a man who had only the chart and sailing directions and had never been there before ?—No, I should say not the least.

25,726. Would you now, or would you not, consider the navigation of the Pentland Firth to be dangerous for strangers ?—Oh yes, it is very dangerous for strangers.

25,727. By strangers do you mean men who have not been there before ?—Yes.

25,728. But if strangers have the sailing directions to tell them about the tides, and if they have also good charts, would it then be dangerous for them ?—I never found them of great service. I think there is nothing equal to practical experience.

25,729. In what does the danger of the Pentland Firth consist ?—It is very narrow, and the tide runs very rapidly ; I have seen it nine knots an hour.

25,730. If a man knows that there is such a tide, then why does he run into it ?—He cannot keep out of it if he once gets within its influence. I have been driven backwards two nights and not got clear.

25,731. But I mean if a man has run for the Pentland Firth, and knows he has to meet the tide there, why should he run into it ?—You may carry the breeze to the end, and when there all at once it may fall calm.

25,732. The danger then consists more in the calm there than its blowing ?—There is much danger in drifting ashore in a calm there, because the tide will set you off the rocks, if you get the ship's head the right way. The thing, in fact, to be afraid of is the Skerries, and there is danger to a ship of shipping seas.

25,733. It is so tremendous ?—Yes.

25,734. Have you ever shipped much water there in a calm ?—Yes, a good deal.

25,735. Did you ever have to batten down ?—No ; it was with a very light ship I was caught that time. I think that was when I was driving for two nights and days backwards and forwards in the calm, and could not get out.

25,736. Was there a heavy sea then running ?—No, not much sea, only when we come near the rocks we have been so near the broken water we did not know which side of the land we were going into. We got on a set of the tide and have gone round one side or the other, according to the tide.

25,737. Where do you think the harbour of refuge should be on this district of the coast ?—As far as I am a judge, it should be, I should say, in Filey Bay.

25,738. In the neighbourhood of the Head ?—Yes.

25,739. The north side of the Head in preference to the south ?—You are more sheltered with northerly winds than with south winds; taking both together, the most dangerous winds we have upon the coast. You are a good deal more sheltered there. I think it would be much easier to make a harbour at the north side than the south.

25,740. For what description of vessels would a harbour be most wanted ?—For colliers.

25,741. Laden or light ?—For laden. Large powerful ships would go off when colliers would not.

25,742. With a good ship under your foot would you rather keep the sea or run into a harbour ?—With a good ship, under my foot I would rather keep the sea than attempt to run into any of these harbours.

25,743. If it was a refuge harbour, a harbour without any tide and no freshets ?—If I made the Head I would not hesitate in going into a harbour then. But sooner than run into a deep bight I would run the risk of keeping out the sea with a good ship. If you get into the bight with a collier which will not go ahead there is little possibility of getting out.

25,744. (*Capt. Vetch.*) You know the navigation off Flamborough Head very well ?—Yes, very well.

25,745. Do vessels bound to the north when they meet adverse winds put into Bridlington Bay ?—Yes.

25,746. How many vessels have you ever known to be there at a time ?—Four hundred or five hundred sail of light colliers.

25,747. Do not the vessels that go north and are caught by the gale accumulate in greater numbers than those going south ?—Yes, they do.

25,748. They sail more under canvas from the south ?—Yes ; they take care in the winter time that they seldom leave one roadstead without a chance of getting another, but sometimes they are caught. You want as good a harbour on the north as you have on the south. I should say, indeed, a better for laden ships.

25,749. Vessels get up as far as the Head from the north—laden colliers—and are taken by south-east winds, and the large colliers cannot take shelter under Speeton Cliffs ?—No ; we get shelter under the Head sometimes, but that is no place.

25,750. What becomes of the other ships ?—If we can manage to get up to Dimlington with the flood tide then we have a little shelter.

25,751. What is to become of those that get as far as the Head and cannot proceed, the wind being from the south-east ?—Some of them manage to get the land of Dimlington by leading all along, and perhaps by taking advantage of the tide. Others lay under the Head and go out at night time. They are obliged to go out at night time for fear of getting into collision, and many of them founder and go down.

25,752. Suppose when vessels are caught by a south-east wind trying to get south from the Head, will it not happen that there is a good number of vessels much to the north of them that have not fetched up to the Head ?—Yes, that is the case.

25,753. What becomes of these ?—Many of them get back to the Firth of Forth, if the wind is so that they can get round the Farn Islands.

25,754. The small vessels may get into Shields ?—Some of them, but the heavy iron ships have no chance, and a great many of them get ashore on Coquet Islands, the rocks and other places. I have known many of them get shelter in the Skate Roads.

25,755. Those that get up to Flamborough Head, and are driven to the north : where do you think would be the best place to provide a shelter for them? —I should say Redcar, along by Huntley Foot. If they once get hold of that land, they can run along it if the weather is ever so thick. The most dangerous weather we have is in snow storms coming from the east, east-south-east, and east-north-east, and east and by north. If they once get hold of that land they can go there, it is so bold. If they once go from that, they are, perhaps, afraid to go into the bight.

25,756. What is the greatest strength of the tide round Flamborough Head ?—About four and half or five knots at the spring tide. Sometimes it may run six.

25,757. From your acquaintance with the Pentland

HULL.

Mr. R. Elder.

27 Oct. 1858.

Capt. Vetch.

Firth, you would say, that with the tide running 9 to 11 knots at Flamborough Head, it would make the matter much worse, and there would be many more wrecks?—Yes, more; all the old colliers would founder.

25,758. (*Mr. Coode.*) Have you ever found a difficulty in getting round the Head when bound to the southward?—Yes, frequently.

25,759. With a flood tide as well as with an ebb?—Not with a flood tide. I have generally endeavoured to get round with a flood tide when we have been under double-reefed topsails. As soon as the flood is made we have endeavoured to get round the Head and get away to Dimlington.

25,760. Have you always succeeded?—No; sometimes I have been driven off.

25,761. Even with a flood tide?—Yes.

25,762. Have you known many vessels driven back to the north?—A great number put back from time to time, and a great many are lost in the endeavour to do so, striking on the bars and knocking their bottoms out.

25,763. Have you known instances of vessels foundering whilst running back?—I have known several, but I cannot recollect the names, with the exception of one. That was the *Captain Cook*, a friend of mine, the owner's brother commanded her, and she foundered. She went off from the Head in a breeze, and she went off and foundered with him.

25,764. He was caught off the Head?—Yes.

25,765. Were the crew lost?—They saved their lives, but lost everything they had.

25,766. Has it ever occurred to you to be driven back to the Firth of Forth?—No, but I have been driven from in sight of Cromer, pretty near down as far as the Farn Islands. On one occasion I was; we just weathered the Head with the wind south-south-east, bound for the Humber; it came so thick; I was only mate; we saw the land once; I suppose the captain was afraid to run for it. If he had had more experience, he might have run by the lead; he kept out; a small brig passed us; we were hove to off the Humber; they were running away to the north-west, and a few hours after they went ashore in the bight, and drowned every soul.

25,767. What bight?—Just to the southward of Bridlington.

25,768. What is the longest time you have been detained off Flamborough Head, trying to get to the southward?—I have been detained for two or three days together. I mean either brought up or dodging about; dodging about for twelve or fifteen hours. Sometimes I have been brought up in Filey Bay for two or three days. I once brought up with a half water-logged ship; I got her pumps out, and got the Humber next day.

25,769. Did you hear the evidence of the last witness, as to the cause of the wrecks between Flamborough Head and Farn Islands; he stated, that he considered that the greatest number of vessels were driven ashore between Flamborough Head and Huntley Foot, and that between Huntley Foot and the north the greatest number were cases of vessels wrecked in attempting to get into harbour?—I think I have known more upon the coast to the south of Sunderland, I mean by that the coast between Sunderland and Hartlepool. I think I am not overstating the case, when I say that I have known 20 or 30 ashore on that part of the coast.

25,770. From what cause?—Driven on shore by the gale of wind.

25,771. Under what circumstances?—Perhaps after hauling upon the wind, and not being able to go out, in order to save their lives, and rather than go ashore on Souter Point, or those places, they ran upon the sands.

25,772. Were any lives lost on that occasion?—Not a great many, but not so many as might have been, except on account of their running in off the shore.

25,773. Were they mostly light vessels?—Mostly light, but some of them were laden.

25,774. You said you wanted a better harbour, rather north than south; did you mean that you wanted a more capacious harbour, or that it was more wanted?—More wanted for laden vessels, and those coming from the Baltic; we all steer for that part of the coast. It is land not difficult to make, unless there is a dense fog, and then there is no place to stop at, at any time, on this coast.

25,775. Do I understand you that there is less danger in making it in a fog than any other part of the coast?—I should say that, in snow storms, or in rain, or during heavy gales of wind, we have small rain, so that we cannot see more than a mile or a mile and a half. If you can only see half a mile you are safe off the Head.

25,776. You can approach that distance, then, without any hesitation?—Oh yes, within half a mile, or less than that.

Mr. T. Marshall examined.

Mr. T. Marshall.

25,777. (*Chairman.*) Do you reside at Hull?—Yes.

25,778. How long have you followed the sea?—About 28 years.

25,779. Of that period how many have you been in command of vessels?—About 15 or 16 years.

25,780. In what trade have the vessels been employed?—Principally in the Baltic. I have made a few voyages on the coast, but not many.

25,781. How many voyages have you made home from the Baltic altogether?—I must have made 33 or 34 since the war, and perhaps a similar number before that.

25,782. Have you made 100 altogether?—I should think 60 or 70.

25,783. Bound to Hull?—I have been generally bound to Hull.

25,784. Where have you generally made the land?—I have generally wanted to make Flamborough Head.

25,785. I do not want to know where you endeavoured to make the land, but where you actually did make it?—All the way from Flamborough Head, nearly as far as the Staples, I think.

25,786. Have you ever been to the north of the Staples?—Never.

25,787. Out of the whole 50 or 60 voyages you never made the land north of the Staples?—Never to the north.

25,788. Are you of opinion that Filey Bay is the place to put this harbour in?—I think so, on turning the matter over in my own mind.

25,789. You have heard the evidence of the previous witnesses?—I have heard some.

25,790. Is there anything which you have to say in addition to what you have heard from them?—Nothing. I think the principal danger is not with ships caught with a southerly wind under the Head; the principal danger is when you are keeping under the high land with the wind off shore for smooth water, &c.; it falls calm; you are close inshore; the wind comes from the eastward; you cannot get to the southward of the Head, and therefore must keep to the north, carrying canvas; with the head at east you may fetch a little north of the Tyne. One great danger is in that case, that if you once passed any harbour of refuge, that might be, for instance, at Filey, and have only one of the bar harbours which, in my case proved to be the Tyne, then the difficulty and danger is that when you arrive there it may be dark, or it may not be tide time.

25,791. But how would it be if the Tyne was made so that you could run into it at any time of the tide?—That would answer the purpose, if it could be

entered at half tide. The rivers are the great difficulty.

25,792. If the Tyne, the Tees, and the Wear were so improved as to have 16 feet water at low-water spring tides, could you then dispense with a harbour at Filey?—No, I do not think you could. A harbour at Filey is, I think, of great consequence, because ships around there, which would not risk one of those harbours you have mentioned, would take that at once, provided it was under the Head, so that they might get in before dark. It would be attended with nearly the same danger that any of the others would be, to take a lee shore in a gale of wind; there might be 30, or 40, or 50 ships run for the place at the same time. That is one of the great objections to the coal ports; the great number of ships running for them, and the consequent risk of damage and injury, and the same thing would apply to harbours of refuge.

25,793. Therefore there would be chances of difficulty and mischief?—The same thing must occur in all harbours of refuge with ships coming in in gales of wind, because you cannot tell what harm a ship will take. One man lets go his anchor, and others run in upon him.

25,794. For what number of ships should you think it would be necessary to provide accommodation in a harbour of refuge?—I should think that there should be a great space.

25,795. For what number?—I can hardly calculate because they would not be packed together. One would let go his anchor in one place, and one in another. In a dark stormy night, with an easterly gale, it is impossible for a man to see where to anchor, where he is, or how far he is from his neighbour. I should think it would require a space of 15 or 16 miles inside.

25,796. Will you tell me the number of ships that you will want it to take in?—I should think, on the average, perhaps 400 would be the utmost. It would not be likely that more, than 400 would accumulate. I should think that that would be the utmost.

25,797. What is the longest passage you have made home after taking your departure from the Naze or the Scaw?—I have been within 40 miles of Flamborough Head and then back to Norway. The longest passage that I have ever made was 20 days.

25,798. Were you knocking about in the North Sea all the time?—Yes, with gales from the south-west and south-south-west.

25,799. In heavy weather?—Of course there was heavy weather.

25,800. Had you hard work?—Very hard work.

25,801. And would a harbour at Filey have enabled you to run in there?—A harbour at Filey would have been of service.

25,802. If there had been a harbour at Filey could you have run into it?—It generally happens that a ship is well washed, and you would be glad to get any harbour of refuge if only to get put to rights for one night.

25,803. In that case in which you were 20 days at sea, as I understand, if there had been a harbour at Filey could you have run into it?—No, I could not.

25,804. It would not have saved you on that occasion running back to the coast of Norway?—No, I did not run back, I drove back.

25,805. You think this harbour would be of use for vessels after knocking about at sea, for some time, to go into to refit, if only for a time?—It would be of use in that way because ships could lay to, after they got under the land to the north of the head. At present if the wind should come from the east they cannot fetch round to the northward. They have no alternative but to stand to the north. They must take the chance. If the gale lasts more than 24 hours they have no alternative but to seek a coal port. They cannot fetch into the Firth of Forth, with a wind at east, nor can they get round the head.

25,806. That being the case, the refit touches the question of the safety of life?—Yes, because there are so many chances of danger on the coast. If a ship met any of these changes she would drown all hands.

25,807. Then were you pretty well knocked about that time you were 21 days at sea?—Yes, we were.

25,808. The crew were pretty well done up?—Yes; it generally happens that everything is wet on board.

25,809. There is a good deal of hardship?—A good deal of hardship to be endured in a ship that is, perhaps, a fortnight longer at sea than she is intended in such a short passage.

25,810. Would you say that the hardship is so great that it may touch the safety of the vessel, should she get on a lee shore, as to working off?—Well, it would almost be impossible, because a ship with a deck load of wood or what not, when she gets on the coast is not a coaster and not fitted for it. The anchors and sails are not so easily got up and down, and she cannot be managed like a regular collier, and, therefore, labours under great disadvantages.

25,811. (*Mr. Coode.*) Have you ever gone through the Pentland Firth?—Two or three times.

25,812. Have you gone through in gales of wind?—No.

25,813. Were you employed in the coasting trade at all?—I have been in the coasting trade.

25,814. For a length of time?—More or less for a year. Not at once, but at different times. But call it a year.

25,815. Did you ever see fleets of vessels congregate under Flamborough Head?—Yes; it is a matter of very frequent occurrence.

25,816. What is the greatest number that you have seen?—I have seen 200 or 300.

25,817. Vessels going north or south?—Bound south.

25,818. Do you consider that a harbour is wanted most for light or for laden ships?—I think the light ships are in most danger, but then they would not take it if they had any chance of getting to the north.

25,819. If they were north of Filey of course they could not fetch it. You think the light ships incur the most danger?—They are in the most danger on a lee shore, which all would be exposed to. A laden ship would always keep off 24 hours with the wind at east, and the chances are that in that time there may be better weather.

25,820. In which case would there be the greater danger to life, in laden or in light ships?—I think in laden ships.

25,821. Looking to the saving of life, you would provide a harbour rather for laden than for light ships?—It would be necessary to provide for both, but the laden ships are in most danger as to life.

25,822. As regards the saving of life, which class of vessels should you provide for most?—It would be necessary to provide for both. The thing is so near a balance, I cannot say which should be provided for in preference. I can only say this, that if a laden ship came on shore the chances are that she would drown her crew, when that of a light one might get clear ashore.

25,823. (*Chairman.*) In very bad weather, when it is a question of the safety of the vessel, in the open sea with plenty of room and no port to run for, would you heave a ship in ballast to, or run with her?—Heave to, no question about it.

25,824. Notwithstanding that accidents sometimes occur from vessels lurching or shifting their ballast?—Those are casualties that you must make the best of. If you shift the ballast and it shifts at the bottom end, you must go before the wind at any risk.

25,825. Does the ballast ever shift when you are running?—You can trim her and get it right again.

25,826. With a laden vessel, under the same circumstances, would you heave to or run?—I would lay to. It is not often that a sea hurts a good ship, if she is not overloaded.

HULL.

Mr. R. Bartlett.

27 Oct. 1858.

Mr. ROBERT BARTLETT examined.

25,827. (*Chairman.*) You are a resident in Hull?—Yes.

25,828. Are you a seafaring man?—Yes.

25,829. How many years have you been at sea?—Thirty-three.

25,830. How many years have you commanded vessels?—Eighteen.

25,831. In what trade were your vessels chiefly employed?—The North Sea, coast, and Baltic.

25,832. How many voyages have you made home from the Baltic?—Perhaps twenty.

25,833. At all times of the year, I suppose?—Yes.

25,834. What landfall did you make coming home from the Baltic—not what you did endeavour to make, but what you did eventually make?—Between Huntley Foot and the Head.

25,835. Did you ever make St. Abb's Head?—No.

25,836. Did you ever make the land to the north of St. Abb's Head?—No.

25,837. Did you ever make it as far north as the Staples?—No.

25,838. Never to the north of St. Abb's Head?—No, never.

25,839. What is the landfall you endeavoured to make?—We generally tried to make the Head.

25,840. Bound to the Humber, would you endeavour to make the Head?—That would depend on the time of the year. Generally in winter time I should prefer it. In fine weather we try to make the land at Orfordness or Lowestoft.

25,841. Where would you put a harbour of refuge on this coast?—Either at Redcar or Filey, or at both I should prefer.

25,842. Which should you prefer?—I do not know. I think Filey, because sometimes we may take the north country ports at high water. You might get the Tyne when you could not get Filey.

25,843. Have you ever run into bar harbours in very bad weather?—Not very bad.

25,844. Knowing that you risked ship or life?—No, not particularly. I generally endeavoured to keep off.

25,845. Have you been here to-day?—Part of it.

25,846. Is there anything more that it occurs to you to tell us which we have not heard from the other witnesses?—Frequently we might come with a little wind from Sunderland or the Tyne, being towed out by steamboats; after we got out the wind might come from the east, and then when we could not get Filey we might be able to get Redcar. The ebb tide comes on, and you cannot get clear of the land with an easterly wind. You get tide-way on the starboard bow, generally the ebb, with an easterly wind. You might fetch Redcar when you could not get round Robin Hood Bay and fetch Filey.

25,847. If you are to have a harbour at Filey would it not be better to put another in the bottom of Tees Bay, because if you could not fetch what would happen then?—We could generally get that far. It is only seven miles to get to the south-east and by south. The steamboats generally takes us that far—five or six miles, and Redcar is not over seven miles off Hartlepool to the south-east and by south.

25,848. Still a quarter of a mile to windward in a gale of wind is as bad as a dozen sometimes. Would it not be better to have the shelter in the bottom of the bay then at Redcar?—There is very little difference between Hartlepool and Redcar. I should not like to cross the mouth of the Tees.

25,849. With the wind from the south-south-east and south-east a ship could, could she not?—Not too well. I had rather keep under the land, in order to get into Redcar. You get a very nasty sea crossing the sands, and shoal water, and the offset of the tide.

25,850. A vessel off Redcar with a wind east-south-east, and even east, could aways get into Hartlepool, could not she?—She might; but there is a nasty sea to contend with crossing the mouth of the Tees.

25,851. Could she, with a wind east-north-east, fetch Redcar?—Carrying good canvas, she must.

25,852. Could she get off the coast on the other tack?—No; not on the port tack.

25,853. Do you know the land about Hartlepool?—Pretty well.

25,854. Is it difficult to make when you see it?—No.

25,855. If you can make out the land at all you can make out that? You cannot mistake it for the other side of the Tees?—No.

25,856. Is it difficult to see in thick weather?—It is not difficult to make by soundings.

25,857. But to see the land?—I could make it out if I could see the Hartlepool Heugh and the land to the south.

25,858. It is very easy to make?—Not if you have thick weather. The high land lying back and the low ground being in front, it is not easy to see, not until you get in about seven fathoms or less.

25,859. Before you make it out clearly in thick weather, can you run for Hartlepool by the lead?—No; not direct.

25,860. You could not tell how far you were off the land, and would not be positive as to your position?—No.

25,861. In a gale of wind you would not like to run down?—I would not attempt it if I could keep out. If I could not I must run in and try it.

25,862. Is there anything in the nature of the bottom which will tell you whether you are to the north or to the south of Hartlepool?—There is little black-specked sand to the northward, and there is more white sand going to the mouth of the Tees.

25,863. Therefore a man who is well acquainted with the coast and the nature of the bottom, might run in?—He may, but I would still prefer keeping out at sea.

25,864. Because there is too much risk?—Yes.

25,865. In what water does the sea break in Hartlepool Bay?—I should say in seven fathoms. It is not dangerous until about six, but it is very dangerous in seven fathoms.

25,866. How far off the shore is that?—It would be one mile and a half or one mile and a quarter. It is pretty well off.

25,867. Did you hear the evidence about running through the broken water? It was said that the first sea was the worst; what do you say about it?—I heard it.

25,868. Do you agree with it?—No, I do not at all.

25,869. What is your opinion?—My opinion is that the second or third is the worst and the most dangerous. My experience has told me that. I have frequently gone over the dangerous bar at Oporto, and experience has told me which is the worst sea. I have gone over Shields bar in heavy weather, but it is a great deal worse at Oporto. My experience tells me which is the worst.

25,870. Oporto is worse than Shields?—A great deal.

25,871. The result of your experience is that it is not the first sea, or the second, but the third, which is the worst?—Yes; I have gone through the first, but have been shot away by the second and third, the men lashed in the rigging, and the pilot also being lashed. The first sea never touched me.

25,872. Have you ever gone into bar harbours, say with the men in the rigging, and the man at the helm lashed to it?—No, only standing by and looking out to jump up, when going into Sunderland, and Shields too.

25,873. With a vessel in ballast with very heavy weather, blowing very hard, if you had lots of sea room, would you to save life and ship rather heave to or scud?—Heave to, decidedly. It is of no use running the ship. Do you mean if I have a harbour?

25,874. No, no harbour; in the open sea ?—Heave to, decidedly, under a trysail.

25,875. With a loaded vessel the same ?—The same rule.

25,876. With a loaded collier would you rather heave to than run ?—Most of them would go dry if she was a tight ship. If not, run her neck or nothing and take the beach.

25,877. I am speaking of the open sea; what would you do ?—I should heave her to. I think she would be easy; most ships are.

25,878. (*Capt. Vetch.*) Speaking of the difficulty of getting into Hartlepool, is not the light visible at some distance ?—Oh, yes; you can see it 15 miles off pretty well.

25,879. In thick weather ?—Nine or ten miles, perhaps.

25,880. So that you can generally see the light within four or five miles ?—Yes; it is not wisdom to run for the harbour, unless you can see it at that distance.

25,281. How far do you think you can see it in misty weather ? Do you see it two miles off ?—I should go by my lead, then it would be very near the seven fathom water.

25,882. In thick weather a lighthouse is of no use ?—No; but sometimes there will be a fog below and it will be clear up aloft, about the lighthouse top.

25,883. How far can you see the light in a misty night ?—About 11 miles; but it depends entirely on the mist.

25,884. What is there, a red light, and a harbour light below ?—Yes, a tide light.

25,885. How far can you see that ?—Ten miles off.

25,886. You would be able to see that three miles off in bad weather ?—Yes, we should.

25,887. Would not that be a guide to you to get in ?—Decidedly it would. The Seaton Carew light is a guide in; but I prefer having a harbour at Redcar, because Hartlepool is a harbour in itself. At tide time many light vessels could go in, even blowing a gale of wind. Laden ships from the north want to take a harbour of refuge. You have two places; the light ships bound there and if not, in seeking a cargo will go to Hartlepool; the loaded ships will go to Filey and Redcar. We should then have two ports in the room of one great large one.

25,888. I think so; but admitting that Redcar is the better place, still the objection that you cannot see the land at Hartlepool is a good deal lessened by the fact that there are two lights to be seen, the red light and the white light on the Heugh, and that there is also the lighthouse at Seaton Carew ?—By the same rule you would see the Seaton Carew to bring you round Huntley Foot; and get close round and hug by the land, and it must be very dark, indeed, if you could not find your way round the coast to Redcar.

25,889. (*Mr. Coode.*) Is the land as easy to make at Redcar as it is at Hartlepool ?—Much easier. Previous to going there, you must make the land to the eastward before you come to Redcar. You must go in close in shore at Huntley Foot; you go round along under the foot of the hill, and may go into five fathoms if you like to keep the land close aboard until you are clear of the Scars.

25,890. Have you had much experience in Tees Bay ?—No, I do not like to go there if I can help it.

25,891. Have you been there in gales of wind ?—Pretty close down, but I generally happen to keep off, as I endeavour to do.

25,892. Have you happened to notice whether there is most sea towards Hartlepool or Redcar ?—I should say it would depend entirely upon the wind, that if it was a south-east wind, blowing strong, the onset of the sea would be towards Hartlepool; on the contrary, if the wind is from the north-east or north, it would be towards Redcar.

25,893. Supposing the wind at east, setting right in ?—I should say it would be alike on both ends of the bay.

25,894. Have you been much in the coal trade ?—No, I have not; but I have been a good deal on the coast.

25,895. Between what ports have you principally traded ?—Between the Downs and Leith roads, and sometimes through the Firth.

25,896. The Pentland Firth do you mean ?—Yes.

25,897. Have you ever been through in a gale of wind ?—Yes, I have. The vessel was a large one, and carrying a press of canvas with a favourable tide. The first of the tide was against us, but it was only four knots an hour.

25,898. But would that be neaps or springs ?—I cannot positively say; the tide had not made its full force. It was about four knots when we got about half way through.

25,899. Have you ever seen many vessels collected off Flamborough Head ?—Yes, a great many in Bridlington Bay, or dodging about off the Head under Speeton Cliffs.

25,900. What is the greatest number you have seen together to the northward of the Head, either dodging about or anchoring under Speeton Cliffs ?—Not more than between 200 and 300 sail.

25,901. Have you seen that more than once ?—Yes, but I have not seen it very often; perhaps I have seen that quantity four or five times; 50, 60, or 100 I have seen more frequently.

25,902. That is a matter of common occurrence ?—Yes; when the south-south-west wind begins to blow they try at flood tide to get round, and if it blows too hard they do not attempt it, but dodge under the Head and the cliffs to and fro all night long.

25,903. What is the longest time you have ever been detained there ?—Ten or eleven days frequently between Leith and the Humber.

25,904. To the north of the Head ?—In order to get round I have been detained four or five days, I think, and sometimes I have been blown back as far as the Farn Islands.

25,905. Has that been on more than one occasion ?—Three times.

25,906. Have you known of any cases of vessels foundering in running back ?—No, I have never seen one; I would not run back; there is no place to run to only the Firth. You are not back until you get well to the northward and then keep away to the Firth.

25,907. You say you have been driven back three times from the Head; do you mean to the Firth ?—No; sometimes off Sunderland and sometimes to the Tees.

25,908. You were never driven as far as the Firth ?—Yes, twice to Queen's Ferry; I run for it twice when I got as far as Shields, with the wind blowing hard from the east, and there was no other refuge in a winter's day.

25,909. (*Chairman.*) Is there any place you could run into under Holy Island ?—Yes; a man who was acquainted with it might go inside the Farn Islands to the Skate roads.

25,910. What sort of a place is that to run into?—It is middling; a stranger could not take it. Under the lee of the land it is very good, but a stranger would not like to attempt it.

25,911. Why did you not take it instead of going to the Firth ?—I was a young hand on the coast, and I did not like. It was thick, rainy weather, and I did not know it, sir, then. In running down the coast in thick weather it is best to keep clear of the Ferns; it is dangerous about there. We have no soundings.

25,912. What about the Firth of Forth ? Could a ship run in at any time ?—I run right up to the Hope.

25,913. You know the Firth ?—Yes.

25,914. Could a vessel run up by night as well as by day ?—I should not fancy it without seeing the Inchkeith lights.

25,915. Do you know Long Hope in the Orkneys ?—I have not been in, but I have seen it.

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25,916. You know it by chart and sailing directions ?—Yes.

25,917. Would you have any hesitation in running for it under proper circumstances ?—No ; it is very easy of access.

25,918. From what you know of the general run of men who command coasting vessels, would you say that any of them would have any difficulty in running for Long Hope under proper circumstances, merely knowing it by chart, and having the sailing directions ?—A man who should be a master of a ship, and who can understand the charts at all, can take it if he can see the place.

25,919. If you were making the passage through the Pentland Firth, say from this side, and had a strong favourable gale of wind blowing, if there was a harbour at Wick would you use it or try to make the passage ?—Decidedly try to make the passage. There is no danger in running through.

25,920. But supposing the weather tide was making just as you were running into the entrance, what would you do ?—Heave her upon the wind until the tide eased, and as soon as the tide eased get through.

25,921. That being the case, from your knowledge of the coasting vessels generally, would you say that that is the course which they ought to pursue, and which they would pursue generally ?—I should think so.

25,922. What would you think of a man who did not do it, who, supposing that there was a harbour of refuge at Wick, ran into Wick with a fair wind there? —I should unship him.

25,923. You would unship him?—For not running through the Firth.

25,924. (*Capt Vetch.*) Have you ever been in Long Hope?—No, I have never been in the harbour. I have been close at the mouth.

25,926. We were told that claws of wind sometimes come down from the hills and sometimes cause vessels to drift from their anchors, and oblige them to leave and go to Widewall ?—I have never known a case of that sort, only in heavy gales. There are always gusts coming off high land, but not so serious as that, just before the gale is over.

25,926. If that be the case, it would not be safe to go to ?—If the holding ground is good, a strong puff of air does not matter.

25,927. If you were told by a person who knew the place well, that it was the case that ships drove from their anchors, what would you say ?—I have known them drive with both anchors down in heavy gales.

25,928. I am speaking of Long Hope ?—I have known them drive with both anchors down, with heavy gales of wind. They will, in most places, where it blows like a complete spendrift.

25,929. Have you been through the Pentland Firth in gales ?—I have been through five times in a calm, and have taken no harm going close to the islands. The tide has taken me through to Duncansby Head, and then changed, tracked backward, and turned me to Dunnet Head, and so I have turned and returned five times, going so close to the islands that you might jump on shore, and could almost smoke a pipe of tobacco before she passed them. Just when she got close to, off she would go.

25,930. (*Mr. Coode.*) Do you mean five times backwards and forwards in the same voyage ? — Yes, before I could get clear of it.

25,931. You have been often along the north-east coast of Scotland ?—No, not often.

25,932. Did it ever occur to you to want a harbour of refuge there ? Was your vessel ever endangered on that coast ?—No ; we generally had either one firth open or another.

25,933. If you are caught with any sort of offing, you can get into one of the firths. Do you think a harbour of refuge is necessary about Aberdeen ?—I think it would be very good.

25,934. Where would you place it ?—I really could not tell you the locality.

25,935. You think a harbour of refuge is necessary in that locality ?—I think so just about there.

25,936. Between what points should you say it is most required ?—I hardly know the locality just at this moment.

Mr. WILLIAM CLARKSON examined.

Mr. W. Clarkson.

25,937. (*Chairman*) Where do you belong to ?—To Hull.

25,938. Are you the witness whose evidence we were to have received at Bridlington ?—I am. I had a letter from them to come here.

25,939. How long have you followed the sea ?—Twenty-seven years.

25,940. How many years have you been a master?—Twenty-one years.

25,941. In what trade have the vessels you have commanded been chiefly employed ?—In the coasting trade.

25,942. In the coasting trade the whole of the time ?—In the general coasting trade. I have not any particular place ; we find employment where we can.

25,943. All round ?—All round, but more particularly on the east coast, chiefly between the Firth and the Humber.

25,944. Have you been present during the proceedings of the day ?—I have been here about half an hour or a little more.

25,945. You are aware that the object of the inquiry is to find which is the proper site for a harbour of refuge on this district of the coast, between the Humber and the Tweed ?—I am aware of that.

25,946. Where would you put it ?—I should prefer Bridlington Bay on the east coast.

25,947. Will you give your reasons ?—I think it would be of more service there to light ships, as well being nearly as good for laden vessels as further north.

25,948. For which class is a refuge most needed ?—For laden ships I think mostly. But light ships stand much in need of a harbour at times.

25,949. Have not light ships got a capital anchorage in Bridlington Bay as it is ?—Not while the wind keeps to the northward, but when the wind flies round easterly it is good.

25,950. Have you ever seen a vessel riding out a gale at Bridlington Bay with an easterly wind ?—Yes, frequently.

25,951. Was she a light or a laden ship ?—I have seen a laden ship ride out a heavy gale there.

25,952. But light ships ride more easily ?—The sea has less hold upon them.

25,953. A light ship rides more easily ?—She is not so deep for the sea to get hold of, but the wind has more effect on a light than on a laden ship.

25,954. Taking all that into consideration, which rides most easily, a light or a laden ship ?—A light ship.

25,955. Which is likely to part her cable soonest ? —A laden ship if the sea is heavy, but if it is only wind then the light ship will be likely to go.

25,956. What was this laden ship that rode out the gale in Bridlington Bay ?—She was a brig from the Baltic that rode out the heaviest of the gales. I was a master of a vessel nine years belonging to Bridlington, and was frequently in there, and have frequently seen vessels ride out gales.

25,957. What was the cargo of this brig ?—I do not know.

25,958. What masts had she up ?—She struck her topgallant masts and topgallant yards.

25,959. Were the yards pointed to the wind ? How many anchors were down ?—Two.

25,960. Do you know the scope of cable ?—I do not bear that in mind now, it is several years since. No one, except her, rode it out. It was a tremendous hurricane of wind from the east-south-east,

and nearly as bad as it could be. It could not have been worse. But the vessel rode the gale out.

25,961. Do you know any other instance in which a vessel has ridden out a gale with that wind ?—No, not exactly such an extreme gale as that. I have seen a good many ships go to the harbour to prevent driving on shore, and many drive on shore. I have been at Bridlington, when that has been the case, three or four times.

25,962. The holding ground is capital, is it not ?—Yes ; it is good ground to the northward of the harbour.

25,963. At low water the shelter from the Smithic Sand is pretty good ?—Yes ; it shelters a good deal.

25,964. That being the case, and Bridlington Bay being so good, would it not be almost better to put the harbour on the other side of the Head ?—It would be a shade better for laden ships, but it would be very useful to light vessels to have a harbour instead of an open bay in the winter months. It is only a few times that ships of the northward of the Head could not get round with a flood tide.

25,965. Have you ever worked round with a flood tide in a strong breeze ?—Yes.

25,966. In what description of vessel ?—A collier.

25,967. Blowing hard ?—Hard ; but not very hard. We never worked round unless we thought that there was a prospect of getting to the northward.

25,968. What sail were you under ?—Under single reefs. If we could not carry single-reefed sails it was useless to go round the Head with a southerly wind.

25,969. Could you have got round with a flood tide, say with two reefs down ?—I have ridden under Speeton Cliffs for four or five days with hard southerly winds, whereas if there had been a harbour at Bridlington Bay I could have got round with a flood tide, but I had not the prospect of getting south, and so did not try to do it.

25,970. Do you think a laden collier brig could work round the Head under close-reefed topsails ?—Unless it was an extreme gale, with a flood, she could make one tack off and then would be round.

25,971. Is not the sea heavy there ?—Yes.

25,972. Which side is the sea heaviest, the north or the south ?—At the south side with a southerly wind.

25,973. With a flood tide would it not be a weather tide ?—Yes, it would be.

25,974. At what rate does the tide run in spring tides ?—At 4½ knots.

25,975. Would not that make a bad sea in a gale of wind ?—It would, a very strong sea ; but there is only a very short tack, if the vessel is under Speeton Cliffs, to weather Flamborough Head, and then be in the harbour.

25,976. What leeway would a vessel make under close-reefed topsails ?—If she had a good flood tide she would not make much, but that depends on the character and build of the vessel.

25,977. Supposing that there is no tide, what leeway would you make ?—A good deal.

25,978. How many points ?—Perhaps three points. She would be nine points off the wind. They would never attempt to work without a flood tide.

25,979. A laden collier under close-reefed topsails and courses would make three points leeway ?—She would in a dead sea.

25,980. She would be sailing nine points off the wind ?—She would in that case ; without a tide to assist her she would never get round.

25,981. (*Capt. Vetch.*) You know Flamborough Head very well ?—Yes ; I have been at anchor in Filey Bay with northerly winds, and have shifted to Bridlington to get better shelter.

25,982. Can you tell me whether most vessels wait in Bridlington Bay for a wind to get northward, or in Filey Bay for a wind to go south ?—I think more wait at the south side for a wind to go north than at the north side for a wind to go south. I have several times seen upwards of 500 sail bound north anchored in Bridlington Bay, but I do not know that I ever saw more than 100 waiting to get south.

25,983. Where the greatest number of vessels are the greatest quantity of shelter is required, is it not ?—I think so.

25,984. Could Bridlington harbour be very much improved ?—The harbour ?

25,985. No, the roadstead ?—By making a breakwater on the Smithic Sand. I think it would.

25,986. Would that be of great value ?—Yes.

25,987. To what points is it most exposed ?—From east to south-east are the points to which Bridlington Bay is most exposed.

25,988. How many vessels did you say you had seen ashore on one occasion ?—Three.

25,989. Three in one gale ?—Yes. Two of them attempted to enter the present Bridlington harbour, but failed in the attempt ; and one drove right on the beach without trying for the harbour.

25,990. On the north side of the Head there is no place to resort to for safety ?—At present it is with north and north-east winds.

25,991. There is no shelter from a south-east wind, and the south-east wind is the worst that blows. In that case they must run back to their own ports ?—Perhaps they hold on under the Head, if the weather is at all moderate.

25,992. But I am supposing a gale ?—Under Speeton Cliffs is not a very pleasant place on a winter's night with a laden ship. If the wind comes round east, the chances are you would not be able to get out of Filey Bay.

25,993. If a breakwater were constructed in Filey Bay, would that be a great advantage to vessels that cannot get south ?—Yes, it would. It would be very good in Filey Bay ; but my idea is that it would be better in Bridlington Bay if only one harbour is to be made.

25,994. But you would prefer both ?—I should not prefer two so near to each other. If we are to have two, they ought to be placed further apart.

25,995. Suppose that Bridlington Bay is made a good shelter, what would you like to see done next ?—A shelter made north, in Tees Bay.

25,996. At which side of the bay ?—I think I should prefer the south side, the Redcar side.

25,997. Have you often been there ?—Yes, frequently.

25,998. Do not the lighthouses give you some assistance to find the land there in misty weather ?—If it is clear they do.

25,999. But even if it is hazy ?—No ; if there is much haze you cannot see the light very far.

26,000. Two or three miles off ?—Yes, if it is moderate, not very thick, you will see it two or three miles off.

26,001. Then you think the second harbour should be at Redcar ?—There or at Hartlepool.

26,002. (*Mr. Coode.*) Do vessels find good shelter under the Smithic ?—Not with easterly winds. If the wind is a little to the north of east they do, but if it gets out at east the shelter is gone to a great extent. The sea rolls in heavily with the wind at east.

26,003. Suppose that there were 100 vessels under the Smithic and 100 under Speeton Cliffs, which do you think would be in most danger if the wind shifted to the eastward ?—Those under Speeton Cliffs undoubtedly.

26,004. Did it ever happen to you to get to Flamborough Head, bound to the southward, and not to be able to get round ?—Yes, frequently.

26,005. What have you done under those circumstances ?—Sometimes I have tacked about under the Head, and I have been anchored for four or five days together under Speeton Cliffs when bound to the south, waiting for a change of wind.

26,006. Have you ever been driven back to the northward ?—Yes.

26,007. How far ?—When I have been south of

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Mr. Coode.

Shields I have never but once been driven as far north as the Farn Islands. I was once driven from Shields and took Holy Island.

26,008. You have been driven back from Flamborough Head ?—Yes.

26,009. More than once?—I have taken Scarborough for shelter, and Hartlepool once or twice. I have gone into Hartlepool with a very heavy gale from the south-east when neither steamboats nor pilots could get off.

26,010. On these occasions had you been to Flamborough Head, and not got to the southward ?—No ; I had only been the length of Whitby that time. I have never had charge of any very large vessel; the vessels which I had were generally of a smallish class, and even when the tide was ebbing we had water into most of the harbours.

26,011. I think I understood that it had happened to you to be detained for some days under Speeton Cliffs, unable to get southward ?—Yes.

26,012. When you were bound to the south with a laden vessel ?—Yes.

(*Chairman.*) Are there any other parties present who are interested in this inquiry, who wish to tender evidence to us ?

No answer.

Sitting at Hull closed.

LONDON.

Monday, 29th November 1858.

PRESENT :

Admiral HOPE (Chairman).

Captain WASHINGTON.
Captain SULIVAN.
Captain VETCH.
Mr. COODE.
Mr. EVANS, Secretary.

Mr. WILLIAM DALE examined.

LONDON.

Mr. W. Dale.

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26,013. (*Chairman.*) How long have you been at sea ?—Twenty-five years.

26,014. Of that period how long have you been a master of vessel?—Fifteen.

26,015. Where do you belong to ?—To Whitby.

26,016. In what trade have you been chiefly employed ?—In the Baltic, the coasting, and the American trade. Principally in the Baltic trade.

26,017. You have heard this question of a harbour of refuge discussed. Give us your opinion where is the best place for this harbour of refuge, for the purpose of saving life, on the east coast of England ?—Life and property ?

26,018. Life and property ?—To make another harbour of refuge ?

26,019. Which is the best place to make a harbour of refuge, whether it exists at present, or to construct one if necessary ?—My opinion is south of the Tees.

26,020. At what particular spot in Tees Bay ?—I must say I think in Tees Bay, if you make it on a gigantic scale. I do not see how you can make a harbour of refuge in the Tees without doing it on that scale.

26,021. You consider the bight of Tees Bay is the place ?—South of the Tees ?

26,022. South of the Tees ?—Yes.

26,023. Between the Tees and Redcar ?—Between Redcar and Flamborough Head, I should say.

26,024. Between Redcar and Flamborough Head ?—Yes.

26,025. Between Redcar and Flamborough Head is a wide term. Whereabouts would you place it between Redcar and Flamborough Head ?—I would not like to say about that. It is scarcely a point I could say.

26,026. Where would you put it ?—Well, to go south, of course I should say Filey is as good a place as anywhere I know of.

26,027. As good as any you know of ?—Yes ; but I should object to it upon one point, for its being too far south. Whitby is more central.

26,028. (*Capt. Sulivan.*) Did you say to go south or going south ?—To go south.

26,029. (*Chairman.*) In your opinion Whitby is the place ?—Whitby ; for, to take it altogether, I consider it as a central place for ships from the Baltic and different places, it is where ships make the land more usually than they do further north. I had experience of this a fortnight since on a Sunday. I made Whitby in a heavy gale on the Sunday night, and I was there from that time until Thursday.

26,030. If a ship was embayed in Tees Bay, of what use would a harbour of refuge at Whitby be to her ?—No ; but you must act with caution in going along the low land. The land is very low down there in Tees Bay.

26,031. (*Capt. Sulivan.*) Looking principally to laden colliers bound south from any of the ports, Hartlepool, Sunderland, or the Tyne, if you had to decide between Filey and Hartlepool, or anywhere in Tees Bay, as a harbour of refuge for laden colliers, which would you take ?—I should say Whitby.

26,032. I ask you if you had to decide between Filey and Hartlepool ?—To decide between Filey and Hartlepool ?

26,033. Yes, where a harbour of refuge should be placed at one of those places ?—I should say Filey.

26,034. For laden vessels ?—Yes; but it is too far south.

26,035. I am asking you between Tees Bay and Filey ; supposing it was to be at one of those two places and no other ?—In Tees Bay or Filey ?

26,036. Yes, for laden colliers ?—The thing is, that a laden collier will not come to sea unless the master can see a distance clear to get to Filey.

26,037. Then for laden vessels, do you consider Filey preferable to Tees Bay ?—I consider it is preferable, but too far south.

26,038. I do not ask you as compared with Whitby or any other place, I only ask you which of the two places I have mentioned ?—Between the two ?

26,039. Between Tees Bay and Filey. Which would be the most valuable for laden colliers if there was a harbour of refuge at each of those two places ?—Tees Bay, if it is thought you could make it the same as at Filey, but I consider in Tees Bay the water is too shallow.

26,040. Putting that out of the question, and looking merely to the situation for laden colliers leaving the coal ports. You said, I think, that vessels would not start without they could get some way to the south ?—Certainly not. None will go to sea with a bad prospect unless they see a little distance before them.

26,041. Considering that, and looking to laden

colliers, which do you think they would find most valuable for them, a harbour of refuge at Filey or one in Tees Bay ?—A harbour at Filey would be very valuable decidedly, but it is too far south.

26,042. Compared with Tees Bay, can't you say which of the two, if there is to be only one ?—I should say Tees Bay if there is to be only one. If there is to be only one upon a large scale, I should say Tees Bay would be the best.

26,043. Do you think one harbour at either place would meet the wants of that coast ?—That is a question I am not prepared to answer. I can't say one harbour would. I must say there is room for many improvements in different places.

26,044. If there was to be one harbour of refuge, do you think it would meet all the wants of the large trade on the coast ?—One very large harbour ?

26,045. A harbour sufficient to take in the number of vessels that would run for refuge at any one time ?—I should. One very large harbour would do.

26,046. Would you prefer one large harbour in one place, or two moderate harbours ; one in the bight of the bay, and one nearer Flamborough Head ?—I prefer the two.

26,047. From your knowledge, is it the case that in cases of shipwreck life is most exposed to danger in laden vessels ?—Yes ; I should think so.

26,048. Then would you make the laden vessels a first consideration in making a harbour for saving life ?—What do you say ?

26,049. Would you make laden vessels a first consideration in making a harbour to save life ?—Decidedly ; ships drawing the most water. They draw more water laden than light, and they want to enter at all times of tide. I mean as to danger to life.

26,050. Is there more danger of loss of life in laden vessels or in light vessels ?—In laden vessels decidedly.

26,051. Would you think that it would be most important to consider laden vessels in deciding upon a harbour of refuge ?—Most property I think is lost on the coast in laden ships ; I should think so.

26,052. Would that be a reason for having them especially in view in deciding upon a site for a harbour of refuge ?—Yes.

26,053. (*Capt. Vetch.*) Will you have the kindness to attend to the question which I shall put to you. I think you have said as regards Hartlepool that if a harbour there could be made upon a sufficiently large scale to meet all the requirements of the trade, you would think it the best place for saving the greatest number of ships and lives ?—I think so, most certainly ; that is my opinion.

26,054. A vessel caught down in the bight of the bay could not work out with the wind on shore ?—The water is so shallow that ships can't turn out there. The sea is so heavy in stormy weather. In heavy weather the sea runs so strong down in Tees Bay that it would be impossible for ships to get out of it.

26,055. That would be one reason ?—Yes.

26,056. I suppose you would stop until the gale was over until you came out ?—Out of Hartlepool ?

26,057. Yes ?—Yes, I dare say.

26,058. In your opinion, supposing that a large harbour was made there fully as capacious as you wish would more ships and lives be saved by a harbour of refuge, or breakwater, there than at any other place between Blyth and Flamborough Head ?—I can scarcely answer that question.

26,059. (*Chairman.*) You can't answer that question ?—No.

26,060. (*Capt. Vetch.*) I think you said the greatest number of vessels get embayed there—in danger there—which made you select that place, if you make a harbour big enough ?—I think so, as being more central.

26,061. (*Mr. Coode.*) In reply to Capt. Vetch's question you said that Hartlepool was more central ?—It is Tees Bay I mean when I say Hartlepool.

26,062. You mean Tees Bay ?—Yes.

26,063. (*Capt. Vetch.*) I meant Tees Bay too.

26,064. (*Mr. Coode.*) You say you would decidedly prefer two harbours ; assuming it to bedecided to construct two upon this coast, what sites would you prefer ?—I should name south of the Tees.

26,065. Supposing you were asked to name two sites for two harbours, which you say you would decidedly prefer, what sites would you select, provided it was left to you to do so ?—If two harbours were made ?

26,066. If it was decided to make two large harbours of refuge, what two sites would you prefer ? You have already said you would prefer two to one ?—To make two I should prefer Filey and Hartlepool.

26,067. (*Chairman.*) If you were in the gale of wind on a lee shore, where would you like the harbour to be ?—Under my lee.

26,068. Certainly under your lee ?—Yes.

26,069. (*Capt. Sulivan.*) Is it the case that laden colliers frequently get up to Flamborough Head, and are there caught by bad weather and there assemble in very large numbers ?—Yes, they do about Filey ; but I consider there is a great many lost that never get that far. Whitby Beach picks up a great many ships. I should think as much property is lost there as at any other place.

Mr. William Turner examined.

26,070 (*Chairman.*) To what part of the country do you belong ?—To Banff.

26,071. How long have you been at sea ?—Twenty-eight years.

26,072. How long have you been a master ?—Nine years.

26,073. In what style of vessels have you been chiefly employed ?—In schooners.

26,074. Along the coast ?—Along the coast, and to the Mediterranean and the Baltic.

26,075. Have you been much employed in the coal trade ?—Never in the coal trade. Only taking coal down home from here.

26,076. Do you know Hartlepool ?—Yes.

26,077. Do you know the Tyne ?—I know any place along the coast.

26,078. If there is to be a harbour of refuge made, where would you put it ?—Well, there is a good many places under cover of Flamborough Head ; but I think my proposal would be Hartlepool.

26,079. You would put it at Hartlepool ?—Yes.

26,080. Give us your reasons for putting it there ?—Both for ships coming north or south.

26,081. Both for ships coming north or south ?—Yes.

26,082. Then what is your reason ? Is it that it is the most central spot on the coast ? is that it ?—Well, it is there down in the bight, and if a ship is going north or south, she can always get Tees Bay, when she can get nowhere else.

26,083. Do I understand you to say that if a ship was taken by heavy weather with a gale on shore, just to the north of Flamborough Head, she could, as a general rule, get into a harbour of refuge existing in Tees Bay ?—Well, if she has any distance at all, if she gets round Whitby, she goes gradually on. There is always a bit of vacancy to go round the same, coming from the north. It is a bight place.

26,084. So that if a ship had a decent offing, she can always reach a harbour in Tees Bay ?—Yes.

26,085. Is that your reason for preferring Tees Bay ?—Yes. Of course if a ship is too far in shore at any stage of her voyage, she can fetch any harbour, you see.

26,086. (*Capt. Sulivan.*) Where have you traded from ; what ports principally ?—With the exception

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of the last six years, I have been on the east coast all the time I have been at sea.

26,087. Bound from what ports?—Bound to London.

26,088. From what ports?—From Scotland.

26,089. That is Banff?—North of Aberdeen to London; from London to Sunderland and Newcastle, to load coals there.

26,090. Do you make Flamborough Head bound south?—Always.

26,091. When you get off Flamborough Head, have you often found that the wind drawing to the south brings up a number of laden vessels off the Head?—Not from the south.

26,092. Do you find the wind drawing to the south off Flamborough Head brings up, that is, stops in that neighbourhood a large number of laden vessels? Do they collect off the Head?—If they are bound to the south and the wind comes from the south, then of course it stops them.

26,093. Have you ever seen a large number of vessels about Flamborough Head?—I never saw a great many laden vessels, but I have seen a good many light ones coming down. I never was in company with a great many laden ones,—very few.

26,094. For laden vessels off Flamborough Head would it be very desirable to have a harbour anywhere near the Head?—At times it might, but all times are not alike. It is owing to the winds. Of course in easterly winds they could not get out of harbour. Sometimes they are caught off Flamborough Head, but if the wind is from the south at all, they can always fetch the Tees Bay. They can run back there many times; they can run back to the ports they come from.

26,095. Have you ever, when off Flamborough Head to the north, found that the wind in heavy gales draws round to the north of east?—Yes.

26,096. Are you aware that in gales of that kind great numbers of laden vessels have been lost between Flamborough Head and Whitby, that could not get round into Hartlepool Bay?—There is a good deal to be considered. Sometimes ships get on shore for want of canvass, want of management, or one thing or another; there is no providing for everything. Of course there is Filey Bay, and a good many ports between the Tees and the Head.

26,097. Between where?—Betwixt the Tees and Flamborough Head.

26,098. At present there are no parts there?—Yes, there are Whitby and Scarborough.

26,099. When I say no ports, I mean ports in which a collier can take refuge at any time of tide in a gale of wind. There are none of these?—Not if she is long in getting to the place. There are none but tidal ports; none but tidal ports.

26,100. With your knowledge of tidal ports, in speaking of harbours of refuge for ships, would they do?—There are none except in Filey Bay: that might be a place, but it is not finished; it is not fit for them now.

26,101. Could we have a harbour of refuge off a tidal port?—Not such as they are now.

26,102. If there was a harbour near Flamborough Head, say at Filey, and another in the bight of the bay, would that be better for vessels than one large harbour in the bight of the bay?—Of course two chances are better than one.

26,103. Do you mean that even if the harbours were not so large, you would prefer two moderate-sized harbours, one in the depth of the bay, and another at Filey, to one single harbour of refuge at the bottom of the bay?—Yes, I should think so. That would be much better, of course.

26,104. Are laden colliers often in danger when running back, or in distress when caught in heavy weather?—Oh yes, they are in great danger going back.

26,105. For all laden colliers caught off Flamborough Head, would Filey be a better place than the depth of the bay?—Of course; they would get Filey Bay sooner than the Tees Bay. Before they get to the Tees they have nothing to take them there, neither canvass nor anything else.

26,106. You mean that their sails would be all blown away?—Yes.

26,107. Would that be a reason for having a harbour of refuge as near as possible to the Head?—Yes.

26,108. When you speak of Hartlepool do you mean that particular spot in Tees Bay or some place in that bay?—Some place in Tees Bay. I do not know all the rocks and places there.

26,109. Do you know Redcar?—I have been near in, but it is very seldom we are without way.

26,110. (*Chairman.*) Are you a shipowner as well as a master?—No.

26,111. You never owned any vessels?—No.

26,112. Are you acquainted with the general run of vessels employed in the coal trade, what style of vessels they are?—No, I could not say that.

26,113. You can't speak as to that?—No. There are good and bad ships among them.

26,114. There are good and bad among them?—Oh yes.

26,115. Which is the largest proportion, the good or the bad vessels?—I should say the most portion of them are good.

26,116. You would say the largest proportion was good?—Yes. I have seen a good many bad ones, but I should say the most part is good. No doubt there are some which I should not like to put my foot aboard of.

26,117. There are some you would not like to put your foot on board of?—No, that I would not, if it was likely I should be caught in a breeze of wind going along the coast.

26,118. Did you ever see one of the old colliers breaking up in any port?—Yes, I have seen them breaking up in all directions along the coast.

26,119. Along the coast?—From Yarmouth Roads to Hartlepool, lots of them; and at Sunderland too, and all places.

26,120. What I want to know is this: Have you ever seen any shipbuilder breaking them up?—No, I never saw any shipbuilder breaking them up.

26,121. Have you ever seen vessels broken up to be sold for firewood?—I have seen a few, not many.

26,122. Among those few have you ever seen a collier broken up in that way?—No, I never saw a collier broken up for firewood, but I have seen them cast on shore many a time. I never had so much time to spare to see whether they broke up after they went on shore.

26,123. Are the good colliers, generally, as good as your own vessel—the one you now command?—No doubt their tackle is as good, but they can't go with the vessel that I have got.

26,124. Are they sound in their hulls?—I can't tell you anything about that.

26,125. You can't tell, but you have your opinion; we all have our opinions, have we not?—I can't say anything about it, you know. I don't know how the ships are built, you see.

26,126. Are they as well found aloft as you are?—Well. I could not say.

26,127. You do not like to say, I suppose, so I will not press you upon that point.

Mr. CHARLES NOBLE examined.

Mr. C. Noble.

26,128. (*Chairman.*) Where do you belong to?—To Fraserburgh.

26,129. How long have you been at sea?—About 20 years.

26,130. And how long have you been in command of vessels?—Three years.

26,131. In what trade have you been employed

chiefly ?—The Baltic, the east coast of England, and Scotland.

26,132. If we were to have a harbour of refuge upon the east coast of England, where would you put it ?—I would have it about the month of the Tees somewhere.

26,133. At the mouth of the Tees ?—Yes.

26,134. Why would you put it at the mouth of the Tees ?—Because it is in the bight with easterly gales of wind, east and east-north-east gales of wind. It is the farthest point upon the lee shore.

26,135. It is the furthest in the bight and so you think that in a gale of wind on shore a ship would be sure to pick herself up there ?—Yes, from both sides.

26,136. Have you been upon this coast in heavy weather lately ?—Yes, I just was in the last south-east gales of wind.

26,137. Upon what part of the coast ?—I was just about three miles to leeward of Flamborough Head. I could not get round the Head ; I durst not look at it.

26,138. Upon which side of the Head is your worst sea ; on the north or on the south ?—Right abreast of the point is the worst ; I feel it the worst there.

26,139. Taking the sea to the north of the Head, and the sea to the south—I mean going along the coast 50 or 60, or 100 miles,—as a general rule, is there any difference between the sea on the one side or the other ?—It is far more broken to the south.

26,140. It is more broken to the southward than it is to the north ?—Yes.

26,141. Have you ever been into Tees Bay in bad weather ?—No, I always come out of it.

26,142. You always keep well out of it, then ?—Yes.

26,143. Did you ever run into Hartlepool in bad weather ?—I have made for it, but I have been frightened to tackle it, and I have hung her off at different times.

26,144. You have made for it, but have been frightened to take it ?—Yes.

26,145. Why were you frightened to take it ?—For fear of the tide.

26,146. That you would not hit the right time of tide over the bar ?—Yes ; the tide has always been out, and I have been too late always.

26,147. Too late always ?—Yes.

26,148. Is the land easy to make out about that part of the coast ?—Yes. It is a very particular part of the coast, that is.

26,149. There is no mistaking it when once you make it ?—No. At a distance at sea it is the best part of the coast, I should say. A man could distinguish Huntcliff on the one side, and the hills above Sunderland on the other, and then the vacancy of the Tees. A man can never go wrong, but run there.

26,150. Just in the immediate neighbourhood of Hartlepool is the land very easy to be made out ?—You can see no land at a distance at sea.

26,151. When you do see it is there any mistaking it ?—No.

26,152. It is not like any other part of the coast ?—Not like any other part of the coast, north or south.

26,153. About the soundings. In going into Tees Bay are they good ; can you make out in thick weather where you are by the soundings ?—In thick weather I hardly could without taking notice of the chart, and looking now and again. It is pretty shoal, from 7 to 11 fathoms.

26,154. You have never gone into Hartlepool or Tees Bay with the lead in thick weather ?—No ; I never try any place in thick weather, I always run off them.

26,155. (*Capt. Sulivan.*) Are vessels often stopped by east-south-east and south-east gales of wind off Flamborough Head, as you were the other day ?—Yes ; they must get south.

26,156. To laden coal ships bound south is that a frequent occurrence in their voyage ?—Yes, very frequent.

26,157. Would a harbour at Filey Bay be of great benefit to vessels caught in such a position as you were ?—It would, more especially for vessels coming from the Baltic and making the land at the Head.

26,158. Do you know that the loss of life is much greater in laden vessels than it is in light ones ?—It generally is, I think.

26,159. Is the danger to life greater when a laden vessel is wrecked than it is in a light one ?—Yes.

26,160. Then you would consider that it is of great importance in choosing a harbour of refuge that a site should be selected with especial reference to laden vessels ?—Well, for laden vessels or light vessels. You see, light vessels can bump themselves on the sand to save life, although the property is lost.

26,161. Supposing a harbour of refuge to be principally intended for the saving of life, do you think that, in considering a site for that purpose, you should have special reference to laden vessels ?—Yes, to laden vessels.

26,162. (*Mr. Coode.*) Were there many vessels in company with you in the last gale?—Three.

26,163. What became of them ?—One I spoke, and told him there was going to be a change of wind. He said he did not see any appearance of it. Says I, We are going to have a gale. He ran ashore the next day in Filey Bay.

26,164. When was that ?—It was on Friday night, the 12th.

26,165. Of this month ?—Yes.

26,166. Were any of the hands lost, do you know ?—No.

26,167. Have you frequently been in company with many vessels that were detained under Flamborough Head, being unable to get to the south ?—Very frequently.

26,168. What is the greatest number of vessels you have ever seen there ?—I have been in company there with about 300 sail.

26,169. Have you been long detained there at any time ?—I was detained once, and rode out a heavy gale of wind there in Filey Bay, with about 300 sail. I was the first ship that brought up in Filey Bay, and rode that heavy gale of wind out during five days, the wind being south and south and by west.

26,170. When was that ?—About six years ago this November. I came from the Baltic.

26,171. Do vessels incur much danger in running back, or when they are driven back, being unable to get to the south of Flamborough Head ? Vessels endeavouring to get south of Flamborough Head are very often driven back, are they not ?—Yes.

26,172. Do they incur great danger of foundering in running back ?—No ; without the ship springs a leak, and then they very often founder, you know.

26,173. Just so. If a vessel has to bear up, and to run back some distance, there is that danger attached to it ?—Yes ; there is that danger.

26,174. In such cases there is great risk of loss of life, is there not ?—There is in bad weather a chance of all hands being lost.

26,175. (*Chairman.*) Have you ever taken any bar harbour in bad weather ?—I have taken Shields.

26,176. In very bad weather ?—Yes.

26,177. How long ago was that ?—Three years ago, I took it with a gale of wind from the south-east. About five years previous to that, I was the mate of a vessel, and I then took it in a very heavy gale.

26,178. Were you obliged to lash the man to the wheel and send the people up into the rigging when you ran in ?—Yes ; all the persons were in the rigging.

26,179. I mean on the last occasion ?—Yes.

26,180. Did you get in without mischief ?—I did, because I had a ship that steered well.

26,181. But still there was great risk ?—Many ships went ashore. Oh yes, there was great risk.

26,182. There was great risk in doing it ?—If she had broached to the least, she would have gone over like a basin and capsized directly.

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Mr. Coode.

26,183. On the occasion, five years before, were you in great danger?—We were in great danger.

26,184. From the same causes?—From the same causes.

26,185. What sort of vessels was it?—It was a schooner in ballast.

26,186. On both occasions?—In both cases.

26,187. If you were on a lee shore in a heavy gale of wind, where would you like the harbour to be?—Upon the north coast of England?

26,188. I mean anywhere? If you were on a lee shore in a heavy gale, where would you like to have a harbour to run for?—Right under my lee.

26,189. Is this a subject on which you have conversed with seafaring men on this harbour of refuge question? Has it been a matter of conversation amongst the seafaring men of your acquaintance?—Yes, very often.

26,190. Very often?—Yes.

26,191. Amongst men not locally connected with the ports?—Amongst our own Scotchmen.

26,192. Could you venture to say what is their opinion on the subject?—In general, it has been always the bight of the Tees; right in the bight.

26,193. Right in the bight?—Yes.

26,194. The question of a harbour at Filey has been discussed by them as opposed to a harbour in Tees Bay?—Yes.

26,195. It has been discussed amongst them, and you are disposed to say generally that they would like to have it in the bight?—They would like to have it in the bight.

26,196. For the same reasons you have stated to us?—For the same reasons.

26,197. Are you pretty well acquainted with the style of vessels they have in the coal trade?—Oh yes.

26,198. What style of vessels are they generally?—Old wrecks. They have enough to do to keep some of them afloat.

26,199. It is difficult to keep them afloat?—You see them always pumping in harbour, at all events.

26,200. You see them always pumping in harbour?—Yes.

26,201. How are they found aloft generally, so far as you had occasion to notice?—I have seen them generally very badly situated for canvass.

26,202. Generally very badly situated for canvass?—A great many of them.

26,203. Would you be disposed to attribute the loss of a considerable number of these vessels at sea to the circumstance of their being bad vessels, and badly found?—There are a great many lost on account of the bad canvass, because they cannot bring them off a lee shore.

26,204. As to the number of men who sail in them, do you consider they have generally on board a sufficient number of men to work them?—No, I think they have not.

26,205. They are insufficiently manned?—Colliers are in general insufficiently manned.

26,206. Have you any opinion as to whether the men are as good now as they were in former days, because they had then the credit of being the best seamen in the country,—for the north-countrymen of the coasting trade. What should you say now, are they as good as they used to be?—Well, I should say that they were.

26,207. There is no difference in the quality of the seamen?—I do not think it.

26,208. I suppose you are of opinion that there are no better men to be found?—No; I do not think that there are any better men to be found.

26,209. Who are the colliers owned by generally? Have you any notion?—No.

26,210. Do not they own them in shares?—Frequently some owners have lots of them.

26,211. You have no idea of the system by which they are owned?—No, I do not. I am not much acquainted about the coal ports.

26,212. (*Capt. Sulivan.*) You said a vessel was wrecked that was in company with you in that east-south-east gale?—Yes.

26,213. Do you know how she got ashore?—I stood on Scarborough Quay, and saw them run ashore.

26,214. Could she not have run back into Tees Bay?—My vessel is a small one, but I could have hung her off and gone off the lee shore; but she could not do so.

26,215. I suppose yours is one of the Scotch schooners?—Yes.

26,216. They will go to windward when the colliers cannot?—Colliers cannot go to windward, they are too deeply laden.

26,217. A vessel of the class you command is no criterion for the wants of colliers?—No.

26,218. Why did this vessel bear up, was she embayed?—Yes.

26,219. She could not get off, or could she have run to Tees Bay?—She could have run to Tees Bay with her yards checked if there had been a harbour there.

26,220. Was the ship leaking, or anything of that kind, that made her run upon the beach at Filey?—The report in the *Gazette* said that she was leaking.

26,221. For that reason she ran ashore on the first beach?—She ran ashore before dark.

26,222. For all vessels so situated would Filey save many more than Tees Bay?—Yes; Filey would save them if there was no harbour there, as it does now.

26,223. I mean with a harbour at Filey. With as harbour for vessels of that description caught as she was off Filey Head, would Filey save that class of vessels more even than a harbour in Tees Bay?—Oh yes, it would, because they are generally in bigger lumps about Flamborough Head.

26,224. Suppose you had to make a harbour of refuge for laden vessels bound south, leaving out of consideration all the light ones, in which of the two places would you put it, Filey or Tees Bay?—I would have it in Tees Bay.

26,225. For vessels bound south?—Yes.

26,226. (*Chairman.*) You say you would have it in Tees Bay?—Yes.

26,227. Is it for this reason, that generally speaking, in bad weather, a vessel to the northward of the Head could get back into a harbour in Tees Bay, and that, reversing the case, vessels in Tees Bay could not find a harbour near the Head of any use to them? Is that your reason?—My reason is, that it is for vessels upon both sides; for vessels making the land, foreigners and all; to give every man a chance who is driving down upon a lee shore. That is my reason, and not for colliers only.

26,228. Have you ever worked round the Head with a flood tide and a strong southerly wind?—Yes.

26,229. What sail were you carrying?—Double-reefed sails, to get the Humber.

26,230. Could a collier have done it?—No; there were colliers driven ashore at the same time.

Mr. Robert Philip Walker examined.

Mr. R. P. Walker.

26,231. (*Chairman.*) How many years have you been at sea?—Since 1839.

26,232. Of that period how many years were you master?—Eleven.

26,233. How long were you a pilot in the navy?—During the years 1854–5.

26,234. What part of the coast do you belong to?—To Whitby.

26,235. What have you to say about a harbour of refuge?—I think, according to my opinion, Redcar would be the best place.

26,236. Give us your reasons for thinking Redcar

the best place ?—Because I have been many times caught in a gale of wind from the eastward, with a collier bound from the north, and we could generally get back to Tees Bay when we could not get round Flamborough Head; but if you cannot get to the southward off Robin Hood's Bay, you have a little more allowance going to the north, and you can also get into the bay when you cannot get out of it.

26,237. Therefore you think Redcar would be the best place ?—For the class of vessels on that coast.

26,238. (*Capt. Washington.*) Do you know Redcar pretty well ?—I never was there. I have been trading to Hartlepool and the Tees, but I never was at Redcar.

26,239. You have been often at Hartlepool ?—Yes, and Middlesbrough.

26,240. Are you able to take the Tees easily ?—I have done so, but I have not been there lately. There have been alterations in the lights since I was there.

26,241. Would you venture to run for the Tees with the wind blowing hard ?—I should not like it; not with a ship of any draught, because before you get to the bar, the same as before you get to Hartlepool, you get into shoal water. There is much broken water, and a ship runs off her steerage.

26,242. In what depth do you meet with the water, five, six, or seven fathoms ?—It would be about eight fathoms when we began to fall in with the sea. There was not much in eight fathoms.

26,243. Do you know the Tyne well ?—Yes, I have been a great many times there. I was five years master of a vessel out of the Tyne.

26,244. Have you shoal water off the entrance to the Tyne ?—Yes.

26,245. Does it break in the same way ?—It breaks, but not so far from the Fairway buoy.

26,246. It does not break so far out ?—No.

26,247. Do you know Sunderland well ?—I have been there several times.

26,248. Where did you think the best place on that coast for a harbour of refuge ?—Redcar; because it would be principally used by colliers, and they are such a poor class they are not able to keep the sea.

26,249. Is your reason for mentioning Redcar because it is in the bight ?—Because it is in the bight. They have an opportunity, if they get to the southward, of getting down into the bight, while if they are caught in Tees Bay, and are running for Hartlepool, they are very likely to be wrecked, and cannot get out. If they were further to the southward and they would not be able to get out of Tees Bay, and as many are caught there and between there and Whitby and Scarborough as anywhere. I should say about 80 times out of 100 a ship can get back to the north, when she cannot get round the Head, and get into the Humber. When caught in a gale of wind, they can almost always get to the north. The wind so prevails, that it is better getting to the north than to the southward round into the Humber.

26,250. Has the subject of a harbour of refuge been a question discussed amongst seafaring men ?—It has for a length of time now.

26,251. During the last year upon the coast ?—Yes, amongst all the captains that I have been mixing with here, but I never felt any interest in it, not thinking to go to sea any more.

26,252. Have you happened to hear what they think of it ?—The Whitby people think Whitby would be the best place. The Hartlepool people Hartlepool, and so on; they are all of them for their own place. I am now keeping a public house, and mix with a great many north-country captains. Every one thinks his own place is the best.

26,253. Suppose that some of these tidal harbours could be improved, do you think it would be desirable to do so ?—I cannot see which of them would suit.

26,254. Do you think the Tyne could be made a harbour of refuge ?—No, I think not.

26,255. You would prefer a large harbour of refuge to any attempt to improve the tidal harbour ?—I should.

26,256. Do you think that that is the general opinion on the coast ?—It is the general opinion amongst seafaring people upon the coast.

26,257. (*Capt. Sulivan.*) Are laden colliers very frequently caught off Flamborough Head in bad weather ?—They are very often caught off Flamborough Head.

26,258. For laden colliers only, leaving out the light ones, supposing them to be bound south, would Filey Bay be a valuable harbour of refuge for laden colliers ?—It would; because it would be so much nearer hand. It would be a very nice place too.

26,259. Leaving out the light colliers, and speaking first only of laden ones bound south, which do you think would be the best site for a harbour of refuge ?—Redcar would be the best place to take between the Forth and the Humber, but there are a great many colliers very often dodging in the bay, and if they were caught there that harbour would be of great service.

26,260. Would a harbour there save all the loss of life which occurs in laden colliers running back leaking and unable to reach a port ?—Yes, but if they are between Whitby and Filey they cannot get into Filey.

26,261. I say for vessels near Flamborough ?—Filey would be the best place then.

26,262. If you had your choice between one very large harbour at Redcar, or a smaller one at Redcar and another one at Filey, both sufficient to take the deepest class of colliers, which should you prefer, one very large one or two moderate ones ?—I should prefer two moderate ones on the east coast of England.

26,263. If you had two, would Filey and Redcar be two as good places as you could find for them ?—According to my opinion they would be two of the best places between the Humber and the Forth.

26,264. Why should you prefer Redcar to Hartlepool, both being in the depth of the bay ?—Because it would be deeper water at the entrance.

26,265. Do you think there would be less danger from the sea to a vessel running for Redcar than for Hartlepool ?—A great deal less danger attends it.

26,266. Do you think there is any serious difference against Redcar for vessels bound south going to sea again ?—If they save their lives and the ship, let them stop until they can get safe out.

26,267. Would you think there was any great disadvantage at Redcar as compared with Hartlepool for vessels getting to sea when they had taken refuge and no longer needed it ?—Not the least. They would as easily get from one place as another; for when they go to sea from both the Hartlepools, they generally have steamers.

26,268. Supposing Hartlepool and Redcar to be equal in all these points you have named, but that one would have nothing but refuge vessels, and the other would have a large trade running to it besides, which would you prefer if you were in a vessel running for refuge; a harbour exclusively for refuge purposes, or one which would also have a large trade ?—A harbour exclusively for refuge.

26,269. Is the reason that it would give more room at all times and be less crowded ?—If they did not allow the two Hartlepools to make a convenience of it. They would have plenty of room in a harbour at Redcar for all the vessels that could be caught in a gale of wind on that part of the coast.

26,270. Is the advantage that you suppose a pure refuge harbour possesses over a trade harbour made into a refuge harbour, that it would have more room in consequence of trade vessels being kept out and going to another port ?—A harbour of refuge alone would be preferable a great deal.

26,271. If there was a harbour at Hartlepool ?—It would be full of steam-boats.

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26,272. Do you believe it would be used by larger vessels than can now load in the docks; that they would load inside up to a certain mark, and then make use of the trade harbour to load the rest of their cargoes?—They would do so, as sure as ever that was the case.

26,273. Would that crowd it for refuge purposes?—Do you mean, would they use the refuge harbour if it was at Redcar?

26,274. No, at Hartlepool. I say if Hartlepool was made a refuge harbour, would ships use it also for loading deeper than they could in the docks?—They could, because a great many more of those large vessels that go there and to the north would go there.

26,275. Would they load the last part of their cargoes in the outer harbour?—You might be sure that they would if they were allowed, and that would be a great disadvantage.

26,276. Would that crowd the safe anchorage for vessels?—It would: because if a vessel was running in, in a gale of wind, and the place was crowded, she would be liable to get a great deal of damage.

26,277. Would that class of vessels keep exactly the best part of the harbour, being of deeper water, which they would require?—I should say so.

26,278. For that reason should you prefer a pure harbour of refuge, such as Redcar or Filey?—That is the reason I should prefer it.

26,279. (*Capt. Vetch.*) Do laden vessels bound to the southward often get detained off Flamborough Head?—Very often.

26,280. Does it happen more often just off the Head than at any other part of the coast?—No.

26,281. Not more often?—No, not oftener off the Head than off Whitby or Scarborough.

26,282. Have you ever seen any large number of vessels off the Head trying to get southward?—Yes; as many as 200 at a time. What they call "dodging" off Flamborough Head.

26,283. Have you known them detained for any length of time?—Yes; several days.

26,284. Do many, when they are detained, go into Filey Bay and bring up?—It is very often the case, when they are not too far out.

26,285. Will a vessel so brought up in Filey Bay have occasion to go out again if the wind gets too far to the eastward?—Yes; ships anchor and go away if they can get round Filey Brigg. If not, they must ride it out.

26,286. To vessels so situated would not a harbour of refuge at Filey be advantageous?—Yes; it would indeed in that case.

26,287. How often do you think you have seen anything like 200 vessels off Filey Head trying to get to the southward?—Above a score of times I should think.

26,288. (*Chairman.*) Have you ever taken the Tyne in bad weather?—Never.

26,289. Never in bad weather?—No.

26,290. Have you ever run into Hartlepool in bad weather?—Never when it was past a steamboat getting off.

26,291. How far off Hartlepool did the sea break?—In about five fathoms water.

26,292. It breaks out in five fathoms?—Yes; I have seen it.

26,293. Do you know whether it ever breaks out further than in five fathoms?—I have never seen it.

26,294. You have seen it break in five fathoms?—Yes.

26,295. Are you acquainted with the vessels in the coasting trade?—I know that class of vessels exactly. I served my time in them.

26,296. What sort of vessels are they as to quality, good or bad?—A very poor class of vessels generally; vessels that are condemned out of all other trades.

26,297. How are they found aloft generally?—Just about as poorly as they are in hull; the generality of them.

26,298. Just as bad in the rigging as they are in the hull; is that it?—Yes.

26,299. You attribute the loss of these vessels at sea to their being indifferent vessels?—In a great many cases.

26,300. Do they overload them?—Yes.

26,301. Is overloading a common practice?—It is a very common practice now. They never carry enough for them. They hardly ever carry enough. They never consider them large enough.

26,302. I understand you to say that they do overload them very much?—Yes: rather too much so. There are exceptions. There are a great many good ones, and a great many more that are hardly fit to go to sea.

26,303. By whom are these vessels that are unfit to go to sea owned?—I cannot say. Every person. Almost every tradesman has got parts. Almost every young tradesman in these parts has part in a vessel.

26,304. You think the vessels that are owned in shares in that way are worse looked after than others?—At present, through times being so bad, they cannot afford to keep them well fitted.

26,305. The times being so bad, they cannot afford to keep them in good condition; is that it?—Yes.

26,306. Is it a common practice for servants and people of that description, who have saved a little money in the north, to put it into shares in a collier?—It is.

26,307. So that one of these vessels may be owned by 20 or 30 people?—In a great many cases.

26,308. (*Capt. Washington.*) You said you thought Redcar would be about the best place for a refuge harbour?—Yes.

26,309. Have you ever seen a drawn plan for a harbour at Redcar?—No, never. I am merely talking of the situation of the place between the Humber and the Forth. I have never seen a plan of any harbour, because I have never had any interest in it.

26,310. You take it as in the bight of the bay?—Yes.

26,311. You prefer it to either improving the Tees or Hartlepool. You very much prefer it as a site in Tees Bay?—Yes.

26,312. Or was it only that you said Redcar as part of Tees Bay?—To have a harbour of refuge at Redcar was my opinion.

26,313. I know you think that, but why do you say Redcar particularly?—On account of so many vessels being caught between Flamborough Head and there, further north.

26,314. You mean somewhere in the bight, do not you?—I mean in the bight. There are so many caught in Tees Bay, and they can generally get to the northward, when they cannot get out of Tees Bay and get to the southward. But if caught further south, they could always get back again, if they cannot get Flamborough Head.

26,315. I think you said, in answer to a question which Capt. Sulivan put, that if a large harbour of refuge was made at Hartlepool, vessels would come outside, and load up their cargoes in the refuge harbour?—I am almost sure of it.

26,316. It is very natural to suppose so, is it not?—They would be sure to take advantage of it directly.

26,317. But suppose a million of public money to be laid out upon a refuge narbour, say there or at any other place, would it be any hardship to make a regulation that ships should not do so, and enforce it under the direction of the harbour master by means of a heavy penalty; would that be any hardship?—Not at all, I should think.

26,318. The public money has a right to be laid out for the public good, has it not?—If it is to be a refuge harbour, I think it should be a refuge harbour independently of the colliers.

26,319. You would, as a sailor, think it no hardship to be placed under such a regulation if a refuge harbour was made at that part of the coast?—Not conscientiously; nor should I if I was an owner.

26,320. (*Capt. Sulivan.*) What depth of water at either of the places you have mentioned, that is, Redcar or Filey, would you consider necessary at the entrance of the harbour for a laden vessel to take it in safety in a gale of wind?—At low water?

26,321. Dead low water spring tides?—Six fathoms.

26,322. Do you think that would be sufficient for any class of vessels in any sea that you have seen on that coast at those two places you have named?—Not for any class of vessels.

26,323. I am speaking now of the class of laden colliers?—Yes, for any class of laden colliers it would.

26,324. At Redcar would the sea break inside six fathoms?—Not at six fathoms. I think it would not.

26,325. Have you ever seen a heavy sea in Filey Bay?—Never; because when I have been there it has been merely for shelter, dodging under the Head.

26,326. (*Capt. Vetch.*) Suppose there was a breakwater in Tees Bay on the line of seven fathoms, there would be no breakers inside of that, would there?—No.

26,327. (*Mr. Coode.*) Do you consider that there is less broken water off Redcar than off Hartlepool?—Yes, outside the rock.

26,328. Are you quite clear about that?—Yes; whenever I have been there, and I have been a great many times, I always saw less sea outside Redcar rocks than off Hartlepool.

26,329. That is to say, that in five or six fathoms water off Redcar you do not see so much sea as in five or six fathoms off Hartlepool; is that so?—The waves are more regular outside Redcar rocks than in Tees Bay.

26,330. You give it as the result of your experience that there is less broken water off Redcar than off Hartlepool?—Yes, I do.

26,331. Have you been there often in heavy weather?—Not such very heavy weather. I have never gone there in weather so strong that a steamboat could not get out. I have gone with a gale of wind, and then you could form an idea from the roll of the sea. That is the most that I have seen.

26,332. Then the result of your experience is, that there is less broken water off Redcar than off Hartlepool?—I think so.

26,333. Supposing that there was a small harbour at each place, and you had occasion to run for one or the other, which should you choose in a gale of wind?—Redcar.

26,334. You would rather run for Redcar than for Hartlepool?—Yes, I would.

26,335. For what reason?—Because I think there would be less sea in taking it. You are generally running from the southward, and the entrance to Redcar from the southward would be better than that to Hartlepool.

26,336. That is your reason. You think there would be less broken water?—Yes.

26,337. Would you have any question about prefering Redcar to Hartlepool?—I should prefer Redcar.

26,338. That is the only reason, is it?—That is the only reason. Taking it in a gale of wind, I think there would be less chance of a collier being pooped and running off her steerage.

26,339. (*Chairman.*) Are a considerable number of vessels that trade to the north for coals commanded by men from the river Thames or from this south part of the country?—Very few.

26,340. They are chiefly north countrymen?—Yes, if the ships are owned by London owners the captains are principally north countrymen.

26,341. So that the men on board are chiefly north countrymen?—Yes.

Tuesday, 30th November 1858.

PRESENT:

Admiral Hope (Chairman).

Captain Washington.
Captain Sulivan.
Captain Vetch.
Mr. Coode.
Mr. Evans, Secretary.

Mr. James Ware examined.

26,342. (*Chairman.*) You are the water-bailiff of the port of Bridgewater?—Yes.

26,343. And you appear here on the part of the Harbour Commissioners of Bridgewater?—The Bridgewater Corporation.

26,344. To state their views on the subject of a harbour of refuge in the Bristol Channel, is it not?—Yes.

26,345. Will you then proceed to make any statement you may wish on that subject?—All that I know, and I have an experience of thirty-six years up and down the Bristol Channel, is, that I have always thought it would be necessary to have a harbour of refuge there. I do not know any other place in the channel that is more convenient for that purpose than Lundy Island. I have many times seen 100 sail—so far back as when I went with convoy. We have been under convoy with 100 to 200 sail, and have been forced back to the Mumbles and further up in consequence of the weather blowing so strong from south-west and south-south-west we could not get shelter. If we had a harbour of refuge there we could always get under way,—on either side. We could go either to the northward or southward. Clovelly has been talked of, but I always thought it too far into the bay. I do not know a more convenient place in the channel than Lundy Island. It is mid-channel for shipping passing both up and down in gales of wind.

26,346. But were you a seafaring man yourself at any period of your life?—For thirty-six years.

26,347. And of that period how long were you in command of vessels?—For twenty-two years in one, for six in another, for one in another, and for four in another. I was mostly in the Government trade, carrying timber to Her Majesty's dockyards.

26,348. How long were you a master?—Thirty-two years.

26,349. Then in what trade were you chiefly employed—foreign or home?—I was always in the Portsmouth, Plymouth, Milford, and Chatham trade, carrying timber from Bridgewater, Chepstow, Barnstaple, and Bideford.

26,350. During the whole of that time?—Yes, during the whole of that time.

26,351. Then your opinion is decidedly in favour of Lundy Island?—Yes.

26,352. Have you ever made Lundy Island in very bad weather, running in from the sea?—Oh yes, many and many scores of times.

26,353. And it is an easy place to make?—Yes, very easy.

26,354. Is it easy and safe to make?—If we run off within a few miles, and we can always see where we are, or know by our reckoning. It is very seldom that we cannot see two or three miles off, unless it is very foggy weather; if it is any way clear, since the lights have been there, we can see them, and we have

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a better opportunity of making it than we used to have.

26,355. Have you ever run for the land about the Mumbles in bad weather ?—Yes.

26,356. And what is your opinion of that as a land-fall to make in bad weather—Very bad indeed. I have nearly been ashore several times.

26,357. Why is it so bad ?—It is so very far to the leeward ; we are afraid to go, on account of the Skerweathers, and there is generally a great drift taking us on the starboard bow, and carrying us to leeward.

26,358. You have been inside the Mumbles ?—I have not been inside the Mumbles.

26,359. In thick weather, in the daytime, is there anything in the land to prevent you ; is it not high land ?—Yes.

26,360. Then is it not easily made ; is there anything that prevents it being less easily made than other high land ?—No ; sometimes I have been at the Mumbles when we could not see the land : we have seen the sea break in when we could not see the opening of the harbour or knew where we were.

26,361. But is it worse at the Mumbles than anywhere else on that part of the coast ?—No, not worse than it is from that to Ram Head, or for 15 miles along. We call it running so many miles to leeward when vessels are over by Lundy Island, and it is hard to run back again 35 miles on a lee shore.

26,362. In the upper part of the Bristol Channel what kind of anchorage is there ?—Whereabouts do you mean ?

26,363. About the Holmes ; what kind of anchorage is there ?—Oh, there is very good anchorage ; everywhere above the Holmes on to Pentreath there is anchorage.

26,364. But is not, in point of fact, the whole of the channel above the Holmes a harbour of refuge in itself ?—You can always stop a tide in the tideway, but you don't lie in an open roadstead like that, in consequence of the tide running so strong there.

26,365. But, supposing a ship running in from south-west, is there anything to endanger her safety besides the tide if she lies there ?—She would lie under the Flat Holmes, where there is a roadstead ; in general, large ships lie there ; I have seen Government ships there.

26,366. Did you ever know an accident happen to a ship lying there, in that part of the Bristol Channel ?—Not while lying at anchor.

26,367. Have you ever rode out a gale of wind there in the Bristol Channel ?—No, only at Penarth.

26,368. Do you know Milford ?—Yes.

26,369. Have you ever made Milford Harbour in bad weather ?—Yes, I have been in and out of the harbour.

26,370. And would not anchor ?—Yes.

26,371. Why ?—Because it blew so hard.

26,372. You could not fetch far enough in to anchor ?—No ; I was obliged to come out again.

26,373. What kind of a place is Milford to make ?—It is like all other places when the weather is fine, and you can see the light.

26,374. But in thick weather, what kind of a place is it to make ?—We cannot make it well in thick weather, the fog hangs about it.

26,375. Is it what is called a blind harbour ?—Yes ; we are obliged to go off to sea. I have sometimes been close in to the Head, and could not see the top, and have been obliged to go off again to sea, and wait a few hours.

26,376. You are well acquainted with the coast between Hartland Point and the Land's End ?—Yes.

26,377. Supposing you had a harbour of refuge at Lundy Island, where would be the best place of shelter for a vessel caught on that coast with the wind on shore between Hartland Point and the Land's End ?—There is Padstow. I have run into Padstow. St. Ives is a good place.

26,378. Which is the best, do you think, Padstow or St. Ives ?—Why, I can hardly say. I have been to Padstow when it has been blowing a gale of wind right in, but it is bad getting in. You can beat into St. Ives Bay better. But a harbour of refuge would be outside, and you would not want to get in.

26,379. But to repeat my question. Between Hartland Point and the Land's End where would be the best place to spend money upon in forming a harbour of refuge to give shelter to vessels caught there with the wind on shore ?—I should say St. Ives.

26,380. And would a vessel always be able to get to St. Ives ?—Oh no ; sometimes there are 200 or 300 vessels lying off the Land's End and obliged to beat about or run for the Scilly Islands.

26,381. How many vessels have you seen off the Land's End so circumstanced ?—I have seen as many as 200 sail there.

26,382. At anchor ?—At anchor and beating about, not all at anchor.

26,383. When you say at anchor at the Land's End, where do you mean ?—At Whitsand Bay.

26,384. Where is Whitsand Bay ?—Just to the eastward of Longships, between that and the Brizons.

26,385. How many vessels have you seen at anchor there at one time ?—I have seen 100 sail, and as many working off and on, when I have seen a fleet of vessels meet from each way, down the Bristol Channel and from Liverpool.

26,386. These Liverpool ships you speak of are coasting vessels ?—Yes.

26,387. I suppose the foreign traders from and to Liverpool never come near the Land's End ?—Oh yes, when they are bound to the English Channel.

26,388. You mean those which are for the western foreign trade ?—Oh no ; they go round by Cape Clear, they never touch the Land's End.

26,389. (*Capt. Washington.*) You belong to Bridgewater, do you not ?—Yes.

26,390. What is doing at Burnham now ?—They are repairing the causeway, and making up and new building the quay.

26,391. Is there any intention of making a large harbour there ?—I do not know ; they have been speaking about it ; they have been talking about going to Parliament for a bill, but I do not know anything about it.

26,392. You do not know anything about it yourself ; you have not been consulted ?—No ; all I know is from hearing the Burnham people speak of it.

26,393. The Burnham people and the Bridgewater people are separate, are they not ?—Oh no. I am opposed to the causeway, for I was driven ashore there.

26,394. The causeway projects too far out, I suppose ?—It is two feet high and eighteen feet long, and vessels bringing up drive on shore there. It was said there is no sea there, but there has been 500*l.* damage since.

26,395. Since the causeway was placed there ?—Yes.

26,396. You mean that the damage was done to the shore, not to the vessels ?—Yes, to the shore.

26,397. Has any vessel been driven on the causeway ?—No ; I think it will do good sometime. The Bridgewater people are not against it.

26,398. You speak of a good many vessels being anchored at Whitsand Bay, lying off the Brizons ?—Yes, a great number.

26,399. Have you ever been anchored there yourself ?—Yes.

26,400. That as a stopping place ?—Yes, as a stopping place.

26,401. Is it not very much exposed ?—Yes, and the anchorage brings home such a surf.

26,402. Would a stopping place there in that neighbourhood, or a harbour of refuge at any point of the Land's End, not be useful ?—I am afraid not ; I think the surf is too great.

26,403. I speak of the coast anywhere within ten miles of the Land's End ; at St. Ives, for instance ?—

At St. Ives it would. There is a fine bay there, and the stones run out. You are sheltered from the easterly winds.

26,404. If anything is to be done in that neighbourhood, then you think St. Ives Bay the best place?—Yes.

26,405. Have you been there since the light was placed there?—No, I have not been at sea for the last 14 or 15 years.

26,406. What was the tonnage of the vessel you commanded?—About 135 or 140 tons.

26,407. I think you said you had been in a convoy that was forced back to the Mumbles?—Yes.

26,408. How far had you got?—Below the Mumbles, with the wind north-north-west.

26,409. Where were you going from?—From the Mumbles.

26,410. But what port had you sailed from?—From Bridgewater.

26,411. How came you then on the north side?—When the wind is north-north-west we cannot get down the channel, and we run away to the Mumbles, where there is good shelter until the wind comes round to south and south-south-west.

26,412. Is that the usual practice with vessels sailing from Bridgewater?—Yes, and from Bristol.

26,413. And from Penarth?—Yes, because then you get the wind, and get down to Lundy Island.

26,414. I think we were told in the Bristol Channel that no vessel went near the Mumbles that could help it; is that your experience?—No, a great number go there.

26,415. What number have you seen there?—About 200 sail.

26,416. Is that a common occurrence?—No; sometimes with long southerly winds blowing I have seen 100 to 150. There is a great many go into Swansea.

26,417. Then the Mumbles road is still found a useful shelter for vessels navigating the Bristol Channel?—Yes.

26,418. But your opinion is, that if one harbour of refuge is formed in the channel, Lundy Island would be the right place?—Yes, because it is in the middle of the channel.

26,419. The middle of the whole channel?—Yes, of the whole channel.

26,420. You are speaking of the upper part of the channel, are you not?—Yes.

26,421. Do you think anything is wanted further seaward, further down,—at St. Ives, for instance?—It would be an excellent thing if it could be done.

26,422. Would it be the means of saving many lives?—I should think there are many lost there. I should think there are a great many vessels lost inside Hartland Point that cannot get off. I have been in company with two vessels that were lost there.

26,423. You have been in company with two vessels that were lost on that part of the coast of Cornwall?—Yes, they got embayed.

26,424. Where?—In Bude Bay.

26,425. Would a harbour of refuge at St. Ives have saved these vessels?—Yes, if they had gone there.

26,426. Would they have gone there if there had been a harbour of refuge there?—I don't know. I can't say.

26,427. Do you think if harbours of refuge were placed round about the coast, vessels would try to make their passage so as that they could run into them if bad weather came on?—Certainly.

26,428. And that a harbour of refuge placed at a good spot would be a more direct benefit than at first sight appears?—It would.

26,429. Have you ever been anchored under Lundy Island yourself?—Yes, many a time, lying out there and anchoring there; and I have been to the eastward, running under double-reefed canvas, not being able to get up. I did not like to go to Padstow.

26,430. (*Capt. Sulivan.*) What gales do you specially want refuge from in the Bristol Channel?—South, south-south-west, south-west, west, and west-north-west.

26,431. Does not Lundy Island afford a good anchorage with these winds?—Yes, from south-west, but people are afraid of the wind coming in.

26,432. You mean shifting to the eastward?—Yes. It is like Dublin Bay. See what an excellent place that is. When I went to sea how many vessels were lost there; but now it is an excellent harbour of refuge, on account of the breakwater.

26,433. In your experience, where have you known the greatest loss of life in the Bristol Channel,—above Lundy, or between Lundy and the Land's End?—Above Lundy.

26,434. What part?—In Tenby Bay.

26,435. That is below Lundy?—No.

26,436. I speak of the Bristol Channel proper; that is, the narrower part of the channel above Lundy Island, between the Nash and Bristol; where have you known the greatest loss of life,—there, or between Hartland Point and the Land's End?—I think we have more lost up above the Nash and Thorney Point, and up along there.

26,437. Where is that?—Up above the Nash lights.

26,438. Have you known any case, of your own knowledge, of vessels that have put back from Lundy that have been wrecked there with loss of life?—I cannot say; I may have forgotten.

26,439. Have you of your own knowledge known any vessels wrecked between the Land's End and Lundy?—I have heard of them.

26,440. I do not mean to ask you if you saw them, but do you know from information that many vessels have been wrecked in that locality, with loss of life?—Yes. We had one from Bridgewater lost there.

26,441. With loss of life?—Yes, with loss of life.

26,442. What gale was it that you were anchored in,—in the bay you described near the Land's End, Whitsand Bay?—I did not anchor during that gale.

26,443. No, but some vessels you told us were at anchor?—Yes, that was with an easterly wind.

26,444. Then you would not want a harbour of refuge at St. Ives or on the west coast of Cornwall with these winds. No vessel is in danger of being lost with these winds?—No, they are in danger of driving out; several were driven out during this gale, and driven over to Crookhaven or Baltimore.

26,445. The danger is being driven out to sea?—Yes.

26,446. But for a refuge to save life you want a harbour where the gales are on the land?—Yes.

26,447. Then the north-west gales are, I suppose, the most dangerous gales on the coast?—Yes, the north-west would be.

26,448. Then St. Ives Bay would be the best place?—Yes.

26,449. If an anchorage was made at St. Ives Bay, do you think that vessels bound down the coast would be far enough to windward to fetch into it?—Oftentimes I have been myself down there for Bridgewater, and been forced to go back to the Mumbles again.

26,450. But with a north-west gale a vessel might not be able to weather Hartland Point?—She might not be able to weather it out when you take a lee tide.

26,451. With north-west gales a vessel might find a difficulty in weathering Hartland Point?—Yes.

26,452. But vessels caught between Hartland and St. Ives with such a wind would be in danger?—Yes.

26,453. Would Padstow form a desirable harbour of refuge?—Yes.

26,454. Do you know the difficulty of entering Padstow?—Yes, with the wind north-west and north-north-west. There is a sand called the Doom-bar, and I have known many vessels get on it.

26,455. Have you ever experienced any difficulty in high gales from the north-north-west from the wind being suddenly eddied by the Point?—No, I

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have never attempted to run in there with such a wind.

26,456. If the entrance to Padstow could be made safe with north-west gales for vessels to enter, would it then be a very desirable harbour of refuge ?—It would be, if you could make it so. But you could not make it so while the Doombar is there, unless you made it outside by the island. The entrance is very narrow there.

26,457. (*Capt. Vetch.*) I think you mentioned that you had taken refuge under Lundy Island ?—Yes.

26,458. How often have you done so ?—Once or twice in a year.

26,459. Once a year, how long ?—Sometimes I have been there two days at a time, sometimes more, and sometimes only a tide.

26,460. What is the greatest number of vessels you ever saw there at any one time ?—Never more than a dozen.

26,461. How long do you say you have been kept there at anchor ?—Two days, and sometimes a day.

26,462. Waiting for a wind ?—Yes, and then we ran away to Milford or back to the Mumbles, for we were afraid to lie there, because the wind set in sometimes a whole week together.

26,463. Then you think Lundy Island would make a good harbour of refuge ?—I think it would.

26,464. Is it not so now ?—No ; when the wind comes round any way to the south, you must go off and run up channel, or away to Milford if you are bound for the Land's End.

26,465. What would be necessary to make it a good harbour of refuge ? What works do you think would be necessary ?—I was thinking it might be done like Kingstown in Ireland.

26,466. That is, to enclose it on all sides except one ?—Yes.

26,467. Except an opening in the middle ?—Yes.

26,468. That would be very expensive ?—That is what I say.

26,469. Is not the island two miles long ?—2¾ miles, and there is shoal water at two points. It is shoal water from Rat Island to the one point, a distance of 1¾ miles.

26,470. I believe the great difficulty there is, that the vesssels drag their anchors ?—I never knew them to drag their anchors. I have known them to part from their anchors.

26,471. Would not the fact of laying down moorings obviate that difficulty ?—It would do great good for the vessels to make fast to.

26,472. And at small expense ?—Yes, at small expense.

26,473. You spoke of Whitsand Bay ; did you ever lie there ?—I have lain there a day or so, and ran for the Scilly Islands. I have frequently run for the Scilly Islands when we could not get up channel.

26,474. That would be only in easterly winds ?—Just so, in easterly winds, when the wind is east-south-east.

26,475. And with regard to St. Ives,—did you ever take shelter there ?—Yes.

26,476. I believe that is very open at present to the north-west, is it not ?—Right open to the north-west. They did begin to make a breakwater there themselves, years ago.

26,477. If it was protected by a breakwater, would it then be a valuable place for vessels to shelter in ?—Yes, the breakwater would take away the north-west sea, and the bay shelters you from the east ; and it is a convenient place for getting round the land for ships and vessels.

26,478. You have also been asked about the Mumbles. You say that at certain times that proves a very useful place for vessels to reach when waiting for a wind ?—Yes.

26,479. But it is rather shoal at present, is it not ?—Yes, it is dry at half tide.

26,480. If it could be deepened and dredged, and a little more sheltered by works, it would be a much more useful place, would it not, than it is now ?—Oh yes, for large vessels strike now sometimes at low water, but the small craft lie aground there dry.

26,481. You have spoken of the Padstow Harbour, I suppose you have often been in there ?—Not more than seven or eight times in my life.

26,482. Did I understand you to mention that you had been on the Doombar Sand ?—Oh no, I was never on it ; if I were, I should be afraid of getting off again. I have been there ; in easterly winds everything tacks off Lundy Island.

26,483. But if the Doombar could be removed altogether it would be a useful place ?—Yes ; but I recollect many years ago they tried to do that and could not succeed.

26,484. (*Mr. Coode.*) You said you had been to Padstow several times ?—Yes.

26,485. When you went to Padstow did you run for shelter or did you go there in the ordinary course of trade ?—I have run there for shelter many times. I was once forced to run in, in the middle of the night, or we should have foundered.

26,486. When you say forced, could you have got to no other place for shelter ?—No ; I was in a brig which was leaky, and she made so much water that I was forced to run in, about 12 o'clock at night.

26,487. Do you mean to say that vessels in the bay cannot run for anywhere else ?—Oh yes, they can run down channel, but I was forced to run in or sink.

26,488. Now, speaking of the two positions quite irrespective of their natural facilities for making a harbour, which would you prefer, supposing it could be made at Padstow as readily as at St. Ives, and at St. Ives as easily as at Padstow, at which place would you have it, if you had your choice ?—I should still prefer St. Ives.

26,489. You prefer St. Ives ?—Yes.

26,490. Why so ?—We are often getting down to St. Ives, and if we had the harbour there we should have something to look to. In heavy gales we get further down.

26,491. Is it a fact that the heaviest gales in the channel come from the southward and the westward ?—I suppose they do.

26,492. And if you were off Padstow and caught by westerly gales, would you be able to fetch St. Ives ?—No, nor Padstow either.

26,493. Then it would often occur that you could not fetch either one or the other ?—It would.

26,494. What would you do under such circumstances ?—Go away for the Mumbles.

26,495. And suppose there was a harbour at Lundy Island, could you fetch it ?—Yes, I should then go for Lundy Island. If close to Hartland, I should then go for the Mumbles.

26,496. What were the circumstances attending the loss of the Bridgewater vessel you spoke of just now ?—She foundered.

26,497. She did not get ashore ?—No, she went down.

26,498. Had she been beating about long in heavy weather in the channel ?—No ; she was coming up channel, beating up when she went down, and all hands on board were drowned.

26,499. But that is not a case, then, in which the vessel would have been saved, had there been a harbour of refuge ?—No.

26,500. You said just now that many vessels were obliged to go to Padstow. Do you think those vessels would be able to fetch St. Ives as well as Padstow ?—No, or they would not go to Padstow.

26,501. They only go to Padstow, then, when they are forced there ?—Yes.

26,502. Is not that an argument for making a harbour of refuge in that locality ?—I think there are more vessels caught down by St. Ives than near Padstow.

26,503. Just so, and therefore you think a harbour at St. Ives preferable ?—Yes.

26,504. With regard to those vessels you referred to as being caught in Whitsand Bay, would they have gone there, do you think, if there had been a harbour

at St. Ives ?—Perhaps they would not have gone down. If the weather was blowing hard they would probably have gone into St. Ives.

26,505. But if they had passed St. Ives and had got as far as Whitsand Bay, could they have got back to St. Ives ?—They could not.

26,506. They could not get back with an easterly wind blowing ?—They could not.

26,507. But would have gone into St. Ives, you think, as they went down ?—I should say so.

26,508. Is it a common occurrence to see anything like 200 vessels off the Land's End at Whitsand Bay ?—Oh no ; but this wind prevailed for five or six weeks.

26,509. When you spoke of making a harbour at Lundy Island similar to that at Kingstown, you did not, I presume, propose to throw a pier out from the south, and another from the north point of the island ?—Oh no.

26,510. What is your idea of the position in which the harbour should be placed ?—I would run the south pier out from Rat Island and the north pier from Tibbet Point.

26,511. If a harbour of refuge were to be formed at Lundy Island, for how many vessels do you think it should be made to provide ?—About 100 sail.

26,512. You think that would suffice ?—Yes, I should think so.

26,513. You have seen large vessels brought up under Lundy Island, or dodging about there ?—Oh yes ; I was brought up there on one occasion with a large brig, or I should have been obliged to run away for Milford or forced to the Mumbles.

26,514. Have you not known any instances of vessels parting from their cables and losing their anchors at Lundy Island ?—No.

26,515. I think you said you knew of no instances where the vessel dragged her anchors ?—No.

26,516. From your experience of Lundy Island, then, do you say it is good holding ground ?—I should say so, speaking from my own experience.

26,517. For small vessels ?—Yes, small vessels we bring up well now.

26,518. You never found the holding ground bad or indifferent ?—No, not where I brought up ; but I cannot speak to it in deeper water.

26,519. You said that you had been down to St. Ives and driven back to the Mumbles ; has that happened more than once ?—I don't know exactly. I have got back to Milford again many times.

26,520. Were many vessels in company with you ?—Oh yes, a great many. We cannot beat back, you see.

26,521. How many vessels have you seen so circumstanced at any one time ?—We have gone out with about 100 sail perhaps, but have soon lost each other ; some would sail faster and some slower than others.

26,522. Where have you generally sailed from ?—Some from the Mumbles, and some from Milford.

26,523. Have you known any vessels lost or foundered through being driven back ?—No.

26,524. You say that you give a decided preference to St. Ives, from Lundy downwards, for a harbour of refuge ?—Yes.

26,525. Taking the British Channel as a whole, you prefer, first Lundy, and then St. Ives ?—Yes.

26,526. (*Capt. Sulivan.*) Do you think it desirable that any harbour of refuge should have its entrance placed in such a position that vessels taking the entrance should go in with a fair wind ?—Where ?

26,527. Anywhere. Would it be necessary that all vessels using the harbour should have a fair wind in ?—You cannot at all times do that.

26,528. If you have a harbour of refuge at Lundy, the entrance must be on the eastern side ?—Yes.

26,529. And if you had to put back with westerly gales you would have to work up into the harbour ?—Yes, but you are under the lee of the harbour.

26,530. Could any disabled ship work into the harbour if she was on the lee side ?—Not if she was disabled, but she would have a buoy or something put down to assist her.

Mr. Charles Hunt examined.

26,531. (*Chairman.*) You are a seafaring man ?—Yes.

26,532. How long have you been at sea ?—Twenty-five years.

26,533. Are you still following the sea ?—Not now.

26,534. Are you a shipowner, or connected with shipping in any way ?—I am a shipowner.

26,535. How long have you been in command of vessels ?—For 15 years.

26,536. In what trade were the vessels which you commanded chiefly employed ?—In the coasting trade, in the Bristol Channel.

26,537. What description of vessels were they ?—Coasters of about 100 tons, about 60 or 70 tons register.

26,538. Schooners ?—Schooners and brigs.

26,539. You have heard the evidence of the last witness ?—Yes.

26,540. Do you generally concur in the reasons which he has given for placing a harbour of refuge at Lundy Island ?—Yes.

26,541. Have you anything to state in addition to the reasons he has already given ?—No. There was one question which you put respecting loss of life ; I think the greatest loss of life occurs between Lundy Island and the Land's End.

26,542. Is not the whole of the channel about Lundy Island nearly a harbour of refuge in itself ?—It is very nearly so.

26,543. Supposing a vessel in a heavy south-west gale runs in and drops anchor anywhere near the Nash lights, she can hardly come to mischief with good scope of cable and ground tackle ?—She would not stop ; she would run up the channel for Penarth. It is clear up the channel at any time. There is high land in some parts, and you can go in shore so close that you can throw a biscuit on shore, and shape your course to Penarth, where you have not the difficulties you find at the Mumbles Head.

26,544. If you are running with a heavy breeze, would you run for the Mumbles or for Penarth ?—I would not run for the Mumbles with a good ship ; I should be afraid.

26,545. Where would you run for in preference to the Mumbles ?—Right up the channel to Penarth.

26,546. Supposing a ship to drop anchor in 14 fathoms water abreast the Nash lights with a heavy breeze right in, is there any sea that could do her a mischief ?—No.

26,547. With good ground tackle and scope of cable ?—No ; the only difficulty is the strength of the tide, and the ship getting athwart and rolling heavily.

26,548. But still there is not much sea there to hurt a vessel ?—Not much.

26,549. Not a good ship ?—No.

26,550. Have you seen any sea in the Mumbles hurt a ship ?—Yes.

26,551. From what direction ?—If it blows strong from the south-west there is a very nasty sea.

26,552. Have you seen ships part there ?—Yes, and drive ashore ; I have had my own ship ashore ; I have known 20 at one tide.

26,553. Therefore for the Swansea shipping some additional protection is necessary ?—Yes ; Swansea is a little harbour of refuge for small vessels. No stranger would ever run for the Mumbles in dark weather, for, if you happen not to sight the land, you have so much to encounter. The south-west weather is often so thick and dirty that you cannot see the length of the ship, and you are in amongst the breakers before you are aware of it ; you don't know

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whether you are too far to the east or to the west. There is the Helwick, a long dangerous sand, and I have known vessels coming to Swansea get ashore. At the Mumbles Head there is a sand, and not far from the Mumbles Head there is the Skerweather Sand; so that you have a narrow channel through which to find your way to the Mumbles, and sometimes vessels coming up channel will get on the Skerweathers.

26,554. Are these the grounds on which you think the Mumbles a bad place for a harbour of refuge?—Yes, on account of the danger of running for it in thick weather. At this time of the year, and with strong south-west gales, which are generally thick and dirty, you can scarcely ever see three times, the length of the ship, and the tide runs rather unruly.

26,555. From Hartland Point to the Land's End where is the best shelter for shipping going round the Land's End?—From Hartland Point to the Land's End?

26,556. Yes. Where would be the best place to find shelter for shipping in an on-shore wind?—Padstow would be a very good place, and if you could make a harbour there we should be very thankful. I should say the same with respect to St. Ives and Lundy Island. If you come to the point whether there should be one or three harbours, I shall be able to answer.

26,557. I put Lundy Island out of the question for the present, and ask, which is the best place on this district of coast between Hartland Point and the Land's End?—I should say St. Ives Bay.

26,558. In point of fact, a ship caught with an on-shore wind to the north of Padstow would always be able to get into St. Ives Bay?—It would be very hard if she could not get either to Padstow or St. Ives. If not, she must get ashore. Sometimes the weather is so bad that, even with a harbour of refuge under your lee, you cannot get into it; that is the case in thick and snowy weather. When a vessel is leaky it is sometimes a difficult matter to get into a harbour.

26,559. But you think St. Ives would be a most useful place?—I think if a harbour were made there it would be the means of saving a great deal of life and property. I have no interest in the matter, and wish to answer the questions in a straightforward manner.

26,560. (*Capt. Sulivan.*) Do you know Padstow yourself?—I never was in there. I have passed it several times. I have been close in, and know all about it.

26,561. I mean with respect to the difficulty of entering with a north-west wind?—I don't know how that can be altered.

26,562. Do you know anything of the difficulties of the entrance?—Yes; going in you are so close under the land, and the channel is so narrow, that the eddying wind drives the vessels over the Doombar.

26,563. The difficulties would be averted if vessels could get a cable's length inside the Doombar when she is met with the baffling wind?—Yes.

26,564. If the point could be cut down quite low, and to a sufficient distance to carry a steady wind a cable's length further in, would the harbour be safer to enter as a place of refuge?—I am afraid not, because vessels going in, go in under canvas, and it would be difficult to cut away such a quantity of the point as to get a true wind.

26,565. But supposing you could carry in a steady wind by cutting away the point, would that obviate the great difficulty?—I am not prepared to answer that question, and think it better to leave it alone.

26,566. (*Chairman.*) I think we have nothing further to ask you, Mr. Hunt. The last witness went so fully into the matter, and you so entirely agree with him, that we have no wish to detain you further. There is nothing further that occurs to you, as I understand?—With respect to Whitsand Bay, I have had vessels there in easterly gales. If there had been a harbour of refuge at St. Ives, the vessels would have gone there in preference to lying in Whitsand Bay. One of my captains says that several vessels drove away, the anchors and cables having parted. Some of the vessels went to the Scilly Islands, and others to different places. If there had been a harbour these vessels would have gone into it.

26,567. (*Mr. Coode.*) With respect to the saving of life and property, would you prefer St. Ives, or Padstow, as a harbour of refuge? I am not speaking of their relative engineering facilities, but, from your knowledge of the coast, I wish to know which place you would select?—St. Ives.

26,568. You think St. Ives better than Padstow?—Yes.

26,569. Do you agree with the last witness, that if a harbour were made there, many vessels would put in during doubtful weather, and not run on with the chance of being brought up in Whitsand Bay?—Yes.

26,570. There is great danger when 100 vessels bring up in that small space, of their running into each other and doing considerable damage?—My captain says there were three or four steamers there, which could not steam up channel, but were in Whitsand Bay.

26,571. When did your captain write to you?—About 10 days ago.

26,572. Was there any damage done on that occasion?—Yes; he lost an anchor and cable, and tells me that several other vessels parted from their cables and drove away.

26,573. Do you think that much of that damage might have been avoided if there had been a harbour of refuge at St. Ives?—Yes; the vessels would have run in. It blew so hard that they could not get to Mount's Bay, and sometimes they run for Scilly.

26,574. They would run into St. Ives?—Yes.

Mr. JOHN W. ARNOLD examined.

Mr. J. W. Arnold.

26,575. (*Chairman.*) What is your present occupation?—I am a Trinity House pilot.

26,576. How long have you occupied that position?—Four years.

26,577. Previous to that how were you employed?—In the coal trade.

26,578. How long were you engaged in the coal trade?—Five years.

26,579. As mate, or in what capacity?—I was for three years mate in the coal trade.

26,580. From what ports did your vessel sail?—From Shields to Woolwich Dockyard, and Chatham and Sheerness.

26,581. How long were you employed in the fishing business?—About 10 years.

26,582. Where were you so employed?—Along the coast, in luggers,—from the Farn Islands to the North Foreland, on the whole of the north-east coast.

26,583. Where would you put a harbour of refuge between Flamborough Head and the Farn Islands?—If I had to place a harbour of refuge I should decidedly say Filey Bay.

26,584. Why?—Because it would be more in the direct track of the shipping at Filey than at any other part of the coast.

26,585. Taking the coast from Flamborough Head to the Farn Islands, what is the wind that blows dead on shore?—The east-north-east.

26,586. The east-north-east blows dead on shore?—Yes; or the east by north, as near as can be.

26,587. Now supposing a vessel to be caught somewhere between Whitby and the Farn Islands, embayed there, of what use to her would be a harbour at Filey, with the wind dead on shore?—If a man knew there was a harbour he would persevere and get there.

26,588. But how could he do that if he could not weather Whitby Head?—A man coming there with

a good harbour would persevere and get there if possible.

26,589. But if he could not?—I should say he would then go back again.

26,590. Where to?—Hartlepool; but I should prefer going to Shields at once.

26,591. You say you would prefer a harbour in Filey Bay. What I want to know is this: with the wind on the shore on that line of coast how would a vessel be able to make Filey, if she was in danger of going on shore? What use would Filey Harbour be to her?—A heavy gale of wind always gives some hours' warning, except it is going to be a south gale. That perhaps will only last a few hours, and is of no consequence till it gets round to south-south-west, then it ends with lots of rain. If the wind goes the other way, we expect two or three days of it to the east and the east-north-east, and from that to the north-east.

26,592. I understand you to say that a vessel knowing there was a harbour at Filey Bay would get a sufficient offing to fetch it before the wind came on?—Yes.

26,593. Have you ever taken the Tyne in bad weather?—I have.

26,594. More than once?—Once or twice.

26,595. Give us some account of the worst time you ever took the Tyne?—I cannot give exactly the date when that was.

26,596. I do not want the date. Tell us how it happened?—We were caught down there. We had hove to in the night, waiting for water, and were forced to go in in the morning. We could not keep off the land any longer, and of course we had to go in through the broken water. There were a great many vessels there in the same predicament, all wanting to go out together, and the consequence was there was many foul of one another. I did not get any damage going in.

26,597. Was it blowing very hard?—Yes.

26,598. What time of the tide did you run in?—About a couple of hours before high water.

26,599. Were you light or loaded?—Light.

26,600. What sail did you run in under?—Under a foresail and a close-reefed maintopsail.

26,601. And what sail had you been heaving to under?—Under a close-reefed maintopsail and a fore-topmast staysail.

26,602. When you run in were you in danger of incurring any mischief?—The vessel was a very handy vessel, but some of the others—most of them—are very bad vessels to go in with in such a case as that. They almost all broach to.

26,603. Were your men placed in the rigging on that occasion?—No, I don't recollect that they were.

26,604. You did not put them up in the rigging?—No.

26,605. There was no necessity for that?—No.

26,606. Did you ever run into Hartlepool in bad weather?—No, I never did.

26,607. Have you ever been in the bay in bad weather?—Yes.

26,608. When?—I had a specimen of it a few days ago.

26,609. In the *Banshee*?—Yes.

26,610. Was there a heavy sea?—Yes.

26,611. What water were you lying in?—About four and a half fathoms at low water.

26,612. What distance were you from the shore?—I should think about half a mile from the Heugh, and I suppose about a third of a mile from the Longscar buoy.

26,613. Did the sea break outside of you?—Yes.

26,614. How far?—About a third of a mile outside, when we were lying there, and before we could get outside of it.

26,615. (*Capt. Sulivan.*) Do you know if the greatest loss of life happens in loaded colliers?—I think that is so.

26,616. Do the loaded colliers often get up to Flamborough Head before they meet bad weather, and collect there in great numbers?—Yes; they generally sail from the coal ports with a slant of wind. That brings them up to Flamborough Head, and three times out of five they catch the wind southerly, and get there in a lump together.

26,617. Are many vessels lost in putting back after getting up to Flamborough Head?—Yes.

26,618. For vessels under these circumstances would Filey be the best place for a harbour of refuge?—Yes; I think so.

26,619. For light vessels bound to the north, caught in east gales, would a harbour somewhere in the bight be better?—I think if the Tyne and Hartlepool were improved they would answer the purpose for light vessels, for light ships.

26,620. But if there were a harbour of refuge at Hartlepool and another at Filey, which do you think would save most loaded vessels?—One at Filey.

26,621. Do you think that the persons generally on the coast who are unconnected with the coal ports would prefer Filey?—I think so.

26,622. For loaded vessels?—I think so.

26,623. Have you ever heard such an opinion expressed?—I have.

26,624. Have you spoken to any persons on the subject?—I have spoken to captains of the Woolwich vessels trading constantly to Newcastle. They are in the habit of making about sixteen voyages a year, and are more along the coast than any other class of colliers.

26,625. Have you found them generally prefer Filey?—Yes.

26,626. Have you never heard them speak of any place in the bay as desirable?—I have heard them speak of it, but they generally give a preference to Filey.

26,627. Do you think any one harbour, either at Filey or in the bay, would save a large portion of the vessels that require shelter?—I think one at Filey would do so.

26,628. Do you think that a harbour at either of the places would be as good as a moderate though even smaller harbour both at Filey and in the bay?—The more harbours the better, of course.

26,629. But if you had your choice between one large harbour at Filey, say, and a smaller harbour, but one sufficient to take loaded colliers at all times, at Filey and somewhere in the bay, which would you prefer?—I should prefer a large harbour at Filey, with an improvement at Hartlepool and the Tyne.

26,630. But supposing these harbours could not be improved, and you had to make some shelter, would you prefer two smaller harbours, one in the Bay and the other at Filey, to a large harbour at Filey alone?—I should prefer a large harbour at Filey.

26,631. Would a harbour of refuge at Filey be of great advantage to the off-shore fishing vessels?—Yes, very great. They come from Penzance, and round the whole coast of England, and go to the Scarborough herring season. I believe 600 or 700 of these vessels go out every night in September and October. They are often caught, and have no place to go to except Scarborough, and nine out of ten get into the Humber.

26,632. For all that class of vessels would Filey be the best place?—Yes, decidedly the best place.

26,633. (*Capt. Vetch.*) Between the Farn Islands and Flamborough Head, with the wind directly on shore, you are of opinion that a shelter in Filey Bay would save more vessels than at any other site?—More loaded vessels.

26,634. Do you know the distance between the Farn Islands and Filey Bay?—I should say 90 miles.

26,635. Suppose it to be 90 miles, and suppose there are five ships in every mile, and the gale is dead on shore, how many vessels would Filey save out of that number?—I think, supposing these vessels to be between the Farn Islands and Filey, that a great number of them would get back again to their own ports, such as the Tyne and Hartlepool, before the

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weather came on very bad, because such gales generally give some hours' warning.

26,636. Do you think that vessels that had reached Whitby would be able to get on to Filey ?—If not, they would go Hartlepool or the Tyne.

26,637. Which place within these 90 miles would catch the most vessels ?—Provided the vessels had not got so far as Filey, Filey would be of no use ; but nine times out of ten they generally happen to be that far.

26,638. It would save all the vessels that had got so far as that ?—Yes ; and the others would persevere and get there if they could. If not, they must go back to their own ports. They could reach Shields or Hartlepool.

26,639. (*Mr. Coode.*) Is it the fact or not, that there are more vessels detained at Flamborough Head than on any other part of the coast ?—Yes.

26,640. And what proportion of vessels would Filey serve ?—For loaded vessels.

26,641. You were asked, if there were five vessels in each mile along the coast between the Fern Islands and Flamborough Head, what number Filey would save ; do you think vessels are ever caught equally distributed along the coast in that way ?—No.

26,642. Is it not a matter of common occurrence that vessels are caught in large numbers at Flamborough Head ?—Yes.

26,643. In large fleets ?—Yes.

26,644. How many have you seen there ?—From 400 to 500 sail.

26,645. Has that been a solitary occasion ?—Once. I have frequently seen from 200 to 300.

26,646. Have you been detained there yourself ?—I have.

26,647. Have you been detained for any time ?—For three or four days. I have been brought up in Filey Bay.

26,648. Have you had any great number brought up with you ?—About 200 sail.

26,649. Is it a fact that vessels seldom leave the coal ports till there is a reasonable chance of fetching the Head ?—Yes, they generally leave these ports with a slant of wind.

26,650. And if there is not a reasonable prospect of making the Head, they do not leave their ports ?—No.

26,651. (*Chairman.*) I think you said you had sailed from Gravesend in the coal trade ?—From Woolwich, rather.

26,652. Did the men who commanded the vessels in which you sailed belong to the south country or the north ?—The man I sailed with lives in the north certainly, and is a native of Shields. They generally belong to Woolwich, because the ships belong to Woolwich.

26,653. They are north countrymen generally ?—Yes.

26,654. That is the case generally with the London colliers ?—Yes.

26,655. That the masters and mates are north countrymen ?—Yes.

26,656. As respects the state of the vessels employed in the coal trade, what sort of vessels are they, generally speaking ?—Those I have been accustomed to were good sea boats, and made no water ; they made the whole passage without water.

26,657. There is no reason why a collier should be leaky if she be a well-constructed vessel ?—None.

26,658. There is no reason why she should be always pumping ?—No.

26,659. Are there many vessels in the trade like those you have described ?—I think a great part of the colliers are rattle-trap things ; most of them, I think. They are vessels worn out in another trade, and put into the coal trade afterwards.

26,660. Are a considerable number of them very bad ?—There are some I should not like to trust myself in.

26,661. A great number belonging to every port ?—A great number.

26,662. Does your answer respect the state of the hull, or as they are found aloft ?—Generally, as respects the hull.

26,663. Are they pretty well found aloft with sails ?—Generally.

26,664. How are they owned generally in the northern ports ?—The vessels belonging to the north are generally owned by small owners.

26,665. Are they frequently held in shares ?—I don't know any of them that are owned in shares.

26,666. What kind of cargo is coal in heavy weather,—is it a very dead cargo, like iron ?—It is a very lively cargo in bad weather.

26,667. So that if a ship is hove to in a heavy gale of wind, coal is not a bad cargo to have ?—No, it is a good cargo to have on board.

26,668. In one of these vessels coal-laden, would you rather run or heave to in a heavy gale of wind ?—I would rather heave to.

26,669. When in ballast would you rather run or heave to ?—I would rather lay to as long as possible, unless I was going to run for a harbour.

26,670. But putting that out of the question, you would rather heave to ?—Yes.

26,671. They are safe to heave to in ballast ?—Yes.

26,672. Supposing the ballast don't shift ?—Yes.

26,673. You have been hove to in very bad weather in colliers ?—Yes.

26,674. Under what sail ?—A close-reefed maintopsail, and a foretopmast staysail.

26,675. Under that sail they heave to very well ?—Yes.

26,676. Do you know Sunderland ?—Yes.

26,677. Have you ever been in Sunderland in bad weather ?—No, I never have.

26,678. What kind of land is the land about Hartlepool to make ?—It is very bad land to make.

26,679. Why is it bad land to make ?—Because it is low, with high land at the back of it.

26,680. But when you do make the land out, can it be mistaken for any other land along the coast ?—Not by anybody that is used to it. But a stranger would not make it out. He would be apt to get too far to the north or south.

26,681. But is not the land about the Heugh well defined ?—That is good land to make. You cannot mistake that.

26,682. Now with regard to soundings ; could you run into Hartlepool Bay in thick weather by your soundings ?—Yes.

26,683. Are the soundings such as to keep you in a fair course for Hartlepool ?—The soundings are very good, except you find deeper water to the north.

26,684. Is there any change at the bottom by which you would know where you are ?—Yes.

26,685. Is there anything in the character of the bottom, on the ground itself, that would tell you ?—North of Tees Bay you generally find mud. To the southward you find rock, small honeycomb rock.

26,686. By that you would know your place ?—Yes.

26,687. In running in for Flamborough Head in thick weather, can you tell where you are by the Head ?—The water is too deep.

26,688. There is nothing in the nature of the bottom which you can bring up, showing that you are running for the Head ?—There is chalk.

26,689. Therefore you could tell that you are running for the Head ?—Yes. There is no chalk on the other parts of the coast.

26,690. Is there any eddy off Filey Brigg ?—There is at Flamborough Head, but not at Filey Brigg.

26,691. There is no stream running out there ?—Nothing to speak of.

26,692. (*Capt. Washington.*) When you were at anchor in the *Banshee* at Hartlepool, how did the Heugh bear ?—About north-north-east.

26,693. By the compass ?—Yes.

26,694. Where did you say you chiefly traded to ?—Shields.

26,695. For four years ?—For five years.

26,696. Did you go to any other coal ports besides Shields ?—One year I went to Middlesborough. The other four years I went to Shields.

26,697. During the time you traded to Middlesborough had you any difficulty in getting into the Tees ?—No. We happened to be there every time in fine weather.

26,698. How many voyages a-year did you make ?—Nine or ten.

26,699. Winter and summer ?—Altogether, one or the other.

26,700. Did you go the winter through ?—We used to lay up sometimes in winter during the months of December and January.

26,701. Did you ever go to Sunderland ?—I never traded there.

26,702. Have you been to Hartlepool ?—I have been there several times.

26,703. On what occasion ?—Sometimes when I was trading to Middleborough we might go to Hartlepool. We used to call it trading to Middlesborough for the year because we only went to Hartlepool a chance voyage, and took a cargo in the wet dock.

26,704. Had you ever occasion to bear up in a heavy gale on the north-east coast ?—I have run down to Leith roads.

26,705. How often ?—Only once.

26,706. Have you ever run for any other place besides Leith roads ?—No, only the Humber. I have run there several times.

26,707. Where from ?—From Cromer.

27,708. What place are you a native of ?—Kingdown, a little fishing village close to Deal.

26,709. You are in the employ of Mr. Strother of Woolwich, I think ?—Yes.

26,710. I think you said that men would generally run for their own ports ?—Yes, they generally will in light vessels,—in light colliers. If there is any chance, they risk anything to get to their destination when on their homeward passage.

26,711. Would loaded colliers try to run for their own ports ?—No.

26,712. They dare not do it ?—No.

26,713. Seeing the great desire captains have to run for their own ports, is it desirable that they should be improved, if possible?—I think it is ; at least, Shields and Hartlepool. I think if they were improved it would be a great benefit.

26,714. What improvement would you suggest at Shields?—I think if they could get 14 or 15 feet at low water at Shields, that would be a sufficient protection for light ships.

26,715. Have you seen the piers now running out at the mouth of the Tyne ?—Yes.

26,716. Do you think it desirable to continue them into deep water ?—Yes ; the north pier, especially.

26,717. It is a shelter from the north that is wanted ?—Yes ; I think as the south pier goes out the sand will go away.

26,718. Does the sand come from the southward or the northward ?—I think it comes from the southward.

26,719. Do you think it worth while to make an effort to improve the entrance to the Tyne ?—Yes, I think so.

26,720. What would you do at Hartlepool ?—I would improve it by running out a pier on the Heugh, and another on the Longscar.

26,721. If piers such as you speak of could be carried out into six or seven fathoms water, would you have any hesitation in running for such a harbour ?—At Hartlepool ?

22,722. Yes ?—No, none whatever. If one pier extended as far as the Longscar Buoy, and the other to the Heugh Bay, I don't think there would be much difficulty in going to Hartlepool then.

26,723. Do many ships run there now ?—Not in bad weather.

26,724. Now there is no refuge ?—Not for loaded vessels.

26,725. But for light vessels ?—Oh yes ; light vessels go there, and very often get damage.

26,726. Do you know if many lives are lost at Hartlepool every year ?—I know that several are lost every year even in the light ships.

26,727. We were told at Hartlepool that for the last 12 years 22 lives have been lost every year in Hartlepool Bay ?—I should think so. We generally see something very serious about Hartlepool. If there are any gales on the coast, generally some vessel catches it at Hartlepool or Shields.

26,728. That being the case, do you think it desirable that shelter should be afforded for ships going there ?—Yes.

26,729. The fact that a great number of laden vessels and lives being lost there is a proof that a great number were there ?—Yes, light vessels.

26,730. (*Mr. Coode.*) Do you think that anything like the same number would run for Hartlepool as do now, if a harbour of refuge were made at Filey ?—The light vessels would go there, but not the loaded vessels. If there was a harbour of refuge at Filey the Hartlepool ships could almost get there in one tide.

26,731. Then you think Filey decidedly preferable for loaded vessels ?—Yes. Even if there was a harbour anywhere else, loaded vessels would go past it and proceed to Flamborough Head, and get jammed, as they do three times out of five ; that is, when a harbour of refuge at Filey would catch them.

26,732. Then the same reasons which induce the light vessels to press on to their ports would induce the loaded vessels to hold on and get to Flamborough Head ?—Yes.

26,733. And therefore a harbour near there would be more suitable for laden vessels than for light ones?—Yes ; not only colliers, but vessels from the Baltic, and fishing vessels.

26,734. For the Baltic trade alone, what position should you select as a site for a harbour of refuge ?—The Baltic trade, if they possibly can, like to make Flamborough Head the first land. If caught and they get to the southward, then Filey would be a good place and afford them shelter.

26,735. You say that Filey would be a good place for the fishing vessels ; would it be the best ?—Yes.

26,736. Why so ?—Because it is nearest to where the vessels are likely to be caught in heavy gales of wind. It is where the fishing ground is in the herring season.

26,737. How long does the fishing last there ?—August, September, October, and November.

26,738. Do you consider these treacherous months to be at sea ?—Yes, very.

26,739. About what is the average number of vessels employed in that fishery ?—It has increased very fast within the last three years. I dare say last year there were not less than 600 sail there.

26,740. How many men are there on the average in each vessel ?—There are eight or nine in each vessel.

26,741. In that case there are at least 5,000 men so employed ?—Yes.

26,742. Would Filey be as convenient as any other place for landing fish ?—More convenient.

26,743. (*Chairman.*) Supposing a harbour of refuge to be placed at Hartlepool,—as a general rule, with an on-shore wind blowing dead on the coast, could the vessels at the Head reach that harbour of refuge ?—I don't think they could.

26,744. Why could they not do so ?—If the wind was right on the land, I don't think they could get round Whitby rock.

26,745. What offing would a vessel require under such circumstances to get round Whitby rock ; how many miles say off shore ?—I should think five or six miles or so.

26,746. If a loaded vessel had an offing of six miles off shore, she could then, with a wind dead on shore, always reach a harbour in Hartlepool Bay ?—Yes, provided everything held on ; provided she had no

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Mr. J. W. Arnold.

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Chairman.

misfortune, and was not struck with a heavy sea, and did not burst her decks through.

26,747. Taking the reverse case. Supposing a harbour of refuge to be constructed at Filey, could these vessels make use of that harbour ?—Oh yes.

26,748. But how could they reach it ?—Not if they were six miles off Flamborough Head ?

26,749. No ; but stretching across from the Tyne, making their course to the Head. Supposing they were between Whitby and the Tyne in a direct course stretching across the bay, could they get up to the harbour at Filey ?—Not if they were at Hartlepool.

26,750. Supposing a Shields vessel stretching across from the Tyne on a direct course, with a six miles offing at Whitby, and supposing her to be caught abreast of Hartlepool, in the same weather, could she reach Filey ?—It all depends on what sort of vessel she is. I think a good vessel would reach Filey or the Tyne.

26,751. But not colliers, as they generally are supposed to be ?—I think they could reach Filey, but I think they could reach the Tyne better. It would depend on the tide.

26,752. Have you ever seen the freshets come down the Tyne ?—Yes.

26,753. Are they heavy ?—Sometimes, but not often.

26,754. Do they occur frequently ?—Not very often.

26,755. How many are there in the course of the year ?—I don't think there are more than two or three.

26,756. What is the heaviest freshet you have seen running ? How many knots in addition to the usual stream or tide ?—I think not above three knots in addition to the usual tide. Certainly I have seen it break great tiers of vessels adrift.

26,757. And do considerable mischief ?—Yes, certainly.

26,758. Do these freshets increase the sea running into the harbour much ?—They make more sea upon the bar.

26,759. They make a worse sea upon the bar ?—Yes.

26,760. (*Mr. Coode.*) Which way do the south-east gales generally turn in the North Sea ?—Generally they go round with the sun from south-east to south-west, and finish at south-west with lots of rain. But if they come the other way they are generally very heavy.

26,761. Then the worst gales turn round from the east towards the north ?—From south-east to north-east. They generally terminate at north-east.

26,762. The worst gales ?—Yes.

26,763. Which way do the south-east gales mostly turn ?—To the south and south-west.

26,764. But the worst are towards the east and north ?—Yes.

26,765. If a vessel is caught off Hartlepool in the position put just now, in one of the heaviest gales, would the chance be that the wind would come more in her favour for fetching Filey, than in the opposite direction ?—Yes, if they could keep the vessel at sea so long.

26,766. And she would have a better chance of getting to Filey ?—Yes ; but about nine times out of ten, after sailing from the coal ports she would reach Filey before the gale came on.

26,767. If the weather is doubtful these vessels don't leave the ports ?—No.

Captain ROBERTSON, R.N., examined.

Captain Robertson, R.N.

26,768. (*Chairman.*) You are Surveyor-General of the Board of Trade, I believe ?—Of the Marine D-e partment of the Board of Trade.

26,769. Surveyor-General of the Marine Department of the Board of Trade ?—Yes.

26,770. And this return of wrecks which I have here is made out under your superintendence ?—Under my superintendence.

26,771. I see in the report made 27th January, 1858, that we have a description of the data on which this return is made ?—Yes.

26,772. That is, I presume, a perfectly accurate description of the causes of the wrecks, so far as it goes ?—Quite so.

26,773. These are the returns of wrecks made to the Board of Trade for three years?—For three years.

26,774. Do you consider this last return which I hold in my hand, the return for the year 1857, is more accurate than the two that preceded it ?—I think so.

26,775. You consider this last return more accurate than either of the other two ?—I think the last better than either of the other two.

26,776. To what do you attribute that circumstance? —I attribute it to the fact that we have got into better working order, and that our officers of the coast guard are more zealous, and their attention is called to every casualty that occurs along the coast. Then the collectors of customs are receivers of wrecks ; they hear of everything that takes place, take depositions from the masters, and make their report.

26,777. I perceive that the first return you have made is much less full than this one ?—Yes.

26,778. That arises, I presume, from the circumstance of your not having got your system into working order before ?—Yes, from its being quite new to me.

26,779. With regard to the return for the year 1856, ending December 1856, I presume that though it is not quite so full as that for the following year 1857, it is quite as accurate ?—Yes, it is, I think, quite as accurate. We obtained the information from the same source—the officers, inspecting commanders of Coast Guard and receivers of wreck, acting under the control of the department.

26,780. So that you are disposed to think that these returns for the two years afford a pretty safe basis for a decision respecting refuge harbours ?—So far as the wreck returns are useful for that purpose.

26,781. Will you turn now to page 18 of the report ?—Yes, I have it.

26,782. In table 19 there is the average given of the rate per cent. of casualties upon voyages for the last six years. and it is rather remarkable, is it not, that the average for the six years is decimal 44, which agrees exactly with the return under the head of "British ships," for the two years 1856 and 1857 ? —Yes.

26,783. The decimal 44 agrees with it exactly ?—Yes.

26,784. And there is very little difference between the returns under the several headings for 1856 and 1857 and the average for the six years. Do you notice that ?—I do.

26,785. As respects British ships, the average of casualties for the six years is precisely the same as the returns for the years 1856 and 1857 ?—Yes, I see it is as regards the number.

26,786. With regard to foreign ships there is a slight difference, but for the total the average for the six years is the same as the return for the year 1857, and not very greatly different from that of the year 1856?—I do not exactly understand what you mean.

26,787. I mean that the average for the six years is precisely the same as the returns for British ships for the years, 1856 and 1857 ?—Yes, I see it is for British ships.

26,788. And though in the same way the return under the head of "foreign" ships is slightly different, the average of the total for the six years is precisely the same as the return for the year 1857, and nearly the same as the return for the year 1856 ?—Yes.

26,789. Do you consider it, then, a fair conclusion that these returns for 1856 and 1857 may be taken as representing the fair average return for the whole six

years ? You see the rate per cent. of the casualties is the same ?—I can hardly say. I know nothing about the previous years. I cannot, therefore, say whether the return as to them is correct or not.

26,790. But as far as the returns go for 1856 and 1857, they will be a fair representation—supposing the returns for the previous years to be also accurate—of the average rate per cent. of casualties in the whole six years ?—Yes.

26,791. Would it, then, be a fair conclusion to draw that, so far as the averages go, the return for the six years are correct ?—I cannot tell at all. I know nothing of the first four years, and cannot, therefore, say whether the returns as to them are accurate or not.

26,792. But assuming the returns to be accurate, they would then form a very fair representation of the average ?—Assuming them to be accurate they would.

26,793. That is, that the returns for the years 1856 and 1857 would be a fair representation of the previous years ?—They would, assuming the returns for the first four years to be equally correct.

26,794. In one of your tables, at page 29—a short table which shows the total diminution,—there is a comparative statement of the number of lives lost during the previous six years, showing a diminution—a gradual diminution from the year 1852 down to 1857—the numbers for 1856 and 1857 being reduced to 521 and 532, the numbers in the previous years having been 1920, 689, and so forth. To what do you attribute that diminution? Is there any cause for it that you are aware of ?—I think that greater care is taken in navigating the ships off the coast, and that the ships are better.

26,795. To what do you attribute the greater care and the better ships ?—To the inquiries which are now going on by the officers of the coast guard, under the control of the Board of Trade. I think the men who command the merchant ships are more careful than they were formerly, now they know that every accident will be strictly inquired into. In every case of accident that occurs upon the coast it is the duty of the inspecting commander of Coast Guard to inquire into the circumstances attending it, and to report thereon to the department.

26,796. And you think that is telling upon them ?—I think very much so; and I think another cause is, the means adopted for saving life on the coast by life-boats, and rocket and mortar apparatus.

26,797. Now turn to the table which gives the losses, together with the state of the winds; have you got it ?—Yes, I have that table.

26,798. Then if you look at the following page—page 14—you will find there is a table, No. 10, in which the classes of wrecks are divided as having arisen from stress of weather, the state of the weather being indicated by numbers ?—Yes.

26,799. Now with regard to stress of weather, what force of wind do you call stress of weather ?—About 9, I think, would be stress of weather.

26,800. It would begin at 9 ?—With 9, I think,—"strong gales."

26,801. And are you aware if this table 10, class 1, was formed in that way, by taking the losses with the force of wind, as 9, 10, 11, and 12 ?—No, it was not; it was not taken by numbers at all, but by the opinions and facts given by the returns. We never take any numbers.

26,802. What is the precise meaning of the words "stress of weather" under class 1 ?—That the ships were in such a position that when the gale came on it was difficult to fetch off shore.

26,803. In forming this table, then, there was no reference made to the strength of the wind ?—None at all. These returns have been made by the inspecting commanders of the coast guard, by whom the circumstances have been inquired into, and who have stated what they found to be the case.

26,804. And if I were disposed to form an estimate of the losses arising from sheer stress of weather, then you would say that the numbers 9, 10, 11, and 12 would be the numbers to take ?—Yes, I think so: from 9 upwards.

26,805. You are acquainted with the east coast of England yourself, are you not ?—Pretty well.

26,806. Have you formed any opinion upon the subject of harbours of refuge ?—Yes, from reading the evidence taken before the Commissioners, and hearing what has been said on the coast.

26,807. What is your conclusion as to the best position for a harbour of refuge on the east coast ?—The opinion I have always had is that Hartlepool was the best place.

26,808. Why ?—Because there are two ports inside into which ships might go for repairs.

26,809. But considering the first requisite of a harbour of refuge to be facility to get to it in bad weather, should you still say that Hartlepool was, in your opinion, the best place ?—I know nothing of that part of the coast. I know nothing of the depth of water there, and therefore I cannot say.

26,810. You have formed no opinion, then, upon that subject ?—None.

26,811. (*Capt. Washington.*) You are aware that the returns of wrecks were given originally by the Admiralty ?—Yes.

26,812. Have you more perfect machinery at the Board of Trade for obtaining accurate returns than the Admiralty had ?—Much more so.

26,813. In consequence of what ?—In consequence of the officers of the coast guard and the receivers of wrecks having the duty of examining and reporting all cases that occur.

26,814. The Admiralty had not the means of obtaining information that you have ?—No; and to that I attribute the greater accuracy of our returns.

26,815. And you think that accounts for any discrepancy there may be between the earlier returns and the later ones ?—I think so. I think the earlier returns were not so perfect because you had not the machinery to make them so.

26,816. (*Mr. Coode.*) You have no reason to doubt that the returns of the Admiralty were correct as far as they went ?—I believe they were.

26,817. But that they were not complete ?—So far as they went I believe they were accurate, but they were not complete. They were principally made up from the returns in the *Shipping Gazette*, the reports of Lloyd's agents, and persons of that description.

26,818. But still you think that as far as they went they were correct ?—I have no reason to doubt; but they were not so accurate as the present returns, for the reason I have stated.

26,819. (*Chairman.*) When you used the word "control" just now you meant, I presume, legal control ?—I mean control by Act of Parliament. By the Mercantile Marine Act all the officers of the coast guard have certain duties to perform. They have to inquire into all wrecks and casualties. The Coast Guard act for receivers of wrecks, and it is their duty to make inquiry, and report.

26,820. What you mean by "control," then, is legal control,—control by law ?—Yes, not in any other way.

26,821. (*Capt. Washington.*) Are you aware that in the Admiralty returns there was a column for the authority ?—Yes.

26,822. And that in many cases the authority given was the *Shipping Gazette* ?—Yes.

26,823. Still you have no reason to doubt that these returns were as correct as any others ?—So far as they went they were no doubt correct.

26,824. (*Mr. Coode.*) From your recollection of the Admiralty returns, do they not quote Lloyd's agents and the Coast Guard as well as the *Shipping Gazette* ?—Yes, in some cases.

26,825. The accounts in some cases were quoted from Lloyd's agents, and in some from the *Shipping Gazette* ?—Yes.

26,826. And is it not a fact that the same wreck is sometimes quoted from three or four different authorities ?—Yes, it is.

LONDON.

G. Hampton.

30 Nov. 1858.

GEORGE HAMPTON examined.

26,827. (*Chairman.*) Where are you serving now; in what ship?—The *Cressy*.

26,828. What are you?—An able seaman.

26,829. How old are you?—I shall be 22 next May.

26,830. Where were you brought up?—I was born in Lymington, and was brought up at Southampton.

26,831. At what age did you go to sea?—At ten years old.

26,832. Who with?—My uncle.

26,833. In what class of vessel?—A smack.

26,834. Where did she trade from?—She traded from Southampton to Swansea.

26,835. Were you ever employed upon the east coast of England?—Yes.

26,836. In what class of vessel?—A collier.

26,837. How long were you so employed?—Seven years.

26,838. What age were you when you began to be so employed?—I was 11 years of age.

26,839. Then from the time you were 11 years old until you were 18 you were employed in a collier?—Yes.

26,840. After that how were you employed?—Part of the time in the merchant service,—in the Mediterranean trade.

26,841. When you were employed in the coal trade, what port did you sail out of?—Shields.

26,842. What sort of a vessel was it you were employed in?—A brig.

26,843. What was her size?—One was 300 tons, and one I was in afterwards was 400 tons.

26,844. What style of vessel was she; was she a good one?—Yes; a very good one.

26,845. Was she well found aloft?—Not very well.

26,846. Did you see a good deal of bad weather in her first and last?—Yes.

26,847. Were you in her the whole time?—Not the whole time; I was in three during the course of the seven years.

26,848. The second you served in, what was she?—A very bad one indeed; she was very leaky.

26,849. How long was you in her?—Seven months.

26,850. Where did she belong to?—Shields.

26,851. What time of the year were you in her; was it winter or summer?—It was winter.

26,852. Was there much pumping while you were in her?—Yes; we were obliged to keep the pumps always going.

26,853. All the time she was at sea?—Yes, all the time.

26,854. Is that a common occurrence among the colliers?—Very common, when they are loaded.

26,855. When they are loaded, for the pumps to be going all the time?—Yes.

26,856. And when they are light is there the same occasion for pumping?—No.

26,857. Were you ever in her in bad weather?—Yes.

26,858. I mean in weather endangering the safety of the ship?—Yes.

26,859. When?—The winter before last, in the south-east gales.

26,860. Where?—Off Flamborough Head.

26,861. And what were you in danger of being lost from; was it the leaky state of the vessel?—No; from bad weather.

26,862. This second vessel, how was she found aloft?—She was better found aloft than the first.

26,863. Were her sails good?—Yes, very good.

26,864. And her rigging, was that good too?—Yes, it was very good.

26,865. And the first one, in what state were her sails?—Her sails were all to pieces.

26,866. And her rigging, how was that?—It was almost all to pieces too.

26,867. Then if you had been caught in the first vessel on a lee shore, what would have happened, do you think?—She never would have got off.

26,868. On account of the bad state of her sails and rigging?—Yes.

26,869. The third vessel you were in, what sort of a vessel was she?—Oh, she was a very good vessel.

26,870. Was she well found aloft?—Yes; she was a new vessel altogether.

26,871. And was well found aloft?—Yes.

26,872. How was the first vessel owned; I do not want to know the names of the owners, but was she owned in shares or by a single owner?—Yes, by a single owner.

26,873. Not in shares?—No.

26,874. And the second, how was she owned?—The same as the first.

26,875. And the third?—She belonged to the same owner.

26,876. They were all in the same employ?—Yes.

26,877. Did that owner employ many ships?—Yes, a great many.

26,878. How many?—He had 34.

26,879. How many of them were good ships, and how many were bad?—There were a great number of bad.

26,880. What proportion do you think were bad of the whole number?—I should say fully two-thirds.

26,881. Are there any vessels in the coal trade that you know of worse than the worst of the three you have described?—Yes.

26,882. Some worse than that first ship you mentioned?—Yes.

26,883. Very old ships?—Very old.

26,884. Are they ever repaired?—Yes, they are repaired at times, but very little.

26,885. Did you ever see any of them under repair in the graving dock?—Yes, I have seen them; but very little was done to them.

26,886. Did you ever see one of these vessels opened out?—Yes.

26,887. In what state was her bottom?—It was rotten.

26,888. Her timbers were rotten?—Yes.

26,889. Were the timbers taken out and replaced?—Yes, I have seen the timbers taken out and put in again; but there was not sufficient timber put in—not what was wanted.

26,890. There was not sufficient timber put in?—No.

26,891. And the planking, was that bad likewise?—Yes, very bad.

26,892. Both inside and out?—Yes.

26,893. Was the planking made good?—Yes, that was made good.

26,894. (*Mr. Coode.*) Were you often caught off Flamborough Head in trying to get to Shields?—Yes, many times.

26,895. Do you know of many vessels being so detained in the same way?—Yes, a great many.

26,896. How many have you seen detained there at one time?—I have seen 50 or 60—close upon 100 at times.

26,897. Vessels detained there like yourselves?—Yes.

26,898. Have you been detained there long yourself at any time?—Yes.

26,899. How long?—Two days and two nights; that was in fine weather. I have been detained longer in bad weather.

26,900. (*Chairman.*) Did you ever know a vessel so bad that the men would not go on board of her?—Yes.

26,901. Where was that?—That was at Cardiff.

26,902. Did you ever know such a case at the coal ports, at Shields?—I knew of one at Whitby.

26,903. Where the vessel was so bad that the men would not ship on board of her?—Yes.

26,904. Is there any difference in the pay on board

bad ships and good ships ?—There is no difference ; the wages are the same.

26,905. And, as a general rule, are there sufficient men on board these coal vessels ?—Yes.

26,906. As a general rule there are sufficient men to do the work ?—Yes.

26,907. Did you talk amongst yourselves about the bad state of the vessels ?—Yes.

26,908. And it was considered by you that some of them were in such a bad state that men ought not to be sent to sea in them ?—It was.

26,909. Then why did they go ?—There were a great many complaints made.

26,910. But why did the men go to sea in these bad ships ?—They would not know how bad the vessel was till they got to sea, and the strain came upon her.

26,911. You only know of one ship that the men actually refused to go to sea in ?—Only one on the north coast, but I knew three at Southampton.

26,912. What became of those vessels afterwards ? —Two of those at Southampton were left for sale, and one was put through a thorough repair, and made a first-class ship again.

26,913. Do you know anything about the clubs that they insure vessels in, in the coal ports ?—No.

26,914. You know nothing about them ?—No.

26,915. (*Mr. Coode.*) The one vessel you have described as being so bad at Whitby that the men would not go to sea in her, what became of her ?—She was left there, and broken up.

26,916. How long was she left there before she was broken up ?—Two years. She was left there for sale, and then they found they could not move her, so they were obliged to break her up.

26,917. Did they try to move her ?—Yes, they tried to move her, and when they got her off into the middle of the harbour she sank.

26,918. That was where ?—In Whitby Harbour.

26,919. Inside the harbour ?—Yes.

26,920. They made the attempt to get her off ?—Yes, they tried to get her off to repair her, but they could not get her to the repairing yard.

Wednesday, 1st December 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Sulivan.
Mr. Lindsay.	Captain Vetch.
Captain Washington.	Mr. Coode.

Mr. Evans, Secretary.

General Sir J. Burgoyne, G.C.B., examined.

26,921. (*Chairman.*) You are Inspector-General of Fortifications ?—Yes.

26,922. Have you ever had occasion to turn your attention to the establishment or improvement of harbours ?—I was chairman of public works for several years ; and during that time several harbours and harbour works came under my notice, and gave me occasion to consider the subject.

26,923. In Ireland ?—Yes.

26,924. Have you adopted any particular views regarding the construction of harbours ?—I should speak with great diffidence upon that question, because I have adopted views which I believe differ very much from those of many engineers, and therefore I have some doubts whether I am correct or not. One of my views is, that I think the principle of improving harbours by what is called a scour is erroneous. The greater the scour the more injurious effect will be produced. The best harbours are those where the sea has a clear, even, and smooth run in and out. A strong current out of a harbour always tends to create a bar and to do mischief; and therefore I think that rivers are particularly unfavourable and disadvantageous to form harbours upon ; for this reason, that every river that has a narrow entrance and narrow channel has a bar ; and the more backwater that comes out of it the worse that bar will be ; and therefore I think that this proves that the backwater is injurious. What first called my attention to that subject was as far back as 1814, when I was at Bayonne with the army. The river Adour, which runs past that town, and enters the sea a few miles below it by a narrow entrance, comes down with a great body of water, and has a very bad bar. Some 80 or 100 years ago they thought to remove that bar by carrying two parallel piers out into deep water, under the impression that the scour would carry away the bar. The result was, however, that the bar formed again at the mouth. They performed a similar operation a second time, but the bar still formed at the mouth. At last they gave it up, and there the bar is to this moment. I think that not only the backwater of rivers may be prejudicial, but that a similar result may be produced even in great estuaries if they have a narrow entrance,—narrow in proportion to the amount of water that comes in. In such a case a similar effect will be produced. We have a striking instance of that in the south of Ireland. There is there a great lake of Ballyteague in Wexford. It was of very shallow water, with mud banks, covered at high-water time, and it had a communication with the sea by a long narrow channel. The channel was so much in disproportion to the great expanse of water that there was inside, that the lake never had time to fill. The consequence was, that at high tide the water is fully three feet higher outside than it was at the upper end of the lake, and during the time that the real tide was falling it was still running into the lake. We made a proposition to drain the lake, and turn it into agricultural land. The proposition was to form a dam across the narrow channel where it began to expand. There was some opposition, as there always is, to measures of that kind. But when the opposition failed altogether in every other way, they appealed to the Admiralty, and said that we were going to ruin the harbour which was in the narrow channel. The subject was considered by the Admiralty, but they did not think it proper to prevent the works going on. The works proposed were completed, and the little harbour has been improved by them, as we anticipated; that is, the water goes in and out to the dam quite smoothly, and consequently it rises at the landing quay at that part a foot or 18 inches more than it did before, which is a clear gain. Whether the bar is improved I do not know; but if they thought it worth while to dredge out a passage through the bar I am sure it would have much less tendency to silt up again than it had before. I cannot help thinking that even Portsmouth Harbour might be improved by adopting a different system than that which is at present adopted there. At present there is a very strong current in and out of Portsmouth Harbour. It is very perceptible. I think that it arises from the great

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quantity of water that goes in every tide, and the smallness of the channel that it has to go through. If the interior expanse were reduced by a judicious abstraction of the remote shallow mud banks by embanking, it would improve the navigation of the entrance, and perhaps the bar. Deepen it as much as you please: that will do no harm; but if the space inside is out of proportion to the channel by which the water enters, I do not think that any expenditure upon the mere removal of the bar will produce any certain and lasting effect. As long as there is a strong current it will always have a tendency to silt up; whereas if it goes in and out smoothly, whatever you dredge out you gain permanently.

26,925. (*Chairman.*) It may be convenient that my colleagues should ask any questions they may wish to put to you upon this subject before we go to the question of construction. Will you, therefore, proceed with any further statement which you may have to make in regard to that branch of the subject?—I have nothing more to say at present.

(*Sir F. Smith.*) Sir J. Burgoyne has put the subject so clearly that I really have no question to ask him.

(*Chairman.*) Surely this is a very interesting question, because in the case of the Tyne, where they are carrying out piers with a view to the removal of the bar, this would seem to be a very important point.

(*Witness.*) I will just add another point. Rivers sometimes have a very extensive navigation, and would make very fine harbours, but there is a difficulty in getting in, owing to the bar at the mouth. That is a difficulty I should be inclined to remove, by making, whenever it is practicable, a harbour outside the bar, and locking up into the river.

26,926. (*Chairman.*) A harbour on one or other side of the bar?—Yes; and then locking into the river. You will get a good smooth entrance, and ships will get up into deep water, and have all the advantages of an interior harbour. There has lately been a great question about opening the mouths of the Danube, and many projects have been suggested with that object. The Danube is an immense river, and has an immense body of water, and many engineers have offered projects for carrying piers straight out from either one mouth or the other. My impression is that these piers would do no good at all, because, whether the narrowness of the channel is natural or artificial, it comes to the same thing; there would be always that great mass of backwater going down and getting interrupted by the bank of the sea, and so laying its deposit, which I think is the cause of the whole evil. It drops whatever it is charged with in the sea, and whether the cause of the narrowness was natural or artificial, the same effect would be produced. In the case of the Danube, I recommended that they should try and find a place where they could make an artificial harbour near the mouth of the river, and from then lock up, having effected which they would get into the river, and then have 100 miles navigation in deep water; that has now been proposed.

26,927. (*Capt. Washington.*) An artificial canal?—Yes, an artificial canal; making a small harbour at the side of the St. George mouth of the river, and then locking up into the river itself, which will be a very simple operation, by means of a canal five or six miles in length.

26,928. You think there would be no fear of easterly winds throwing up a bar at the entrance of that artificial harbour?—I think much less chance, because there would be no backwater. The backwater is what occasions the difficulty, because the backwater coming down against the great bank of the sea, which you may call stationary, naturally drops all the matter with which it is charged to the bottom, and that makes a bar. If there is a side current along the shore, which carries sand or mud or any other material with it, of course that meets a check, in the same position and in the same sort of way, and tends to increase the bar. If you can have a harbour on one side, and lock up into the river, you will obviate all these difficulties, because that coast is a very peculiar one. There is a great current, and great quantities of sand and mud come down, and one cannot well answer for what might be the effect; but I think that, having no backwater, you would be very likely to preserve your harbour. I do not see any great tendency there would be to fill up.

26,929. (*Chairman.*) Do I gather that your opinion is that bars at the mouths of rivers are formed by the deposition of sediment in still water formed by the meeting of the current of the river and the current of the sea?—Yes; the bank of the sea, you may call it, which is comparatively stationary. The river water running out meets with a check, and naturally all the mud and other matter which it brings down from the interior falls to the bottom.

26,930. Have you a practical experience of bars formed in Ireland or elsewhere?—No; except that I see every river in the world that has got a narrow channel has a bar, and a bad bar too.

26,931. We have it in evidence before us that bars are frequently formed by deposition of sediment, not brought by the river, but of sand which is brought by the sea, and in corroboration of that the actual matter of a bar has been produced. Have you any personal experience as to that, whether bars are generally formed chiefly by the sediment from the sea, or by the sediment from the rivers themselves?—I could not say; but I should think that even if it is from the sediment brought from the coast the cause of its deposition will be the meeting of the backwater with the sea. That is what would cause the deposition of sediment brought from along the coast at the mouth of the river.

26,932. (*Showing a plan.*) Here is a plan of the port of Sunderland, showing the river Wear and the south dock which has been formed inside of it. Does that meet your views of what is requisite?—If the entrance is at the outside, clear of the bar.

26,933. (*Pointing to the "south outlet."*) Would that be sufficient?—That I should say would be much more likely to remain good than the entrance by means of the river; in fact this would be precisely what I recommend. It is an entrance into deep water, having a lock to prevent any violent tide in and out. I should suppose that if they dredge that out it would be likely to maintain itself for a long time. If it did collect it would be much more easily removed than the matter which comes down from the river.

26,934. Therefore, in your opinion, the mode of meeting the difficulties of having harbours at the mouth of navigable rivers that have bars, is to place a harbour on one or the other side of the entrance, if possible?—Certainly, if circumstances will permit it.

26,935. (*Sir F. Smith.*) Your view is to disconnect the harbour from the tidal river?—Yes; or else to draw the water of the river by means of a new channel away from the port on which a harbour is constructed, which would be equivalent. If you could make a new channel for the current, by putting a dam across, and keeping the backwater from the entrance, that would be virtually the same thing, and would have the same effect.

26,936. Your opinion is, that the bar is chiefly formed by the sort of dam which the flood tide forms, arresting the progress of the water running out of the river, and leading to the deposit of the matter which is held in solution?—The sudden check there is to a great current.

26,937. (*Referring to another plan.*) This plan which is before you represents a portion of the Tyne and Tynemouth. It shows the lower part of the river, and at the left extremity of the plan the Northumberland docks. With a view to the improvement of the Tyne, and to render it, as it were, partly a harbour of refuge, it is in contemplation to carry out two piers, one to the north and another

to the south of the entrance to the river, and in that way they hope to get the means of giving shelter to vessels of a certain draught of water at all times of tide. These piers are upon the plan represented as going out to 14 feet at low-water spring tides, and it is assumed that by getting in this large body of water, and improving by dredging in the Tyne, that the outfall will carry away the bar?—I think not; I should expect that the bar would form there again.

26,938. In point of fact if you extend it into deeper water?—I would rather have the harbour to the south or north, clear of the entrance, but I do not know whether circumstances would permit it.

26,939. In point of fact, you would rather have a harbour which is to be a harbour of refuge clear of the current?—Clear of the backwater.

26,940. Unless the current can be turned?—Then it is clear. We have a pretty good instance in the harbour at Kingstown in Dublin Bay which has answered beautifully, and never had the least tendency to silt up in any sort or way. There is a clear flow in and out, without any current, just as the tide rises; there is no tendency to silt up. If the Liffey was a great river like the Thames, and had a great navigation, there would be no great difficulty in making a canal from Kingstown harbour to the Liffey, and that would be better than attempting to improve the mouth of the river.

26,941. You think the Commissioners would hardly be justified in recommending a large expenditure of public money to carry out a scheme such as that proposed at the Tyne, which you are inclined to think would not succeed?—I should be very cautious in giving any opinion upon that subject, as the matter has been considered, and different conclusions arrived at, by many others who are more competent than I am to decide upon the subject.

26,942. In the case of the Adour, did the water shoal gradually, or was there a rapid descent? If you look at the mouth of the Tyne, the section shows a very great fall within a short distance; from 14 feet to 53 feet?—The Tyne is rather favourably circumstanced; from running into a kind of estuary, it does not continue its narrow course. I should think the best improvement would be to cut off a part, and give it a bell mouth; to cut off the Herd sound, and give it a bell mouth by means of excavating two points.

26,943. In fact, almost to reverse the order of the plan, which is a bell mouth in, instead of outwards?—Yes.

26,944. (*Mr. Lindsay.*) Is it your opinion, Sir John, that a bar is formed at the mouth of a river mainly by the sediment coming down from the river, or is it in part formed by the sand washing in from the sea as well?—Both. The sediment from the river must deposit itself first, and then if there is any action along the shore bringing sand or other matter, that will be checked at the same spot for the same reasons, and as the sediment that comes from the river is probably mud, and what comes along the shore is very likely sand or harder material, it is probable that the surface will remain of sand, and the mud will get sunk, and be apparently lost.

26,945. Do you think that the sediment which the ebb tide and freshets throw out of the river meets with the sand which the sea drives into the bight, and the two meeting together, the counter currents meeting together, form a bank which is usually called a bar, and that bar is usually at the point of the piers where the two currents must necessarily meet?—Yes; in proportion as the river is large the bar will be at a distance from the mouth. In the case of large rivers, the current so far overpowers the sea that it carries the bar off for two or three or even five or six miles, and it is formed outside of that, just where the current of the river comes to be checked by the sea. That is the case with the Danube; the bar is at a considerable distance from the mouth.

26,946. I know nothing about engineering, and ask purely for information. You see these piers which are laid down at the mouth of the Tyne. These are as present in the course of construction, and are at present finished to the extent which you see upon the plan. We had it in evidence, and the evidence was very distinct, that since these piers had been carried out only to this very limited extent, that the water has deepened upon the bar, and I think to the amount of two feet. Can you account for that, presuming it to be the fact that since the carrying out of these piers to the limited extent shown the water has deepened two feet?—I think that must arise from the cause you have mentioned; the checking of the side current.

26,947. Then if that be the fact, as stated, will the consequence not be that the further you carry out the piers the more you will check this tendency to accumulate, and consequently the more will you tend to deepen the water, and remove the bar?—I do not think that follows. This may have checked it in the first instance, but when the space behind the piers gets filled, the sand will run round the point to the end of the pier, and probably form a bar again. But it is possible and very likely that you may arrive at a point at which a pier may be usefully carried out, and beyond which it should not proceed, although you cannot lay down any principle as to where that point should be. A curious instance of this occurs to me. At the mouth of the Liffey, in Dublin harbour, there was a very bad bar, having only seven feet water on one side of it. They intended to improve the harbour, and formed a design to carry out piers in two different directions. After they had gone to a certain extent they produced a very beneficial effect upon the bar. They got 11 feet water in a straight line, instead of only a tortuous channel of seven feet. The engineer very wisely and prudently said, "I will go no further. I will not carry "out my whole plan. Here is a good effect. I will "finish what I have got." That was done. That is the story which I have heard, and that is kept up to this day. They have 11 feet at low tide.

26,948. (*Chairman.*) Where they had only seven feet?—Where they only had seven feet in a tortuous course, they have now 11 feet in a straight line.

26,949. (*Mr. Lindsay.*) Following this up, you say that in your opinion the cause of the greater depth of the water upon the bar at the mouth of the Tyne is to some extent that the carrying out of the south pier has checked the sand from falling upon the bar?—Yes.

26,950. Well then, the further you carry it out the greater will be the tendency to check that fall?—Yes.

26,951. Then the natural consequence of this south pier is to form a groin, and the object of a groin being to make land. Am I correct in that?—Yes; to fill up.

26,952. Suppose that we had no river here at all at this particular side of the Tyne; but suppose we had a sufficient space, and considered this a good site to make a good harbour of refuge, independently altogether of its being the mouth of a tidal river, from what you said the effect would be to surround these piers or groins with sand until the sand would gather right out at the pier head, and consequently would block it up altogether?—It would at last, I dare say.

26,953. Then, if your reasoning is good as to the effect produced at the mouth of a river, it goes to the extent that where you put piers which are groins the consequence is that you are putting that which will be collecting sand which will make land, and which will have a tendency in the course of time to make that dry land which is now deep water?—Exactly. That shows it is not a favourable place to put a harbour in. That is not the case at Kingstown, nor would it be the case under a rocky coast. It is only in the case of a sandy or shingly beach, under a rocky coast is the best place to make a harbour.

26,954. I will put before you a plan of Filey Bay. I understood you to say that a pier is to a certain extent a groin?—Certainly; if there is a tendency to

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collect shingle or sand or anything along the shore, every pier will be a groin.

26,955. And the object of a groin is to make land? —That is not the object, but the consequence.

26,956. When I say the object, I have a case in my mind. When they wished to construct docks at Sunderland they found the best site for them was upon the beach. To make land upon the beach they ran out a great number of groins. I suppose the object of running them out was to raise the land?—Yes.

26,957. If the object of groins is to make land, and if a pier run out to sea along the beach is nothing more nor less than another name for a great groin, what would be the effect of running out from Filey Bay a great groin to form that bay into a harbour of refuge? Would the tendency be the same; to collect the sand?—In which line does the sand run; because that makes a great difference? Does it run from the north or the south? It would be a material point as to whether it runs from the south into the bay, or from the north to the back of the pier.

26,958. Say that it flows from the south and within the pier, would it then form land along the pier to the eastward?—You might correct that by leaving openings for the sand to pass through.

26,959. That might be corrected if it had a tendency so to do?—I should think so. Leaving openings for the sand to pass through would prevent its collecting there.

26,960. Does the current run from the south or from the north?—There has been a very pretty operation carried out at Newhaven by means of a groin. Whenever the current along the coast is in one direction, and you put a groin, it will have a tendency to throw up the shingle or sand on the upper side, but to cut away the land on its lee side. At Newhaven they put a groin to the west of the line in which the shingle comes, and the result has been that it has made an excavation to the leeward of it, which has carried away the bar, or improved it very much, by the fact of that excavation.

26,961. Therefore, if the tide runs to the southward, the further you carry the pier the more tendency it would have to carry away the bar? Say that the sand flows from the north, will the tendency of that pier which they are now running out at the Tyne be to improve the bar?—I should think so.

26,962. Well then, that being the case, why do you think, because I understood you to say, in reply to Admiral Hope, that the expenditure of money in the construction of these piers which are laid down upon the plan, and which will cost about 1,400,000*l.*, will be of no value?—I said I should be very cautious in saying that, because there are better opinions upon the subject given by persons who have bestowed more consideration upon it than I can, and very likely those engineers are right; but as a matter of principle I should always object to backwater. I think backwater always tends to injury, and that the mouth of a river is, generally speaking, a disadvantageous place for the formation of a harbour. The Tyne is a place of very great importance, and it is very possible that there is no other mode of doing it, and this will create a certain advantage, I presume, as it has been so carefully considered; but still I should apprehend that there will be a bar formed there at the mouth of it, on account of the large quantity of water which I believe comes down it.

26,963. It seems to me to be a vexed question amongst very eminent engineers; this question of the carrying out of piers having the effect of carrying out the bar to whatever depth you carry out the piers. Now, looking at this river, the Tyne, and seeing that it would cost, presuming that it would cost, 800,000*l.* to make these great piers, and carry them out, not to 14 but to 30 feet at low-water spring tides, do you think that if the people locally interested were willing to raise 600,000*l.* by a tax upon themselves, on the faith of the eminent engineers whom they have consulted, do you think that for so great an experiment as that the Government would be justified in going to the extent of advancing 200,000*l.*?—I should say so, decidedly having nothing against their wishes but this poor opinion of mine.

26,964. I should like your opinion upon it. Such an offer is worth a great experiment?—They cannot have a better foundation than that the people there are inclined to advance largely towards it themselves.

26,965. Say that they were willing to tax themselves to the amount of 600,000*l.*, and come to the Government, and say that they want 200,000*l.* more, but that they are willing to raise 600,000*l.* themselves, having great faith that they will be able to maintain a depth of 30 feet at low-water spring tides, and consequently to form a harbour which will be the means of saving a large amount of property, but cannot raise more than 600,000*l.* by any means, would you think that under such circumstances the Government would be justified in advancing 200,000*l.* to make this experiment?—There is a great political question involved in that matter. If it were purely for local purposes the Government would not advance anything; but if it were made a harbour of refuge for ships passing along the coast, a general harbour of refuge of national advantage, then I presume the Government might advance money largely for such an object.

26,966. You think if it could be shown that the harbour would be made so as to have 30 feet at low-water spring tides, and that the people locally interested were willing to tax themselves to the extent of 600,000*l.*, and if it could be shown that that harbour would be the means of saving life and property in the passing trade, under such circumstances the Government might be justified in advancing this 200,000*l.* out of the 800,000*l.*, so that that great experiment might be tried?—Most undoubtedly. I cannot conceive any case where the Government money could be better expended than in the formation of harbours, directly or indirectly; they are all of such great advantage that the expenditure of a few hundreds of thousounds of pounds or even of a million of money is of trifling importance.

26,967. From the opinions you have expressed I draw this conclusion, that although you may have a strong conviction in regard to a bar being formed, even although the piers be carried out to 30 feet at low water, yet that that conviction is not so strong as to enable you to say that that bar would be formed there, that the bar which now exists would be carried out to that depth, and that, although you hold it strongly as an opinion, you are not prepared to say it would so happen as a certainty, and that there is still a conflict of opinion upon that point amongst many very eminent men?—The only thing which causes me to doubt is the opinion of others who I hold must be better judges than I am. There is one question as to the 600,000*l.*, as to whether the locality is prepared to spend that at once, or only to pledge dues for a Government advance; for I have observed in Ireland that that makes a great deal of difference. They promise dues to a large amount that are never realised. If the locality would spend the money at once it would be a bonâ fide outlay on their part.

26,968. I asked the question with this understanding, that the people locally interested would subscribe the money, or would give satisfactory guarantees to the Government that that money should be subscribed, and would be expended, and not merely expended but expended according to such a plan of a harbour as the Government might approve, and expended under their directions; it was assuming those conditions that I asked you the question?—That is a very favourable proposition, and very different from Government advancing money on the faith of prospective dues, because that has often led to undue outlay.

26,969. I asked the question, and you, I imagine, gave the answer, presuming that the Government would be perfectly satisfied as to the guarantee given? —I should think the Government would do very well

to advance the money in co-operation with any great body that would propose such an improvement.

26,970. In cross-examining the witnesses down in the north, we found out that the people at the Tyne are already expending 400,000*l.*, or that there is a great plan to expend that sum, part of which they are going on with, and that there is a disposition on the part of Newcastle to realise certain local dues, and thus obtain 200,000*l.*, which would make 600,000*l.*, provided the Government would come forward with the other 200,000*l.* That is the way I put it?—I should think it would be very well expended on the part of the Government for a great improvement like that as it promises to be.

26,971. (*Capt. Sulivan.*) If you knew that the result has been that as the pier has grown out so the sand has accumulated rapidly, so as in some cases even to flow over the pier, would that strengthen your opinion that as it goes out the sand will more rapidly tend to block up the entrance?—It is very possible that when it got to a certain extent it might not have a tendency to fill up any more.

26,972. With reference to the deepening of the channel of the Tyne two feet while the piers were going out, I can tell you that prior to that deepening there existed some large blocks of stone and fragments of rocks in the channel, just where it began to shoal, and that higher up there is what they call a nine-feet bar of conglomerate and very hard stuff. During the time that they were building the piers they were also cutting a deeper channel through that bar, by dredging and removing all the masses of rock and wreck which were inside the shoalest part of the bar. Might that not account for the subsequent deepening of two feet just over the bar, and therefore might not that be not altogether caused by the carrying out of the two piers?—I do not think that that would create a deepening outside the bar.

26,973. It is immediately inside the shoalest part of the bar at the inner edge?—I do not think that that would occasion its deepening outside the excavation. If it is a very hard substance it will never form again.

26,974. Would not that bar of nine feet tend rather, while shoal, to disperse the tide, and when the deeper channel was cut through would not it throw the volume of water more directly on the shallower bar?—It might move the bar a little further off, but I do not think it would prevent the collection of it.

26,975. Supposing the result of constructing these piers to be the deepening of the water over the present bar, must not all that material that is carried down by the river be deposited somewhere at or near the pier-head?—It would go to sea, I presume; but I doubt whether both piers have had the effect of deepening the channel. I suspect it has been only one or other of them.

26,976. But suppose the piers to be continued, and to produce a stronger current, so as to carry away some portions of the bar, must it not be deposited where the pierhead will be?—I think so.

26,977. Will it be only a question of time when that bar shall be formed at these piers?—My impression is that it will be formed there.

26,978. Would you be kind enough to say how far the Adour piers were carried out?—They were carried out three or four miles.

26,979. What depth of water were they in at the outer extremity? (*A plan of the Adour River, dated* 1828, *was produced, and shown to the witness.*) I refer to 1814, when the bar and the passage was in a different position to what it is shown upon the plan. We went in with boats.

26,980. Before these long piers were built?—The first piers were high up, and the bar collected outside them. Then they threw out other piers, and the bar collected again. I am told the present Emperor is about to renew efforts for its improvement.

26,981. Has the tendency then been to form land at the back of the piers, and as they were thrown out has the bar been thrown still further outside?—It has thrown the bar further outside, and sandbanks have accumulated at the back of the piers.

26,982. You were asked a question about Filey. I must first explain that at present a natural pier exists there for some distance above high-water mark, called Filey Brigg; that there is no tendency to any travelling of the sand from the southward to Filey towards the corner formed by that brigg and the shore. Would that be sufficient to show that building a pier still further out could not in any way alter the accumulation of sand?—I should think it would. That would give great reason to expect that there would be no accumulation.

26,983. Looking to the small plan of Filey Bay which I now place before you, you will see that Flamborough Head, which is a few miles south of Filey, cuts off entirely all travelling of sand from the south; that rocky chalk cliffs exist to very nearly within two miles of Filey, and the sandy beach only commences at the end of these chalk cliffs. We have it in evidence that flints falling from these chalk cliffs have not travelled at all along that sandy beach, but remain at or very near where they fell, and that there is no sand to accumulate from that end of the beach to Flamborough Head. Would that satisfy you that there would naturally be little fear of any accumulation being caused in that bay?—That looks very like it; but I should say that if a harbour were made under Speeton Cliffs it would remain perfectly clear, and having so much done by nature it seems worth while to carry the works further, so as to enclose the bay, and give more shelter.

26,984. Are you satisfied that with such a structure, or rather such a brigg, placed there by nature nearly in the direction in which a pier would be carried, that had there been any tendency to travel, the corner of the bay inside of that must have shown an accumulation of sand?—I should think it would; but there could be no harm in leaving a part of the pier open.

26,985. Filey Point at present projects nearly half a mile beyond the cliffs, and the brigg projects nearly another half mile even above high water, and there is another large portion dry at low water, yet there is no tendency to accumulation even in the corner inside Filey Point?—I should consider that promises to be a very good harbour. There is no backwater, of which I have the greatest dread, and there would be no fear of accumulation if there was. I think that leaving an opening in the pier would remove any such danger.

26,986. With reference to what you said as to the advisability of assisting the people at the Tyne by a grant of 200,000*l.*, if the responsibility rested with you to recommend to the Government the expenditure of a sum of money to do most good for the saving of live and property on the coast, could you recommend that outlay at a point that enclosed within the works a tidal river?—I should not prefer that. I should prefer a plan that did not; but there is a great inducement, having so much assistance from other sources.

26,987. If your views are right, that it is only a question of time before a bar will again form at the entrance, both the outlay of the local parties and that of the Government would be comparatively thrown away?—If my views are correct, it would.

26,988. You are aware that this question of the improvement of tidal rivers is one of very great importance to the country, in which nearly all our harbours are at the entrance of tidal rivers, and therefore you will excuse my asking one or two further questions. You instanced the Adour. Did I understand you to say that the want of gain that has occurred at the Adour would be a reason for not attempting any experiment at the Tyne?—Oh dear, no; not at all; because there are so many different circumstances in different rivers. When a river enters into a considerable estuary it is always very much better. Large estuaries, like the Thames and many others, remove the difficulty, because a great body of

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tidal water neutralizes the effect of backwater coming down, and therefore it has not so much effect as it would otherwise produce. Now the Tyne is under much more favourable circumstances than the Adour, because the latter river goes by a very narrow entrance abruptly upon the sea, whereas the Tyne does open into a kind of estuary. There is a great expanse for the flow of the water of the sea which would tend to relieve it.

26,989. The Adour is a small stream opening upon a sandy beach ?—It is a large stream; a large body of water comes down the Adour.

26,990. As large as the Tyne ?—I do not know exactly the dimensions of either one or the other, but it is a large body of water.

26,991. It opens, I think, upon a sandy beach, without any headland upon either side ?—Upon a sandy beach without any headland.

26,992. I think on the north-east angle of the Bay of Biscay ?—Yes.

26,993. Exposed to the whole force of the Atlantic wave ?—Yes.

26,994. And in a very sandy coast ?—On a very sandy coast, which is an unfavourable circumstance.

26,995. Therefore you would not compare that with the river Tyne ?—No. For instance there is the Nile, which is a great deal worse than the Adour. There is an immense river comes out, and not six feet water at the bar.

26,996. You would not adduce an argument from either the Nile or the Adour against trying an experiment at the Tyne ?—I would not speak against any specific project; I only hold it as a principle that a great mass of backwater is prejudicial to the forming of a harbour, but that if it expand into a great estuary it becomes in a degree neutralized. In fact that great rush of water coming at once against the bank of the sea is not arrested to the extent which takes place in other cases.

26,997. You are aware that the River Humber has no bar ?—The Humber has a very fine entrance.

26,998. And has no bar ?—And has no bar.

26,999. Can you account for that ?—I attribute it to the existence of the great estuary, which lies within the spit of land called Spurn Point; a great estuary which lets in a great mass of tidal water, so that the backwater has not the same effect; it is lost in that mass, and I have no doubt that the current at the Humber is not particularly strong, as it is out of many rivers. Whenever there is a very strong current I think there must be a prejudicial action produced.

27,000. Are you aware that in the river Tay there is, comparatively speaking, no bar; that is, there is a bar, but with 20 feet water at low-water spring tides? —My recollection is that the Tay runs out with a great bell mouth.

27,001. It does ?—That is what I consider a favourable circumstance.

27,002. A bell mouth with regard to the land, but carried almost to a small mouth by sands on one side. Are you aware that the Yare, the entrance to Yarmouth, has been deepened, and that a depth of nearly 10 feet over the bar has been gained within 20 years? —I do not recollect the Yare; I think it is a very winding passage.

27,003. Yet it meets the sea almost at a right angle ?—I do not know that that has been improved; has it ?

27,004. Yes; it has been greatly improved by dredging. Do you think that there is anything to be done in the way of improving a river by dredging the bottom to a very slight slope ? Do you consider that a slight slope is more or less likely to produce a bar than a rapid one ?—You may increase anything by dredging, but the question is whether it will not silt up.

27,005. But might we not reduce the sea reach of a river to a moderate slope; a better slope for meeting the sea water than allowing it to be rapid ?—Anything that reduces the rapidity of the current will produce a good effect.

27,006. Between the Tyne bar and Newcastle, a distance of 10 miles, there is, if I recollect right, a loss of 5 feet of tide. Do you think that any benefit would arise from dredging the Tyne up to Newcastle Bridge nearly to a level ?—I should think certainly so; the more you can dredge it, the more space you can get for the sea, the better.

27,007. You think that would have a beneficial effect upon the bar ?—I think it would. Anything that admits more sea into and neutralises the effect of the backwater I think would be of benefit.

27,008. Seeing the number of tidal rivers and harbours that we have around the country, do you think it desirable that every effort of engineering skill should be put forth to endeavour to improve them ?—Certainly.

27,009. Do we understand your evidence would be to discourage that or not ?—Oh no, not at all. The only thing I say is that I think backwater is prejudicial, cæteris paribus, to the formation of a harbour, and that I would rather have a harbour without any backwater.

27,010. For a general refuge harbour, would you construct it where there is no backwater ?—Yes.

27,011. I think all the engineers in the country would agree with you on that point, probably; but you would not carry that so far as to say that it would not be worth while to make an effort to improve the tidal harbours ?—Certainly not; many of the tidal harbours are of vast commercial importance. If you cannot gain the object in one way by a lateral port, as I have mentioned, your only choice is to improve the mouth of the harbour itself.

27,012. You are probably aware that in the River Clyde, at the Bromielaw Quay, within the memory of men living, a barge would not be afloat, and that at present West Indiamen drawing 20 feet of water discharge their cargoes at high water ?—I think Glasgow is not a favourable case to quote, as to the improvement of harbours, for if I am rightly informed I believe that the tide does not rise so high by two feet or two feet six inches as it did in former times.

27,013. Do you mean at Glasgow Quay ?—At Glasgow Quay. I do not know whether I am correct, but some years ago, in talking about Glasgow, it was explained to me that by restricting the flow of water by means of dams which they have made going up the river they have prevented the influx of the tide, so that it does not rise at Glasgow so high by two feet or two feet six inches as it did before. But they have gained by deepening. By dredging they have gained a passage up there, which has given an improved waterway.

27,014. I think you have been misinformed as to the facts ?—That may be.

27,015. No doubt some of the dykes in the lower part of the river have checked the tidal flow. It is, probably, one of the very points that led to the establishment of the Tidal Harbours Commission, that fault on the Clyde. At the same time they have dredged out the bottom so as to have a rise of 10 feet at Glasgow, where they had only 18 inches ?—Have they got that rise of tide ?

27,016. A rise and flow of tide from dredging out the bottom. They have lowered the level of the bottom, but not raised the level of high water above what it was formerly. You think it does not rise so high ?—I think the high-water level is not so high by two feet as it was before. That was the impression I formed, and that was occasioned by the dams they had carried out—longitudinal dams, I believe, carried all along, which have obstructed the entrance of the sea up the Clyde.

27,017. It is found that these dykes are now too narrow for navigation, and they are setting them back at a great expense ?—If they could carry them all away it would let in the tide, and would improve the passage to Glasgow.

27,018. I understand that you are in favour of encouraging the tidal flow everywhere ?—Yes, to the utmost extent, provided the entrance be proportionate.

27,019. You would remove all obstructive bridges, starlings, and piers that prevent the tide flowing ?—Everything which shows itself to be a real obstruction.

27,020. You are aware that at Newcastle Old Bridge the abutments, piers, and starlings occupy 200 feet, or two-fifths of the river ; do you consider it would be a great advantage to remove that structure, and allow the tide to flow upwards ?—I think anything that impedes the tidal entrance, with the proviso that I made before, is injurious. At Portsmouth, I think, if you lessened the amount of tidal water that went into the harbour that would improve the entrance.

27,021. (*Capt. Vetch.*) Admitting, the general principle, that in the case of a river meeting the sea, that the two opposite forces meeting must necessarily cause a bar by the stroke of the sea meeting the current and sand brought down by the river, that there must be a point where these two forces meet, and neutralise each other, deposit their sediments and cause a bar, I should like to know whether there are no other causes that help to form these bars ; for instance, whether when a river discharges itself, having shifting materials in its bed or on its shores, may that not be a great feature in the formation of a bar ?—Oh yes. It seems to be formed from that ; but I think it is occasioned by the deposit on a particular spot by the current meeting the break of the sea, and that even the side current drops its deposit from the same cause.

27,022. For instance, in the case of the Mississippi, with which I believe you are acquainted, there is 100 miles of very deep water from New Orleans to the mouth. At New Orleans the depth is 100 fathoms, but at the mouth you will recollect there is a bank or bar which large vessels cannot get over, a bank with 11 feet water, and there is little tide in the Mississippi ?—It is an enormous river, but the banks are of mud, and the bar is mud, and ships break right through it, and do not care whether they touch it or not if they have force to go through it. It is a very strong case of the effect of backwater. When we went there we had to anchor. It is of loose materials, and shifts about and deposits anywhere.

27,023. In the case of the Guadiana, one of the most powerful streams in Spain, a bar is formed all round the mouth, five or six miles in length, completely obstructing it. That I suppose you will attribute to the violence of a strong stream meeting the sea with a strong impulse ?—Yes.

27,024. That the two meet, and occasion a sediment ?—The current is checked by the break of the sea. The mouth of the Douro is another strong example. It is an enormous river, and brings down an immense quantity of water. There are parts in the interior where it rises 200 feet between the mountains. There is a terrible bar at the mouth of that river ; a very bad one indeed.

27,025. I think that in all the cases of bars mentioned we find that the material is loose both on the bottom and at the sides where the river discharges, whether it is sand or mud ?—At the mouth of the Douro I do not think there is much sand, or much cause for deposit, except what is brought down by the river, because it is a very rocky shore there.

27,026. Suppose the River Tyne, instead of falling through a great bank of sand, was bounded by two rocky promontories, one on each side, do you think that the same effect would arise as now occurs at its mouth ?—I think it would form a bar if it had a narrow entrance, from the mere deposit from the river alone.

27,027. I think you will find these bars generally exist where there is loose material ?—The mouth of the Tyne has a fine entrance, but there is a great estuary, which enables the tide to flow in and out smoothly ; still there is a bar there, but it is a very good one.

27,028. I only want to draw your attention to the combination of these two circumstances, first, the river running with rapidity and meeting the sea, and the shock of the two forming a deposit, and also to the fact that that tendency is very much increased by the nature of the material through which the river discharges itself ?—No doubt the Nile is very bad from that circumstance of sand.

27,029. (*Mr. Coode.*) Referring to the case of the Tyne, I should like to ask, if you will tell us, what in your opinion will be the effect of the works as indicated upon the Admiralty chart lying before you ?—It is very difficult for me, without knowing the movement of the sand, to judge precisely as to that. What I want to adhere to is, the main principle, that a great quantity of backwater meeting the sea has a great tendency to create a deposit.

27,030. I will tell you as a fact, that so far as the south pier has gone at present, the tendency has been to cause an accumulation of sand on the south side, and that the sand is growing towards the east end as the pier advances. Having made that explanation, I should like to know, if you feel in a position to give an opinion, what will be the effect of the works. If you cannot give an opinion, I will not press you for an answer ?—I should expect the sand would flow to the entrance, and ultimately form a bar.

27,031. You expect the ultimate effect will be that a bar will be formed ?—That is my opinion.

27,032. In short, that it would be simply a question of time ?—It may form so slowly that ordinary dredging might keep it clear ; something of that kind.

27,033. I gather, that the result of your observation and experience has been to confirm your opinion that the more nearly the entrance of a tidal river partakes of an estuary character the less will be the liability to the formation of a bar ?—That is my idea.

27,034. Holding these opinions, do you consider that the forming of piers at the Tyne is judicious, because it seems to me that it is the reverse of the estuary form ?—If it is narrow at the entrance that would be injurious.

27,035. You prefer the bell mouth ?—Yes.

27,036. I think your reason is that that more nearly partook of the form of an estuary ?—Precisely.

27,037. In fact it was keeping to those natural forms which we see are the most successful ?—It enables the sea-water to go in and out smoothly and evenly.

27,038. As you are aware, the matter we are dealing with is one of refuge rather than commerce ; should you think that if the Government made a grant towards the improvement of the Tyne, with a view to improve it for refuge purposes, some substantial guarantee should be taken that a proper amount of space should be always available for refuge, as an equivalent for granting the public money ; that the Tyne people should not be left free to occupy the whole for commercial purposes in any way they may think proper ?—That would be going into too great refinement of legislation. It would be better to take it for granted that the larger basin would be always available for refuge.

27,039. We have known these circumstances to have arisen, that notice has been given to prevent vessels from leaving the docks and going into the river, because there was no room for them ?—If these works are carried out they will form a very large basin, because it is natural to suppose that it will be artificially deepened, will it not ?

27,040. The deepening of that forming no part of the plan, I would ask you whether, in that case, do you think that the construction of that south pier would not have a tendency to cause an accumulation on the north side ?—No ; I expect a bar would be formed.

27,041. What do you apprehend would be the direction of the channel when the piers were made ? You do not apprehend that the simple construction of piers would cause the space between them to deepen, but that it would require to be deepened by artificial

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means ?—Yes ; it would be simple sand, and might easily be deepened.

27,042. Your reference to the case of the Adour might possibly mislead a little, if it were to be understood that the piers were carried out into the sea. I understood your explanation to be, that they had been extended two or three miles beyond the entrance of the river, whereas by the chart they appear to be entirely within the river's mouth ?—They were in the first instance carried out into the sea ; the first ones, according to my impression, were carried out into the sea, and the sand has accumulated about them since. My impression was that at first they were carried out into the sea, and all the sand round them has accumulated since.

27,043. (*Chairman.*) (*Looking at a plan that had been produced.*) It can hardly be that, I think ?—I will not be positive about it.

27,044. Upon what authority do you say that ; because from looking at the chart these piers do not seem to have been projected into the sea ?—That was the impression that I formed when I was there.

27,045. (*Mr. Coode.*) The impression made upon my mind by your evidence was, that these piers had been projected into the sea to the extent of two or three miles. Upon referring to the chart I find, that at present, the outer extremity of the piers just touches the line of the shore. If you could tell us what was the line of the shore at the time the piers were projected, it would be an important fact ?—I could not tell you that ; but there is an anecdote in connexion with this subject which may throw some light upon it. In the year 1782 the Emperor Joseph of Austria was travelling about the world incognito, and came to Bayonne. They were then carrying out the piers there ; and he said to them, "You may "carry out your piers as far as you like, even to the "opposite shore, but however far you carry them "the sand will fill them up, and you will not get a "harbour."

27,046. (*Capt. Sulivan.*) You have stated that the sand has formed at the back of the piers ?—Yes, that is my opinion.

27,047. (*Mr. Coode.*) Perhaps you have some authority or document which would assist us in coming to a conclusion ?—No, not at all.

27,048. (*Sir F. Smith.*) It is a question of recollection ?—Yes ; as the thing struck me when I happened to be there.

27,049. (*Mr. Coode.*) You said in reference to the Tyne you would encourage the tidal flow by all possible means. Do you not think that might be carried too far, and that at a certain point it is desirable rather to regulate than to increase the tidal flow ?—It may be carried too far where the entrance of a river is narrow, but not where the entrance is wide. The nearer you approach to a bell mouth the better for the influx of the tide. I believe it is something of that kind which creates the enormously high tides in different parts of the world ; at Fundy, at Liverpool, in the Bristol Channel, and in the Severn.

27,050. Taking the Tyne as an instance, would you apply the principle which you have laid down for the whole of the Tyne, from Shields to Newcastle ?—Yes. If I could make a great wide entrance for the tide to go in, it would improve it very much ; but it is out of the question ; it is almost impossible.

27,051. Taking the Tyne as it now exists, do you not think a greater depth of water could be obtained by training the stream of the tide than by encouraging the amount of tide beyond a certain extent ?—I do not quite understand that.

27,052. I wish to ask whether it would not be more judicious to train and regulate the channel which the tidal water would make above Shields, rather than to permit the influx of a greater quantity of tidal water ?—I think the tidal water does good, and the backwater does harm ; but I do not like to give an opinion upon this subject, which has been under the consideration of engineers who are very able to judge. I would rather confine myself to general principles.

27,053. The degree in which the piers that project from any shore will act as groins, must, I presume, from your former answer, in your opinion depend much upon the kind of material flowing the coast ?—Yes.

27,054. There are instances where projections or piers would not create accumulations ?—That is the case in Kingstown within Dublin Bay. There is an immense expanse of sand along the shore, but a mile from Kingstown there is no sand, and therefore the harbour of Kingstown is perfectly clear.

27,055. (*Chairman.*) You have used the expression "backwater" repeatedly. What must I understand you to mean by that ?—I mean backwater and the river course.

27,056. Backwater, as you have used the expression, is water of the river as distinguished from the water of the sea ?—Yes.

27,057. Therefore you would not call the ebb-tide, the water which flows off the banks in Portsmouth harbour, backwater ?—Except that it produces the same effect, if the expanse inside is out of proportion to the width of the entrance, and produces within a very sharp current, which I hold to be prejudicial.

27,058. But in the sense in which you used the expression "backwater" it is simply water which belongs to the river, and flows from the back country ?—Yes.

27,059. Referring to your evidence as to the piers of Bayonne, do you say, merely as a matter of opinion, or as a matter which you know from any certain authority, that the mouth of the river was where the piers commence, and that the sand at the back has been formed since they were run out ?—I cannot say positively as to that.

(*Capt. Washington.*) I believe that the whole account of the works at the mouth of the Adour may be found in the report contained in the French engineering papers. I believe it to be in the Admiralty library, but if not I can procure it from Paris in a very few days.

27,060. (*Sir F. Smith.*) You are aware that upon some parts of the coast of Sussex where groins have been placed for the purpose of accumulating sand for the protection of the towers they have not succeeded ; there has been no accumulation ; none have taken place, and in consequence some of the towers have been washed away ?—Not where there were groins, I imagine. The groins always succeed.

27,061. Oh no ; in some cases they do not. There seems to be no sufficient reason for it, but there are no accumulations. The line of the south entrance to the Tyne upon the chart shows the line of the south pier. It has been stated to you that in some pents to the right of the pier the sand has grown up to a level with it, and even in some instances has tipped over it. Now as there is a set of sand from the south to that pier, is it not a matter of necessity that it must eventually either spread at the end of the pier or must go over it, and form in a mass of sand on the other side, because it must find a level somewhere, either by going along the end of the pier or over it, and if it goes over the pier it helps to fill up the expanse intended for the accommodation of vessels, and if it does not do that must it not of necessity go to the end of the pier, and in the course of time, in the natural course of things, go into the harbour, and form a bar ?—I should expect it must do so.

27,062. Should you not have imagined, if this had not been a matter upon which engineers had expressed opinions, but if it had been only a scheme proposed by some one,—should you not think it would be a better plan to give the south pier just the reverse form to that which it takes, and make it go beyond the sand called the Herd Sand, so as to give it a bell-mouthed shape ?—The same effect would be produced ; that would have filled, up with sand, but the bar would not be formed, because there would be a larger expanse. It is difficult to give a confident opinion against the

construction which is recommended by celebrated engineers.

27,063. I am assuming that it is not the Tyne, but a scheme for some other place. With regard to Filey, we hear that there is no set of sand there whatever, and you are of opinion that that is an advantageous position for a harbour. If you had to define the form of coast most likely to give the advantages which you want, it would be something of that kind ?—I think it would.

27,064. With a rock to the south and the brigg to the north, without any movement of sand ?—Yes.

27,065. (*Mr. Lindsay.*) In reference to the answer which you gave to Sir F. Smith as to the tendency of sand to accumulate at the south pier at the mouth of the Tyne, would there be exactly the same effect if there was no such thing as the River Tyne at the site shown upon this plan ?—Certainly.

27,066. You said that in your opinion, and you merely gave it as an opinion, you thought that even if the piers were carried out a bar would still remain. Do I understand you to mean this, that if the bar now is at 6 feet, that being the shallowest part, and so called the bar, if the piers were carried out to 30 feet at low water, in the course of time the 6 feet within would deepen, and that where there is now 30 feet there would only be 6 feet ?—Yes, that is my opinion.

27,067. Say that the pier was carried out to 30 feet ; it would meet the ocean tide flowing along the coast. Would the effect of the ocean tide be to catch the sediment as it comes out of the river and scour it, and thus reduce the tendency to form a bar ?—Anything that would augment the force of the collision between the current running out, and the bank of the sea, which is nearly stationary, would be disadvantageous. So long as there is that collision, I think a sediment must be created.

27,068. It would tend to reduce it, but not to remove it ?—No, it would not.

27,069. (*Capt. Washington.*) I should like to return for one moment to the rivers which have been instanced. The Adour, which rises on the north side of the Pyrennees, is a rapid torrent, and falls into the Atlantic ?—Yes.

27,070. The Douro, another river that has been mentioned, also rises in the mountains, has a short and rapid course, and falls also into the Atlantic ?—Yes.

27,071. The Guadiana rises from a very high source, has a rapid descent, and falls, I believe, into the Atlantic ?—Yes. The Douro does not exactly rise in the mountains ; it rises in the great high plains of Castile and Leon, but it is not in the mountains. There are streams which come from the mountains ; but it cannot exactly be said that the river itself rises in the mountains. I do not know whether you mean by a rapid course a precipitous one, but you can navigate the Douro to the frontier of Spain ; I have been as far as that in boats. It is a rapid river, but quite navigable all the way up. It is not precipitous.

27,072. I wish to obtain your opinion whether you think any argument can be derived from the piers at the mouths of these rivers, against any attempt to improve rivers in England ?—I think the circumstances are the same, if a great current of backwater coming into the sea.

27,073. Do you not think a very rapid descent of a river an unfavourable symptom towards doing away with the bar ?—The more rapidly it comes into the sea the worse it is.

27,074. (*Capt. Sulivan.*) You said that you considered the Tyne rather a favourable specimen of a river, and that it might be worth while trying to improve it, because it forms something like an estuary ?—Yes.

27,075. If the piers are carried out as you see them drawn on the Admiralty chart, will not the whole of those advantages be destroyed, and will it not then become more like a river running through a narrow entrance upon a straight coast ?—Yes, I think it would.

27,076. Carrying out your view, and supposing it to be right, and taking it for granted that there is no travelling of sand from the north, will not that north pier as it closes the estuary, without keeping out any silt from the coast, do more harm than good ?—Except for the shelter it gives.

27,077. I am excluding all idea of shelter, because we never had from the parties who designed these piers any idea of their forming a shelter. The anchorage supposed to be gained is higher up. I never heard the idea suggested that the space inside the piers is to form a refuge, but only to deepen the river ?—Then the greater the opening the better.

27,078. The south pier, without the north pier, would according to your views, have more tendency to improve the river ?—Yes ; if there was a pier to the south, and none to the north, it would be better, I think.

27,079. Then, supposing it to be decided that the Government money should be laid out at that place, would you consider it desirable to lay it out upon a plan which shuts it up, and makes it a narrow mouth ? —It is a great question, what is the plan upon which the harbour should be constructed, and I should be very sorry to give my opinion against that of engineers who have considered it upon the spot, and who are really more competent than I am to judge of it.

27,080. (*Mr. Coode.*) Notwithstanding the strong opinion which you entertain of the difficulties which would attend any attempt to improve the entrance of a tidal river, looking also to the importance of this question to the country, you do not go so far as to say you would discourage any attempt to improve the entrance of these rivers, and to make them more valuable for purposes of refuge ?—Certainly not. I should not wish to stop any great improvement of this kind, particularly of such vast commercial importance as all these rivers are ; but in choosing a site for a harbour I would prefer a smooth rocky coast to any other.

27,081. You would give the preference to a site where there was no backwater.

27,082—92. (*Chairman.*) Can you offer any remark upon the means of reducing the cost to the country of the construction of harbours of refuge ?—In the first place,—it is not exactly any answer to that question,—but with regard to economy of harbours, I do not think the public are quite aware of the great benefit of these commercial harbours. They have considered it more as a question of the saving of life, and occasionally of ships getting in in tempestuous weather to find refuge for the moment ; but indirectly there are immense advantages gained by these harbours. Judging from Kingstown Harbour, whenever it blows pretty strong, particularly in winter, Kingstown Harbour is full of shipping. They may have come from Glasgow and other distant places, and having got a little beyond Kingstown meet with a foul wind ; if the wind is pretty strong they drop their anchor, and wait there for a fair wind, instead of running back to Glasgow or elsewhere. By that there is a great saving of property, of wear and tear to ships, and of time ; that causes the formation of such harbours as these to be a very judicious expenditure of money ; I think more so than people generally imagine ; besides the immense saving there is if you save even a single ship from being wrecked. Kingstown Harbour cost about 800,000*l.* Three or four ships saved would pay the whole amount of it ; so that I think it is of great national importance, and that these harbours are of much more national value than people generally are aware of. As to economy of construction, it strikes me that there is occasionally more expenditure in cut stone works and in heads than is absolutely required or actually necessary. The principal object of one of these harbours is to give anchorage, to shelter ships, and to save lives from the effects of the ocean storms ; and to get that in the cheapest way you can, whether by running well cut stone works up from the bottom to the top, or by throwing in rubble, and then afterwards adding your cut stone works just to the extent that

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may be required for piers and wharves or things of that sort; but it is not desirable to carry the cut stone work all the way through, merely to make it a handsome thing; such things cost a great deal more money than is necessary. Some saving may be effected in that way. Another economy, that ought also to be considered, and one of much importance, would also be, before you construct a harbour you should secure the foreshore for the docks, the wharves, and other things of that sort. I think you have right to take that into your possession. I have known a case where a harbour had been made at a very considerable public expense, and where there was a little bit of foreshore within the limits of the pier which was required for a quay. There was a great necessity for taking it, and the value was enormously increased, and the proprietor of that little bit of foreshore asked an enormous price for what was only a piece of bare rock, and had only had any value conferred upon it by the formation of the harbour. That appeared to me to be very unjust; and not only that, but whenever you make a harbour you lead to the creation of a town, with stores and hotels, &c., and from the land being only of agricultural value of so much per acre it becomes of great value, so much per foot. I do not see why you should present that difference to private individuals, or make the fortunes of proprietors, at the public expense. You ought to take the ground round the harbour, and apply the increased value of it towards defraying the expenses of the works. Pay the full value, and a liberal value, for the land, in the first instance, and then turn it to account for the benefit of the harbour.

27,093. In respect to the actual construction of the piers, and so on, you do not wish to offer any evidence?—No. There are many different ways of doing such things. Engineers of course have different views upon these matters.

27,094. You do not wish to offer any opinion upon this subject?—No, none. I think that the upper works are often carried to greater refinement than is actually necessary. I think that the matter of taking the ground is of great importance. At Kingstown quite a city has grown up there, which would have paid the whole expense of the works if the ground had been purchased at the time the harbour was made.

27,095. If it had been bought in the first instance?—Yes, at its agricultural value; a full and liberal price being paid for it.

27,096. (*Mr. Lindsay.*) You have thrown out a very important hint, and I want to see from you how it could well be carried into practical operation, presuming the case of Filey Bay before us?—If you make a harbour there a town will spring up; and I think the Act of Parliament that enables you to make the harbour should empower you take a quantity of land, and turn it to any account you please.

27,097. We are talking of Filey Bay simply because Filey is before us. We might take any other place. Now say that negotiations were opened for the purchase of a certain quantity of land in the immediate neighbourhood of Filey, and the proprietors of that land would say, "the Government intend to do "something here, or they would not seek to buy the "land;" consequently they would not sell. Would you propose that the Government should introduce a bill so as to vest in them the power to buy the land at a valuation?—There is a general Act of Parliament for each specific work of this kind. There would be an Act of Parliament probably for this, to give them power to make these works. You also take quarries, and power over land for them. The Government, before it undertakes a work, is allowed to take land for quarries, and whatever may be necessary for them, at a valuation fixed by a jury; at its then value; not at its prospective value. At its then value, which is an agricultural value, worth perhaps 100*l.* an acre, power is given to take a certain extent of ground for quarries; and I say you ought to go further, and have power to take a considerable space of ground beyond that in case of harbours.

27,098. What you recommend then is that the powers which the Government already possess should be greatly extended?—Yes; they have no power at all except by each specific Act of Parliament.

27,099. Or rather that the power which by the Act of Parliament for any specific purpose, say this for Filey Harbour, they would be vested with for a specific purpose, should be acted upon to a much greater extent than has hitherto been the case?—I should not leave it in the discretion of the Government to take what they please, but should define the amount, within certain limits, and the Government should have the power of taking that at a valuation.

27,100. You would recommend that whenever an Act of Parliament was asked for for the construction of a harbour of refuge at any particular place that there should be a clause defining the amount of land the Government should include?—Yes.

27,101. And that that extent of land should be a good deal more than it has hitherto been?—Yes; quite, certainly all the foreshore and a great deal at the back. It would injure no one, and would be an encouragement to the commencement of such undertakings.

27,102. (*Sir F. Smith.*) Wherever stores would be required?—Yes; in many instances a town would rise up, and there would be an enormous increase in the value of land.

27,103. (*Capt. Washington.*) Have you ever considered the question of applying an island at the entrance of a river, say the Liffey, for the improvement of it?—No; I do not know of any particular instance of that kind.

27,104. Are you aware that about the year 1830 Sir T. Page proposed that an island should be put upon that bar, with a view to getting a deep channel on the other side of it?—No; I am not aware of it. I do not quite see how it would be an improvement.

27,105. Did you ever see any plan proposed by Mr. Glover for such a purpose?—No; I do not recollect ever to have seen it. I think you have a project before you which would be very useful for joining some islands at the Skerries, and making a very fine anchorage at a very moderate expense.

27,106. (*Capt. Sulivan.*) You mean that, supposing it is shown there is a want of a harbour of refuge in that neighbourhood, that that would enable you to make it comparatively easily at the Skerries? Yes. Whenever you decide that a harbour of refuge is necessary, and you determine to undertake it, I would take the land.

27,107. With reference to the Skerries, you said they could easily be made into a harbour of refuge. Do you mean that there is any necessity for a harbour of refuge there, or only that if one was necessary it could easily be made?—I have always understood that it would be a very desirable place; more a roadstead than a harbour. If we enclose a shelter for ships to anchor, I do not think they would go into a harbour at all.

27,108. (*Capt. Vetch.*) I think Sir John has brought a very important consideration before the Commissioners; viz., the fact of the necessity and advantage, whenever the Government means to construct a harbour, which would be highly useful to proprietors of adjoining lands as well as the public, that before doing so they should, under an Act of Parliament, have the same power as promoters of railways and other erections now possess. No one dreams of going to Parliament for such purposes unless he can obtain the power of acquiring land at a reasonable rate and valuation. If a harbour is constructed at Filey, it would be of immense importance to secure the shore, which at present is of very little use, but which would then become enormously valuable, and might be made to pay all the expense and cost of the works?—It

would pay a great deal towards it. A railway is different. They are not allowed to turn land to profit, but only to take what they absolutely want. We want to take more than we want, to turn it to profit, the improvements which make it valuable being effected at the public expense.

27,110. (*Mr. Coode.*) With reference to the suggestion which you have thrown out as to the purchase of land, I would ask whether you are aware that in the case of the harbour at Portland, a special Act was obtained, and a plan was lodged, with limits of deviation within which Government proposed to purchase; the whole frontage was secured, and something like 600 or 700 acres of land inclosed within the limits of deviation shown. There is now in the possession of the public at Portland, something like 500 or 600 acres, obtained in the manner you have mentioned?—I imagine that has been only taken with reference to quarries, to give space for quarrying, and for some works of fortification. The best ground for a town still remains in the hands of private individuals.

27,110*a*. The whole of the frontage is secured, and for the greater portion of the harbour, the land within half a mile of the shore?—I am very glad of it.

27,111. I wish to call attention to the fact, that the admirable proposition you have made was adopted in the case of Portland Harbour, in the Act passed in 1847, and that the whole of the land was secured, and a very large average beyond that necessary for quarrying and fortifications?—As regards the town of Portland, it will be of less consequence than at many other places, because they have Weymouth within reach.

I merely wish to mention that the proposition which you have made has been adopted, and that great benefit has been felt from it. I, as conducting the works at Portland, have been applied to by individuals to know whether there was any hope of the Admiralty selling any part of the frontage for commercial purposes.

27,112. (*Chairman.*) Admitting the very great advantage of taking the course you propose for the purpose of securing to the public the advantage of the increased value of land in the neighbourhood of harbours of refuge, do you not think that they would be better dealt with by a separate Act of Parliament, which would meet all the special circumstances of each case?—I should think each individual case. It would be giving Government too great a power to make it a general matter. The country would not allow that.

27,113. Take the instance of a town already being at the site of your harbour of refuge, then it would be impossible to take land?—Exactly; it would; but you might take the parts that were unoccupied, and that would be improved afterwards.

27,114. In many instances there are no such parts which are not already occupied. The foreshore may be supposed to be occupied by a seaport; in that case you cannot avail yourself of any land?—Just so. For instance, in this case of the Tyne you cannot take anything; it is impossible.

27,115. Do you not think that it would be right that if harbours of refuge are made at the entrance of ports already existing the Government should reserve power to secure a certain area for refuge purposes?—I should think that every harbour that is made at the public expense will be subject to the regulation of the public.

27,116. Wherever the public money is expended for refuge purposes, in your opinion a corresponding refuge area should be secured to the public?—Certainly.

27,117. (*Mr. Lindsay.*) I think in part of your evidence you have recommended that the Government in any Act of Parliament which they may introduce for the construction of a harbour of refuge should take an extended area of land in the immediate neighbourhood of that harbour?—Yes.

27,118. Then do I understand you to mean that the Government ought to take considerably more than would be required for the actual purposes of construction?—Yes; that is what I mean.

27,119. Then, as you are aware a great principle has been laid down and has long been acted upon, that the interests of individuals must be made subservient to the public good, that is, that wherever land is required for the construction of a great public work, the Government should have power to take it at a valuation, and that the owners should be bound to give it, do you think it would be just to apply that principle to the purchase of land not required for the public work?—I think that where a great public work is to be undertaken at the public expense the community in general ought to give certain facilities for carrying it out. There was one instance of that in the case of the Shannon improvement. The Government agreed to contribute one half of the expense of the improvement of the Shannon, the proprietors paying the other half, but upon the condition that all the land required for the work should be paid for under the judgment of the commissioners, and not according to the valuation of a jury That was a condition that was demanded, and was agreed to, and the result was very satisfactory.

27,120. The estimated value of the land taken amounted to 700,000*l*.; the cost was, under this special jurisdiction, reduced to 70,000*l*, and everybody was ultimately satisfied with the explanations which they received. In fact it was a better system of adjudicating, because the commissioners felt that a great responsibility was imposed upon them. They did not decide, as a jury would do, off hand at once, but in cases in which a doubt arose they took time. They employed valuators, surveyors, and engineers of character, who were perfectly impartial. They had these gentlemen before them in open court. The proprietors were allowed to question them, and the result was that they reduced the valuations very considerably, and in a manner that could not be disputed by the proprietors or by any one else. This arrangement proved so satisfactory that since that time proprietors have voluntarily allowed lands to be taken for railways upon the same principle.

27,121. We have mentioned the case of Filey. In that case there might be less difficulty in dealing with the proprietors in the manner you propose. But say that instead of Filey the Government decided upon having a harbour of refuge in Hartlepool Bay. In that bay there is the old town of Hartlepool and the new town of Hartlepool, and nearly the whole foreshore is covered with the two towns. There are an immense number of proprietors there, all of whom would, no doubt, be considerably benefited by the construction of a harbour of refuge there. How would you deal with such a case as that of Hartlepool?—It is a very difficult question on which to give an opinion; but I cannot see that there would be anything unreasonable, if you were making a great public improvement, in taking the unoccupied ground for the public benefit.

27,122. If you took the unoccupied ground at a valuation, why should you not, upon the same principle, take the houses, because they would increase in value as well as the land?—It is a very difficult question. I do not think you could do so, under those circumstances. I doubt whether in such a case you could ever make an equitable arrangement; but where you begin upon a desert, like the shores of Filey Bay or the rocks of Kingstown Harbour, there I think you may reasonably take the land.

(*Sir F. Smith.*) The other would be monstrous.

27,123. (*Mr. Lindsay.*) I was desirous to have it out completely, that although the principle may apply to open places you see a difficulty in regard to others?—It would be difficult.

(*Sir F. Smith.*) It would be a monstrous usurpation.

27,124. (*Capt. Sulivan.*) A portion of the shore of Filey Bay is built upon, and occupied by a town. The east corner is waste land, the very land that will become most valuable should a harbour be built there;

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and in the case of Hartlepool also, although the north side of the bay is built upon, yet there is some unoccupied land upon its shores, and therefore, if the principle is for the benefit of the public, why should it not be applied to the unoccupied land at Hartlepool as well as to that at Filey ?—I do not know. It is a very difficult question ; it would be beyond my power to unravel it.

27,125. I wish to know why the unoccupied land on the beach at Hartlepool might not be taken as well as that at Filey ?—You do not know where to terminate. It is a very nice question.

27,126. I understood that in a case such as that of Hartlepool, you would not apply it even to unoccupied land ?—I am afraid it would be very difficult.

27,127. Do you conceive that where the Government and the public are laying out money for a great public advantage, and if they could get a portion of the money by the plan you propose, they could make a much finer harbour, and give accommodation at a much less expense ? Do you think that that is a legitimate means of obtaining that public advantage ?—I think it is.

27,128 (*Capt. Vetch.*) There is one fact which I think you omitted, and that is that the foreshore between high and low water mark belongs to the Crown ?—It does, and therefore you have to deal with the Crown. Where there is no special grant, the land between high and low water mark belongs to the Crown.

27,129. (*Mr. Coode.*) I presume your opinion is that every place should be dealt with according to its peculiar circumstances ?—Yes.

27,130. You do not wish to lay down one general rule which shall be applicable everywhere ?—No.

27,131. You simply intend to propose that every case should be dealt with according to its merits and the circumstances attending it ?—Yes ; and I think that wherever you make a harbour upon a desert you may apply the principle which I have recommended.

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27,132. (*Chairman.*) Where do you reside ?—At 73, Harley Street, Cavendish Square.

27,133. State to the Commissioners what is your proposition with respect to harbours of refuge ?—My proposition is, to have an artificial or floating beach, intended to resist the force of the waves by yielding, and by the very modified angle which it presents to the action of the sea ; and, from experiments which I have tried upon a very considerable scale, I am led to believe it will answer all the purposes for which it would be intended, inasmuch as it would render the water perfectly smooth under its lee. There may be undulations, but they will be of the most modified character, because, from the nature of the construction, the artificial beach passing beneath the trough of the sea prevents any undulation passing under that point, while the other part, viz., the caisson on which the artificial beach is constructed, rests on the smooth water line, therefore I have never been able to find that any undulation, passed underneath to disturb it or make it oscillate. At the same time, reasoning from the fact that the wind, which is the cause of all waves, except some current waves, which are unimportant in this matter, is deflected over at the same angle at which it impinges on the inclined plane presented to it at an angle of about 15 degrees, there will be another effect produced, which is a still calm under the lee ; that is to say, if the inclined plane be 10 feet above the level of the sea, the wind being horizontal, the current, being deflected over at the same angle at which it would strike, would not fall on the face of the sea under the lee of this work for several thousand yards, and when it did it would do so in a very modified degree. This is exemplified in the coped walls of Scotland. The celebrated agriculturist, Sir Geo. Sinclair, conceived the idea of coping the walls, in order to deflect the wind over, and shelter the produce under their lee. That confirmed me in my ideas, and led me to try this plan. My breakwater, or artificial beach, was used with the most signal success at Lowestoft by Sir M. Peto, and the gentleman who superintended the works there declared that they could not have constructed the sea walls at all without the assistance of the floating sea barrier of my invention. The question of mooring is one which of course immediately suggests itself to the minds of scientific men and sailors. I believe there will be very little difficulty with regard to that. It is a mere question of force and resistance, and the results of the application of science to analogous cases show that we need be under no apprehension that we could not moor even the Isle of Wight if it were afloat. As a sailor, I should be happy to undertake the task. There can be no difficulty with regard to preconcerted moorings, if they are properly constructed, because it is a mere mechanical matter, and a calculation of force and resistance. The power of the sea and the effect of the wind upon any surface are perfectly well known. We can therefore ascertain with what force we have to deal, and may test our moorings beforehand, just as we test a gun. Contracts are about to be entered into for erecting this barrier at Galway, and also at Lyme Regis. The object which I had in obtruding the matter upon the Admiralty, in the hope that it might be laid before the Commissioners, was, that if by wiser and more scientific men than myself this invention was deemed worth a trial, the Government might make the experiment on such a scale and at such an expenditure as they might think they were warranted by the circumstances. I again assert that its perfect success at Lowestoft can be proved if witnesses are sent for.

27,134. (*Sir F. Smith.*) Have you formed any estimate of the cost of this barrier ?—I have. Its cost would be about 30*l.* per lineal yard ; but that would vary a good deal, according to the position in which it was intended to be placed.

27,135. We will suppose that it was to be placed in a very exposed situation, what would the cost be then ?—30*l.* per lineal yard.

27,136. That is the extreme cost ?—Yes.

27,137. That does not include the moorings ?—No. The moorings would be a matter of very little expense, from the fact of there being long links of iron stays inserted, by means of one-fluked anchors, into granite submarine foundations.

27,138. When you say that the cost would be 30*l.* per lineal yard, of what material do you propose to construct this barrier ?—I propose to build it either wholly of iron, wholly of wood, or of the two materials combined ; for instance, the caissons of iron, and the artificial beach of timber.

27,139. For which mode of construction does the estimate provide ?—It would make very little difference in the expense of what material it was constructed. I have ascertained that from practical builders.

27,140. Did I understand you to say that you had tried some small experiments ?—With very small models ; but at Lowestoft it was on a large scale. I think the section was 150 feet, with about 40 feet range of beach.

27,141. You have tried that ?—That was built by the direction of Sir M. Peto.

27,142. Do you consider that a very exposed situation ?—I should say, except Cornwall, the most exposed situation on the coast of England.

27,143. At what depth of water does the sea break off Lowestoft ?—I should say that on the average at from 12 to 14 feet from the trough of the sea to the crest of the wave.

27,144. In what soundings does the sea generally break ?—I should imagine not in more than two or three fathoms ; not in deeper water than that.

27,145. If you were to hear that in some situa-

tions the sea breaks in 12 fathoms, do you think that your breakwater would act in such a position as that? —Most unequivocally. If constructed proportionately large, I have not a doubt of it.

27,146. As a sailor you have no doubt that you can moor this breakwater so that it is utterly impossible that it should break away?—I am convinced of it, and I think that that is proved by what I have stated with regard to Lowestoft. It was there in the depth of winter. The sea washed the sea walls down, until they established this barrier, and under its lee, at a distance of from 100 to 200 yards, they constructed their sea walls.

27,147. Perhaps it is hardly necessary to ask the question, but what would be the effect upon vessels which had taken refuge under your breakwater if by chance the moorings should give way?—Very fatal; there is not the slightest doubt of that. That is one of the most striking objections to the plan, till the mode of securing it is explained. As we find that we can make iron stronger than any force which can be brought to bear upon it, I think we can get over that difficulty.

If we can do that.

27,148. (*Capt. Washington.*) I think you said that you are a sailor?—Yes, I am.

27,149. How long have you been at sea?—25 years.

27,150. In what service?—In the British navy, as midshipman, acting master, and second master. I have been in the Spanish and Portuguese navies as captain during the wars of Liberation and Succession, in the English army as captain, and commanded a corps of engineers in Spain.

27,151. Are you acquainted with the North Sea? —I am; but not so well as with the Channel station and other parts. I was on the Channel station.

27,152. I think that you have said that there would be no difficulty in mooring the caissons which you propose to construct?—I have stated so. I think that there could not be any difficulty.

27,153. Are you aware that light vessels lie at moorings in the North Sea?—I am.

27,154. Are you aware that in a single gale of wind three of them have been known to break adrift? —Yes.

27,155. Do you not believe that the Trinity Board, with the enormous funds at their command, would do their utmost to obtain for these ships the best chains that could possibly be provided?—Yes.

27,156. That being the case, and also that in one gale of wind within the last 20 years three of these vessels broke adrift, why are we to suppose that your caissons would ride better?—Because, in the first place, the construction of these caissons and of the light vessels are perfectly dissimilar. I beg leave to say that there has not been any structure formed analagous to or resembling that which I propose to adopt.

27,157. Do you mean to say that the caissons will present to the sea a less section than will a vessel that swings to the wind?—In that instance I think not; but I believe that there will be a vis inertiæ in this breakwater, or rather in the mass of inert water under its lee, which is not to be found in light or any other vessels.

27,158. To form a breakwater must not the caisson be moored with its broadside to the heaviest sea?— No; an angular side, offering less opposition than that presented by light or any other vessels. It is an acute angle which is presented to the sea.

27,159. What is exposed to the stroke of the sea? Is it not the broadside?—Yes, but with a slope of 15 degrees; it is not perpendicular. Besides there is no leverage. A light vessel exercises the power of a lever of the first order.

27,160. Are the caissons to float?—Yes; but on the smooth water line which never admits of undulation.

27,161. What is the smooth-water line?—A line between the trough of the sea and the crest which is thrown up.

27,162. Of what draught of water are the caissons to be?—Four feet, and 7 to 10 feet the lower point of the artificial beach to seaward.

27,163. What will be the dranght of water of your caissons on the seaward face?—The caissons are of even flotation of 4 feet, but the artificial beach descends obliquely to the depth of 7 to 10 feet.

27,164. Did I understand you to say that they will rest upon a stratum of smooth water?—Yes, the caissons upon the smooth-water line, which is that which is not disturbed before the wind occurs. When the wind takes place, an excavation is produced by it, and the water is rolled up on the sea or beneath the lee of the preceding wave. The line of the water before it was disturbed is the smooth-water line; on that the same undulation does not occur, and on that will rest the body of the caisson.

27,165. I think you mentioned that a section of this had been moored at Lowestoft?—Yes.

27,166. Of what length?—I understand about 110 feet.

27,167. When was it placed there?—I was told, between the years 1846 and 1848.

27,168. How long did it remain?—Until the whole of the sea wall was built.

27,169. How long may that have been?—About a year and a half.

27,170. What became of it afterwards?—It was taken away.

27,171. In what state was it?—Perfect.

27,172. Was it made of wood or of iron?—Of wood.

27,173. What became of it?—It was broken up by the direction of Captain Andrews or Sir M. Peto.

27,174. Why was it broken up?—Because it had accomplished that for which it was intended.

27,175. Do you know of any other proposals for floating breakwaters?—Plans or proposals?

27,176. Plans of which specimens have been laid down?—No, I do not.

27,177. Are you aware that one was laid down by Admiral Taylor off Brighton?—Yes. A frame of timber; a ship without planks. It came out contemporaneously with my own.

27,178. What became of it?—It was broken to pieces.

27,179. Did Mr. Grove lay one down off Dover? —Yes; a perfect cylinder; that was broken to pieces. I wrote previous to their being tried, and I demonstrated their inefficacy and their destruction.

27,180. Although all the floating breakwaters hitherto constructed have been broken to pieces by the sea, you think that yours would last?—Yes, because it is thoroughly dissimilar from any of those which you have mentioned. In those cases there was no reaction at all. In my plan the reaction arises from the dead water underneath, which does not occur in the case of a ship, or in the breakwaters before alluded to. You must be aware that the run of a ship is exceedingly fine, that there is no support under the lee of a ship riding head to wind, and that in conjunction with the action of the sea its masts exercise a most powerful leverage.

27,181. Vessels carrying light, do you mean?— Yes; a light vessel, or a vessel *not* laden, exercises the force of a lever of the first order.

27,182. (*Capt. Sulivan.*) Could the person who witnessed the operation of the breakwater at Lowestoft, and who ordered it to be broken up, give evidence as to the way in which it rode there?—I have not the slightest doubt of it. I heard the other day his brother,—the brother of Captain Andrews,—declared before a witness that Captain Andrews stated that the sea wall could not have been built without it. He did not ask me to establish it, though.

27,183. (*Mr. Coode.*) Do I understand that Captain Andrews would be prepared to come forward and give evidence upon this subject?—I suppose he would have no objection whatever to do so.

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27,184. (*Chairman.*) If the Commissioners are desirous of having evidence as to the working of this breakwater at Lowestoft, perhaps you will undertake to produce it ?—By all means.

27,185. You will undertake to communicate with the witnesses ?—With a great deal of pleasure. I am very much obliged to you for allowing this subject to be brought forward. I will write to Sir M. Peto. Lucas, Brothers, had the contract for building the walls.

27,186. (*Mr. Coode.*) Did Lucas, Brothers, adopt your breakwater ?—I cannot ascertain by whom it was adopted, but there it was.

27,187. Was it exposed to many gales of wind ?—The whole of the winter, and withstood storms which had repeatedly knocked down their walls.

27,188. And never was removed at any time ?—Never ; except from one part to another, as protection was required for the work.

27,189. What sort of moorings were used ?—I do not know.

27,190. Do you think you could give us the names of persons who can furnish that information ?—I shall make it my business to get the fullest possible information on all points.

27,191. Do I understand you to say that the trustees of the harbour of Lyme Regis have resolved to adopt this breakwater ?—Colonel Pinney has laid the matter before the town council.

27,192. Then they have not decided to adopt it ?—They have not definitively decided. The Galway Steam Navigation Company, too, are only waiting to see if the Admiralty will do anything for them, and if not they will adopt it at once. Sir Hesketh Fleetwood told me the other day that they are going to do so, if the Admiralty do not consider it proper to do anything at Galway.

27,193. I understand that your estimate of 30*l.* per lineal yard is simply for the breakwater, exclusive of all moorings ?—Exclusive of all moorings. That is for the most exposed situations.

27,194. That is for the floating structure alone ?—For the structure alone.

27,195. Have you fixed upon any number of moorings for a given length of breakwater ?—I propose to have them every 50 feet ; that will be ample.

27,196. What kind of moorings do you propose to use ?—I should propose a one-fluked anchor, backed by granite, contained in a cradle of iron or oak, or elm, and a submarine foundation made of granite ; into that the anchors would be imbedded, that, with an endless chain or "messenger," forming the lower part of the mooring stays, so that at all times the moorings may be rove round and examined. This chain will be sufficiently long to come perpendicularly to low-water mark, and be wound round, in order that every link may be examined, and changed when necessary.

27,197. Can you furnish the Commissioners with a drawing of the mooring you propose to use, and an estimate of its cost ?—I shall be very happy to do so, and also of every other part if you wish it.

27,198. It is desirable that the Commissioners should have before them a drawing and estimate of the precise description of mooring that you propose to adopt, and also a statement of the length and size of the chains, the number of moorings in a given length of breakwater, and your ideas as to the durability which may be anticipated ?—If I may have a list of what particulars you require, I will furnish them all.

27,199. A list of queries shall be furnished to you. Is there any one besides Mr. Andrews who can give information as to the working of this breakwater at Lowestoft ?—A Mr. Coventry went to see it, and communicated to me before others the facts I have stated, he having seen my breakwater which I built of *two hundred and forty* feet long, and he was well acquainted with my plan, but I have tried in vain to find him at present. I am now gathering information as to its working from eye-witnesses who saw it at Lowestoft.

27,200. We should very much prefer the evidence of experienced men who were actually witnesses of the working of this breakwater during the time it was laid down. The evidence of individuals who merely went to make an inspection would be of little value ?—I will endeavour to get Captain Andrews, who I think was the harbour master.

27,201. We should prefer the evidence of those who were actually connected with the construction of the work ?—I think Captain Andrews would be the very man.

27,202. Will you endeavour to furnish us with the names of the superintending engineer, or the contractors or their agents, who were actually witnesses of the working of this breakwater during the time that it was laid down at Lowesstoft ?—I will.

27,203. What length of section do you propose to adopt ?—I propose 200 feet ; but I would have it as long as possible, say 500 feet because there will be greater and more uninterrupted dead water, forming a vis inertiæ under the lee to support it. As waves are known to travel about 10 miles an hour, and this recedes about five, there would be only half that pressure on the artificial beach.

27,204. Do you imagine that the structure would never be exposed to a more rapid wave than one moving at the rate of ten miles an hour ?—I draw my conclusion only from practical experience. While a ship is running ten miles an hour she never gets pooped, but the moment her speed drops to about seven, and she falls into the trough of the sea, carrying lower canvass, she is often pooped. From that I draw my inference as to the speed of the waves. I have no scientific data to go upon.

27,205. Are you aware that Captain Walker, the harbour master at Plymouth, has reported observations which he has made on the progress of waves, in the course of which he found waves travelling at the rate of 30 and 35 miles an hour ?—No, I am not. That would overrun any ship. If a vessel was going at the rate of 12 miles an hour, and the sea 30 miles, she could never escape it.

27,206. (*Capt. Washington.*) That must be after the sea has struck the beach ; not in the open sea.

27,207. (*Mr. Coode.*) The observations to which I refer were taken just outside Plymouth breakwater ?—It may be so, I am not prepared to say, nor do I give my opinion as a scientific one. I have only the practical idea of a seaman.

27,208. I wish to know if you have any extensive data on which you found your opinion that the waves only move at the rate of 10 miles an hour ?—I never ascertained it by means of any scientific instrument ; only as I have already mentioned. With regard to its force also, I have had practical experience by having the bulwarks of my ship and boats carried away, and things of that sort. There are, however, scientific deductions from experiments fixing the force with which the sea strikes at three tons per square foot. That three tons I have by the angle presented ; the back-set and the receding and reactionary tendency of my breakwater reduced that force to one cwt. on every square foot on the face of my breakwater.

27,209. Have you made any experiments to prove what would be the strain on the mooring chains ?—I had some small models, and they forged to windward. I think it would strike a scientific mind that the very action of the wind on the face of the inclined plane and the dead water under the lee, and the occasional resistance of the cables, and the back-set of the waves, would give a forward or windward tendency, on the same principle that a ship goes within six or seven points of the wind obliquely to windward. The wind strikes the inclined plane at an angle of 15 degrees, the same angle at which it strikes the sails of a ship ; and the dead water under the lee forms a positive resistance, and produces in the case of my breakwater the same effect which is produced in that of a ship. I never could get a strain on the cables.

27,210. Would not that forging to windward probably be the result of the recoil after the wave had struck the breakwater?—I have no doubt it is so in some degree. That is what I have consequently dwelt upon, that there is a re-actionary power in this breakwater which never occurs in a ship lying at anchor. Besides, the anchors of a ship are let go almost promiscuously; even in the case of light vessels the moorings are not preconcerted as they ought to be. A light vessel will readily go down at her moorings if the foundations are good, if they are not in quicksands. If there are no foundations the same difficulty would present itself to me as to the ordinary engineer in building a bridge or a pier, or a stone breakwater; he must select a foundation. I only ask for the same and will very readily moor any sized structure.

27,211. Should you have no apprehension that, in the case of a soft muddy or silty bottom, the moorings would drag?—Never for a moment. I have laid in St. Peter's Bay, Newfoundland, and the moment I cut away my masts the ship, being deeply laden and more of her hull being beneath the smooth-water line than above, forged to windward, because she was released from the pressure of the wind.

27,212. (*Chairman.*) Will you furnish us with a statement of the expense of your breakwater over a series of years, as compared with that of a stone breakwater, because as your breakwater is to be constructed of perishable materials that is a very important element in the consideration of the question?—I shall be very happy to do so. I have already made a calculation which shows that the interest of the money required to construct a stone breakwater would furnish one of these of the same size every year, if it was required. That is a mere arithmetical calculation.

27,213. Have you any models?—I have not. I shall be happy to get any made that may be required, but I think this rather a matter of scientific calculation than the mechanical illustration by models.

Thursday, 2d December 1858

PRESENT:

Admiral Hope (Chairman).

Sir Frederic Smith.
Captain Washington.
Captain Sulivan.
Captain Vetch.
Mr. Coode.
Mr. Evans, Secretary.

Mr. James Abernethy, Civil Engineer, examined.

27,214. (*Chairman.*) Mr. Abernethy, the object of your attendance here to-day is to give us some account of a new mode of construction which you propose for breakwaters?—It is so; and I would beg leave to call to your recollection that certain plans were required from me by the Commissioners when they visited Scotland. Those plans I have prepared, and brought with me, and I beg now to hand them in, in the order in which the examinations took place there. This first is a plan of Fraserburgh Harbour, with the piers as described by me in my evidence given before the Commissioners at Fraserburgh, made to the scale required by them. I also beg to hand in a plan of Aberdeen Harbour, with the proposed alterations; namely, the construction of a new breakwater, as described by me in my evidence at Aberdeen, also drawn to the scale required by the Commissioners. In reference to this plan you will observe that I have marked the acreage of the tidal harbour, showing the portion that would be available for refuge purposes, provided the breakwater were carried out as recommended. The acreage is marked at the corner of the plan, having reference to certain letters, as suggested by you.

27,215. Precisely the acreage as within certain letters which I placed?—Yes. It will also be in your recollection that a deputation attended at Peterhead from the harbour of Lossiemouth, and requested that I should be examined in London on the subject of their statement made there. They have since transmitted an additional statement with regard to that harbour, which I now beg likewise to hand in. With that statement I also wish to hand in a plan of Lossiemouth Harbour, made upon the scale directed by the Commissioners, and showing an extension of the present north pier, as proposed by me, with a view of obviating the range that exists within the harbour during north-east gales. I further propose to hand in a plan of Blyth Harbour, as coming next in order, made upon the Parliamentary scale, as required by the Commissioners. You will remember that when the Commission was at the port of Blyth I was requested to furnish details with regard to the mode of constructing the pier there. That I have done in this plan. There is also here a design for Lossiemouth Harbour, and for a round head at the termination of that pier. (*The several plans, as described, were handed in accordingly.*) With regard to the detailed plan of the proposed construction of the round head at the termination of Lossiemouth Pier, you will observe that there is something peculiar in the arrangement of the timber work. It is a design made by Mr. Michael Scott, civil engineer, and I believe it will be found exceedingly effective; very strong, cheap, and easily constructed. Mr. Scott will himself describe more at length this design for the proposed pier head.

27,216. Have you any other plans you wish to put in?—I have prepared from a recent survey a plan of the proposed breakwater at Swansea Bay. I had previously prepared plans in accordance with the directions of the Commissioners, but they were unfortunately destroyed by fire. Since then, by the kindness of Captain Washington, I have procured tracings of the chart made by Commander Aldridge, which I find differs in many respects from the survey made by Captain Denham. In this plan I have laid down a breakwater, as suggested in my examination at Swansea by the Commissioners. I have to add, that I have carefully revised the estimates which I gave in at that time of the cost of that work, that I believe them to be correct. (*This plan was also handed in.*)

27,217. Is the position of the shoal altered at all?—The position of the shoal is somewhat altered.

27,218. I mean the position of the shoal relative to the breakwater?—It is slightly altered, in consequence of the altered position of the shoal. But since my examination at the Mumbles by the Commissioners, I have taken means to ascertain the exact nature of the shoal by dredging. The dredging machine has been at work, and a large quantity of the materials of which the bottom is composed has been removed, by way of experiments. It consists generally of a crust of shells and small boulder stones, and beneath this crust there is a bed of stiff blue clay. It is obvious, therefore, that there would be no difficulty in removing the shoal by dredging. Of that I am quite satisfied. Commander Aldridge was, I understand, on board the dredging machine for a whole day, for the purpose of satisfying himself that the ground was of the nature I have described.

27,219. Are these the documents, then, Mr. Aber-

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nethy, that you propose to hand in to the Commissioners? Are these all the plans, or have you anything more?—Yes; I have in addition to these one other. I have been requested by Mr. Ralph Ward Jackson, since my previous examination, to visit Hartlepool, and to prepare a report as to the formation of a harbour of refuge in that bay. At his request I hand in also a copy of my report on that subject, accompanied by a plan, drawn upon a large scale, showing the nature and character of the works.

27,220. You have given us a number of plans relating to works on different parts of the coast, and I think it would accord most with the convenience of the Commissioners if you would make consecutively any statement you may wish to give in reference to them, beginning at Fraserburgh, and taking all the places in the order in which we took them in the course of our visits. And when we have had your statement, if the question as to your peculiar mode of construction should not have been sufficiently entered into, we will take whatever explanation you may desire to give in reference to that point afterwards. Or, if you prefer it, we will take your statement as to the general object and design of the plans, and what you have to offer upon the question of construction first. Which do you prefer?—As my estimates for the breakwaters at Swansea Bay and Hartlepool are necessarily based upon the system I propose for the construction of the works, it would probably be as well to take that part of the subject first, if you have no objection.

27,221. Very well, then, you will enter upon the question of construction as a separate question first, without reference to any particular locality. Having done that, you can take the different works in reference to the respective localities where it is proposed that they should be constructed. If, then, you begin with Fraserburgh, and make what observations you may wish as to the application of your particular mode of construction to the works there, and so on with each of the other places, taking them in their order; when you have done that, the Commissioners will decide whether they will proceed with any further examination, or whether they ought not to give a little more time for the consideration of your proposals, and with that view defer the further examination to another day. Probably, looking at the mass of plans you have given in, this latter course would be the more convenient?—Of course I shall be desirous of consulting the convenience of the Commissioners, and shall be perfectly ready to attend whenever they may require me to do so.

27,222. Proceed then now with any statement you may wish to make explanatory of your peculiar mode of construction?—I must apologise for any defects there may be in the plans, on account of the pressure arising from the great number of plans we have at this period of the year to prepare for Parliament. I show here a section and part of the elevation of the work, with respect, first, to the breakwater proposed to be constructed in the bay of Swansea. I produce a sectional elevation and a transverse section of that work, which, with your permission, I will now proceed to describe. I propose, in the first place, at Swansea, to drive piles, two piles, as shown here on the plan, connected together by wale pieces; the piles to be driven down 10 feet into the clay bottom; these piles longitudinally to be 10 feet apart, and to be connected longitudinally also by wale pieces. That is the first process. Next, between these piles and outside of these piles to deposit a mound of rubble and copper slag to a height of 15 feet below the low-water level of spring tides. Next, to construct a framework, as shown in the drawing, of creosoted timber. This framework to be so let down between the ends of the wale pieces, and bolted to them, the frames being, like them, longitudinally 10 feet apart. The frames are then connected longitudinally by wale pieces in the same way. Thereafter I propose to bolt on within the piles planks 12 inches by 6 inches, as shown in the transverse sections; and that being accomplished, to fill in the space within the timber framework with rubble. We have then, what may be regarded as a temporary breakwater, composed and framed of timber in such a way as to have continuity of structure, which can only be attained in a minor degree by masonry simply. So that at the commencement a certain amount of protection would be afforded to ships taking refuge under the lee of the breakwater. I then propose to use this as the stage or means of constructing outside the temporary breakwater a permanent structure. That I propose to accomplish by using powerful hydraulic cranes, as shown upon the plan, each crane being perfect in itself, with its steam-engine, and the necessary accumulator for producing the requisite power to lift, first, large masses of concrete blocks from 20 to 25 tons weight each, which will be lowered down to the top of the rubble mound, the bottom course, or footing course, being let into it half its depth; these concrete blocks to be placed against and abutting upon the outside of the timber framework, which would thus serve transversely as a guide for placing them in position. From the low-water level to a height of 10 feet (in this case) I propose to construct a face wall of solid ashlar, and rubble also in large masses, and above that a rubble wall in mortar, faced also with ashlar blocks. In carrying up the wall I should remove as much of the timber of the upper part of the framework as could be spared from time to time, and by sacrificing a portion of the planks form a bond with the dry rubble packing behind the wall, and the hearting of the timber breakwater. The dry rubble packing would abut upon or come up to the back of the rubble wall.

27,223. (*Sir F. Smith.*) You used the word "bond," did you not?—I did; but you can scarcely call it bond in the dry rubble packing, it is a bond in such a very minor degree, although it would act in that way. Lastly, I propose to pitch the top of the breakwater, after removing the timber bearers, with sufficient pitching. The advantage which I think this mode of constructing a breakwater possesses over the method ordinarily adopted is, that I can afford in a very short space of time a considerable amount of shelter to shipping; that, instead of constructing a permanent structure merely from the end progressively, I can construct the sea and landward faces in lengths as shown upon the plan; by having several of these powerful cranes working at the same time a certain length of face can be brought up and completed at different parts simultaneously, instead of working forward simply from the end; and the staging is so far protected from the action of the sea that the loss of time and damage that accrues to staging in heavy storms by the common method will be altogether obviated. This, generally, is a description of the design. You will observe that the sections differ somewhat; that at Hartlepool being stronger than the section for the Swansea Bay, the sea on the north-east coast being much heavier that at Swansea.

27,224. If I understand you rightly, the main object you have in this style of construction is to afford very rapidly shelter to ships, and to be able to construct the whole work in much less time than it could be done by the ordinary method?—These are two of the objects I propose to accomplish.

27,225. Then I understand you think, further, that some economy would result from the adoption of your system?—I certainly think it would be found more economical than the mode now pursued, as regards the original cost of construction; and I think that the cost of future repairs would be considerably less.

27,226. We will get the work done first before we talk of repairs. What is the total length you propose for the breakwater in this case?—The total length of the breakwater proper at Swansea would be 2,200 yards.

27,227. I understand that 2,200 yards will complete the whole work at Swansea?—That will complete the work.

27,228. Can you tell me what the total cost will be?—I gave some rough estimates for these works in my evidence before the Commissioners at Swansea, and if I recollect rightly, one estimate was 850,000*l.* for the completion of the permanent stone structure, and I think 650,000*l.* for the timber breakwater within the stone facings. I have since gone more closely into the question of cost, and I see no reason to depart from those figures generally. I put it as the result of a more detailed calculation, that the cost of the permanent stone structure would be 847,000*l.*, and for the timber structure 629,200*l.*

27,229. That will give a total cost of how much?—The total cost of the complete work would be, as I have said, 847,000*l.*

27,230. That is of the whole of the works you contemplate, from beginning to end?—Yes.

27,231. Where do you propose to get the stone rubble from?—From the adjoining cliffs, which are composed of mountain limestone, and the copper slag I should get on the banks of the river Tawe, where it is lying in abundance.

27,232. In what space of time do you hope to complete the work from its first commencement?—That is a question I should like to consider a little more before I gave a decided answer.

27,233. There is no part of the work, then, as regards Swansea, for which, in point of fact, you are prepared to fix any time as that in which it might be completed?—I think, on my further examination, that I shall be able to state definitely the time in which I could undertake to complete the work.

27,234. I should be glad to know whether, in the first instance, you propose to complete the whole of the piling and the timber work, or simultaneously as you put in the piles to charge the space within the timber work with the other materials?—My present view is this:—The Swansea breakwaters are now two in number. I should propose, probably, to construct the greater portion of the first breakwater, the timber breakwater, at once, and then to use the material after the completion of the stone structure, for the formation of the second breakwater.

27,235. Then it would be necessary that we should know accurately about the time of the completion of the first to enable us to form anything like an accurate idea of the total time that would be required to complete the whole of the works?—Just so.

27,236. The only use, as I understand it, of the timber work, is to afford facilities for the construction of the more solid and permanent works?—And also to afford shelter to shipping in the meanwhile.

27,237. But the timber work will not afford much shelter?—The timber breakwater, as a breakwater, will be, as regards its efficiency, as complete as the stone structure, though not of the same permanent character.

27,238. You mean that it will be sufficiently strong in its construction to keep it efficient as a breakwater?—Yes.

27,239. In point of fact, then, the moment this timber structure is complete vessels might ride in complete safety behind it?—They might.

27,240. (*Capt. Vetch.*) I think the construction is pretty similar to what we saw at Blyth?—It is the same principle that is carried out at Blyth, but on a larger scale, and in deep water.

28,241. Could you, on this principle, add here an outer wall, as you now propose; that is, a wall outside the timber work?—I could; and I may mention, that when objections were made to the temporary character of timber work, I pointed out to the directors at Blyth how I could face the present piers with stone, if the necessary means were afforded for that purpose, hereafter.

27,242. Taking this plan as you now propose for Swansea as a whole, if you were to execute the timber work alone in the first instance, how long do you think that timber structure might remain and suffice for a harbour to afford the necessary protection to shipping?—I stated, in my examination at Swansea, that it might last for half a century; and if you can protect the timber from the action of the worm, and I am confident you can from my own experience of the effects of creosoting timber, I believe it might remain perfect and efficient as a breakwater, requiring comparatively but little repairs, for half a century.

27,243. Under these circumstances, if means were not forthcoming to complete the stone work, still, by carrying out this timber structure, we should obtain sufficient shelter for the shipping for half a century. Is that your opinion?—That is my opinion.

27,244. Can you tell us what rate of progress you could make with the timber portion of the structure, the timber staging, in a week, or a month, or any given time?—At Blyth, I think, the progress was at the rate of 100 feet a week; but I should like to consider the question more carefully before committing myself by an answer. I do not at present see any difficulty in the way of carrying out the staging and the framework simply at the same rate.

27,245. Could you do 10 feet per diem?—Yes; that would only be setting up one frame a day.

27,246. Then, if money was not forthcoming to complete the permanent structure, you would in this way provide an efficient shelter for ships such as could not otherwise be obtained?—Yes.

27,247. Do you contemplate that these works should go on, the one succeeding the other, or that the permanent or stone structure should be delayed for a while until you had tested the efficiency of the timber work alone?—I think it would be advisable that it should remain some time, to test the efficiency of the timber frame work, and also to allow of the consolidation of the mound below the low-water level.

27,248. And also, I suppose, to give shelter as soon as possible to ships?—Yes. I think it would afford immediate shelter to ships, and enable the Government to complete the permanent works, prosecuting them from time to time as might be found convenient.

27,249. With regard to these concrete blocks, which are to form the first course, are you clearly of opinion that the concrete can be made of such material and so cemented together as to become perfectly durable, and to be depended upon?—I am.

27,250. Have you made trial of the material?—I have made trial of it at Swansea, and we find there that rubble blocks made of sandstone and hydraulic mortar carefully and properly prepared, will in six months become so hard that we cannot separate the particles of the masonry. You must break it up in the mass.

27,251. At Swansea, I suppose, you have the benefit of the Aberthaw limestone?—We have.

27,252. What weight do you say are these blocks?—From 20 to 25 tons each; and, practically, there is no difficulty in making them still heavier, for the cranes will carry 50 tons; but I consider that sufficient weight.

27,253. No power of the waves will disturb blocks of that weight, you think?—No wave will disturb a block of that weight, the more especially as it will abut upon the timber framing, which will sustain and assist it in resisting the shock of the sea.

27,254. (*Mr. Coode.*) Could you give us the cost per yard of the timber structure and the rough rubble in a given depth of water and at a given rise of the tide; say seven fathoms of water, and 33 feet rise of the tide, which I believe are about the circumstances of Swansea?—I have not the particulars with me for that particular section which answers to those conditions; but I will furnish them. Meanwhile I will give you, if you will allow me, the particulars of another section; that at six fathoms water and 27 feet rise of tide. At such a depth and rise of tide I could construct a pier on the system I propose for 260*l.* the lineal yard.

27,255. That is to say, the whole of the pier complete, including the masonry?—Yes, of course,

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including the masonry, the timber work, and the rubble, complete, exclusively of the face work.

27,256. Will you give us the cost of the face work in the same depth of water and the same rise of tide?—With face work I would execute the whole complete for 350*l.* per yard, so that the difference between the 350*l.* and the 260*l.* will give you the cost of the face work.

27,257. That is 90*l.* per lineal yard for the two walls?—Yes, for the two walls.

27,258. Are these piles driven in?—I propose, in the case of Swansea, to drive these piles in 10 feet, as a general rule, into the clay below the bed of the sea.

27,259. And from what level do you propose to drive them?—The first piles would be driven from six or eight feet above low-water mark. That would be the top of the pile.

27,260. Then the top of the pile would be six feet above the level of low-water mark when driven?—Just so.

27,261. Then how do you propose to unite the upper part of one pile with the lower part of the other?—The plan shows the frame work brought down considerably over the pile first driven, so as to have a bearing of 15 feet on the piles first driven. The continuation of the inner pile is carried up, and secured with the transverse bracing.

27,262. But how would the upper portion of the piling be united and tied to the lower portion?—The upper part would rest on the top of the lower pile, and be kept in its place by the transverse bracings, and longitudinally by the planking inside.

27,263. Then the transverse and oblique framing would be let down over the piles first driven?—Yes, over the piles first driven, and embraced by the two wale pieces bolted into the piles first driven.

27,264. Would it not necessitate very accurate dimensions being taken of the breadth between the piles to the level of 15 feet below low-water mark, in order that they might fit accurately?—Precisely; and these piles first being driven in, and connected with the wale pieces, the exact width and form might be easily ascertained.

27,265. After the first piles are driven, you propose to bolt them to the lower wale pieces before the upper piles are let down?—Yes.

27,266. That will have to be done below low water, will it not?—It will.

27,267. The dimensions, then, will have to be taken and the holes to be bored below low water?—Yes.

27,268. And how do you propose to hold these timbers down? How will you prevent their being floated?—Which?

27,269. I speak of the cross wales?—I should load them so as to enable the diver to hold them. In point of fact I have been putting in some wales in a coffer-dam at a depth of 15 feet under water lately.

27,270. (*Sir F. Smith.*) Where?—At Newport. We excavated a new dock there, the water being retained, by means of a coffer-dam, in the old dock, with which the new one communicated, so as not to interrupt the traffic; consequently the lower wale pieces on that side were put on 15 feet below the water level.

27,271. (*Mr. Coode.*) But that was in still water within the dam?—It was in still water within the dock. It was rather muddy water; not clear, like sea water.

27,272. But that was not analogous to an open seaway. You could not work there below water, except in very fine weather?—No; it requires but moderately fine weather to work 15 feet below the surface in a seaway; the disturbing force of the sea is not much at that depth, except in very bad weather.

27,273. Then the piles would be first driven, and the lower wales fitted and fixed below low water?—They would.

27,274. And the wales below the level of low water would have to be let down over and bolted to the piles?—They would be put on, at first, on the top of the pile; I think probably that would be the course adopted.

27,275. Then I understand the whole of the diagonal frame would have to be bolted together, and let down under water over the piles?—As a general rule, I should complete a certain portion of the framework, and connect it together by the cross pieces on shore, and then lower it down. The diagonals and strutts might be let in at any time.

27,276. Do you propose to let down these diagonals, or to fix them after you have let down the vertical framework?—I could do either, but I should prefer to connect the sides of the framework together in the first place, and then put on the diagonals afterwards.

27,277. Then as to the planks within the piles below the level of low water, they would have to be fixed by divers also?—There are two ways of putting on these planks; first, I do not think it would be difficult to fix the planks by divers, but they might be put on in another way; as they are of given lengths, they might be connected together by vertical pieces, and let down bodily behind the piles, the planks of one panel or bay interlacing and binding, as it were, between the openings of the planks of the other, so as to form a bond, as shown in the sketch.

27,278. Do you propose to creosote the whole of the timber used in the entire structure?—I should certainly recommend that the whole be creosoted.

27,279. Then, if it is creosoted, would it not be necessary that the lengths of those several diagonal pieces should be taken after the piles are in place, so as to ensure that the ends may not be cut, and parts of the timber not creosoted left exposed to the action of the worm?—That difficulty was provided for at Blyth very carefully. The size of the timbers were carefully gauged and cut up in the yard; they were then numbered to fit, and all the ends were creosoted; and I see no difficulty in carrying out the same system in this case.

27,280. At Blyth was any portion of the work framed below the level of low water at spring tides?—No.

27,281. Therefore the whole work at Blyth is at some time of the tide uncovered?—It is.

27,282. Do you propose to complete this timber framing before the tipping in of the rubble?—I do. The first process is to drive the lower piles, and then to deposit the rubble round them.

27,283. Before you put in the wale pieces?—No; the wale pieces being put on, and the piles, and the bays also longitudinally connected by wale pieces, before the rubble stone is tipped within and around the piles.

27,284. In that case would not everything during the winter season be exposed necessarily to the action of storms, before the rubble could be tipped in?—It would, to a certain extent; but as the piles are 10 feet apart, a very small surface only would be exposed, being connected by transverse pieces and longitudinal wale pieces, unless you had a very heavy storm, I do not think that the sea would have any effect upon them.

27,285. Then, assuming that the piles were put in, and the transverse wale pieces fixed, and the upper part of the structure not completed, would not that part of the framework so erected, but not completed, be liable to accidents from gales of wind?—It would, but only to a small extent.

27,286. And must not the time of exposure during the winter season be greatly increased by your having to wait for a favourable period to fix the sheet planking?—I think not, for the depositing of the rubble round the piles, and the fixing of the planking, might be carried on simultaneously.

27,287. Do you think the planking, as shown here, could be fixed in anything like heavy weather in an open seaway?—Not in heavy weather in the open sea. But I should not attempt to proceed with that

part of the works which could not be carried on without risk in heavy weather.

27,288. Then there would be occasionally great risk of interruption, and also considerable danger to the stage, from the necessity of having to wait for a period of fine weather before you could proceed beyond a certain stage of the work?—No, I think not; because the deposit of the rubble mound might proceed pari passu with the driving of the first piles and the connecting of them together; and even the continuation of the timber framing above it, and also the planking, might in like manner, by proper arrangements, be proceeded with almost pari passu. I think by properly arranging the various parts of the work, all risk, except to a trifling degree, might be avoided.

27,289. Would not the risk with such a stage as you propose be much greater than in the system adopted at present at Holyhead?—I think not.

27,290. Would not the exposure of so much horizontal surface to the action of the sea necessarily greatly increase the risk of disturbance?—I do not think so. The manner in which the timber framework is braced together, and connected transversely and longitudinally, would secure it. Supposing you were not prepared to carry it up beyond a certain extent, you leave the planks out of the upper part until you are prepared to fill in the packing, so that the sea would pass freely between the piles, you would thus be in the position of having an open pile pier, but braced and secured in a way in which you cannot secure your piles at Holyhead.

27,291. Are you aware that a very similar system of construction was adopted by the late Mr. Rendel at Mill Bay near Plymouth, wherein vertical piles and horizontal and diagonal pieces were used, in a manner very similar to that suggested in your section, and that it was found after heavy gales of wind, that the stage was so much damaged that the system had to be abandoned, whereas when vertical piles alone were exposed it was found to be successful; in short, that the introduction of horizontal and diagonal timbers was found to be most destructive to the stage, and that it was in consequence of his experience at Mill Bay that Mr. Rendel was induced to abandon entirely the use of horizontal and diagonal timbers, and to expose vertical timbers only to the action of the sea?—As I have stated, I do not propose to expose longitudinal masses of timber to the action of the sea until the rubble packing is carried up to the level of those timbers. I am not acquainted with the instance you refer to, and in fact I never heard of it till now. But I know that we have carried out a pier at Blyth, which, though in shallow water, is exposed to the action of progression and percussive waves; that was carried out between low and high water throughout the whole winter without the least danger, 100 feet in length of the timber frame work connected together horizontally and diagonally being exposed to the action of the sea.

27,292. Where was this?—At Blyth.

27,293. In reply to a former question I think you stated that a portion of the works at Blyth was uncovered throughout some part of every day?—Except at low spring tides we cannot get to the base of the pier. There is generally about two feet or three feet of water there at other times, so that we were obliged to select the low spring tides to put down the great mass of the framework.

27,294. Has it not happened in the winter season, or might it not happen, in consequence of bad weather, at any time, that it might be days or weeks before the lower wales and the lower sheet planking could be fixed?—It might so happen in some cases that certain portions of the works could not be carried on in consequence of bad weather, but other parts of the works would be in so progressive a state that they might then be proceeded with. There would be, no doubt, some portions of the works which in heavy gales of wind we should not attempt.

27,295. The piles are driven from a floating stage, I understand?—Yes; but not necessarily so. This is entirely a matter of detail. In fine weather they might be driven from a stage erected on the piles already driven, or they might be driven from floating stages, barges, or punts.

27,296. But if they were driven from barges, that would, in bad weather, occasion delay?—It would; but you will observe that the driving and connecting the piles is a work of trifling extent, and does not of itself occupy any long space of time. The piles might be driven and securely connected in a day.

27,297. Are these piles formed of single timbers?—Of single balks of 14 inches scantling.

27,298. A great portion of the depth of water at the Swansea breakwater is, I believe, seven or eight fathoms?—Seven fathoms, I believe, is the extreme depth; a good deal of it is six fathoms.

27,299. In the case of the piles in the 8-fathom water, there would be 48 feet below low water to the surface ground, 10 feet in the ground, making 58 feet, and 15 feet above low water level, making altogether 73 feet?—I do not think I said 15 feet above low water. I spoke of the top of the piles being six feet above low water, and I said the framework overlapping above would be 15 feet. It is only about six feet from the top that the piles would be exposed to the action of the sea.

27,300. Then you have six feet above the level of low water, 48 feet to the surface ground, and 10 feet into the ground, making in all 64 feet?—Yes.

27,301. Do you apprehend that you will be able to obtain the balks for these piles, and in sufficient numbers, of that length, and bring them within a reasonable cost?—I think I should. Of course these long balks will be more expensive of themselves than the short timbers; but taking the whole of the timber required together I do not think I should find any difficulty in obtaining them at a reasonable price. In the Solway Frith I have put in piles between 60 feet and 70 feet in length, and experienced no difficulty in obtaining them.

27,302. Are they American timber?—Pitch pine.

27,303. What number have you used there?—I should think for about 300 feet we have used these piles, the bays being eight feet apart, and five piles in each bay.

27,304. And are the whole of these piles the length you have stated?—They are. Of course, with regard to the cost, the long piles are exceptional; but when you order a large quantity of timber, taking long and short together, as you do, the proportion of long timbers we should require would not materially increase the aggregate price of the whole.

27,305. Do I understand you, that, looking at the proportions that the long piles bear to the other timbers that would be required for the construction, there would be no additional expense on that account?—If you purchased the long piles by themselves unquestionably a higher price would have to be paid than for the general run of timbers, but not when taken together with the whole of the timber required, long and short.

27,306. You do not anticipate any difficulty in procuring a sufficient number of these long timbers?—No, I think not.

27,307. The diagonals, as I understand, are firmly bolted to the piles at the bottom and at the top?—Yes.

27,308. Assuming, when themound rises to above the level of half tide or thereabouts, that any considerable amount of settlement were to take place in one pile, and not in the others, what would be the effect upon this diagonal framing, with such a vast weight upon it above?—I believe if any material settlement took place it might disturb the diagonal framing to a little extent; but the whole mass of rubble there is allowed to subside between the framework and the outside of the timber skin resting upon the bays, and as the frames are 10 feet apart, the whole mass of rubble

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being confined only within the timber skin, it has free scope for settlement, and the only subsidence that would take place would be in the mass of rubble resting, so far as it rests, on the diagonals, the great mass of rubble subsiding clear of the diagonals.

27,309. Would not the rubble rest upon the lower wales in every case ?—It would.

27,310. Then whatever settlement took place in the rubble there would necessarily be a considerable weight thrown upon the wales by the superincumbent mass ?—Yes, a weight equal to the superincumbent mass upon those wales, multiplied by the breadth ; but as I have said, the great mass of the rubble is allowed to subside clear of the wales, consequently no great strain could at any time arise from the subsidence of the packing behind the transverse pieces. I cannot conceive, therefore, that any great strain can possibly result.

27,311. What is the size of the largest of the stones you propose to use ?—I should propose to use large and small together, keeping the larger masses externally.

27,312. But what size do you suppose that the largest would be ?—It is is difficult to define a size. We might have them up to a ton weight in some instances, but as a general rule they would not, I apprehend, be above four or five cwt. each, the heaviest.

27,313. What would be the greatest dimensions of the stones you would propose to use ?—I should not care to have stones of any great size for the internal part of the structure.

27,314. Would you have no stones three feet in length ?—You might certainly have some as large as that, but they would be exceptions, because limestone rock at the Mumbles does not come away in large masses, generally, but breaks up into rubble, which I should use with the copper slag.

27,315. But if you had a stone two or three feet in length falling upon the wales, would not its unequal weight, as compared with the looser material around, tend to separate the mass ?—That would be a good reason for not putting any large stones in that position.

27,316. But would not heavy stones in ordinary rubble be so interlaid as to bring about such a state of things as would tend to throw a considerable, and an unequal, strain upon these lower wales ?—From what I know of the foundation of Swansea I do not anticipate any subsidence in the packing within the piles that can have any material effect upon the transverse timbers. If you had a very soft bottom to deal with it might be advisable to carry out the packing to a certain height, and allow it time to subside ; but from what I know of the nature of the bottom at Swansea I anticipate very little subsidence.

27,317. What is the nature of the bottom there ?—Hard clay ; exceedingly hard clay.

27,318. Then you imagine that there is so much uniformity in the bottom at Swansea that there would be no fear of any settlement ?—I do not think there would ; but, supposing even a subsidence did take place, it would not materially affect the general structure.

27,319. But, assuming that one pile, or three or four adjoining piles, were to settle on the one side of the structure, and those on the other side, 50 feet or 60 feet apart, did not settle, what then would be the effect upon the general structure ?—I cannot conceive a pile driven down 10 feet into stiff clay settling, and I see nothing in this case to cause a pile so driven 10 feet into stiff clay to settle.

27,320. Then if you were told that in a particular case, piles screwed seven feet into very stiff blue clay, there had been a settlement of 15 feet, occurring sometimes to the extent of three feet or four feet in a single night, would not that circumstance give rise to some apprehension in your mind as to the stability of the structure ?—No, it would not raise any apprehension in my mind, because, as I have said, I know well the character of the clay of Swansea, that it is so compact that I cannot conceive any subsidence or any settlement in piles driven into it to the depth of 10 feet, those piles being, moreover, surrounded and embedded in a mass of compact rubble to a height of 15 feet below the low-water level. You have these piles, in fact, driven ten feet into the clay, and, moreover, surrounded and embedded above the clay bottom with rubble 21 feet in height.

27,321. In the section before us the rubble on the outside of the piles appears 20 feet in depth ?—No ; 21 feet.

27,322. And the rubble on the inside, appears to be about 75 feet in depth ?—It is just 15 feet above the low-water level, then 27 feet below the low-water level to the surface of the bottom, and then 10 feet into the clay ; that is the total depth from the top of the rubble mound to the bottom of the piles, making 52 feet.

27,323. I think you scarcely understood my question. It was this :—Is not the height of the rubble mound on one side of the pile about 20 or 21 feet, and on the other from 70 to 75 ?—No, not so much ; 52 feet.

27,324. My question is this:—We have a pile of 14 inches square, with a rubble bank on the one side of 20 or 21 feet in height, and the rubble bank immediately at the back of that pile 70 to 75 feet in height from the bed of the sea. You still think that you would have no reason to apprehend that there would be any inequality of settlement ?—I do not, for this reason, that the mass of rubble within the piles does not rest upon the top of the piles, but between the piles. The only way the pile could be affected by the rubble would be by the friction along its internal surface by the subsidence of the rubble.

27,325. Would not the bank of 75 feet in height be very much more liable to settlement than a bank of 21 feet in height ?—Undoubtedly so ; but the higher bank subsides within the piles, and not upon the top of the piles. This is a case of a pile driven outside the toe of a quay wall. If the wall subsides it does not follow that a pile driven outside the wall is to subside also.

27,326. Would not the rubble be so intermixed with the horizontal diagonal timbers that it would be impossible for one to settle, for the ground to compress, without inevitably carrying the timber structure with it ?— No, I think not, just for the reason I explained, that the great mass of rubble between the bays has a clear space for settlement from the platform to the base, and that the only pressure which could be exerted by the rubble packing upon the transverse braces would be the weight of the rubble packing above the transverse braces multiplied by the surface or width of the braces themselves. That portion of the rubble bears upon the brace, and to that extent might affect it. But then the great mass of rubble between the bays has a clear space for subsidence from the bed of the sea to the platform of the breakwater.

27,327. Then we have here above the lower wale a mass of rubble 54 feet in height ?—About that, I think.

27,328. 52 feet in height. The weight of a superficial foot of that would probably be somewhere about three tons, would it not ?—I should say 15 feet to a tor, or $3\frac{1}{2}$ tons to the superficial foot.

27,329. And that is resting upon three wales ?—Divided among those in different proportions, and to a certain extent upon the transverse bearers.

27,330. That assumes that there is perfect equality of bearing over every part of the whole structure ?—As all the packing above low-water mark is to be, as at Blyth, carefully done by hand, and put in layers, I do not conceive that any subsidence would take place in the case of Swansea to affect the transverse braces any more than it has done at Blyth.

27,331. It is true hand packing may affect the compression of the material itself, but could that in any way diminish the liability of the bottom to com-

press ?—No ; but I think that even supposing the bottom does compress you cannot suppose that the whole height of the rubble from the base to the summit rests upon those transverse braces. It is merely the mass of rubble between these braces pressing upon the surface or width of these braces ; and even supposing you take it at 3½ tons. for the whole height, that will be divided between all the braces, and I say that two timbers of 12 by 6 inches will bear the whole weight.

27,332. Would it not be a ton per superficial foot ?—Yes.

27,333. Then the lower braces being about 50 feet long, would not the total pressure be something like 50 tons ?—No, it would not, because I cannot conceive that the whole superincumbent mass of rubble above that base would rest upon them.

27,334. Can you by any possibility ensure such perfect uniformity of arrangement in the whole mass that such will not occasionally happen ?—If I had very bad ground to deal with, very soft ground, I might propose to adopt a somewhat different arrangement ; but as applied to the locality of Swansea, knowing, as I do, the nature of the bottom, I do not apprehend that there will be any subsidence. I feel confident that there will not be any subsidence in that mass of rubble that will affect the bracing of the timber work.

27,335. Then it is your opinion that the ground is not only so strong, but so perfectly uniform, that you can calculate upon the pressure upon these wales and on the several parts of the structure being simply the pressure which would be due to the theoretical weight ?—It is so. There is another thing I have not yet pointed out. The rubble mound is first constructed, and that rubble mound will have time to subside before the superstructure is proceeded with, and as the rubble mound has a very great base, as compared with the superstructure and packing above, I cannot conceive that the packing above the level of low-water mark or above the rubble mound can subside to any extent that would affect the bracing. If the whole thing had to be filled in rapidly between the timber work from the top to the bottom, perhaps such a result might take place ; but the rubble mound being formed before the packing above is put in, I cannot conceive that subsidence will take place ; and if comparatively large material was used in forming the base of the rubble mound, a tendency to subside would be still less likely to take place.

27,336. Must not the lower wale of necessity be fixed before the rubble can be carried to a greater height than 20 to 25 feet from the bottom ?—It must.

27,337. Would there not subsequently to the fixing of that wale be an additional height of upwards of 50 feet added to the mound ?—When complete ?

27,338. Yes ?—When complete.

27,339. You propose, I think, to reconvert some portion of the stage after you have tipped the rubble ?—Yes.

27,340. What portions do you think would be convertible ?—In the first place, the crane bearers, the transverse bearers, the transverse wale pieces on the top, the struts, and a certain portion also of the framework itself. The outer framework might be taken and used, when the concrete blocks, which are deposited by means of it, are put in, because it is not necessary to use the powerful travellers shown upon the plan for any purpose except the deposit of the heaviest material. A lighter class of crane will deposit the rest of the work.

27,341. Could you take away the topmost transverse bearers ?—That would be after I had completed the masonry up to that level, and was prepared to put in the pitching of the top of the pier, and then I have to remove both the longitudinal and transverse bearers, and might use them in another portion of the work.

27,342. If the transverse bearers could not be removed until the masonry was brought to that height, how could you get access to the struts ?—As I have already stated, these transverse bearers are only required for the heavy travelling crane, which is used to deposit the concrete blocks, and I can dispense with the use of them for a lighter class of crane required for fixing the superstruction.

27,343. By what means do you propose to deposit the rubble in the manner shown in the section ?—There could be no difficulty in fine weather,—in moderate weather,—in bringing off the rubble in barges, bringing them alongside, and depositing it as shown in the drawing. I cannot see any difficulty.

27,344. You would deposit a portion from staging and a portion from barges ?—That would be a question hereafter to be considered. It is a question of detail. It might be deposited from a roadway or from barges. My present impression is, that, as I intend, as a rule, to use a large mass of copper slag in the mounds below, I should bring it in large hopper barges, carrying each 100 tons, from the copper works, and deposit it upon the site, these piles being driven in to form a guide for the site of deposit.

27,345. Do I understand that you propose to tip the rubble and slag within the timber structure from the roadways above ?—It could be done from the roadways above, or it might, as at Blyth, be tipped from small waggons, passed along the transverse bearers. I think it might, in this case, be done from the roadway alone.

27,346. Assuming it were done from the roadways above, would there not occasionally be a danger of stones striking the piles, and cutting away the outer or creosoted skin ?—No ; because the bays are 10 feet apart. It would be very great carelessness if they tipped a waggon anywhere but between the bays.

27,347. Would not the bays being so close as 10 feet, add materially to the difficulty of so depositing the stones as to prevent the piles being injured ?—I think not. You might tip the stones clear of the piles without any injury in that case.

27,348. You think the stones might be dropped from a height of about 40 feet without separating five feet either in one direction or the other ?—I think they might. For instance, if you used hopper waggons, and brought them over the 10-feet space, and then dropped the stone out, it need not touch the piles, at any rate so as to injure them.

27,349. Have you suspended any of those experimental blocks to which you have referred in crane slings ?—I have not yet, but we are making preparations for lifting a block of 25 tons. I have no doubt about the practicability of doing it, because they are so hard that when we endeavoured to break one up we were obliged to break it in piecemeal, mortar and stone together ; you could not separate one from the other.

27,350. As yet you have not suspended any ?—I have not. I might mention that the idea of rubble blocks has, I find, been entertained by other engineers. In reading Mr. Rendel's report on the formation of the proposed breakwater at Hartlepool, the other day, I find that he proposed the same method of the formation of rubble blocks and masonry on shore.

27,351. I am aware it is not a new idea. I was not speaking with reference to the advisability of using blocks of concrete, but simply with reference to the mode in which you propose to suspend them ; would you do that by lewises, slings, or in what manner ?—It might be done by slings or by lewises. You might put in a small square piece of stone having the tail broader than the face, and put the lewis hole in that, or it might be done by means of slings.

27,352. Do you think you could sling a block of 25 tons from a single lewis ?—I think not. I would rather sling it from four than from one.

27,353. You think the sling method is preferable ?—I think so.

27,354. If you would adopt the system of slinging, I should like to know how, when the stone is lowered into the bed, the diver is to get the sling chain away ?—I misunderstood your previous question. I did not

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intend to say I would adopt the mode of slinging, but I think I should prefer lowering these blocks from a number of lewises, say four lewises instead of one, or a sufficient number to be equal to the weight of the block, and that might be done by imbedding in the rubble mass, say four small square stones, or stones approaching the form of a square, a little broader at the tail than the face, and cutting the lewis holes in these stones.

27,355. A plan similar to that has been adopted at Alderney, but not with blocks of so considerable a weight as you propose to use; but seeing a sling indicated in the drawing, I imagined you preferred it?—The draughtsman put that in.

27,356. It is quite a minor matter. Have you any experience of creosoted timber to induce you to believe that it could last for a period like 40 or 50 years?—I have this experience, that a large portion of the pier at Blyth has been executed for about two years, and that we there have uncreosoted timber placed in immediate juxta-position with creosoted timber; that the uncreosoted wood is almost destroyed by the action of the worm while the creosoted is not touched; I can see no traces upon the skin of that timber of its being in the least degree affected. I have always been of opinion, that as the worm will not eat green-heart timber, it cannot innocuously take every sort of material. I think creosote prevents the action of the worm. I think the worm will not touch timber so prepared. If it is done under pressure, and thoroughly well done, I anticipate no decay of the timber from that cause.

27,357. While quite of your opinion as to creosoted timber keeping off the ravages of the worm for a short period of time, I should wish to know whether you have any experience which would justify a recommendation of any structure which would require that the creosoted timber should be exposed to the worm for a period of anything like 40 or 50 years?—I have not, nor could you get such experience as that; but if the worm will not touch it in a period of two years, while it entirely destroys uncreosoted timber, I see no reason why it should destroy creosoted timber in a longer period of time, seeing that the timber is saturated considerably below the surface.

27,358. That must altogether depend upon the quality of the creosote, and the action of the sea water?—It would.

27,359. Over a period of time upon the creosote itself?—Yes.

27,360. To a certain extent it is questionable what will be the effect?—Yes.

27,361. (*Sir F. Smith.*) I think you have said, that although piles have been disturbed at another place, you think that the nature of the bottom at Swansea is such that that effect would not be produced there?—I think so.

27,362. May I ask you whether you have made borings, and ascertained the depth of the clay?—We have dredged for about eight feet down through the clay, and the resident engineer has driven an iron rod below that depth.

27,363. Was that in the line of the intended breakwater?—At several points in the bay on the line of the timber breakwater. We have only had one or two trials. We have not had time to make a continuous series of experiments.

27,364. These trials have satisfied you that it is a bottom of clay of such a consistency that there would be no liability to disturbance in the position of the piles?—They have.

27,365. To what depth have you dredged?—I think eight feet. There is a stratum of two or three feet of boulder stones, and oyster shells. The oysters are fond of the clay, and accumulate on these shoals.

27,366. Am I to understand that the upper portion of the pile is unconnected by scarfing or otherwise with the lower portions, and that the two portions merely abut upon each other, end to end?—They abut end to end, but the upper pile is retained within the ends of the transverse and of the cross braces, and the two piles are, moreover, connected by the longitudinal planking, which connects one bay with another.

27,367. Then you have no security for the stability of the upper portion of the pile, except that which is afforded by the waling and the cross-pieces?—In this case I cannot see how it can possibly shift, because it is confined externally by the transverse and cross-bracing, and internally by the planking, and also by the pressure of the rubble within, so it is impossible that that pile can shift from its position upon the head of the lower one.

27,368. If that principle is good, will not it apply so as to enable you to diminish the length of the first driven pile?—I could diminish that. I should have no fear of diminishing the length of the first driven pile.

27,369. Because you believe that your connexion is quite perfect, upon your system?—Well, as shown upon this plan it is; but I believe that in this instance I have been over cautious rather than otherwise.

27,370. In the future examination, which most likely the subject will undergo, I should be desirous to have precisely, clearly, and definitely marked out the way in which you intend to begin the work, and carry it through, taking the whole length of the breakwater, and showing where you propose to begin, and how you intend to carry it out, because you say that the filling in and the formation of a framework will go on pari passu. In some parts you do not say that, nor do I believe you could do it, because I apprehend that with bays of 10 feet you would not be able to put in the mass of rubble at the same rate at which you can construct the framework?—I think I said that certain portions might be done pari passu; that is, the formation of the rubble mound, and the driving in of the lower piles; but I do not think I used that expression as regards the superstructure.

27,371. I understood you in that sense. You said that to obviate a difficulty with which you certainly will have to contend in placing this planking by means of divers, that you will let it down in portions connected by means of vertical bars. If you do that, I presume you take the whole space between cross piece and cross piece, do not you?—I do.

27,372. You also said that you were not afraid of the action of the sea, because the only part exposed would be the upright pile. Before you can put in the hearting, you must have your planking. If the planking is put down in a bay of 15 feet, that must be exposed to the action of the sea?—It would all be below the surface of low water, and so would be preserved from the action of the wave. In heavy weather it would be a difficult thing to put 15 feet of planking in in that way.

27,373. In point of fact would not it be impossible?—Under ordinary circumstances there is no possibility of doing it. But I cannot see any practical difficulty in the diver putting on the planks one by one.

27,374. You stated that the only pressure that would come upon the cross pieces would be three tons divided into three intervals?—That is, admitting that there is a subsidence in the whole superincumbent mass of packing.

27,375. As a matter of course there will be. You say at one place that you would deposit the rubble by handpacking, and in another by tipping; which do you propose to accept?—The bays being 10 feet apart, the space between the bays for the whole height from the bottom of the sea to the platform of the timber breakwater is perfectly clear and uninterrupted for the subsidence of the rubble work, and if any subsidence takes place in the rubble work between the bays, this rubble work will be apt to follow it, fall off, and go down with the mass. I cannot conceive a vertical pressure equal to three tons a foot taking place without that the whole mass of rubble

between the different braces should simultaneously subside.

27,376. The three tons is upon one spot, and upon the whole length ?—If you take a superficial foot, it is so.

27,377. You must take the whole length to conceive of the pressure ?—I cannot conceive such a direct vertical pressure as that from subsidence.

27,378. Naturally, if there be any subsidence, it will occur to a much greater degree in the central portion than in the external parts ?—It would.

27,379. In that case, if there be any partial subsidence a rupture must take place ?—There is an advantage you possess. Swansea is perhaps as unfavourable a case as you can suggest, on account of the height of packing required above the mound, which would be much less at Hartlepool, and therefore the latter is a much more favourable instance.

27,380. You spoke before of bays, in describing your work. It is an imaginary bay, is it not, and not a natural bay, because it is an interval not enclosed at either end ?—You may call it an imaginary bay.

27,381. In point of fact the material runs over the whole extent, does it not. The action is continuous through the whole extent of the breakwater, and is not confined to the separate bays ?—All the frames are connected together.

27,382. The frames are connected together. If these bays, as you call them, were planked up, the subsidence would be divided, but in this case it is not ?—You may say tha they are divided into spaces by the transverse bearers.

27,383. But they are spaces which do not prevent the subsidence being general ?—They do not. The whole of the mass might subside from end to end of the breakwater between the frames, and then I think the tendency, if such a thing took place, would be that the rubble work, packed in between the transverse braces, would follow the mass, and subside with it.

27,384. Stones may overlap your bay in both directions ?—If you use very large stones, but as a general rule I should not allow them to put large stones on the top of the framework of the packing.

27,385. Would that avoidance have any influence ?—It might have a slight influence.

27,386. Your object would be to prevent any pressure coming on the transverse timbers ?—Yes ; it is in fact a dry rubble wall.

27,387. (*Capt. Vetch.*) With respect to those cross braces, Mr. Abernethy, have you any braces longitudinal and diagonal ?—No, I have not, in this case, without protection.

27,388. I put that question, because, referring to the work at Mill Bay, my impression is, that the braces that affected the stability of that work were longitudinal and diagonal braces, not cross braces, as you have on your section, and that therefore the two cases are not similar ?—That would make a material difference.

27,389. Have you used any of these braces at Blyth ?—Very similar ones.

27,390. Has the wave had any effect upon the sectional braces ?—None whatever, because the surface exposed to the action of the wave is small compared with horizontal braces.

27,391. What is the breadth of their surface ; their edge ?—Six inches.

27,392. What is the amount of interval between them ?—There is the thickness of the pile, about 12 inches, between them.

27,393. I am speaking of the waling pieces. What interval would there be between one pair and another ?—They are ten feet apart.

27,394. There being an interval of ten feet between the pairs of the braces, and the braces being only six inches in width themselves, is there any possibility that stones would hang upon the braces of six inches in width, when there is a width of ten feet on each side to fall into ?—I think that if there is any tendency in the ten feet mass to subside the stones over the braces would follow it.

27,395. If you keep the braces always sufficiently above the surface of the stones you would avoid the difficulty of stones being caught athwart the braces ?—Yes ; there are various ways to avoid it.

27,396. Suppose there is a difficulty with very large stones, could you not diminish the size of the stones of the internal hearting to such an extent that it would be utterly impracticable for any to be caught on the top of the brace ?—That is so.

27,397. You could reduce the stones to the size of road metal ?—As a rule, I should avoid putting in large stones.

27,398. Would not road metal be as good a size as any ?—I believe it would. I believe that heavy road metal might be used.

27,399. Talking of internal pressure, you could not take a single column of that pressure, say a six-feet column, but must consider the whole amount of the base with the whole amount of the altitude ?—Of course.

27,400. So that what would be applicable to a mere column would not be a legitimate measure of the power of a mass of materials of that great height and width, and having a base of a very great extent as compared with its other dimensions ?—It would not.

27,401. That is the view which I have taken ?—That is decidedly the view which I wish to express.

27,402. With respect to Blyth, have you not had practical experience there of divers putting in the frames under water ?—Not at Blyth.

27,403. Have you seen it anywhere else ?—I have done a great deal of work under water with divers, and feel no difficulty about it.

27,404. Frame and timber work ?—I have repaired lock gates, taken out gate rollers, and put down new segments entirely by divers. If you can execute a mechanical work of that kind in 25-feet water, the mere bolting on of a plank behind a pile is a trifle.

27,405. (*Sir F. Smith.*) Was that work performed in sea water exposed to the beat of the sea ?—It was in thick muddy water.

27,406. (*Capt. Vetch.*) It is an enterprise of rather a novel character, but you do not see that there would be any vast difficulty in providing expedients for any unforeseen difficulties which may not be very obvious at starting. The general principle is such that you could always find expedients to overcome any difficulties by which you may be met in the course of your operation ?—I think so. I can foresee no difficulty of any moment.

27,407. Those difficulties will only arise when you come to test the matter, but as the difficuties arise you expect that you will be able to find means of meeting them ?—Yes, that is so.

27,408. (*Chairman.*) Sir F. Smith asked you to forward a detailed statement of the mode in which the breakwater will be constructed from the commencement to the completion ?—I will do so. I think it would be done better by a series of drawings.

27,409. (*Sir F. Smith.*) They need not be coloured drawings; a statement will be sufficient; a statement with reference to the general line of the work.

27,410. (*Chairman.*) I asked the question because otherwise I should have been under the necessity of eliciting your intended mode of proceeding by questions at the present moment. I should have asked, amongst other things, as to the quantity of piling, the lengths of pile, you would drive before commencing tipping, and various questions of that kind. The statement which you will furnish will give a complete view of the mode in which you intend to proceed, will it not ?—It will.

27,411. The object of this mode of construction, or one of its great objects, is economy, is it not ?—It is.

27,412. Will you give us a comparative statement of the economy by this mode of construction compared with that according to which breakwaters have been constructed, say at Portland and Holyhead ?—I have no means of obtaining information as to the cost of those works.

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27,413. Are there not published official statements which have come to your cognizance ?—The published statements give the amount of money expended, but not the quantity of work executed for the expenditure.

27,414. You have no means within your reach of furnishing a comparative statement of the expense ?—I have not.

27,415. Then how are we to judge whether your mode of proceeding is more economical than any other ?—One way would be to take a section of an existing work, and apply the same prices in both cases to the same description of material; then there would be the element of time ; a comparison as to the time occupied in the construction of each work. That is the only way in which I could draw a comparison.

27,416. That is the only way at your disposal ?—Yes.

27,417. How have you arrived at the conclusion that your mode of construction will be more economical than that which has been adopted elsewhere ?—Generally from a statement of the cost per running yard of certain breakwaters. That is the only way I could get at it. Holyhead is an unfinished work. It is merely a rubble mound, with a timber staging. A great part of the expense, that of the superstructure, is not yet incurred.

27,418. Of course in any comparative statement with which you supply us it will be perfectly competent for you to point out all that ?—That I will do.

27,419. I shall expect the best comparative statement which the means at your disposal enable you to furnish, because the cost is and must be a most important element in the decision, and we must have it from you or from other sources before we can arrive at a decision ?—I shall use the same data in both cases.

27,420. (*Capt. Sulivan.*) I want to understand one thing with regard to the section. Do you mean that the inner sleepers and inner ribbands, or whatever you call them, can be put on and left before the packing inside is put down to support them ?—I should put in a certain portion of it, one half, and then go on with the packing, then put in the other half, and then go on with the packing again.

27,421. That would all be done before the upper portion of the structure was proceeded with ?—It need not, because the outer frame could be put over and secured in its place before the portion of the packing is complete.

27,422. If it was not packed, would not there be a risk of a sudden gale taking away the whole of the framework ?—I should always, as at Blyth, carry on the packing simultaneously with putting on the frame.

27,423. Then I presume the lower part must necessarily be filled in from barges, because the upper staging would not be ready ?—I have stated that as soon as the lower piles are driven in a rubble mound will be formed.

27,424. That rubble mound is what I am speaking of ; that will be done by barges ?—Yes ; that is the first thing to be done. I would not attempt to carry on the superstructure until that was formed.

27,425. That must be formed by barges ?—I propose in this case to do it so. Probably at other sites I might do it by staging.

27,426. In this case you fill that in before you proceed with the framing ? This must be filled in by barges, and that would be going on as you drive your piles ?—It would.

27,427. You say, I think, that the uncreosoted timber to which you referred was destroyed by the worm in two years ?—Yes.

27,428. Supposing that you were going on with the work, masonry and all, do you consider it would be necessary to creosote the timber, or would ordinary materials last until the masonry was ready ?—If it is determined to carry out a complete stone structure at once, and without delay, probably in that case I should not propose to creosote the timber ; but in this case I have shown an instance in which a timber breakwater can be used "per se," exclusive of stone work, or where stone work can be delayed for a considerable length of time, and its construction spread over a considerable period. In this case I have thought it as a precautionary measure advisable to creosote the timber.

27,429. I do not quite understand how the frame, when it is slipped down, bears so as to take the enormous weight imposed upon it. On what does it bear ?—The frame does not carry any weight. The weight of the traveller comes upon the inner pile.

27,430. The outer part of the frame has a large scarfing piece on the outside ; outside the junction of the piles ?—It is for stiffening and scarfing.

27,431. Am I to understand that bears on the main piles ?—The strut abuts on the main piles.

27,432. The whole weight comes direct on the pile, and it is not on the frame ?—Not in any way upon the frame. The outside frame is to connect the transverse and longitudinal pieces together, and act as a stiffening.

27,433. With reference to the weight of the material bearing down the waling pieces, you were asked whether a narrow piece of six inches width would be likely to stop the stone. Have you not two pieces within a foot, and therefore you have two feet of bearing, unless the stones slip down ?—Yes ; I shall use such measures for packing that it would not occupy a space of that width.

27,434. Even supposing you had nothing equal to one foot in size, and nothing of what could go through, when you have such an immense mass of rubble above, do you believe that in case of subsidence these small stones would run round the obstruction, would not the whole of it come down bodily, and carry the wood with it ?—I think not, because the whole of the space, which would be something like 40 feet by 10 feet, would be perfectly clear and uninterrupted from the top to the bottom ; and admitting a subsidence, I cannot but imagine that the rubble between these various braces would all go with the large square pillar or mass of rubble between the frames.

27,435. Do you believe, supposing the mass of rubble to subside, that, however small it was, it would run round two sleepers of six inches, when only 10 feet separates them, without bearing them down with it ?—I think the fact would be this, that supposing the square mass of rubble between the frames to subside, an immediate displacement would take place in the rubble work between the frames. That would not be a vertical or downward pressure, but to some extent a diagonal or lateral one, and it would follow the mass.

27,436. Allowing that it were possible, without saying whether it is or not, that if that subsides the result must be to force out the bolt of one of these braces, supposing it did give way, can you expect to get up your structure so fast or in such a way that you will guard against any injury arising from that cause ?—I think I could. I think there would not be that risk. I have said, that, presuming that during the progress of the work a few of the braces were injured, I do not think that would affect the stability of the work.

27,437. Can you get up your structure fast enough to make the subsidence carrying away these struts and wales of comparative unimportance ?—I think so.

27,438. Or would any serious difficulty arise if one of these wales here and there gives way ?—I think not. I think it can be avoided altogether, as a general rule ; but suppose one or two did gives way, I do not think that would affect the stability of the work.

27,439. (*Capt. Vetch.*) I think each pair of these horizontal cross-waling pieces are a foot apart, are they not ?—Yes.

27,440. And the uprights are 10 feet apart ?—Yes.

27,441. Then on each side of each pair of wales there would be an interval of 10 feet for the stones to tumble down into ?—Yes.

27,442. Supposing any permanent difficulty is likely to occur from stones resting upon the wales, would

there be any vast difficulty or expense in putting a triangular piece between each pair of wales, so as to make every stone tumble down ?—It might be done.

27,443. You could resort to that expedient, so that that would avoid the difficulty. You could put a triangular piece upon each pair of cross walings, so that any piece of stone falling upon the point must deflect into the 10-feet space on one side or the other ?—Yes. I do not see how you could suppose the whole 52 feet of it to subside, because, supposing the stones to sink from both the wale pieces, then the weight above that wale piece would be the mass from it to the one above. I cannot conceive all the spaces moving with a simultaneous vertical motion.

27,444–5. (*Sir F. Smith.*) The difficulty of explaining this by a drawing is very great, because you assume that whatever comes upon one cross timber cannot by possibility bear upon another, but there is something that misses both, and comes down obliquely upon the lower one. If I understand rightly, the interval between these pairs of wales is a foot ?—A foot between the pair.

27,446. How broad are they ?—Six inches.

27,447. That is two-foot space ?—Yes.

27,448. Do you mean that you leave that space unoccupied by rubble altogether ?—No ; but I say that the spaces between the frames being open spaces, and spaces of considerable extent, perfectly open from the level of the roadway down to the very bottom of the rubble mound, and uninterrupted spaces, if any subsidence takes place it will take place in these large spaces, and not in the smaller between the wales or braces.

27,449. But some of the stones which are in these spaces will always project over these frameworks, and then there would be a leverage ?—I should avoid putting large stones in the hearting. I think, as Captain Vetch suggested, that stones not much larger than road metal would answer the purpose.

27,450. If that is part of your plan, let it be stated ?—Quite so.

27,451. (*Mr. Coode.*) If I read the drawing aright, the lower wales are about 42 or 43 feet in length between the piles ?—They are.

27,452. They are but half timbers, about 14 inches by 7 ?—They are mere ties.

27,453. I think I understood you in a previous part of your examination to say that some of the stones would be from two or three feet in dimension. At least they are so shown in the drawing ?—The lowest waling piece to which you refer would rest upon the top of the rubble mound. It is immediately upon the op of the rubble mound.

27,454. Then, if, when the upper portion of the rubble comes to be added, there is any subsidence in the first portion of your rubble mound, will not an undue amount of weight necessarily be thrown upon the lower wales ?—Supposing a great extent of subsidence to take place ; but I have already stated that I am dealing with a certain locality, that I cannot conceive that a rubble mound of that base will subtide to any extent which would affect the superstructure or the superincumbent mass of packing.

27,455. What amount of deflection do you think you might safely allow for one of the lower wales ?—I should not like to speak of deflection, because if it deflects much it must be broken.

27,456. If there be a small amount of subsidence in the lower portion, the weight must necesarily come upon the upper edge of the lower wale ?—I should point out that one of the main objects of that lower transverse brace is to connect the two lower piles together, before putting on the superstructure, because it is obvious that so far as the piles are concerned if may be dispensed with, they are embedded in the whole depth of the rubble work, and therefore cannot separate. The main object of those wales is to secure the outer frame.

27,457. Still, as a matter of safety, these wales must necessarily remain good until the upper portion of the frame is placed ?—The upper frame is placed on before the superincumbent mass of the packing is put in.

27,458. Then, assuming the lower wale to be broken, as you admit may happen, and that the lower rubble is put in as you propose before the construction of the masonry, if the lower wales be broken, would there not be a considerable strain put upon a single timber, which would be about 36 feet in height ; would there not be that pressure upon the pile ?—The pile is embedded and buried for 21 feet in the rubble mound, and I cannot conceive any lateral pressure being exerted upon it sufficient to thrust it out of its place.

27,459. The middle wales or diagonal braces being broken, the piling of that part of the structure would derive no support from the rubble on the outside ?—For 15 feet between low water and the top of the mound it would not; but those piles are 14 inches square, which is a very great scantling in proportion to the length.

27,460. With reference to the wales, the pressure upon them would not be merely that which would be due to the section of six inches in breadth, but it would also have to support the weight due to an inverted cone of this material (would it not) the angles of which cone would vary according to the natural slope of the material ?—The thick end of the cone is downwards. This [*pointing to the section upon the table*] I understand to be the cone, with the apex up and the base below.

27,461. I assume that you have to provide for an amount of pressure upon any portion of any one of these wales, and I ask you, would not that wale have to support, not merely the weight due to the pressure on a superficial foot of it, but the weight of an inverted cone of the material, the angles of which cone would vary with the natural slope of the material which you employ ?—No. If you are dealing with a very loose material, that would have a tendency to fall towards the centre, that would be the cone ; but with a dry rubble wall, hand packed, I cannot conceive it would have that effect.

27,462. Have you not just stated that you propose to deal with a material like road metal ?—Some like road metal ; but the larger masses of rubble would be carefully hand packed behind the planking, so as to form behind the planking two dry stone rubble walls. The interior part would be formed of a similar class of materials.

27,463. As there seems to be some difficulty in understanding the nature of the material, perhaps you will, in the statement you are to forward to us, state the exact character of the material which you would use, and say how far you would use hand-packed rubble, and how far materials of the character of road metal ?—I will do that.

27,464. You have stated that you believe the character of the materials at the bottom of Swansea Bay to be so uniform that there would be no fear of any undue settlement in the case of a mass of material 21 feet high in front of the piling, and I think about 75 feet high at the back of the pile ?—I think not.

27,465. Will you look at the Admiralty chart, and tell me the character of the ground, as generally described here, on the line of your works ? Is there not in one place the mark of broken and rocky ground ?—I have seen that often in Capt. Denham's chart, and have found it to consist of oyster-shells and small boulder stones on the surface of a clay bank.

27,466. Is there not just upon the line of your works the letter G, which describes gravel ?—It may be so ; but the soundings upon a chart of that class do not indicate the true nature of the ground, but merely what is the surface of the ground or the bottom with which they come into contact, that which they find on the surface. It is not to be supposed that they make borings to ascertain the true nature of the strata.

27,467. Seeing that that indicates the character of the ground on the surface, are you prepared to say to what extent the gravel may extend ?—I am not, at

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that particular site. The whole of the bay is covered with a certain stratum of sand, more or less thick.

27,468. Is there just within the line of the proposed work the indication of oozy ground marked by the letters O Y?—I should say that that would mean oysters.

27,469. (*Capt. Washington.*) It does mean oysters, and in any case it is only the surface which is marked there.

27,470. (*Mr. Coode.*) At any rate, seeing the description of broken rocky ground in one place, and G, indicating gravel, close by, and the letters O Y, indicating oysters, also just within the line of your works, does not that seem to indicate that there is a variation in the character of the ground?—The variance amounts to this; there is a variance in the depth of the clay banks which appear above the sand, and which, by the action of the tidal current, are left bare of sand, and attract the oysters, and oyster beds are formed on the top of those clay banks projecting above the general level of the sand in the bay; that is the true character of the variance in the ground throughout that bay.

27,471. Still, these letters indicate four different characters of ground?—That is of surface, merely.

27,472. You have no means of knowing how deep the same character would or would not exist. Would not the description given on that chart seem to indicate that some further examination is necessary before you can with safety adopt this mode of structure?—Probably it would. This might be considered as a general suggestion. If that work was carried out at Swansea it might be necessary for me to modify the design to meet any contingency; but at present I have not supposed all these contingencies to arise; I have taken the general character of the ground I have to deal with. At Blyth the section of the breakwater varied at different points according to the ground. We had to erect the foundations upon soft clay and rock, and we varied the form of the timber structure to meet these requirements.

27,473. What is the greatest height of the stone work deposited at Blyth?—I forget the height of the deep-water section. The greatest height would probably be some 17 feet.

27,474. What is the depth of the water at high water outside the pier at Blyth?—At the termination at high water spring tides it is about 13 or 14 feet outside. That extends on an average for a length of from 50 to 100 feet, and then the water deepens pretty rapidly. There is a ledge of rocks upon which the breakwater is built, and after that the water deepens.

27,475. Has not that ledge the effect of breaking the force of the sea?—Just the contrary. It has the effect of converting the oscillatory and undulatory motion of the deep sea into a wave of progression and percussion. I think so far the pier at Blyth is a favourable specimen of how that description of work meets the action of the sea, because it is a percussive sea from one end of the breakwater to the other. I say that a percussive sea, with a depth of water of 13 to 14 feet at high water, and a continued action, is a much more forcible agent in destroying a work of that description than the undulation of deep water, which is not a wave of progression but of undulation.

27,476. Is not the sudden deepening of the water of which you speak, somewhere about a cable's length in advance of the work at Blyth?—The ledge, I dare say, is that breadth at one place, but in others it comes in. At the Coble Hole we find the sea sets in with great force. It also comes in at another place, which is connected with the outer works by a little narrow neck. I think that if the breakwater at Blyth were placed out in the deep water, having only an oscillatory or undulatory wave to resist, the effect upon the work would not be so great as it is under existing circumstances.

27,477. You were asked some questions as to the diagonals of the pier at Mill Bay being placed longitudinally instead of transversely Would that affect the lifting power of the wave?—No; but if in this case, for instance, I put the plank or framework without carrying up the hearting, I should expect the sea to sweep the whole of the framework away, because I should then expose a surface to the action of the sea sufficient to destroy the framework.

27,478. Would not the hydrostatic pressure of the wave lift any horizontal surface exposed to its influence?—It would have that tendency.

27,479. Whether this diagonal or horizontal surface were placed horizontally or transversely to the structure would not affect the lifting power of the sea?—It would, of course, as far as the difference of specific gravity is concerned; it would so far affect the lifting power of the sea. If the timbers are placed longitudinally you expose to the sea a considerable surface which is not exposed in my plan.

27,480. Is there not also a considerable amount of horizontal surface exposed to the action of the sea in this half-timber sheeting?—Yes; but there is solid work within that sheeting.

27,481. Must not that sheeting be put in before the stone work is placed within, and would it not be for a certain period of time exposed to the action of the sea?—It need not be so. At Blyth we put on the timber planking "pari passu" with carrying up the rubble hearting. If a heavy sea comes on with the work half up, all it does is to tumble about the stone on the surface.

27,482. Has it not been necessary in some instances at Blyth to remove the planking, and to put fresh material to compensate for the consolidation?—We have had to do so to a very slight extent after the pier had been built, and had been exposed to the battery of that percussive sea which has tended to shake the rubble mass down, but that was only very slightly. We only had to take off one or two of the top planks, and put on a little rubble. The pier at Blyth is really a cone with a very narrow top and a broad base, and the difficulty there is to pack the hearting sufficiently, because you had the sides sloping from the apex, and the difficulty was to get the packing properly in. That difficulty would not occur at Swansea.

27,483. If that happens at Blyth with a height of 16 feet, would there not be a greater liability to the same kind of thing at a place like Swansea, where the height would be 72 feet?—The platform of the frame within which you tip the rubble is different in these two cases.

27,484. Still this vast height of material would be more liable to consolidation than the height of 16 feet there is at Blyth, and also to unequal consolidation?—It was impossible to pack the hearting from the sloping sides into the cone. It was impossible to pack the hearting at the base of the cone sufficiently close up against the face of the timbers, so as not to leave interstices or spaces between, and consequently, after standing the battery or thumping of the sea, the rubble work was gradually shaken into those vacant spaces thus inevitably left. That would not be the case at Swansea, because there you would have a considerable mass of rubble with which every vacant space within the framework is certain to be filled. That is not the case at Blyth.

27,485. As yet we have no information how far you would adopt the system of packing, and how far you would simply deposit the material. Perhaps you will show that in the statement you have promised to furnish.

27,486. (*Capt. Sulivan.*) I suppose that the section which you have produced is much the same as the section of any other pier, although built in another way?—It is very much like it.

27,487. Then the amount of material used there in stonework and masonry would be much the same?—Yes.

27,488. Then if there is a saving of material it must be in the woodwork?—There is some saving in the woodwork; but I conceive the principle saving is in the amount of labour required in putting it together.

27,489. In your statement will you make a comparison of the actual number of feet of woodwork required for that, compared with the amount required for staging, according to the plan usually adopted ?—I will do so.

27,490. (*Sir F. Smith.*) You said you do not apprehend any subsidence at Swansea, owing to the nature of the stratum on which the material will be deposited ?—No ; I do not say no subsidence. I mean there would be no subsidence of any extent which would affect the timber-work. In all works there must be some.

27,491. None of moment ?—None of moment. That would be the term.

27,492. Would you not think it advisable, before the public money was applied to a work of this kind, that it should be ascertained beyond a doubt that the soil is suited for that object, and that that should be done by a proper system of boring ?—That would be necessary and desirable before the work is undertaken.

27,493. I believe the project we now have submitted to us is applicable both to Swansea and Hartlepool ?—It is.

27,494. Are the circumstances much alike at Hartlepool and Swansea ?—Yes ; they have a very hard bottom at Hartlepool. They have already constructed piers upon this principle there, and they are now engaged in facing them almost precisely as I propose in this case.

27,495. In what depth of water would the Hartlepool Breakwater be formed ?—The extreme would be seven fathoms, six fathoms, and about five.

27,496. What the is rise of the tide ?—Sixteen feet at springs.

27,497. You think that a more favourable position than Swansea ?—Yes. The rise of the tide being considerably less, it is so far favourable that the work is not so much exposed between the period of low and high water.

27,498. I think you stated that the action of a violent gale would tumble the material about, and disturb it ?—Within the framework ?

27,499. Yes ?—It might.

27,500. That might happen, however well it might be hand-packed, and the arrangement of hand-packing would be disturbed ?—It would ; but I have no doubt the percussive action of the sea so far does good that it actually assists the packing below.

27,501. It might throw some material over the transverse wales ?—We do not find that much the case at Blyth, where there was a lateral sea, which was just the sort of thing to test it.

27,502. Would the sea have a different action at Swansea and Hartlepool ?—At Swansea it would partake more of the character of a deep-water undulating wave. There will not be the same percussive wave we have at Blyth.

27,503. How will that be at Hartlepool ?—At Hartlepool it will be the same, being in five fathoms water.

27,504. But we have had evidence given to us that the sea breaks there in 12 fathoms water. Whether this is true I cannot say, but suppose that was the case, would that have any effect ?—I cannot conceive in the north sea a wave becoming a breaker at so great a depth.

27,505. We have had such evidence ?—Not a breaker, properly. It may arise from this:—Often in violent gales the crest of an undulating deep-water wave has a forward motion from the action of the wind, and has the appearance of breakers. I have seen the sea at Aberdeen for two miles out perfectly white, but these were not breakers, properly so called. It only arose from the action of the wind upon the crest of the waves.

27,506. But supposing the ocean wave did break at that depth of water ?—I cannot conceive the possibility of that.

27,507. Would it interfere with your principle of action ?—I cannot conceive the possibility of a wave breaking at that depth.

27,508. I presume you could counteract the possible injury of pressure upon these works by increasing the dimensions ?—That would be a calculation of strength.

27,509. And of increased cost ?—A little increase of cost.

27,510. (*Capt. Vetch.*) Would you be astonished if I tell you that I have been for three days in the Atlantic in 90 fathoms of water, with the waves breaking so much that we could not see the surface of the sea ?—That might be a breaking wave of the character I speak of, the crest of an ocean wave blowing over by the wind, which has all the appearance of a breaker.

27,511. It looked like drifted snow. With respect to the comparison between the Mill Bay diagonal braces and those you propose to put up, the difference between the two would, I presume, be this, that at Mill Bay the face of the brace was opposed to the sea, and in your case the edge is opposed to it ?—That is the case.

27,512. That would make a considerable difference ?—Just the difference that there would be between the sea breaking upon the end of a pier and breaking at right angles with the side of the pier.

27,513. (*Mr. Coode.*) To follow up the last question, seeing that the damage at Mill Bay was from the lifting power of the wave, and not from the stroke of the wave, would it matter whether these braces were put in edgeways on or on the flat, so far as the lifting power was concerned ?—No ; but I never saw the drawings of Mill Bay Pier. If I saw them I might speak better.

27,514. The work which you speak of having done by divers below the water was entirely within docks or coffer dams ?—Yes ; I have had divers down in Swansea Bay too.

27,515. Still the work of which you have spoken of, putting on wales and so on, was within a dock ?—Yes.

27,516. In the comparison which you were asked to make as between the present system of constructing breakwaters and that which you propose to adopt, I would ask if you would be good enough to institute a comparison in similar depths of water, and with a similar rise of the tide ; and as the examination today has chiefly borne upon the design for Swansea, perhaps you will let the comparison be made with a depth of water and rise of tide similar to that shown on the Swansea drawing ?—Yes ; I will use the same data in both cases.

In applying the same principles to the same character of work you will bear in mind that the circumstances should be the same, or where they are not, you will make proper allowance for the differences.

27,517. (*Chairman.*) We have now gone through the first head of the examination to which we proposed to subject you, which is construction. I will now ask you what you have to offer upon the individual cases, commencing with Fraserburgh, and taking Aberdeen, and so on, in succession ?—I might add a little to my former evidence in each case.

27,518. (*Sir F. Smith.*) May I not venture to assume that the great merit of your plan is, in the first place, the great economy of material ; and, secondly, the great economy of labour and time as regards the labour necessary for putting that material in its place, and especially in the lower part. I look upon that as a great item of expense. If you had not the framework, the spread of the rubble would be considerably more ?—Yes.

27,519. Therefore the framework economizes material in that way ?—Yes.

27,519*a*. (*Capt. Vetch.*) Does not the plan also produce economy of time ?—Yes; that is one main object.

Friday, 3d December 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.
Mr. Lindsay.
Captain Washington.
Captain Sulivan.
Captain Vetch.
Mr. Coode.
Mr. Evans, Secretary.

LONDON. Dec. 1858.

The Secretary read the following report by Mr. Walker :—

To Joseph Cowen, Esq., Chairman of the Tyne Improvement Commissioners.

23, Great George Street,
Sir, 26th November, 1858.

Mr. Guthrie's letter of the 8th September requests me "to proceed with the preparation of a plan and estimate to show the capabilities of the river Tyne as a harbour of refuge."

The accompanying drawing is made in compliance with the above request. It will be seen to be little more than an enlargement of the design of 1853, and therefore the general reasoning in the report which accompanied that design is applicable to this, though to a greater extent, and will be my apology for some repetition, as it is desired that this report should contain a distinct expression of my opinion of the effect of the works I may suggest, without reference to a former report.

It may be proper, however, for the better understanding of the present works, and of my connection with them, to state that my first survey of the entrance to the Tyne was as Admiralty Inspector, in consequence of a difference of opinion between the professional advisers of the Admiralty and the engineer to the Tyne Commissioners as to the plan of piers for the entrance of the river, and their lordships having afterwards complied with the request of the Tyne Commissioners that I should be allowed to submit a plan, upon the understanding that the commissioners would agree that such plan should be final, and accepted by them, and not to be altered without the concurrence of the Admiralty.

After the above, with the evidence I had taken, and the various plans that had been proposed by others before me, for my assistance, I prepared a plan which, I believe, had the unanimous approval of the commissioners and also the approval of the Lords of the Admiralty, and of the then hydrographer to the Admiralty (Sir Francis Beaufort), to whom all the plans which had been received were submitted by me for his opinion. When, however, the commissioners applied for the official sanction of the Admiralty to proceed in the execution of the work according to my plan, that sanction (partly, as I have understood, from a wish to test the efficiency of the plan) was limited to a length of 1,400 feet of the north pier, and 2,800 feet of the core of the south pier.

I have now to inform you that a contract has since been entered into for these portions of the work, and that some progress has been made with both the piers.

The following contains my opinions expressed in my former report, which I have not seen reason to change, always bearing in mind that the extent of shelter, the depth of water, and the freedom from injurious shoaling or bar, will be more certainly obtained by the enlarged than by the former design :—

"The present great evil, to the removal of which all the designs have been directed, is the bar; this has been generally proposed to be effected by confining the ebbing water of the river and the harbour, and directing it upon the bar at the entrance, instead of allowing it to escape over the Sparrow Hawk and other sands; but the difficult question to solve is, can this increase of velocity and depth through the narrowed space between the piers be continued so as not to have the effect of causing a similar deposit outside the piers, and thus forming a bar there?

"It is, in my opinion, clear, that if the outgoing current and the passing (south to north) ebbing tide were in the same direction and of the same velocity as at present, and if the same quantity of sand were still to be admitted by the flood tide into the harbour and river by the 'Wheel,' and afterwards to be passed out during the ebb tide, the same causes would produce the same effect as they do at present, viz., a bar, but outside the present one, for the position of the bar is by no means fixed; it is at the point where the opposing forces, west to east, and south to north, meet or balance, and it would be moved out beyond the piers if this balancing point were moved out by increasing the current between them.

"My expectation, however, is, that all these conspiring causes of a bar would be modified, and the effect of them, to say the least, very much diminished, by the adoption of the design hereafter described, for the following reasons, viz. :—

"That all the outgoing water being confined by piers, instead of spreading over so wide a space as at present, would, at the ends of the piers, join the coast tide passing from south to north, with increased velocity or energy.

"That the sand would be brought out to where there is deeper water, and therefore the same quantity deposited would not produce a bar of the same height as at present.

"That the south to north ebbing tide, to which the piers would be extended, may be expected to be stronger when confined or collected, in passing the ends of the projecting piers, and thus to check the formation of a bar.

"That the operation of a south pier, even if but a short one, which Captain Washington and other naval gentlemen think likely to be sufficient, would stop a large portion of the sand that is now carried into the harbour during the flood tide by the 'Wheel,' so that there would be less sand to go out again on the ebb.

"The general observation of a sympathy between the bar and Sparrow Hawk has been considered as a proof of the effect which confining the water between the piers would have. It is remarked that at present, when the bar is low (good) the Sparrow Hawk is high, from which it would appear that the two facts are connected; but the Sparrow Hawk being high is, I think, rather the effect of the good bar than the cause of it. The sand that forms the bar is deepened by the scour of the river, chiefly during land freshes, with westerly winds; and when so deepened, there is, after the freshes have gone off, a greater channel for the ebbing water to escape in the straight line, and therefore a comparatively less quantity and velocity upon the site of the Sparrow Hawk, thus allowing a deposit upon it, and a rising of its surface. There is also, in times of these freshes which lower the bar, less room in the river for the tidal water to enter, and then all the sands, both the Sparrow Hawk and the Herd, over which the flowing and ebbing tide passes, have a tendency to rise. When there is no fresh, or when the action of a fresh is checked by easterly winds, these causes cease to operate, the sand or bar in the straight channel begins to rise, and a larger portion of the ebbing water is diverted over the Sparrow Hawk, so as to deepen it.

"On one point there was a unanimity of opinion among all parties whose evidence I received, that to confine the outgoing current over what is now the bar, must, by increasing the velocity, deepen the channel.

"In the position and direction of the piers which I have designed, I have been influenced by various considerations besides that of the removal of the bar. The following are the principal, viz. :—

"1st. To give heavy seas space to spread, and spend themselves immediately after passing the piers; so that vessels having got inside the piers, may be in quieter water, in a kind of outer harbour.

"2d. Not to lessen materially the extent or area of sloping sand, which is useful, not only for the above purpose, but also for vessels beaching upon it, in case of their being obliged to do so.

"3d. To enable vessels entering with scant northerly or southerly winds, to haul up close under either the north or south piers, and so to escape getting upon a lee shore, and (owing to the proposed height of the piers) to be sheltered from the violence of the winds; this they would be as soon as they should get inside, or round the heads, and would thus escape the dangers of the Herd Sand and the Black Midden Rocks. From the action of the north to south current of flood tide being upon their broadsides, vessels are at present liable to be driven upon the Herd Sand, particularly when, from the want of depth of water upon the bar, they are but little under command of the helm; but with the piers as proposed, even if vessels were to get ashore, it would be in smoother water, and the danger to ships and crews would be much less than at the present time, when they are quite exposed.

"4th. To give to laden outward-bound ships shelter

from the worst winds, while they clear the pier heads and get into deeper water; and,

"5th. To enable tug boats to get further out to assist ships in entering or leaving the harbour."

As to any interruption that the piers may offer to the full flow of tide into the harbour, I would only observe, that the flood current just outside the bar is at present little more than one mile per hour, and that the width between the piers is proposed to be 1,100 feet, while the total width of Shields Harbour opposite to the New Quay is only 920 feet, and at the Narrows still less.

Taking these considerations together, I do not think the tendency which any contraction would naturally have to throw off the flood tide would amount to a practical obstruction, but rather, that the width of entrance which I have proposed may be found to admit the heavy seas too freely, and that experience may show a further contraction to be desirable. The objects to be attained on the one hand are the removal of the bar, and shelter from heavy seas, and to make the width between the piers such as to accomplish these ends, without on the other hand excluding the flood tide, or increasing materially the velocity of the ebb during freshes, and so as not to interfere injuriously with the entrance of ships. If these objects are opposed to each other, absolute perfection in all of them is not to be expected, but such an arrangement should be attempted as may effect the more important purposes, without producing a conflicting evil to an extent that may prove equally injurious.

The design now submitted consists of an extension into deeper water, and such an enlargement of the plan (coloured yellow) that was proposed by me in 1853 as that all the work yet executed, and the greater part of that at present authorized by the Admiralty, would be brought in. If the work had not advanced so far as it has done, I should not have adopted for an extension into deep water exactly the same lines that I now propose, but I do not consider the difference to be such as to be of much importance practically.

The entrance, according to the accompanying plan, will be in six fathoms at low water, decreasing inwards. *The area* (according to the Admiralty chart) with not less than three fathoms at low water of spring tides is 76 acres, with not less then two and a half fathoms 90 acres, and with not less than two fathoms 104 acres. At all times, excepting at the low water of spring tides, the areas or depths will be considerably greater.

The above areas are comprehended within less than half a mile from the piers inwards, which is under one third of the length of the wide basin, if measured up to the Narrows.

It may be said, that for a general harbour of refuge, the above areas, considered by themselves, are small; but if, as I anticipate, the effect of the proposed piers shall be still further to lower the bar, and to deepen the water inside up to the present deep water above the Narrows, the extent of shelter will be large for vessels of considerable draught, even at low water of spring tides, and as the lift of tides is fifteen feet, ships of still larger draught may, when the channel shall be once dredged, be able to enter and go into Shields Harbour at all times of tide.

They being thus able to pass up to an inner harbour, so as to be out of the way of other vessels seeking shelter, is one of the advantages of a harbour of refuge being at the mouth of a capacious river like the Tyne.

Mr. Wake, the harbour-master, states in a letter now before me, "that the harbour of the Tyne above the Narrows, with the additional space afforded by the Northumberland Docks and the Jarrow Docks, is capable of containing 2,000 sail of vessels, and that before the opening of any dock in the Tyne he has known 1,250 sail of vessels lying at one time in the river, many of them being vessels that have sought shelter in the Tyne from a storm."

The scouring effect of a large backwater for clearing the entrance and passage is another advantage, while the pier heads being carried into deep water, with a tidal current outside, will tend to prevent the entrance of water charged with sand.

The greatest improvement as respects the depth from the proposed entrance, where there is now 30 feet at low water, up to the harbour where there is 20 feet, would be the entire removal of the present obstructions, so as to have practically an uninterrupted inclined plane between the two extreme points. This is more than should be reckoned upon, but I consider that with the aid of some dredging, for the removal of any hard material, there is a fair probability of 18 feet in the whole length of the channel; and I need scarcely say, that the good that would result from this in the saving of lives and property and in giving facility to trade would be great.

Undoubtedly all vessels bound for the Tyne, or having left the Tyne and being driven back by stress of weather, would prefer taking refuge in the Tyne to any other harbour near them; but the advantages to which I have referred apply to the shipping generally that may be caught by storms upon your coast, and seek the refuge of a harbour.

This suggested addition to the area would necessarily increase the cost of construction; my estimate for the present plan being 400,000*l*., while that of the extended harbour as now submitted is 800,000*l*.

The amount may appear large, but I would observe that the addition of 400,000*l*., if it would tend not only to prevent wrecks and loss of life, but to facilitate the trade and shorten the time of 45,000 ships (the annual traffic of the Tyne) making their voyages, or to enable a less number of ships to do the work, would even, as a matter of economy in money, be a prudent expenditure, of which the consumer would have the ultimate advantage.

The returns from the Board of Trade show some important facts named by Mr. T. J. Taylor, viz., that the traffic of the Tyne is nearly as great as that of Blyth, Sunderland, Seaham, Hartlepool, and the Tees collected. Mr. Taylor also remarks, that exceedingly few vessels not belonging or trading to the Tyne are wrecked at or near the mouth of the river, and that the great majority of wrecks upon the coast takes place at or near the entrance of the ports to which they are trading.

To complete the piers according to this enlarged plan would be the work of ten or twelve years, but I expect that the benefits I have referred to would be felt in very much less time.

I have the honour to be, Sir,
Your most obedient Servant,
J. WALKER.

Mr. J. WALKER, C.E., examined.

27,520. (*Chairman.*) Mr. Walker, your report, which has been forwarded to us by the Commissioners of the Tyne Improvement, has been read to the Commissioners; and before we proceed with any examination, I wish to ask you whether there is anything further you desire to state in reference to it?—I think not. The report in the shape you have it is of very modern date, as you will see, and I intended to embrace in it all that this Commission might think it necessary to interrogate me upon on the subject of the Tyne.

27,521. We shall be very glad to have your opinion on a subject which is one of some difficulty,—I mean the accumulation of sand which we witnessed on different parts of the coast. Can you inform us how that occurs? Is it from deposits of sand held in suspension in the water of the North Sea, and brought down by the tide flowing from the southward, or does it arise from local deposits washed in from the sea?—I think the sand you refer to is sand which belongs to the sea, not to the river.

27,522. Yes; but I am not now speaking with reference to the Tyne only, but to the deposits of sand all along the eastern coast of England. Wherever we have been upon that coast we have observed that in every place where there is a projecting point the sand seemed to collect, as if it came in from the south side of that point. Now we should be glad to know your opinion as to how those accumulations of sand arise, and from whence they come?—That is a very general question, and one that can only be answered satisfactorily after an examination of the stratification of the cliffs on each side where the sea washes. If those cliffs consist of stone, and the sea washes the shores at their base, portions will be washed off, and being pulverized into sand might form the matter you refer to.

27,523. Have you ever analyzed the water of the North Sea for the purpose of ascertaining the quantity of sand it holds in suspension?—No.

27,524. Has it never occurred to you to do so?—No; and I should think it would be almost a useless task, for the result would depend very much on the part of the sea you took the water from. If you

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took it from near the shore, where the water is shallow, there would be a considerable quantity of sand, and if you went out to a distance, where the water is deep, there would be little or no sand at all.

27,525. But, as I understand, you do not speak from the results of any actual experiment that you have made ?—No.

27,526. Do you think that the large quantities of sand we found upon the north-east coast, or in certain parts of it, is sand brought down there from the sandy coasts about Yarmouth, and all that sandy district on the east coast, washed down by the action of the water ?—I think it is very likely to be the case.

27,527. You think it is very likely ?—Yes ; but when you say all that sandy district about Yarmouth and the east coast, you give me a very large field, for there is a very large district on that coast which is sand, and there are the Yarmouth sands.

27,528. But it has been stated that in the North Sea the ebb tide flowing to the north brings the sand down in suspension, and that whenever there is still water that sand is deposited ?—Yes.

27,529. You have had great experience in these matters, and may or may not have turned your attention to this particular point; if you have, we should be glad to have the opinion which you have formed as the result of that experience ?—It does not appear to me to be a matter depending upon any general rule so much as upon the circumstances of each particular locality, and for me to give an answer to such a question, applying generally, would be only to mislead you.

27,530. Can you suggest any mode, any experiment or series of experiments, by which the accuracy of the theory I have alluded to might be tested, or the reverse ?—The best experiment would be experience, and that would be best obtained by carefully watching the ground on each side of the rivers and streams, and carefully noting what takes place in the shape of washing down the sand from the cliffs, to ascertain how far that cause may operate to produce these effects.

27,531. You mean, in fact, that a careful examination of the coasts and banks of the rivers, and a careful examination of what is found at the foot of the cliffs comparing it with the geological stratification, would be the most obvious method of arriving at a satisfactory solution of the question ?—Yes ; for there are great lengths of the coast cliffs which have been washed away very rapidly.

27,532. Do you think any good would result from an actual analysis of the water of the North Sea at different distances along the coast, and in different distances from the coast ? Do you think we should be enabled to get at any practical result in that way ? —You mean by a chemical analysis ?

27,533. Yes ?—No, I think none at all. A survey such as I understand this Commission has been making along the coast would be worth 1,000 analyses.

27,534. For the purpose of testing whether the water of the North Sea does hold any considerable quantity of sand in suspension or not ?—Yes.

27,535. (*Sir F. Smith.*) Mr. Walker, I think you projected a scheme for the improvement of the Tyne some years ago ?—I can hardly call myself, as I am named in the report, the projector. I was sent down by the Admiralty to make certain surveys and inquiries upon the subject, and a variety of plans were set before me. I selected the good parts of each, and from them made the plan upon which we are now acting ; adding my own judgment, so far as I could apply it to them.

27,536. Have you a copy of that plan before you ?—Yes. Perhaps I may say, as the gallant General has referred to this point, that very nearly the same answer which I have now given is contained in my printed report. I state there, that I adhered nearly to the plan that was previously deposited to accompany an application to Parliament, and that Mr. Brooks was the engineer at that time to the Tyne Commissioners.

27,537. I am quite aware that what you are now saying is to be found in the printed report, but at the same time it is very desirable that we should have in the minutes of your evidence these important facts, inasmuch as a report given in the Appendix is not always referred to in the same way that the evidence taken before the Commissioners is ?—Will you excuse me ? Perhaps it is the intention of the Board to make the report a part of their proceedings ?

(*Chairman.*) It is minuted.

27,538. (*Sir F. Smith.*) I presume, Mr. Walker, that the plan you have before you is the coloured plan of the proposed breakwater ?—The plan I have before me ; that part coloured yellow is the present plan.

27,539. Looking at the southern breakwater, you will observe that there is a portion of it which extends over the narrower part of the Herd Sand ?—Yes.

27,540. And it goes out to the extent of the slope marked 1857. I perceive there is a considerable widening of the breakwater towards the root ?—Yes.

27,541. What does that represent, the yellowish-brown portion which is so widened ?—That represents the extreme line of railway for bringing the materials from the quarries to the south pier.

27,542. Then that dark yellowish-brown mass has reference to the railway, and not to the accumulation of sand ?—No, nothing of the kind ; it is all artificial.

27,543. Then this part that runs out to the extent of the base, marked September 1858, in various colours—brown and yellowish brown, may I ask why the change of colour takes place at that particular spot ?—Merely to show more distinctly the position of the works in September 1858.

27,544. It was carried up to that point at that date, then ?—Yes.

27,545. Will you be good enough to go a little further out to where the yellow and red form a junction. The yellowish brown runs up to the Head and the blackish brown to the pier head ?—And beyond it.

27,546. What project is that ?—The yellow ?

27,547. Yes ?—The yellow is the plan which I have referred to, and which I submitted to the Admiralty, —the plan which I believe the Commissioners of Newcastle unanimously approved, and which I believe also the Admiralty approved,—the plan which I presume will be carried out, and which I have as yet acted upon, only that, which I have also stated in my report, the Admiralty, for reasons best known to themselves, objected to go beyond a certain point marked in the plan.

27,548. And it is that point to which your project was then directed ?—The yellow was the project then.

27,549. Then, having arrived only at that point marked September 1858, am I to understand that from that point you give a change of direction and take the red course ?—Yes.

27,550. And that goes out so as to give between 30 feet and 40 feet depth of water ?—Yes, that is the plan proposed, should the Commissioners be assisted with the means of carrying it into effect ; in other words, by a grant of public money.

27,551. This, then, is the first time that that project comes before the public, is it not ?—Yes.

27,552. The project before the Admiralty was the shorter project ?—Yes, the yellow plan.

27,553. Will you be good enough to tell us what difference there would be in the expense if the change of projects you contemplate were effected ?—I shall answer that question by a repetition of what is stated in my report,—the difference would be 400,000*l.*

27,554. That is the total cost would be 800,000*l.* instead of of 400,000*l.* ?—Yes.

27,555. And the mode of construction you prefer to adopt is the same ?—Yes.

27,556. The same mode of construction as in the earlier part ?—I answer yes, not, however committing myself to it in all respects. If the gallant General has

seen the works, he will have observed that the south pier is made with a long slope.

27,557. Yes, I have seen it.—That I may call the core of the work ; but the intention was, and is, to raise on that.

27,558. To raise on that ?—So as to make it, as regards the upper part, the same as the north pier.

27,559. Now, I perceive that you carry both piers out to nearly the same distance, the one being in 37 feet water, the other nearer to 40 feet water ; are you of opinion that if you were to construct the south pier up to that point, between 30 feet and 40 feet depth of water, leaving the north pier as it was contemplated to be in the first estimate, it would not answer all purposes ?—I think not.

27,560. Has not an opinion been given by a very competent officer that the north pier might be dispensed with ?—Really, so many opinions have been given that I do not remember. Will the gallant General state to whom he refers as having given that opinion ? I suppose it is no secret.

(*Mr. Lindsay.*) It was given publicly.

(*Capt. Sulivan.*) It is Captain Washington. He is alluded to in Mr. Walker's report by name.

(*Capt. Washington.*) What am I supposed to have said ?

(*Mr. Coode.*) That a shorter pier would be sufficient.

(*Chairman.*) You had better read it.

(*Capt. Sulivan.*) I find in the report of Mr. Walker the following paragraph :—" That the operation of a " south pier, even if but a short one, which Captain " Washington and other naval gentlemen think likely " to be sufficient, would stop a large portion of the " sand that is now carried into the harbour during " the flood tide by the ' wheel,' so that there would " be less sand to go out again on the ebb."

(*Capt. Washington.*) That opinion only refers to the length of the south pier.

(*Chairman.*) The Commissioners, at the commencement of their proceedings, made it a rule that no member of the Commission, while examining a witness, should be interrupted, but that any explanation which any other member might desire to give in reference to such examination should be given subsequently.

(*Capt. Washington.*) But I cannot allow any Commissioner to state that I said what I never did say, whether he be examining a witness or not.

The Chairman directed the room to be cleared.

After a short delay the doors were re-opened, and Mr. Walker's examination was resumed.

27,561. (*Sir F. Smith.*) It happens to be a fact, that an opinion given to us by a man of high position is to the effect in which I understand this paragraph of yours. But I understand from my brother Commissioner, Captain Washington, that it was not intended by him in that sense in which I read the paragraph. Therefore we must suppose that I read it erroneously. I did not, however, read it carelessly ; and, remembering what had been said by another witness, I fancied that Captain Washington had agreed with that witness as to the mode in which the Tyne should be dealt with. An opinion has been given to us that the south pier, as projected, is most valuable and will be most valuable, but that, looking to the effect of the projection at the point, the north pier may be dispensed with ; and I read that paragraph of yours as meaning that a short south pier would suffice, according to the opinion so supposed to have been given by Captain Washington, that the north pier might be dispensed with. Am I to understand then, now, that it was never your intention to dispense with the north pier ?—I never intended that, certainly.

27,562. And you never understood that to be Captain Washington's view ?—I cannot answer that question so distinctly. If Captain Washington says that I am wrong and that he never intended it, I shall be satisfied.

27,563. Did you imagine that Captain Washington intended to say that he would dispense with the north pier ?—I think the substance of the paragraph, and the impression upon my mind at the time, was, that Captain Washington meant to say that the south pier would be sufficient. That appears to have been my impression when I wrote the paragraph ; whether I was mistaken or not is another thing.

27,564. It appears to have been a mistake. Now do you, on further considering the matter, think that the north pier is required to be carried out beyond its present length ?—That is my decided opinion.

27,565. Beyond its length according to the present plan ?—Beyond the length projected for the expenditure of 400,000*l.*

27,566. Do you think it would be necessary to make the additional portion which is coloured red on this plan ?—That would depend upon the objects that are sought to be attained. If I were to look upon it for its greatest capability for forming a harbour of refuge, it is required ; but if I am to look upon it only for the purpose of improving the bar, and allowing ships to enter with greater facility and greater safety than they do now, I should say not.

27,567. I believe you propose to complete the construction in the way in which you have commenced it, as a general principle ?—Yes.

27,568. The mode of construction will be the same ?—I saw no reason for altering that mode, or for altering the plan, until I was asked to accommodate the Tyne for a harbour of refuge. This, which I hand in, is a section of the mode in which the south pier could be finished if the same mode of constructing the base of it were continued which we are following at present, that is, the slope.

27,569. This section will not apply to both piers ?—Only to the south pier.

27,570. Have you any section of the north pier ?—No ; there is one in my report.

27,571. Only as to the south pier. In the south pier the hearting or core is entirely of rubble, is it not ?—It is.

27,572. And to be pitched, with what material ?—To be pitched with large limestone, which is found in the rocks adjoining.

27,573. And this, I suppose, will be used in large blocks ?—It will.

27,574. Will the whole of this pitching be above the low-water line ?—No.

27,575. Up to what distance will it be above the low-water line ; how far out from the shore ?—As the gallant General will see by the plan,—out to the point where the low-water line is shown upon the chart. We are beyond that now considerably.

27,576. Then by what process is the pitching put on ; is it by the diving bell ?—No ; we put the rough rubble stone in to form its natural slope until we get to the level of low water, and then the work of constructing commences. I was trying to think of a parallel case, and the pier at Jersey occurred to my mind ; but that is not the same. The Duke of Buccleuch's harbour at Granton, near Edinburgh, is nearer, but on a smaller scale.

27,577. The pitching is all set by hand?—Yes, with the aid of cranes. May I take the liberty of asking if any of the Commissioners have seen the work at the south pier ?

(*Capt. Vetch.*) I have seen it.

(*Witness.*) I think it is substantial.

27,578. (*Sir F. Smith.*) It is very substantial. Is it set without the diving bell ?—Yes.

27,579. How do you ensure the accuracy of the joints below the low-water mark ?—We do not try to ensure accuracy in the joints below low-water mark. The rubble is thrown with a long slope to find its own shape, then at low water we level the surface of the mass, and upon that begin to build.

27,580. Here, in this drawing, is observed a carefully laid pitching on the top of the rubble mass. I want to know as to that carefully laid pitching, how is it applied ? The pitching you refer to is all above low-water mark, I think, is it not ?—Yes, it is.

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27,581. In point of fact, then, if you were to go out to deeper water you would still not have the pitching below the low-water line?—No, we should not; that is the intention. The mass of the Admiralty pier at Jersey is constructed in the same way. We began building there at the level of low water, and the plan has answered completely.

27,582. Then I may take it, judging from the report, that it is your opinion the bar will be removed out into very much deeper water by the plan you propose?—Whether it be by the one plan or the other, my opinion is that the bar will be removed out.

27,583. Will it be altogether removed by going to the utmost extremity you propose with the works?—I do not pledge myself to that. I will not pledge myself that there may not be some bar, but if there is it will be much lower than it is at present, and so low that it will form no impediment or inconvenience at the entrance.

27,584. Do you think it would be any advantage to change the form which you have given to the external parts in red, and just reverse them, so as to make it bell-mouthed externally?—If it were made bell-mouthed externally, you would have, instead of a contracting mouth to shut out the seas, an open mouth to admit them.

27,585. But might you not give it that form, and still keep it more contracted, so as to exclude the seas inside, and at the same time give it a wider mouth externally?—It might be done, but I should doubt the policy of doing it.

27,586. You doubt the policy?—Yes.

27,587. But do you not imagine if you did it that the quantity of silt and other matter ejected by the ebb tide would go over a large spread of surface, and therefore not rise so high?—If the gallant General supposes that there will be such matter ejected by the ebb tide he is right in his conclusion; but he will also see that the opening or discharge would be the cause of forming a bar at the mouth of the harbour; and he must also imagine, to support his theory, that there is such matter as he refers to ejected. But my hope is, and my opinion is, that if these works are completed, we shall be in water in which there is no such matter to eject; that we shall exclude the sand on both sides, and by going out into deep water exclude the drift also.

27,588. I think you say in your report that the bar is formed where the waters, west to east and south to north, meet and balance, and it would be moved out beyond the piers if this balancing point were moved by increasing the current between them?—It is quite evident wherever the forces cease to act in opposition to each other there must be a deposit.

27,589. You admit that to be the fact?—That is to say, supposing there is matter to deposit.

27,590. Then you are of opinion that there would be no matter to deposit coming down from the river?—There would be some, but not in such quantities as to be injurious here, or to cause a deposit.

27,591. There would be no quantity?—The gallant General must refer to the quantity of matter brought down the river?

27,592. Yes?—The quantity of that is very small comparatively, very light, and would be carried out, I think, to the sea.

27,593. If that is the case, does it not follow that the bar now formed must have been formed, not by various deposits coming down the river, but by the sand thrown in from the sea?—I think so; I think it is more from that cause.

27,594. There cannot be less to come down if you project the pier further out?—Certainly not.

27,595. Whatever there is now, there must be then?—You have just hit on that which is the very point; the great evil at Newcastle at present is the bar, and the great object is to get it removed.

27,596. You state in the report how that bar is to be avoided, how it is to be got rid of?—If any improvement can be made in the lines of these piers, I should be glad to have the advantage of any suggestions for that purpose. As when I first undertook the duty I consulted all opinions upon the subject, I shall now be glad to profit by the opinions of the members of this Commission.

27,597. The question of estimate in detail you are not prepared with, I suppose?—I can give you a detailed estimate, if you desire it.

27,598. I think it is desirable we should have it?—If that is done, I would suggest that it would be most desirable the estimate should be given as a private document, and that it should not be made public, seeing how the publication of such documents would affect contracts and other things hereafter.

27,599. (*Sir F. Smith.*) There can be no objection to that. It is for the use of the Commissioners only?—I shall be happy to give any information you may wish on these points for the use of the Commissioners.

27,600. You will then so understand it?—Then I will submit detailed estimates, which I understand shall be considered confidential and private.

The Commissioners held a short consultation.

(*Chairman.*) You will be informed later, Mr. Walker, whether we shall find it consistent with our usual mode of procedure to accept an estimate as a private document or not. Hitherto all such documents have been received publicly as part of the evidence.

(*Sir F. Smith.*) In the meanwhile Mr. Walker need not prepare it.

(*Chairman.*) You will understand, Mr. Walker, that all the estimates that hitherto have been given in to us have been given as public documents and incorporated with the proceedings, and therefore, before complying with your request, that yours should be considered private, I should like to have the opportunity of considering the question with my brother Commissioners. We will acquaint you with our decision afterwards; and, in the meanwhile, we will not ask you to prepare it.

(*Witness.*) I need not tell you that it is already prepared, for it is the basis of these projects.

27,601. (*Sir F. Smith.*) Have you ever had a project for the construction of a breakwater such as exists at Blyth?—I think there is no project for a breakwater that has not at some time or other been brought before me, but I do not remember what the Blyth breakwater is; how it is constructed.

27,602. By means of piling, and sheeting within the piling, and filling in with rubble. Some years ago Mr. Rastrick, you may remember, proposed to go across Morecombe Bay in that manner.—Perhaps no piers are more common than piers of that construction. The old piers of Dover Harbour were constructed in that way centuries back.

27,603. And so, I believe, are those at Boulogne and Calais. They are constructed much in the same way, are they not?—Yes, I believe so.

27,604. You do not think we should effect any great saving by adopting that system here?—Certainly not; quite the reverse.

27,605. You do not think there would be any difficulty in dealing with piles 40 or 50 feet long exposed to the beat of the sea?—No, we are driving longer piles than that at the Admiralty pier at Dover; but that would be a much more expensive plan than the one we propose to adopt, and would be much less permanent, a timber structure being much less durable than stone.

27,606. Did you drive these piles at Dover before you put in the hearting or afterwards; is it a mere stage for the work?—A stage for the work.

27,607. Then is not that a parallel case?—You will hardly find two parallel cases, as every structure must depend, as to the system of construction, upon the locality and circumstances of the place for which it is required.

27,608. Do you know the eastern coast where the Tyne runs into the ocean?—Yes, I do pretty well. I have had a good deal to do with many of the harbours there.

27,609. You are aware that there is a movement of the sand towards the north ?—Yes.

27,610. And none toward the Tees mouth from the north ?—I do not know if there is none; perhaps there is not so much as there is the other way.

27,611. Is there any ?—Well, I cannot say there is none.

27,612. Well, if there is, it is very slight in comparison with the other way, is it not ?—Very slight, if you please.

27,613. And do you think that a great period of time must elapse before the silting of the sand from the south to the south pier would tend to get round the head of that pier ?—I think it would tend to do so from the commencement, but I think, also, it would be a very long time before it touched the point, and after that I expect that the current and the force of the water passing through, and the obstruction caused by the piers themselves, would increase the tide and carry out the sand beyond the opening.

27,614. Might not the sand be prevented from entering the harbour mouth by shortening the north pier a little, so that the set of the tide would carry what was at the south pier beyond the north ?—Either I do not understand your question, or it would have quite a contrary effect.

27,615. You say that in the course of time the sand might come round the end of the south pier ?—Yes.

27,616. If it did, and the wash of the flood tide set in, of course the sand would come into the harbour's mouth, the north pier being at its extended length; but if, on the contrary, the north pier were shortened, the set of the south tide might send the whole beyond the entrance altogether ?—I fear, under those circumstances, with a flood tide the tendency would be to form an eddy inside and bring the sand in.

27,617. What amount of acreage do you get in your extreme harbour ? I mean, what is the increased capacity by your larger scheme ?—The quantity is given in acres in the report, at all the different depths.

27,618. Have you got the figures before you ?—I think the report does not give the increase of the new plan over the old ?—I think it does nearly so; it gives it in round numbers.

27,619. It does not separate them. I want to know precisely the increase of the area resulting from the increase of cost ?—I believe the increase of area is stated generally in the report.

27,620. But that is only the increase ?—Yes.

27,621. And not the total ?—No, not the total.

27,622. What is the increase to be got by your present plan ? I want to know what is the increase of area that you obtain by your extended plan ?—In the first case, I have data to go from; I have the present plan. You ask me the difference between the old plan and the new one.

27,623. I want to know what increase you get by the existing plan ?—Which I have answered in the report.

27,624. And how much by the enlarged plan ? How much do you get for this additional outlay of 400,000*l.* ?—That is a difficult question to answer. I do not know how far to measure to give you the acreage, and I have no data to go back to. I can give you the increase between the first plan and the second; but if I am to give you the increase upon the first plan I must have some data to start from.

27,625. That would be the state of things with which you commenced ?—Exactly so; the state of things with which I commenced. I can give you the area of the whole bay up to low water.

27,626. Well, what did the first plan contemplate that was to cost 400,000*l.*; did you contemplate any refuge by that first plan ?—Yes.

27,627. What is that acreage of refuge ? I think I had better take it up to low water; because, if I apprehend your scheme correctly, it is that by an increased size you get an increased area of refuge, and that you get rid of the bar ?—Yes, those are the two points.

27,628. Yes; but I want to know what are the advantages we are to obtain for this outlay of 400,000*l.* The riddance of the bar is one thing, the area is another ?—You ask me what you are to get for the 400,000*l.* To save time, I should answer you that I have given everything that I have stated in the report. I cannot make it fuller. You get the removal of the bar, and a large space that is enclosed within the piers. At low water there is not a very large space, but it is of considerable depth by the first plan.

27,629. Yes, I wanted to know what that space was; I wanted to know the area each plan gave; but if it is difficult to give it, I will not ask you any further ?—I cannot give it you so distinctly as it is given in the report.

27,630. (*Mr. Lindsay.*) The main points, after all, are the bar, the depth of water, and the maintenance of that depth, and as to these I will trouble you with one or two questions. It was stated to us at Shields, in the evidence of the harbour-master, who had sounded it since the piers had been commenced, that there had been a depth of water—an increase of depth—on the bar of two feet; do you think that the effect of the piers being carried out, as they are now, in a very limited degree, would be to increase the depth of the water to that extent ?—I had not calculated upon an increase of depth to that extent in so short a length as the piers are now carried out, but understanding that that effect was produced, I began to look if the piers were the cause of it. And it is an odd fact that the set of the Sparrow Hawk—do you know it ?

27,631. Yes.—It is an odd fact that there is a harmony and consistency between the sand of the Sparrow Hawk and the bar, so that when the sand is high at the Sparrow Hawk the bar is low, and when the Sparrow Hawk is low the sand at the bar is high. That is a fact that has engaged my attention, for it is well known that these two sands influence each other. I consider that what we have done here in forming the base of the pier is to form in some degree a permanent Sparrow Hawk. I do not know if you understand me ?

27,632. I understand you perfectly well.—And that the action of the tide is prevented by that from interfering with the water of the harbour to the same extent that it did, and therefore the effect is, I think, accounted for; although I confess that I did not expect that we should begin to improve the bar so soon; but I believe that to be the cause.

27,633. Then have you not in the course of your examination been able to find other causes which have tended to the deepening of the bar ?—I do not remember; examination of what ?

27,634. The examination of which you have spoken. You stated that when you heard that the bar was deeper by two feet, you were led to make an examination; did you in the course of that examination find any other cause for the deepening of the water at the bar, besides the carrying out of this pier ?—I meant a mental examination.

27,635. Just so, an inquiry in your own mind ?—We have also, as you have seen, carried out the south pier to a considerable length; that has, perhaps, had some effect in shutting off the sand, but not to the same extent that the north pier has done. The Herd Sand is lowering very considerably already.

27,636. I think you stated in evidence, in answer to Sir Frederic Smith, that in your opinion the formation of the bar was caused more by the sand flowing in from along the coast than by any sediment coming down the river ?—Yes, I said so.

27,637. Consequently the carrying out of your south pier will entirely shut out a very large portion of the sand which now tends to create the formation of the bar ?—Yes, presuming that it does so.

27,638. And from what you stated, it appears also that whenever the sand plays between the bar and

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the Sparrow Hawk, another sand—[Yes.]—by carrying out the north pier you prevent that constant playing that has hitherto been going on, and by means of this north pier you have actually obtained, either by carrying on the piers to the limited extent they now are, a greater depth of water on the bar ?—Yes.

27,639. In addition to which the co-operation of the tide at the bar is prevented, and the action of the tide over the set of the bar is less interrupted than it was before you began these works ?—Yes.

27,640. Now it has been stated—it is in evidence—that to whatever extent piers are carried out the bar will follow the piers. I notice in the chart before me a bar called the 9-feet bar, in which there is one patch marked 5½ feet. But take the 9-feet, is it the case that the 9-feet bar would be carried out and form a 9-feet bar at that point where we have now got the piers,—those piers where 37 feet of water is marked ; what is your opinion of that ?—That must be a mistake.

27,641. It has been stated so in evidence ; what is your opinion upon the point ?—I think there must be some mistake in the evidence.

27,642. I heard it so stated ; but it appeared to me so extraordinary a statement that I want to have your opinion upon it ?—Well, I think it would not.

27,643. You think it would not form a new 9-feet bar there ?—Certainly not.

27,644. Decidedly not ?—Yes, decidedly not.

27,645. Do you think that the carrying out of these piers would have a tendency upon the whole to give less water within a certain limit, or more water in the course of time ?—More water at the entrance, certainly.

27,646. But within the area altogether ?—It would give more area altogether. It would give a greater depth of water, and by giving more depth it would afford a greater area. And I think in the course of time the Herd Sand would go away altogether.

27,647. Then instead of these piers causing a silting up within the area, as has been suggested, you think the tendency would be quite the reverse ?—Yes, I dare say it would.

27,648. That is your opinion, that the tendency would be quite the reverse ?—Yes.

27,649. Decidedly so ?—Decidedly so. It would have been very wrong in me to have adopted these piers if I had had any reason to doubt it. In the first steps I took in the matter—in the first consultation I had with the Tyne Commissioners on the subject—or at any other time—such an idea was never broached, and it is altogether out of the question.

27,650. Then taking it in a more reasonable way than it appears to have been put by certain gentlemen to us, do you think you will be able to maintain the depth of water at the end of these piers, as stated, 37 feet, 36 feet, and 39 feet ?—No, I will not promise that. I will not promise always to keep that depth. I have already said in answer to the gallant General that I think there may at the entrance, near where the piers are, be something of a bar, but that it will be always so low as not to produce any inconvenience. I have had a good deal to do with these harbour questions, and I have known numbers of cases where the bar has been completely removed. We have no bar now at Dover ; we have no bar at Great Yarmouth.

27,651. In the plans laid down in the report there is marked at the entrance, a very little outside of the pier, a depth of 39 feet ; do you think that in the course of 20 years that 39 feet may be reduced to 30 ?—I think it may, or to less.

27,652. Is there any chance of its being reduced to 25 feet in that time ?—I cannot say there is no chance.

27,653. No, nor probably in 50 years ?—50 years is a long while.

27,654. It is ; but these are questions of importance which I want to get answered. What is your opinion about 50 years ?—You must take off a few feet for 50 years, if you please. It is not a pleasant thing to be confined to figures in this way. The honourable member will see that when the piers are carried out the current of tide in front will be stronger, and the probability is that the depth, except just outside the piers, will not be decreased at all. Upon the whole I think it will be increased. There is no reason why it should not. But I expect that a small bar will be formed exactly outside the piers.

27,655. Do I understand you to say that in 20 years at this place, now marked 39 feet, the depth will probably be reduced to 30 feet ?—Yes, probably so. But will you allow me to add, after a moment's consideration, that at the end of 20 or 25 years it will have acquired a regimen, and have arrived at that state at which it will not decrease beyond.

27,656. Then you think that, although in the course of 20 or 25 years the depth may decrease to 30 feet, the tendency after that will be not to decrease further ?—Yes, that is my opinion ; at the same time not wishing to confine myself to the 30 feet.

27,657. Do you know any instance—I ask the question for information, being ignorant of engineering points myself—do you know any instance in which a bar has been formed under such circumstances, or is the tendency of carrying out piers, as a general rule, to carry the bar out with them ?—The general tendency is to carry the bar out with them, and to lower the bar at the end of the piers. But if you will allow me the general tendency of contracting the water within the piers, and letting it at the end of the piers go into an enlarged space is to increase the velocity within the piers, and when that velocity meets the force of the water outside, and is checked to form a deposit, if there be matter to deposit ; in other words, carrying out the piers is carrying out the bar.

27,658. Carrying out the piers is carrying out the bar, you say ; carrying out the bar ?—Yes, but not carrying out the bar to the same level as it was inside of the piers.

27,659. That is just the explanation I want, because many persons who will read the report are ignorant, as I am myself, of engineering matters ; what I was anxious to know was, what in your opinion the effect of time in decreasing the depth would be ?—I think I have answered that question in what I have said as to the depth at the end of 20 years. I look upon the Tyne generally, as regards life, as one of the most, perhaps the most, important rivers in this kingdom. I feel highly honoured by having charge of these works, which I do expect will be successful, and more successful if we are allowed to carry them out to the greater extent.

27,660. Now in this bar on the plan nine feet is marked, and there is one patch here marked 5½ feet ; what depth do you expect to have there after you have completed these piers upon the extended plan ; have you formed any idea ?—I have formed an opinion, I hope, and I have said, I think in the last report, that I expect to have 18 feet of water then.

27,661. Eighteen feet at low water ?—Yes, at low water.

27,662. And you expect to carry 18 feet of water all the way down from Peggy's Hole, down at low water ?—We expect to maintain that depth of 18 feet at spring tides all the way out, and increasing downward, the minimum being 18 feet.

27,663. So that the carrying out of these piers will give a depth at the entrance at no time less than 30 feet at the outer pier ?—Yes.

27,664. Will give you a channel of not less than 18 feet at low water spring tides where it is now bar at 5½ feet ; that is your opinion ?—That is my opinion. But I have said, and repeat, that it must be assisted at places by dredging. In that very place to which the honourable member has referred it must be dredged. I take it that the bar at the 5½-feet point is rocky, and must be assisted. And it is but fair to the hydrographer now in the room to say, that he

pressed very much to have that done, and I know that the Commissioners were very desirous to have it done; and a great deal has been done, but not so completely as it might have been.

27,665. If that be so, you will have by the extension of the piers a harbour which will be an efficient harbour of refuge at all times of the tide, sufficient for the large majority of vessels frequenting the north coast of England?—Yes, at all times of the tide.

27,666. And a harbour whereby those vessels at low water spring tides will be able not merely to enter within the limits of the piers, but will be able to run up right opposite to Shields, and above it, and find good shelter?—Yes.

27,667. And abundance of room to move?—Yes; but the abundance of room to move must depend upon the number of ships there.

27,668. I say abundance of room nevertheless, when you consider the large space there is. There is a large space there?—Yes; but will you allow me upon this point to refer to a paragraph in my report? "Mr. Wake, the harbour-master, states." But I suppose this need not be taken down?

27,669. Oh yes. I want it in evidence, and therefore I am asking your opinion as to the abundance of room?—I suppose it is the intention of the Commissioners to print my report?

27,670. But what I want is, to get down your answer upon the point in reply to my question on the minutes of evidence?—Then I will read the passage. Mr. Wake, the harbour-master, states in a letter now before me, "that the harbour of the Tyne above the "Narrows, with the additional space afforded by the "Northumberland Docks and the Jarrow Docks, is "capable of containing 2,000 sail of vessels, and that "before the opening of any dock in the Tyne he has "known 1,250 sail of vessels lying at one time in the "river, many of them being vessels that have sought "shelter in the Tyne from a storm."

27,671. Then you are aware, Mr. Walker, that there is increased dock accommodation going on in the Tyne?—Yes, I am aware of it.

27,672. And you will recollect that many of the ships which are now moored in the river will, when that accommodation is completed, be removed to these docks?—No doubt.

27,673. Consequently a great deal more space will be available for those vessels seeking shelter?—Unless the trade increases to a greater extent than the docks can accommodate.

27,674. Now, as you are aware, there is another bar called the Bar, which is marked 6½ feet and 7 feet. Do I understand your answer as to the depth to apply to that bar also; that you will have 18 feet of water there?—Yes, it applies to that also.

27,675. Then would you obtain the 18 feet at this point by dredging, or by the river going out?—I think the scour would do it, with but little assistance by dredging.

27,676. And you think it would not be necessary to use the dredge in any portion of the lower part of the harbour?—I think not much.

(*Chairman.*) The report only reached the Commissioners yesterday afternoon, and therefore they have not been able to master it.

(*Mr. Clayton.*) We have had it two or three days in the north.

(*Witness.*) It is brought up from Newcastle to-day.

(*Chairman.*) I mention the circumstance that you may understand that if the Commissioners are occasionally going over the ground traversed in the report, it arises from that report only having come to hand late yesterday afternoon. Although the manuscript report was read to the Commissioners just before you came in, for the express purpose of endeavouring to avoid going over the same ground, you will observe that under the circumstances it is not altogether possible to avoid doing so in some degree.

(*Witness.*) Generally, matters are more correctly stated in a report than in a *vivâ voce* examination.

27,677. (*Capt. Washington.*) Reference has been made to a plan that I gave to you in the year 1853 for the improvement of the Tyne?—Yes, reference was made to the evidence you gave.

27,678. You have that plan before you at this moment?—I have.

27,679. It appears from that that the length of the pier proposed to be constructed on the north side seaward has 930 feet, and that at the end of that a further length of 100 feet is proposed in the shape of a T head?—Yes, I dare say you are correct in the dimensions.

27,680. And on the south side that I proposed a groin or pier 1,900 feet in length?—Yes, coming out to near low water.

27,681. Going out to near low water?—Yes, over the Herd Sand.

27,682. At the time the evidence was given before you, had you the whole subject of a harbour of refuge in the Tyne under consideration, or merely that of the improvement of the entrance?—I cannot say that the question of a harbour of refuge was entirely before me, but rather the improvement of the entrance and the general accommodation to the shipping in the Tyne, but not certainly as a general harbour of refuge.

27,683. Mostly, like the large scheme now under consideration?—Certainly not.

27,684. Do you happen to remember what depth you contemplated obtaining at that time by the then proposed improvement?—No; I dare say I did not commit myself to any depth. If I did, it is in the report; but I do not like to commit myself to dimensions, unless I am called upon to do so.

27,685. You are aware that the plan that I laid before you had no reference to a harbour of refuge, but simply to a mode of deepening the harbour three or four feet?—Yes, that is evident from the plan.

27,686. To return to your large scheme, may I ask if a part of your plan is to dredge the river upwards as high as Newcastle Bridge?—It is not part of the estimate, nor any part that I have at all referred to, but I think it would be a very desirable thing to do it, and I believe the Commissioners are at work at it. I think in numbers of harbours that I could name, quite as much good has been done by regulating and deepening the river as by works erected at its mouth.

27,687. I observe you say in your report, "the "scouring effect of a large backwater for clearing an "entrance passage is another advantage." Do you consider that it would be desirable to carry the tide up, and to free the river Tyne from any obstruction which would prevent its upward flow?—I do.

27,688. And to allow it to reach its utmost limit?—Yes.

27,689. Do you consider it would be desirable to remove the obstruction of the old Town Bridge, if it could be done without great inconvenience to the population dwelling on the banks of the Tyne?—Yes, I think it would; and undoubtedly it could be done without any inconvenience to the inhabitants on the banks of the Tyne, by substituting a modern bridge with less obstruction in the piers than the present one.

27,690. Do you think that would be a great benefit to the navigation of the river?—It would be a benefit.

27,691. Are you aware that the present piers and starlings occupy 200 feet of the breadth of the Tyne opposite Newcastle, or about two-fifths of the whole space?—I dare say that is the case, but I do not know it of my own knowledge.

27,692. You think it desirable that these obstructions should be removed, and a more open approach substituted?—I think it would be very desirable every way. I ought to say that I am not engineer for the Tyne, but only to the piers, and I do not remember that I have ever been consulted with regard to the general improvement of the Tyne.

BIBLIOTECA DEL C.S.A.M.

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Mr. J. Walker.

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Capt. Washington.

27,693. I would go on to ask, do you consider that the Tyne as a tidal river has ever had as full engineering skill bestowed upon it as might have been in case abundance of funds had been available?—I am not aware of the fact, one way or the other.

27,694. You will understand that the object of my question is not to throw blame on any individual connected with the Tyne; it is only to ascertain whether you consider that any tidal river in this country has ever been treated with full engineering skill; any river with which you are acquainted?—I think that would be too sweeping a denunciation. I believe that rivers generally have been treated properly, so far as the funds would go, and I have no reason to suppose there has been anything otherwise. I have no reason to suppose that in the case of the Tyne the funds of the Commissioners have not been expended properly. I consider Mr. Brooks their engineer to be a very clever man.

27,695. What I wish is to get your opinion, whether you think that improving the upper part of the river would not be very beneficial towards removing the bar?—Yes, I think so. But, you see, that never having been consulted, and never having looked really at the question professionally, my opinion is not half so good as your own. But with regard to harbours, there is one which the honourable Member for Tynemouth knows, and to which I have been consulting engineer for a great many years, namely, the Clyde. I cannot say the Commissioners of that river have not improved it, as far as the means at their command have enabled them to do so.

27,696. I am glad you have mentioned that. A great deal of dredging has been done there, has it not?—Yes, and a great deal is being done now.

27,697. It was stated in evidence, a day or two ago, that at Glasgow, owing to the establishment of contracting dykes in the river Clyde, there had been a loss of $2\frac{1}{2}$ feet in the rise of the tide. Is that a fact within your own knowledge?—I think I may say it is a fact within my own knowledge that that is not so; there is no loss of rise of tide at Glasgow, but the reverse. It is possible that at one time, when, in order to get a depth of water, the trustees, 60 or 70 years ago, under the direction of Mr. Gouldburn, contracted the width of the Clyde, they may have prevented the water getting up to the full height by the kind of wire drawing that took place at that time, owing to the narrowness; but what we have been doing for the last ten years has been to widen the river and make a nearly parallel channel of water from Glasgow downwards, for some miles, so that any restriction of the passage of water that took place formerly is in the way of being entirely removed, and the water now rises higher at Glasgow than it does at port Glasgow, and will do so more and more as we remove obstructions. At high water the river is one foot higher at Glasgow than it is at Port Glasgow. There is still a fall at low water.

27,698. The whole rise of the tide at Glasgow is as great as at Greenock at the mouth of the river?—Nearly so.

27,699. You consider that a desirable state of things to exist in a river?—Yes.

27,700. Do you think that would assist in keeping down a bar at the mouth of the Clyde?—I do not know that they have a bar.

27,701. Towards keeping the river deep?— No doubt.

27,702. Can you tell me the difference between the rise of the tide at Shields bar and its rise at Newcastle Quay?—I cannot at this moment, but it is recorded.

27,703. You are probably aware that the rise is 15 feet at Shields bar, and 10 feet at Newcastle Quay, so that there is a loss of five feet in the length of the river, which is about 10 miles. Is that occasioned by the water that goes down the river being kept up, or by the flood tide being kept down?—I am not prepared to say which. I only know the fact that it is so. Mr. Messent, the resident engineer, says that it is from the water being kept up. That could be very materially improved by dredging.

27,704. Would it not, as a consequence of that state of things, be most desirable to carry the dredging to Newcastle Bridge?—No doubt it would, and perhaps it would be necessary to renew the bridge for the purpose, because many of those bridges are not founded sufficiently low to enable you to deepen the river.

27,705. You are aware that the tide flows 10 miles above Newcastle Bridge?—From 8 to 10 miles.

27,706. You consider it desirable to encourage the tide upwards as much as possible?—Yes.

27,707. You mentioned that in some harbours which you have treated—Dover and Yarmouth, for instance—there is no longer any bar. Can you say to what chiefly you attribute that improvement?—I think I have stated that the chief cause of the improvement at Yarmouth is the regulation, improvement, and deepening of the river. At Dover the removal of the bar was caused, I think, entirely by the Admiralty piers, which acts as a groin, and keeps the shingle from coming from the westward in front of the harbour. The late Lord Warden, the Duke of Wellington, took a great interest in that matter, and was anxious that the pier should be made; but he was afraid that the valuable buildings to the eastward which front the harbour would suffer by preventing shingle going to them. We have not only got entirely rid of the bar, but we have plenty of shingle, in front of the harbour to protect them.

27,708. Considering that in this country the greater part of our harbours are at the entrance to tidal rivers, do you think it desirable that every effort should be made, both by the expenditure of money and by the exercise of engineering skill, to try to improve these rivers to the utmost?—Yes; that is my decided opinion. I consider that a harbour of refuge at the mouth of a commercial port, such as the Tyne is, of very much more value than if there was no communication internally with a harbour of commerce, because it is almost unnecessary to say, that when a ship comes into a harbour of the former class, she is in the charge of people who take care that she is attended to, and goes out as soon as possible. I have heard very offensive terms applied by a very large shipowner to harbours of refuge which were not in connection with a port of commerce; that is to say, that captains got into them, and you could not get them out again.

27,709. Do you know any river in which that experiment could be tried on a better scale or with a fairer opportunity of beneficial results than in the river Tyne?—I do not remember anywhere the advantage would be so great; because, as I have said already, it is a river of the very first importance in the country. The Thames and the Mersey, both of which I know very well, have obstructions at the mouth. The Thames has shoals at the entrance and the Mersey has a bar; but the loss of life and property is, I believe, much greater at the entrance of the Tyne than it is at the entrance of either the Mersey or the Thames.

27,710. It has repeatedly been given in evidence to us along the coast that the sailors will run for the ports at which the ships are owned; do you believe that to be the case?—Yes. I suppose that is a matter of fact that must be known to every gentleman. It is quite evident that owners must desire that.

27,711. And that, even if harbours of refuge were placed along the coast, and the masters of vessels thought there was a chance of getting into their own ports, they would run the risk of being enabled to enter them rather than run at once for a harbour of refuge?—Yes.

27,712. You believe that would be the case?—I do.

27,713. Do you consider that an additional reason for attempting to improve the Tyne to the very utmost?—Yes. I think those owners would receive

them back to their own ports with welcome, whereas if they heard that they were in any other harbour, they would find fault with them.

27,714. And it is your belief that the Tyne may be so improved as to make it, in a limited sense, a harbour of refuge ?—Yes. As Mr. Lindsay says, the sea area is so great, both within the piers and above them, that it becomes a very large harbour of refuge, if I am correct in the opinion I have formed as to the effect of those piers.

27,715. (*Capt. Sulivan.*) With reference to your last answer, I will put a question that was put to the engineer of the Tyne. Do you know any instance in which two piers thrown out on each side of the entrance of a tidal river have permanently increased the depth of water at the bar ?—Yes.

27,716. Will you mention an instance ?—I may mention Yarmouth and Newhaven.

27,717. I understood you to say that you considered that Yarmouth Harbour had been deepened by the arrangement inside ?—I said the channel.

27,718. Then that would not be a case in point to prove that piers alone thrown out will deepen a river ?—That alone would not do it.

27,719. Do you know any case in which piers alone outside of a tidal river on each side have had the effect of permanently improving the depth over the bar ?—I have mentioned Newhaven.

27,720. At Dover, I think you say the bar was removed by the travelling shingle being stopped by the pier on one side ?—Yes.

27,721. Suppose there was a south pier only at the Tyne, and that there was no deposit coming from the north, and that the south pier cut off the deposit from the south, would then the effect probably be something similar to what has occurred at Dover ?—No; the Dover pier, or rather the Dover breakwater, is at a distance from the entrance. There are two piers, and the Admiralty pier is a considerable distance away to the westward of both.

27,722. I quite understand what you mean, but I understood you that the effect of the pier to the westward of the harbour has been to stop the travelling matter along the coast, and therefore that it has allowed the current of the harbour to remove the bar, and has prevented any accumulation or silting up ?—In that case it is because all the movement of shingle is from the westward.

27,723. Suppose the movement off the Tyne to be from the southward and not from the northward, might not a single pier to the south have the same effect ?—It would not have the same effect, supposing there was one only, if any sand came the other way. It is evident it would if no sand did so, because there would be none to be shut off from the other side. If none came from the northward there would be none to be shut off by the pier on that side of the harbour, but the harbour would, in the absence of a pier there, be left entirely open to the north-east seas, as it is now, and there would be no extent of quiet water inside the pier.

27,724. I see that; but I was asking you especially with reference to the effect on the removal of the bar, and not with any bearing on the shelter of the entrance. The bar I see is immediately inside your first-designed piers, and the piers are near enough to the bar rather to increase the strength of the tide over it, and narrow the channel, and so cause an extraordinary strength of the tide over the bar ?—Yes.

27,725. Will you tell me how, if the piers are removed further out, you will have any stronger stream over that bar than would be caused by the inner piers ?—You would not as regards the bar, but you must take the depth of water that is on each side of the bar. If the bar were removed, the water could not be lower than you see upon the chart on each side of it.

27,726. I see 18 feet immediately outside the entrance in your first plan, and I presume that the effect immediately between the pier heads would be rather to deepen the water ?—It would rather shallow it outside.

27,727. Then if you had that depth inside by the stream of the tide, and the tide will not be any stronger over the bar by carrying the piers further out, how do you expect to get any deeper water on the bar with the enlarged plan than by the former plan, if there is no deepening by dredging ?—Because I consider that the whole of the space between the present bar and the proposed piers would become an inclined plane. There is nothing in the first plan that should cause the water to be lower than it is marked upon the chart; but if the piers were extended to the action of the tide or into deep water, I think there is no doubt that the depth of 18 feet between the present piers would be increased.

27,728. If you take the part of the bar where, on the chart, the word "bar" is marked, I see there seven or eight feet. You propose by your plan that the current of the river shall sweep away that bar to a greater depth ?—I expect that would be the case with the assistance of dredging.

27,729. Would there be any stronger current to sweep away the bar at that spot with the enlarged plan than would be given by the smaller one ?—Not any greater extent of current, but it would be carried into a greater depth.

27,730. The material carried away would be carried into a greater depth ?—Yes.

27,731. Therefore it would be a longer time before the accumulation at the entrance could become serious ?—I have said that in the course of twenty years I think a regimen would be obtained to meet that, and there would be no increase.

27,732. But though it is carried into a greater depth, how would it deepen the bar to a greater extent at the point where those words are marked upon the chart ?—By the action of the current upon it.

27,733. But if the current is no stronger in that part of the bar, according to the enlarged plan, than it would be with the first plan, how will the larger plan deepen the bar any more than a smaller plan would ?—Simply as I say, because the depth of water at the extended piers is greater than the depth at the inner piers.

27,734. Will you explain how the depth of water at the entrance will cause the stream further in to sweep away a deeper channel ?—I think the tendency would be to form an inclined plane from Shields—from the Narrows—to the outer piers. If the lower end of that distance is 39 feet in depth, and the upper end 18 feet, the tendency will be to form an inclined plane from the one point to the other; but if the outer end be only 18 feet in depth, the tendency would be to form an inclination from only 18 feet at the upper end to very little more at the point between the inner piers to which you refer.

27,735. If at any future time the accumulation of sand at the back of the piers should grow out to the pier heads, will not the effect be to reproduce the state of things that existed before the piers were built, and, as it were, to start afresh with a bar off a straight shore ?—I think not. There is a considerable depth of water inside at present. There is more at the very further end of the piers, and therefore if this present depth remains I do not expect that at that part there would be much increase of sand, if any. I think it possible it might be the reverse.

27,736. If the sand grew out to the pier heads, would not the action of the sand along the shore be as likely to bring the sand into the mouth as it was before there were any piers ?—I think it would not. Are you supposing the sand is brought out to the end of the piers ?

27,737. Yes; that the corners are filled up ?—Then I think it would not, for the reason that there would be a strong tide passing, and a strong current coming out of the river, which would prevent the sand being brought into the harbour. If the piers were constructed so that one should be shorter than the other, or no north pier at all, that might be the

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effect; but I think by carrying the piers out as shown upon the plan, the effect would not be so.

27,738. You said that you wished to see the 9-feet bar dredged away. Would the effect of that bar being deepened be, that a straighter and more powerful body of water would be carried down to the bar?—Yes.

27,739. The tendency would be to sweep away any sediment from the bar?—Yes.

27,740. If any obstructions have been removed inside the outer bar,—blocks of stones, wood, and things that cause something like another 9-feet bar further out, besides the deepening of the 9-feet bar,—may that not account for there being a little deeper water on the bar?—I do not mean to say that the tendency would not be what you say. I was not aware that any such operations had been performed, but perhaps you know that they have.

27,741. We had it in evidence that large boulder stones—I think, some large stones and fragments of wreck sunk solidly in the ground—had been got up to some extent immediately inside the outer bar, at the same time that the nine-feet bar had been deepened. I think they were got up somewhere outside the Black Middens, or abreast of it?—I do not know the fact of their being got up, but Mr. Messent has pointed out to me where the wreck was taken up, and it was abreast of the Black Middens, but out of the navigable channel, as shown here, and I do not think the removal of wreck at that place could have the practical effect you attribute to it, and which it would have if it were in the navigable channel.

27,742. Would not the removal of that at the same time as the deepening of the nine-feet bar took place have some effect in deepening the outer bar?—Yes, that would be its tendency.

27,743. I understand that both these things have been going on recently?

(*Witness.*) When was that done, Mr. Clayton?

(*Mr. Clayton.*) Within the last two years. The increase of depth has been taking place during the same period.

(*Witness.*) How long has the two feet increase of water on the bar been noticed?

(*Mr. Messent.*) Within the last year.

(*Witness.*) Both the operations you mention must have the tendency you describe. With regard to the movement of wreck, I do not think it would have a practical effect; and with regard to the other, it would depend upon the extent to which it was carried. It appears that the deepening of the nine-feet bar has been the work of two years, while I understand that the increased depth on the bar has not been noticed until within the last year.

(*Mr. Clayton.*) The harbour-master's evidence says that the improvement has not been completed until within the last year.

27,744. (*Capt. Sulivan.*) You say that ships naturally run for their own ports, and will persevere in doing so at some risk. I presume you allude merely to vessels bound to ports light, and do not mean that vessels bound south in cargo would run back to their own ports if in danger, in preference to taking refuge in a harbour that was on their road?—That would depend very much on the distance. Unless it is a considerable distance, I think they would rather endeavour to find their own harbour, particularly if it was, as I hope the Tyne may some day be, a harbour of easy entrance. But that is a matter which can hardly be called an engineering question.

27,745. But as you gave an answer to that question before, I wish to know clearly whether you suppose that laden colliers, with a harbour of refuge on their road, would ever run past that and run back to the Tyne rather than go into it?—It must depend on the distance, and whether the harbour of refuge was a free harbour; but I think, that generally speaking, the case would be as I have said. I do not mean to give more than a general answer,—not to give it in miles; but I think that that would be the case.

27,746. We were told in evidence that one of the reasons why they endeavoured to run back to their own ports, when bound north, was, that the men were engaged by the voyage, and that the quicker the voyage was the better it would be for them; would not the same reasons induce them, when bound south, to put into any port that would enable them to hold their own, if it was a safe port, rather than lose time by running back?—I do. To return for a moment the bar, Captain Sulivan read an observation I made with regard to the Sparrow Hawk, and the analogy between it and the work we have done on the north pier.

(*Capt. Sulivan.*) I did.

(*Witness.*) If he has no question to put on that subject, I shall suppose he agrees with me.

27,747. (*Capt. Sulivan.*) I will put a question on that subject. Am I right in supposing that from the Sparrow Hawk not having grown up or enlarged since the northern pier has been built, that the sand or other matter travels from the north, which was formerly cut off by the Sparrow Hawk, and is now shut out by the northern pier?—Yes; I meant to say that the northern pier forms a substitute for the sand upon the Sparrow Hawk.

27,748. Then it does collect the sand?—Yes.

27,749. That would rather imply that sandy matter travels from the north as well as the south?—Yes, there is some sandy matter.

27,750. Did you ever give any opinion upon what would be the probable depth of water to be obtained by your original plan?—I do not think I have.

27,751. Could you give us any idea what would be the additional depth of water obtained upon the bar by your enlarged plan, because it would be necessary to know the increased refuge facilities, independent of the outer area, that would be afforded to vessels by the extra outlay?—I have said, that the nearer point being 18 feet in depth, any part between that and the piers would not be less than 18 feet, but rather increasing outwards, and if so it would be more than 18 feet on the site of the present bar. I said I thought it might be done without dredging, and I believe so; but I do not mean to say that dredging may not be wanted to a certain extent in different parts; but if it is all sand, clean sand, it will not be so.

27,752. I quite understand you, but I should like to know what depth of water additional you would get by your large plan that you would not obtain by your small one; that is, what additional depth you would obtain by the increased outlay of 400,000*l.*, because we had it in evidence at Shields that the depth of water expected to be got by the smaller plan was 15 feet, and therefore, if that be the case, you see you would only get three feet more depth for your extra 400,000*l.*?—The three feet on the site of the present bar.

27,753. I am quite aware of that. But how much greater depth of water could be got into the Tyne, because that is the real test? If 15 feet of water was the proposed depth in the one plan, and 18 feet in the other, the extra 400,000*l.* would be really required to obtain the three feet additional. Am I right in that view?—You are right in saying you would only have three feet more, supposing the premises to be what you say. You have, then, only three feet additional upon what I call the site of the bar, but you have beside all the area outside of it of greater depth.

27,754. I distinctly said in my first question to you, leaving out of consideration for a time the area to be gained, and looking only to the main question, which is, the real depth of water that can be carried into the Tyne?—I dare say that is not far from the mark.

27,755. (*Capt. Vetch.*) Have you formed any opinion in what direction the sand travels along that coast?—No. I think that would be very much better got from the observations which the harbour-master and others on the spot have taken.

27,756. Do you think that there is much travelling sand?—Yes. There is a good deal of travelling sand from the south, but I believe comparatively little from the north.

27,757. I suppose you found that along the shore the sand generally accumulates in sheltered places? —Yes.

27,758. And that consequently the Herd Sand is merely a shelter for it, a quiet nook in which the sand can obtain comparative repose?—Well, the shape itself shows a good deal the cause of it. It travels from the south until it meets the water issuing from the river, and there it forms, as the plan shows, not in nooks, but rather on projections.

27,759. The contest between the water of the sea and the river water makes it accumulate in that form?—Yes. We have found already that the Herd Sand is lower.

27,760. In consequence of its being stopped?—Yes, with respect to the channel of navigation from the Narrows down to the Head in the last-proposed plan. The first obstruction seems to be that of the 9-feet bar, with which you are well acquainted. I am not so well acquainted with it. I know it existed, and that it is partly removed.

27,761. Do you know whether it is rock or boulders, or what materials?—Chiefly boulders, I believe.

27,762. Is there no stratum of rock there?—I think not. I do not believe there is any. I think it is boulder.

27,763. Presuming, as you say, that you are correct in expecting there will be a natural inclined plane in the new channel from the Narrows to the pier heads? —Yes, that is the most we can expect. I do not expect so much.

27,764. But still that would be the direction?—Yes, the tendency of it.

27,765. Then, under the circumstances, do you not think it would be a proper thing to see how far you can propitiate nature in forming that inclined plane, if immediate steps were taken to remove the 9-feet bar entirely, and if there are rocks, which I presume there may be, that they should be blasted out of the way at once, because as long as the bar remains to collect material or large stones it will always prove an obstruction?—I think it ought to be done, and that that has been stated.

27,766. Then between the 9-feet bar and the 12-feet line, are you aware of what the sand in that distance is composed, or do you know whether it has been bored?—I believe thatit has been bored by Mr. Brooks. I think it would be better upon this point to have his evidence. I believe he has carefully sounded and bored it.

27,767. Supposing that it happened to be hard blue clay, it could not easily be removed by the scour of the river in the incoming tide?—Certainly not.

27,768. If it is composed of blue clay, of which there is a very considerable probability, it would be necessary to dredge it in order to produce the inclined plane which you expect?—Yes.

27,769. Because so long as the hard clay remains there will be no improvement in the channel?—No.

I mention these things because I really think the Tyne Commissioners ought to apply themselves to it.

(*Mr. Clayton.*) They are doing so.

(*Witness.*) I believe they have done so. I think Mr. Brooks has soundings. Mr. Messent tells me that in the report I said that Mr. Brooks had bored upon the bar to 18 feet below low water, and found that it was all sand.

(*Capt. Vetch.*) Then he did not happen to put his borer upon two wrecks which were got out of the narrow channel.

(*Witness.*) Before leaving the question of boring, Mr. Messent reminds me that Mr. Brooks informed me that during the last summer he bored in four places in a straight line inside, outside, and upon the bar to the depth of 18 feet below low water, and found it to be all sand.

27,770. How many borings did he make?—Four. It had better have been 40.

27,771. What additional means do you expect for maintaining the entrance when the pier heads get out into deep water? I presume the extended area in which the tide flows and re-flows would be an element towards scouring out the entrance?—Yes, an element, but not a very important one.

27,772. Then as to the question of carrying out the pier heads into 40 feet water, when the original proposition was to carry them into 14 feet only, would not that circumstance be more favourable to the maintenance of a deep entrance, since to silt up one in 40 feet water would require so much more deposit, and so much longer time to silt up, than one of only 14 feet water?—Where the quantities depend upon the square? I do not understand you.

27,773. That is, that the amount of accumulation of sand and silt in the deep water to impede the entrance of ships to the Tyne, must be greater in quantity and much slower to grow up, than in shoal water?—I do not understand that as to the square, but we will suppose it to be so.

27,774. The quantity of matter required to dam up a deep entrance would be much greater than the quantity of matter required to dam up a shallow one? —Yes.

27,775. In consequence of which it requires a longer time to accumulate?—Yes; in addition to that, sand is formed at the entrance, or is deposited at the entrance, because it is travelling along only at a certain distance from the shore; but if the piers were carried out to a great extent, as proposed in the large plan, I do not see where the sand is to come from. I think we should have this great area free—clear of sand.

27,776. Supposing that there was some accumulation, I want to know, from the piers being thrown more into the tideway, the flow of the tide outside would not help to clear away the sand?—Yes. The force of the tide would be very much increased by carrying out the piers. We found at Dover, although the pier is not carried out a great way, the current of the tide is very strong at the end of the pier—more than double what it was before the pier was erected.

27,777. Does that not happen at every headland nearly?—Yes.

27,778. At Flamborough Head, for instance?—Yes; but there is perhaps a difference, because in the case of these piers the expansion is very sudden, and the tide comes up with considerable force until it sets near to the pier, and then it is carried off with considerable velocity.

27,779. An assumption has been entertained by some gentlemen, that carry out the piers to whatever extent you may—even to the middle of the North Sea, if you like—you will still have a bar, or at least some deposit there. Do you concur in those views? —No; I think the evidence I have given shows that I do not agree with them.

27,780. (*Mr. Coode.*) In answer to some questions which have just been put to you by Captain Vetch, you said that if the piers were carried out to the middle of the North Sea there would be no bar. In a paragraph of your report, at the top of page 2, it is stated "that the sand would be brought out to where "there is deeper water, and therefore the same quantity "of deposit would not produce a bar at the same height "as at present." By your present plan you do anticipate some bar, but that bar not so high?—I think I have said so more than once.

27,781. Still the answer which you have just given might lead to some misunderstanding. If you carry the piers out to the middle of the North Sea there would be no bar, you say. What I wish to know is, whether, according to your present proposition, you anticipate that there would be some bar?—I do.

27,782. And you also said that in a period, which we may assume to be 25 years, a regimen would be acquired. Have you formed any idea what depth you would then expect to have permanently at the entrance?—No. Do you mean what the height of the bar would be?

27,783. Yes?—I would rather not answer that question. I have said it would not rise to such a height as to be inconvenient to the shipping.

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27,784. Is the matter composing the present bar sea sand, or is it material brought down from the adjoining cliffs?—I consider it to be all sea sand; but the sea sand, for anything I know, came originally from the cliffs.

27,785. In your opinion does it come from the sea?—I think it does come from the sea, washed down, I believe, originally from the cliffs.

27,786. Do you think that any very considerable portion of it is composed of shell sand?—There are some shells.

27,787. Do you think that any part of it consists of gravel or *detritus* brought down by the Tyne?—No, I should think not.

27,788. You would think not?—No, I do not think so.

27,789. Have you examined it so as to enable you to speak of it?—No; Mr. Messent, the resident engineer, will give you all the information upon that point which you may want.

27,790. I did not know whether you had acquainted yourself with that fact?—I have acquainted myself with a good many things, and I have afterwards forgotten them.

27,791. It was given in evidence before us, a day or two since, that the more the mouth of a tidal river partakes of the character of an estuary, the less chance there is of the formation of a bar. Do you concur in that opinion?—I am not prepared to give an opinion upon the point, for I do not quite understand what it means.

27,792. That the more the mouth of a tidal river partakes of an estuary character, the less would be the chance of the formation of a bar. Such was the evidence that was given to us only two or three days ago, and I would wish to have your opinion upon it. The Severn and the Thames were quoted as instances of the mouths of rivers partaking of the estuary character?—The Severn was named as one?

27,793. Yes?—Then I should say yes, now that I think I understand the question.

27,794. In such cases there would be less probability of the formation of a bar?—Yes.

27,795. In that case, as the shores at the mouth of the river would expand, and as your piers the shores would close together, I would ask you whether the form you have laid down for the improvement of the Tyne would not be opposed to the character of an estuary?—I do not regard it in that light at all.

27,796. The estuary character being considered to be that wherein the shores extend as they advance seaward, or, in other words, in a bell-mouth shape, your piers are the reverse of that. As you have already said that the bell-mouth shape is less liable to cause the formation of a bar, I wish to ask you whether you have not adopted in these piers the reverse of the principle which you seem to agree with other witnesses in thinking would be less likely to form a bar?—There is no parallel between this case and the instance of the Severn. It is a pity the Commissioners should be misled by any answer I could give to the question—and any answer which I might give might mislead them—for in referring to the Severn you refer to a river which is many, many miles in length, and which widens by degrees. That is quite a different thing, surely, from piers erected at the mouth of a river enclosing a portion of the sea, as is the case at the Tyne.

27,797. Am I to understand you to say that it would be an improvement in these plans if the entrance was made of an estuary shape? I am not saying whether it would or would not be an improvement, but I am merely calling your attention to the fact that the evidence of a gentleman has been given before us approving of that principle in which you appear to concur. I then see that your piers are in opposition to that principle, and I ask if you can give us any information which may tend to reconcile the two?—I do not think that the two want reconciling. I do not want in anything that I may say to refer to such a case as the Tyne, but I refer to the Severn, which is a river of a great many miles in length.

27,798. Still the principle is the same, whether it be large or small. It involves the question of a bell-mouth or of a mouth which gradually contracts as you go seaward; which is the best of those forms?—My opinion is that in the case of the Tyne to have made the piers bell-mouthed would have been a mistake. I think I said so in answer to a question from Sir F. Smith at the very commencement of my examination. Perhaps you will upon the plan mark the bell-mouth to which you refer.

27,799. I was asking as to the general principle. I mean, as to the application of that general principle to the case of the Tyne, if you will show me what you would consider to be a bell-mouth.

27,800. (*Mr. Coode having sketched in pencil some forms upon the plan, exhibited them to the witness.*) I do not refer to these precise lines here, but to the question of general principle. From your large experience I now ask you kindly to give us your opinion upon this point?—My opinion upon the lines you have drawn is, that that form would render the entrance much more open to the sea than it now is, and that a shallow bar would be apt to be formed where I have marked it inside the bell-mouth which you have marked upon the plan.

27,801. You still think that form of mouth would be liable to the formation of a bar?—I do, and that it would be more exposed to the sea.

27,802. My question referred rather to the formation of a bar than to the exposure to the sea?—I think all the space near the end of the expanded wall would be shallow water.

27,803. And there would be a greater liability to the formation of a bar than there would be with the piers which you have laid down here?—Yes; but as you are a professional man, it would be very satisfactory to me to know whether you agree with me.

27,804. I am not giving any opinion at this moment, but am simply asking for the sake of information?—The general inference that I should draw would be that you differed from my opinion upon the subject.

27,805. I am asking for information, in order that we might compare your evidence with that of a gentleman which was given before us two or three days ago, wherein he said, that the nearer the mouth of a river partakes of the character of an estuary, the less probability there would be of the formation of a bar at the entrance?—That is in the case of the mouth of a river. Now, this is not the mouth of a river. The gentleman's evidence would apply probably to the river from Shields upwards, and not to a space like this, which is entirely outside the river.

The evidence had reference to the mouth of a river, strictly so called, and it was laid down as a general principle, and it was assumed that the same principle would hold good in the case of the Tyne as he conceived it would apply elsewhere. It is a question of principle, and as such it is very important, and I should wish very much to obtain your opinion upon it.

27,806. Is there any tendency towards the formation of a bar at Dover during the long continuance of easterly winds?—No, there is not.

27,807. Is not the Admiralty pier at Dover on the west side of the harbour?—Yes.

27,808. Are you able to say that during the long continuance of easterly winds there is no tendency to the formation of a bar?—I meant to say that there has been none.

27,809. You said that you thought the effect of the construction of the piers at the Tyne would be that the Herd Sand would go away altogether?—It looked as if it would. I would not say I should be surprised if it did not, but I think the tendency would be to diminish and to go away altogether. After we have constructed the piers according to this plan, I can't see that there is any sea sand to come in, and the question is, therefore, whether some of it will not go away. There will be

none to come in, and if any movement takes place, some sand must be carried out.

27,810. You think that after the completion of these piers there will be no tendency of the sand to come into the Tyne ?—Well, I do not see where it is to come from.

27,811. Is it or is it not a fact that sand has been growing up on the south side of the south pier ?—It is.

27,812. And advancing as the piers advance ?—Yes, to the extent which I have stated I think it will. I have said also that a time may come when it will go round the end of the pier, but I think the ebb tide and the effect of the cross current on it will prevent any of it going into the harbour.

27,813. You said, I think, that the material would not travel at more than a certain distance from the shore ; in what depth of water do you apprehend the sand will move, and at what depth will it cease to move ?—I gave a general opinion, but I should not like to give it in feet or inches.

27,814. You would not like to define any limit ?—No.

27,815. The velocity at the ends of these piers will, I presume, be affected by the depth of the water which may permanently be found to exist there ; the rate of tide will be affected by the depth ; I wish to ask you a question, in consequence of a query which Captain Vetch put to you, wherein the ends of the piers were compared with Flamborough Head ; do you not think that the rate of the tide will materially depend upon the depth of the water existing there ?—Yes, it will depend upon what is the depth of the water, but I do not think a great deal. I do not think so for this reason, it has all the North Sea to supply it, and probably the greater the depth of the water the greater the current of the tide.

27,816. Presuming that material does accumulate at the south pier, when the water shallows the rate of the tide will not be so great ?—I do not think that will practically affect it one way or the other, the quantity of the sand is so very small.

27,817. Would a line drawn from the end of the north pier to the end of the south pier, as designed on the plan, be nearly in the general current of the coast tide ?—Nearly so.

27,818. At any rate, practically ?—Yes.

27,819. Are you aware of a proposition that has been made to improve the mouths of tidal harbours by the construction of what may be called island breakwaters in front of them ?—Yes, I have heard of a proposition by Mr. Glover of that kind.

27,820. Have you formed any opinion upon that plan ?—Well, in respect to Mr. Glover's proposition, I do not think, from what I could learn of it, that the time of the Commissioners would be taken up to much advantage in discussing that plan.

27,821. Still, the improvement of the mouths of tidal rivers is a very great and important question ?—I come here to speak of the Tyne, you will remember.

27,822. But if the Commissioners desire to obtain your opinion upon this point, would you have any objection to give it to us ?—I could have no possible objection to do so, but I would rather not commit myself either for or against Mr. Glover's scheme. It was intended at one time to have an island pier in front of Kingstown Harbour ; I have such plans brought before me daily. There is one, I think, just now for an island pier in front of Alderney.

27,823. Mr. Glover's proposition has reference only to the entrances to tidal rivers, and not to the enclosure of bays ?—Plymouth breakwater and that at Cherbourg are island piers, are they not ?

Plymouth breakwater can scarcely be said to be at the mouth of a tidal river ; it is at the mouth of a large bay, into which two tidal rivers empty themselves.

27,824. (*Sir F. Smith.*) I think you said the beach accumulated at the back of the western space of Dover New Harbour ?—Yes, it does, but not so rapidly as I could wish it to do.

27,825. Can I have been misinformed, if I have been told at Dover, a short time back, that there was not sufficient shingle there to make up the concrete with ?—No; the fact is so.

27,826. Do you imagine that that pier has had any effect in removing the shingle from round Sandown Castle, the base of which is exposed to the beat of the sea ?—The Admiralty pier ?

27,827. Yes.—No, not at all. The quantity is so small that is accumulated. The shingle is all caught which used to travel along the coast past Dover,—is all caught away to the eastward by Folkestone and other erections to the westward of Folkestone, so that we get none at Dover scarcely.

27,828. That corresponds with my view of the beach being taken away, even from Sandown Castle to the eastward of Deal. The Marine Parade at Dover is almost denuded of its shingle in front, and the shingle that was there has been removed by there being no fresh supply from the westward ?—It is in a very good state ; I have no reason to complain of a want of shingle in front of the Marine Parade.

27,829. (*Chairman.*) As I understand it, the normal state of the entrance of this harbour some 20 years hence will be a depth of about 30 feet water ?—I guessed it at that.

27,830. More or less, you mean ?—Yes.

27,831. In heavy gales of wind on shore would you expect the sea to break outside the mouth of the harbour in that depth of water ?—I should not.

27,832. From the observations you have made on the Tyne, which has been under your notice for many years, would you expect any sea to break in the harbour's mouth ?—I do not expect that it would in that depth of water.

27,833. From the form of these piers, which I may say have some resemblance to the bow of a ship, would you expect any reflex sea,—any back sea from the piers,—which would occasion a bad sea at the harbour's mouth, or would you anticipate that it would be a fair sea there ?—I think the sea opposite to the entrance would be a fair sea, but on the other side, on the oblique face, there would be a rebound.

27,834. But that rebound, from the peculiar form of the piers, would not affect the sea which runs into the harbour ?—Practically, I think not.

27,835. And this form is favourable to the sea continuing a fair sea ?—That is my opinion.

27,836. Do you consider this form for the piers is more favourable than if they were flatter ?—I think, if there was any return at all, the sea would be still fairer, but its force would not be so likely to be shut off from the inside, and therefore I think that, practically, that would be a fair sea. I do not think a contraction would assist the fairness of the sea, if I may use that expression.

27,837. I think you misunderstood my question. Supposing that the pier heads, instead of being curved, as shown in the plan, were brought squ: re across, as I have pencilled it on the chart, what would be the effect upon the sea running in at the entrance of the harbour ? Would it be more or less favourable ?—I don't think it would be more favourable. I should expect, rather, that the sea, coming obliquely upon the square face you have drawn in the sketch, would pass off and rebound so as to interfere with the entrance more than the line I have drawn would do.

27,838. Therefore, you think the sea would not be so fair as in the entrance which you propose ?—It would be more interrupted, more interfered with, I think ; more what we call a cross sea.

Saturday, 4th December 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Sulivan.
Mr. Lindsay.	Captain Vetch.
Captain Washington.	Mr. Coode.

Mr. Evans, Secretary.

Mr. James Abernethy re-examined.

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27,839. (*Chairman.*) Mr. Abernethy, it was arranged that when you came here again this morning you should take consecutively each plan that you have handed in, commencing with Fraserburgh, and make such statements respecting each as you might think necessary ?—I so understood the arrangement, and will commence with a few brief remarks respecting the port of Lossiemouth.

27,840. Have we more than one plan ?—I handed in one plan, showing the nature of the intended construction, which you have now before you, I have reduced the scale recommended by the Commissioners, and though it is small it is quite sufficient. The port of Lossiemouth at present consists of an outer basin, of 1 acre and 3 roods, and of an inner basin and new basin together of 2 acres. The entrance to the harbour of Lossiemouth is exposed to the action of the north-east seas ; and, in order to remedy the great range arising from those seas within the harbour, it is proposed to extend a breakwater beyond the northern pier for a length of 420 feet, as shown on the plan, sheltering the pier on the south side, connected with a railway which leads from the Great North of Scotland railway to Lossiemouth, with the view of making the harbour at Lossiemouth a station for a steam ferry across to the opposite coast. That has been a great desideratum with the directors of the railway for a considerable time, but from the unsheltered state of the harbour they found it impossible to carry out their views. The breakwater shown upon the plan is to be constructed of timber and rubble work, and the estimated cost of that and the pier which it shelters is 13,920*l.* I am of opinion that, if this pier be erected, sufficient shelter will be afforded for a steam-vessel capable of making the passage to the ferry on the opposite coast. Lossiemouth harbour is also a place of considerable trade in connexion with the herring fishery, and I have no doubt that the breakwater would afford great additional shelter for the herring boats in stormy weather. The present area is not sufficient to accommodate these boats, but by the extension of the breakwater considerable additional shelter will be afforded. Numerous wrecks occur in the neighbourhood of Lossiemouth, arising from the projecting rocks called the Scars, which extend a considerable way into the Firth of Forth, and vessels caught in north-east gales along the shore from Lossiemouth to the mouth of the Firth, in endeavouring to run up to Inverness for shelter, have been wrecked on the Scar rocks immediately to the westward of Lossiemouth. If the breakwater in the plan is constructed, the probability is that a portion of the vessels would be able to take the harbour during these gales ; and the directors of the railway, who are also the commissioners of the harbour, propose to excavate a new basin, and thus materially increase the area of the harbour within the shelter of the breakwater.

27,841. (*Sir F. Smith.*) You state that the wrecks at Lossiemouth take place on the rocks to the westward ?—Yes.

27,842. Do you imagine that they arise from the difficulties of the navigation at some particular spot, or from the efforts that are made to obtain shelter ?—I believe they arise from the difficulties of the navigation, and from the fact that in north-east gales the harbour is a difficult one to make. The danger arises from the projection of the Scar rocks to a considerable distance, two miles altogether, immediately to the westward of Lossiemouth, and if vessels have not a good offing at that point for a run up the Firth in north-east gales, they are wrecked upon these rocks.

27,843. There is a shelter now afforded by the headland, is there not ?—A partial shelter.

27,844. What depth of water would you get into the harbour by your proposed arrangements ?—There would be a pier beyond the projected breakwater, and there would be a depth of 13 feet at low-water spring tides.

27,845. At the entrance ?—Yes.

27,846. Would that extend to the full length of the docks ?—It would extend about 300 feet, the present depth is only 4 feet at spring tides.

27,847. How do you deal with that ?—There is a pier proposed to the south under shelter of the breakwater, and it is intended that a steam-vessel, in connection with the ferry traffic, shall lie there.

27,848. You do not propose to give much shelter ?—Except at high water, when the ordinary class of vessels are always entering.

27,849. How many could you accommodate then?—Assuming eight vessels to the acre, which I think a moderate calculation, for vessels lying in harbour, there would be room for thirty-two vessels in the new basin.

27,850. Vessels of what tonnage ?—The general class of coasters, about 100 tons.

27,851. At the present moment they can get in, I believe ?—Yes. There is a considerable trade in connexion with the railway, and vessels of 200 tons can enter the harbour. We are about to enlarge the harbour. A contract has been entered into, and arrangements have been made for extending it.

27,852. Unconnected with the breakwater ?—Yes, unconnected with the breakwater.

27,853. Then the breakwater merely gives a certain facility of entrance in north-east gales ?—Yes.

27,854. Will it not be exposed to the east winds ?—It will ; but the sea with an east wind is not so heavy as with a north-east wind.

27,855. Do you know the number of fishing boats at Lossiemouth ?—I do not ; but I believe a statement will be put in.

27,856. (*Capt. Sulivan.*) Is it the case that the new works in the old harbour have quite failed to answer the purpose for which they were erected, and that the depth of water at the entrance and inside has decreased, and is in fact less than was anticipated ?—No, it is not. I have examined into that matter very carefully, and I find that there is no decrease in the depth of the harbour. In fact the bottom of the harbour is rock, and I find that rock quite bare and free from any sandy deposit.

27,857. I believe the outer harbour is comparatively new work, added to the former harbour ?—Comparatively new. That is to say, the end of the north pier is comparatively a recent work.

27,858. Is it the case that this harbour has failed to realize the anticipations that were entertained, and that boats in the outer harbour are not so safe as it was supposed they would be ?—At present, in north-east gales the boats are not safe, and one of the great objects of the extension of the breakwater is to remedy that evil.

27,859. Could you, as an engineer, put forward this plan as in the slightest degree providing a harbour of refuge for passing ships ?—No ; I do not treat it as a harbour of refuge for ships. I should say that a few vessels might attempt to enter the harbour in

north-east gales, if compelled to do so, with much greater safety than at present. But I do not put Lossiemouth harbour forth as a harbour of refuge in a general sense. The plan is intended more to provide local accommodation than anything else.

27,860. (*Capt. Vetch.*) Are you well acquainted with the south coast of the Moray Firth?—From Burghhead to Troup Head?

27,861. From Banff to Burghhead?—I am; I have been there repeatedly.

27,862. Are you aware that it is a very shoal shore, generally speaking?—Generally speaking it is, and the shoal extends considerably beyond low-water mark.

27,863. It is a shoal coast, and very rocky, generally speaking, along that coast?—It is.

27,864. Are you aware that in north-east gales the sea breaks very heavily there?—It does.

27,865. Amongst these rocks?—Yes; I think it the most dangerous part of the coast in north-east gales.

27,866. And there is a great loss of life?—Yes, I am quite aware of it.

27,867. Will you tell me the particular object of the work now proposed?—It is chiefly local. The principal object of the extension of the pier is to afford accommodation to passage steamers in connexion with the railway. At the same time, no doubt, it will materially lessen the range within the outer harbour, which renders it dangerous for the herring boats to be there in stormy weather.

27,868. Are you aware that at Banff, and in the little harbours along the coast, Mr. Bremner used immense blocks of stone, coupled with iron clamps, and that the quantity of stonework was very large?—Yes.

27,869. And that notwithstanding all this the break of the sea, in comparatively shoal water, was so violent that the stones were disrupted, bars and all?—That is the case at Banff. I reported upon the state of that harbour, and am aware of the fact. The stones are large blocks, bound together with iron bars, and are constantly torn out in heavy gales.

27,870. I think you said, that it is proposed to constitute a ferry between Lossiemouth and Little Ferry on the opposite coast?—Yes.

27,871. Would that make the communication considerably shorter and more commodious?—No doubt. Through a considerable portion of the year it would be a great boon to the inhabitants of the north part of Scotland.

27,872. Are you aware that it has long been desired in the district?—Yes, and a company was formed at Elgin to carry it out. They were about to contract for a steamer of a superior class, but I advised them to wait, and extend the pier so as to enable vessels to enter.

27,873. What is the distance from Lossiemouth to Little Ferry?—I am not aware of the exact distance.

27,874. It seems, looking at the chart, to be about twenty-six miles?—I believe it is between twenty and thirty miles.

27,875. If the ferry did not exist, what distance would it be to go round by land?—You must proceed to Inverness and round the whole north coast of the Moray Firth. I should think it would be upwards of 70 miles.

27,876. The people in that part of the country consider it a great boon to have that accommodation?—They do. There is a very fine agricultural district to the north of the Moray Firth, and a great quantity of cattle could be sent across that would otherwise have to go round by Inverness.

27,877. You think an additional breakwater would be sufficient for the steamboat?—I do.

27,878. Would it in any way tend to preserve the boats and the fishermen?—It would. At present the harbour of Lossiemouth in the fishing season is extremely crowded, and in north-east gales the boats have great difficulty in getting under shelter.

27,879. Is it not the fact, that a little to the westward it was proposed to make an entrance for that purpose?—It was proposed to make an entrance there.

27,880. Can you tell me why the intention was abandoned?—The entrance was originally designed by myself and Mr. David Stephenson. After the Bill had passed through Parliament, I received a representation from the Commissioners that the ground at the entrance was extremely foul; that it was rocky ground. I made an examination of the ground, and found that we had made a mistake, and that the ground was very foul.

27,881. Was rocky?—Yes, and that it was impossible to form an entrance at the site which had been selected.

27,882. The position of the present harbour you conceive to be more appropriate?—It is the only clear ground. There are no rocks lying to the north-east or east of the entrance.

27,883. It will afford accommodation to the steamer?—It will.

(*Mr. Coode.*) As this appears to be matter of local convenience, more than a question of refuge, I do not think it necessary to ask any question.

27,884. (*Capt. Sulivan.*) Are you aware, Mr. Abernethy, that the Board of Scotch Fisheries are just about to make a harbour of refuge on that coast to meet the very wants you have described?—I have heard it so stated.

27,885. (*Chairman.*) Where is it to be? You mentioned this the other day, do you know the place?—I know the whole coast. It is about there (*pointing to a place on the chart*).

(*Capt. Sulivan.*) Mr. Stephenson has made a report, with drawings and a plan.

27,886. (*Chairman.*) The harbour at Lossiemouth would not be at all available, even as a small harbour for the smaller class of coasting vessels?—No. The outer part of the harbour we propose to devote to ferry purposes, and could not appropriate it to coasters.

27,887. It would not be available for them?—It would not; but it would, no doubt, shelter materially the inner harbour, and the boats lying there.

27,888. But the small coasting vessels could not come in at all?—Not as into a general harbour of refuge.

27,889. Will you now proceed with your statement relative to Fraserburgh?—I produce a plan of Fraserburgh, reduced to the scale required by the Commissioners, showing the extension of the present pier. Originally my design was simply to extend the pier, so as to afford shelter to the existing harbour for local purposes. It was then further proposed to extend the length 1,500 feet, so as to enable vessels in limited number to take shelter there at low water; and subsequently it was proposed to extend the distance to about 1,500 yards seaward, with a view of forming, not a local harbour of refuge, but a general harbour. On the plan I have shown the extension of the breakwater 1,500 yards. There you have a sheltered anchorage within the eastern line, as shown in the margin. I presume I need not recapitulate my evidence in favour of Fraserburgh?

(*Chairman.*) No. We have gone into the matter very fully.

27,890. (*Capt. Vetch.*) The ground inside the breakwater is clean ground?—Yes.

27,891. And good holding ground?—Yes. I think that was distinctly proved before the Commissioners. I perhaps may be allowed to allude to the estimate. The estimated cost of the first section, the 1,500 feet, I stated would be 80,000*l.*, and that the extension to the full length of 1,500 yards would cost about 400,000*l.* I have, since I made that statement, gone more closely into the matter respecting the quantities of the work, and I now put down the estimate at 375,000*l.*

27,892. (*Sir F. Smith.*) Is that on your new principle of construction or on the old one?—It is with the view of forming a stone breakwater, using

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the medium which I have brought before the Commissioners to some extent, modified considerably from the circumstances of the case. The rise of tide and the depth of water being less than at Swansea, the difficulty would be still less.

27,893. (*Mr Coode.*) Have you a transverse section showing the mode of construction?—I have not. I have taken a section of the present pier, assuming that it would be carried out on the same line.

27,894. Will you describe as shortly as possible the sort of section you propose to adopt at Fraserburgh, unless you prefer sending it in?—If the Commissioners desire it I will send in the section. Perhaps the better course would be to do so.

27,895. Have you examined the bottom very carefully? Of what does it consist?—Clay, with sand above.

27,896. Have you probed the bottom to any depth, or do you merely judge from superficial results?—I have not made any borings, but I have probed and examined sufficiently to satisfy myself that there are no rocks, and all the nautical evidence shows that there are none.

27,897. What length of time do you think would be required for the completion of the length of 1,500 feet?—The period I originally proposed was three years.

27,898. And what period for the 1,500 yards?—I cannot say exactly. I may be prepared to state that, and send it in with my report on the Swansea case.

27,899. In sending in the transverse section you will perhaps state the length of time required for the construction of the 1,500 yards?—I will do so.

27,900. (*Chairman.*) What is the next harbour to which you wish to refer?—The next is the harbour of Aberdeen. I have upon the plan laid down a breakwater, with the view of making the harbour of Aberdeen accessible under any circumstances of wind or tide. The harbour at present is exposed directly to the action of south-east gales, and the existing breakwater being in a line with the present north pier head, affords no shelter whatever immediately at the entrance, but, on the contrary, tends to create a very heavy cross sea at that point. I have long been of opinion that by constructing a breakwater from Shortness point, about 1,300 feet further seaward, the entrance at the pier head would be rendered safe under any circumstances, and as Aberdeen harbour is a capacious harbour, and capable of affording a great amount of shelter when vessels are once within it, I conceive such a work would be of great public benefit. The port of Aberdeen is situated in the bight of a great bay, Buchan Ness Point bearing about north-east by north from the port of Aberdeen, and there is a long straight shore to the south; so that if vessels are caught in east gales in the bay of Aberdeen, unless they have a very considerable offing they cannot weather Buchanness point, and must run all the way back to the Firth of Forth for shelter. Vessels generally prefer running to the Firth of Forth to running for the Tay. The Tay is dangerous.

27,901. Will you state why?—It looks good on the chart. There is at the mouth of the Tay a bar and a considerable swell arising from the action of the outgoing current and tide, so as to create an exceedingly heavy cross sea there. Although I have not personally surveyed the mouth of the Tay yet I know from common report, and having lived so long in the neighbourhood, that it has always been considered a dangerous harbour to take. As I have before stated, unless they have a considerable offing in an east gale, they cannot weather Buchan Ness Point to the north, and it is doubtful whether they can succeed in reaching the Firth of Forth to the south, for they have a long straight shore between these points.

27,902. Does that conclude your observations?—I have estimated the cost of the breakwater at 75,000*l.* Its length is 400 yards.

27,903. On what system would the breakwater be constructed?—I might, to a limited extent, use the system I propose for Swansea, but of course varied with the circumstances of the case, and the different class of material with which I have to deal. We have an abundant supply of granite at Aberdeen.

27,904. What depth of water will you have at the pier head at low water?—There will be 5 fathoms at low water and spring tide at the point of the pier, covering about 13 acres.

27,905. And that 13 acres would be refuge?—Until there was sufficient depth of water between the pier head to enable vessels to go into the harbour. I have seen vessels riding at the point immediately within the site of the proposed breakwater. I recollect one London schooner arriving with passengers, and riding there 24 hours until she sank, the holding ground is so good.

27,906. Would you propose to retain or remove the old south breakwater?—I should propose to remove the breakwater and allow any sea that came in to expend itself on the beach. The object of the old breakwater was to protect the works at the north pier during their progress, and was never designed for a breakwater in the proper sense of the word.

27,907. (*Sir F. Smith.*) How long will it take to complete this breakwater?—I think it might be completed within a period of two years.

27,908. What am I to understand is the present depth at the entrance at low water spring tides?—The depth is 9 feet 6 inches at low water spring tides.

27,909. Will the breakwater make any difference in the depth of the water?—It will not affect the existing depth of the water, but a great additional depth has been obtained in Aberdeen harbour by dredging, and that process may be followed up to a considerable extent.

27,910. To what extent?—I think an additional 5 feet in the centre of the channel might be obtained, without at all risking the stability of the pier.

27,911. That would give you 14 feet?—Yes; 14 feet at spring tide.

27,912. That is all you expect to get?—Without risking the north pier, or rendering it necessary to spend money to secure the foundation of that pier.

27,913. If you were to do that could you get 19 feet?—I am of opinion we could.

27,914. Are there any obstructions of any kind before you come to the pier head?—No; the bed is composed of gravel and large stones. These we are constantly removing and thus deepening the harbour.

27,915. There is no bar?—There is no bar, no ridge in the proper sense of the word. It is a continued inclined plane down the channel seaward.

27,916. Is there any shifting of the sand along that part of the coast?—No, it is exceedingly permanent. In the condition of things at Aberdeen I have not observed any great variation.

27,917. Then this is an instance of a tidal harbour where there is no bar at the mouth?—Yes; this is an instance of a tidal harbour without a bar at the mouth. A bar formerly existed, and I attribute its removal to the prolongation of the north pier sufficiently far seaward to bring the matter which comes down the river in floods within the influence of the tidal current of the ocean, which sweeps round the point to the south.

27,918. Does the tide run to the north or south?—The flood tide, of course, from the north. The south tide is deflected considerably off by the point. There is a great extent of sandy beach from Aberdeen nearly to Buchan Ness Point, and north-east gales tend to bring that down to the harbour at Aberdeen. But we do not find that low water immediately to the north of the north pier has extended seaward. We have found no difference as regards the low-water line.

27,919. Then you imagine that any material coming from Buchan Ness Point passes with the tide beyond the mouth of the harbour?—It does; we find no deposit within the harbour.

27,920. But still it does pass along from north to south ?—Yes.

27,921. That you have no doubt about ?—None.

27,922. If it be so ; if it passes from north to south would not the breakwater arrest it in the angle ?—I should propose to have a slight opening, which is not sufficiently shown on the plan, between the end of the breakwater and the foreshore. The breakwater extends beyond Shortness Point.

27,923. Do you think an opening there would carry off the whole of the material ?—I think there would be a strong tide running past which would tend to remove the material.

27,924. Do you not think that all these little irregularities along the coast are filling up ?—We do not find that to be so.

27,925. Because the materiel passes with the tide ?—Yes ; it is all bare rock without any sand.

27,926. (*Capt. Vetch.*) What depth of water will the proposed breakwater give for vessels to enter at low water ?—Immediately within the breakwater there will be a depth of 5 fathoms.

27,927. Will that accommodate vessels of any magnitude ?—Large vessels arriving at low water which could not enter the harbour proper might take refuge under the breakwater, and pass into the harbour at high water.

27,928. In the present state of affairs how many feet have you at low water ?—9 feet 6 inches at low water spring tides.

27,929. Then a large vessel cannot get in at low water ?—She cannot.

27,930. Are there any other impediments to vessels entering ?—In south-east gales it is an exceedingly dangerous harbour to take. The sea is so heavy between the existing breakwater and the north pier that in south-east gales vessels lose steerage way, and are driven to leeward. No less than three large steamers have been wrecked on the north pier. Even steam-power does not avail them to pass the cross sea.

27,931. Does it often happen that vessels bound to Aberdeen are unable to get inside ?—Yes.

27,932. To get under shelter ?—Yes.

27,933. In that case, where do they run to ?—The general rule is to beach to the north. When they cannot do any better they are obliged to go on to the beach.

27,934. Can vessels get out at low water ?—Large vessels cannot get out ; smaller vessels can.

27,935. Do you think the proposed breakwater would completely qualify or rather supersede the present inconvenience ?—I have no doubt it would. I have no doubt that at high water vessels might pass in under any circumstances, and that at low water they might take shelter and pass into the inner harbour when there was sufficient depth ; and, as we have a floating dock of 30 acres, we can accommodate a great number of a large class of vessels.

27,936. What do you say the cost would be ?—75,000*l.*

27,937. (*Mr. Coode.*) I think you say you could obtain a depth of 14 feet at low water spring tides without endangering the safety of the existing pier ?—Yes, I think so.

27,938. What do you imagine would be the cost of dredging the channel from the entrance between the piers up to the point marked North Capstan on the plan ?—About 9,000*l.*

27,939. Looking at the risk of deposit on the north side of the proposed breakwater, do you not conceive that that would be a more judicious outlay than constructing the extensive breakwater laid down on the plan ?—No, I do not think it would. If you observe, that between the existing breakwater and the old south pier there is a bay. We do not find any deposit in that bay. It is in the same state it was fifteen years ago to my own knowledge, and by leaving a sufficient opening between the foreshore and the proposed breakwater the action of the tidal current will be preserved, and there will be no deposit on the rocks.

27,940. What width of opening would suffice for that purpose ?—I should think an opening about 200 feet in width would be sufficient ; and, as the shore within or lying to the west of the breakwater trends a good deal to the north, you might have an opening of that extent without affecting the question of shelter.

27,941. You think with an opening of that width there would be no risk of deposit on the west side of the proposed breakwater ?—I do not think there would be any. I may mention that the deposit we have most to fear is brought down by the floods of the Dee ; that is the only deposit with which we have to deal, because the beach to the northward has not altered for a long time, nor has the high-water mark advanced at that point. This shows that the tendency to accumulate sand to the north has reached its limit.

27,942. Of what material was the old bar composed ?—Of sand and the alluvial matter brought down by the river, which, being bound together, becomes exceedingly compact and hard.

27,943. Did that sand come along the coast from the north ?—When the bar existed the pier was not one-third of its present length, and therefore the sand brought down by the north gales was deposited on the bar ; but by the prolongation of the north pier into deep water that has been remedied, and for the last ten years there has been no trace of a bar.

27,944. That is because the materiel has been carried away by the current ?—Yes ; and because the sand brought down by the north-east winds is caught by the north pier, which forms a groyne and is prevented from going round the point.

27,945. Does the sand at the back of the north pier grow to the east at all ?—No, it does not. The high-water level there is permanent ; we have found no alteration for a long time.

27,946. Will you furnish us with a section of the construction you propose to adopt in this case, as in the case of Fraserburgh ?—I will.

27,947. The section should be in 4 fathoms depth ?—Yes ; you will find the average marked on the plan, and that is very considerable.

27,948. (*Chairman.*) I see there are no soundings marked in the spillwater channel, which is included in the acreage ?—The spillwater channel was originally intended to take off the flood water of the river Dee, but, in consequence of the increased capacity of the channel of the river and the raising of the banks, it is carried off sufficiently. The spillwater might be made an exceedingly useful adjunct for a tidal harbour.

27,949. What is the average depth ?—For a considerable distance up at spring tides the depth is about 9 feet at high water.

27,950. The minimum depth I think you say is about 7 feet 3 inches ?—Yes ; 7 feet 3 inches at one point.

27,951. Would there be any possibility of increasing the depth from the lock to the harbour's mouth 10 feet throughout ?—There would not. There is nothing impracticable in that. It is a mere question of dredging. When I became the engineer at Aberdeen in 1841, the entrance, at the present site, of the lock which is now 7 feet 3 inches was only 4 feet 6 inches.

27,952. And by dredging could you gain a depth of 15 feet throughout, do you think that possible ?—I think it is possible. It is a mere question of dredging.

27,953. What draught of water could get in in a gale of wind on shore with the present depth of 7 feet 3 inches, or rather with 10 feet 3 inches between the pier-heads ?—10 feet 3 inches at the pier-head would give a depth of 22 feet 3 inches at high-water spring tides.

27,954. You misunderstand my question. With a gale of wind on shore, what draught of water could get in with 10 feet 3 inches between the pier-heads ?—About 16 feet draught of water might get in between the present pier-heads.

27,955. That would be at high water ?—Yes.

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27,956. But at low water ?—At low water no vessel would attempt it, in consequence of the lift of the sea being so great, and the channel so confined.

27,957. Supposing it possible to deepen the channel to 18 feet between the pier-heads, and then to 15 feet, gradually decreasing to 10 feet as you get up to the lock, what draught of water could then get in at low water ; a vessel drawing what water ?—A vessel drawing from 10 to 12 feet might enter at low water —the general class of coasting vessels.

27,958. In your opinion would it be possible by dredging to make the harbour at Aberdeen a harbour of refuge for the smaller class of coasting vessels ?—It would.

27,959. At all times of the tide ?—Yes. I have long entertained that opinion. I may state that there is no other harbour on the east coast of Scotland that has the same capacity.

27,960. Will you point out to me on the chart of the Tay where you suppose the difficulty to which you have referred, because we should be glad to have a harbour of refuge of this kind on the north-east coast of England. Is the bar marked from 16 to 18 feet your point of difficulty ?—That is not the main point of difficulty, but the Gay sands in north-easterly gales ; because, from the position of the entrance, a vessel is apt in north-east gales to get to leeward, and go ashore there. I have always heard the entrance of the Tay spoken of as dangerous.

27,961. The difficulty is, that when the wind is scant the vessel falls to leeward upon the Spit and the shoals adjoining ?—Yes ; and there is another difficulty. The Tay is subject to floods, and there is an outgoing current which would render it extremely difficult for a vessel to stand into the entrance. In easterly gales there is a very great conflict between the outgoing current and the heavy sea.

27,962. (*Mr. Coode.*) Supposing the breakwater to be constructed, the entrance to the harbour at Aberdeen would be equally exposed to east-north-east gales as at present, would it not ?—Yes ; but we do not find heavy gales with the wind in that direction. The heavy gales, as a general rule, begin from the south-east, vary to the east, and die away to the north-east ; and we generally find that a gale from the direction you mention does not materially affect vessels entering Aberdeen harbour during such gales.

27,963. The rule is, that by the time the gale arrives a teast-north-east its force is moderated ?—Yes ; and from the trending of the land to Buchan Ness Point, we are considerably sheltered. The fetch of the sea is exceedingly short in that direction.

27,964. (*Chairman.*) What is the next case ?—Here is a plan of the works at Blyth, but I have no remark to make with regard to the works, which will be completed within a month. I have here a drawing of Swansea bay, including the whole of the bay, and the town and port of Swansea.

27,965. There is nothing further to be said about this, I think, we have gone into the matter very fully. Have you anything further to say on this point ?—Nothing beyond this, that we have ascertained the nature of the shoals in the Green Ground, and we find they can all be removed by dredging, and also, that the position shown in the plan is more favourable than that shown on the chart by Capt. Denham.

27,966. There are one or two hummocks to the north of the pier, marked 1, 5, and 6⅛. Did we ask you the expense of their removal ?—I am not aware.

27,967. They are small in extent, and their removal would not be very expensive ?—It would not. If they are removed, the whole of the ground will give the very best anchorage, being clay.

27,968. I think the areas are not filled in ?—I have filled in the areas.

27,969. Perhaps you will read them over ?—The area of the sheltered anchorage is included within the south-south-east line from the pier head. The sea from that direction is not a heavy sea ; but I have thought it desirable to lay that line down upon the drawing, and to consider that the whole space between that line and the line of breakwater is an effectual shelter under all circumstances of wind and weather. From 1 to 2½ fathoms there are 265 acres.

27,970. Does that include the patches with the figures 1, 5, 6, upon them ?—They have been deducted from the area, but on the supposition of dredging the area will be slightly increased. The area from 1 to 2½ fathoms is 265 acres, from 2½ to 3 fathoms 67 acres, from 3 to 4 fathoms 161 acres, from 4 to 5 fathoms 40 acres, from 5 fathoms and upwards 235 acres, making a total of 768 acres from 1 fathom to 5 fathoms and upwards.

27,971. (*Mr Coode.*) Have you any observations to make, or any information to give, as to the strength of the tide at springs, either on the ebb or flood ?—I think you had that in evidence at Swansea. There is a very strong current upon the ebb tide round the Mumbles head.

27,972. What is the strength of the current ?—I think it is upwards of 3 knots an hour. I am desirous of leaving the present opening through the Mumbles headland and the other headland to allow a current to pass through, and to prevent the accumulation of sand, because I am of opinion, that if we made a continuous extension of the headland, the tendency would be in south-west gales to drive the sand against the breakwater and cause accumulation.

27,973. How far off the Mumbles head, in a south-east direction, does that current extend ?—A distance of about 1,000 feet, and then gradually diminishes to the usual tidal current. It makes a complete sweep out of the bay. All these shoals appear to be of a permanent character.

27,974. (*Chairman.*) I fear, from the very acute angle which the limiting line of the area forms with the line of the breakwater, that to obtain any area of refuge the larger part of the breakwater would have to be completed, would it not ?—The larger portion would have to be completed in order to afford shelter.

27,975. So that if one-half the larger and middle breakwater were completed, a very inadequate idea would be afforded of the advantages which the breakwater is calculated to afford ?—I think so. I should certainly recommend the construction of the greater portion of the breakwater shown on the plan. You will observe that the area of deep water is great as compared with the shallow. It is 335 acres.

27,976. Having given the subject, as you naturally must have done, a great deal of consideration, do you think there is no means by which a breakwater could be constructed by which a proportionate advantage could be gained as the breakwater was extended?—I think not.

27,977. I ask the question, because in these very extensive works it would be most desirable if we could adopt, to a certain extent, a tentative process, so that the country might become satisfied, as the work proceeded, that the advantages contemplated are likely to be ensured. Now this, I fear, is not a case in which that object could be accomplished?—I think not. I put the breakwater further to seawards. I should not require a greater length to shelter an increased area, but the depth is increased to 9 or 10 fathoms ; and I find as the expense increases so greatly with the depth, it would be scarcely advisable.

27,978. (*Capt. Vetch.*) How many vessels might safely take anchorage at a time ?—In my calculations respecting Swansea I spoke of 2 vessels per acre, and I think that a moderate allowance in a harbour of refuge.

27,979. Taking large and small vessels, from a draught of 8 feet upwards to 16 feet, what number of vessels would the harbour accommodate ?—It would afford accommodation for 1,500 sail, large and small ; and of the very largest class of shipping, 550 sail.

27,980. What is the direction of the pier ?—It is almost in the direction of the headland where the lighthouses are constructed. The name of the headland has escaped my memory.

27,981. (*Chairman.*) There is one point on

which I should be glad to avail myself of your experience, which is this:—What would you consider a fair average per acre for vessels in a harbour of refuge, taking one with another; I do not mean with reference to this particular case, but speaking generally?—Taking large and small vessels together, I should say 3 vessels to the acre. In a dock you may have 8 or 10 per acre.

27,982. (*Capt. Vetch.*) Supposing moorings to be provided in the harbour, how many could you then accommodate?—If you treat it as a tidal harbour, you might put down fixed moorings, and have 5 vessels per acre; but in gales of wind it is difficult for vessels to bring up.

27,983. You could put double the number with moorings that you could without moorings?—Yes.

27,984. (*Mr. Coode.*) Then you do not agree with the nautical evidence which has been given, that it would be necessary to provide something like 2 or 3 acres for each vessel?—I think not. I consider it an extravagant allowance.

27,985. Always bearing in mind that we are speaking of harbours of refuge, as distinct from commercial harbours?—Yes. I went minutely into the question with Capt. Herbert, a most experienced man, the harbour-master at Swansea, and we came to the conclusion that 2 vessels per acre could be accommodated with safety.

27,986. (*Chairman.*) Was that number adopted without reference to the additional accommodation that could be obtained by some regulation for placing vessels on their arrival, removing them on the following day to a better anchorage, so as to make more room?—Yes. It was thought desirable that a better system should be adopted, and that the vessels first coming in shore should go to the further portion of the moorings.

27,987. Of the harbour?—Yes, to the farther part of the harbour.

27,988. Will you now proceed with the Hartlepool case. With reference to Hartlepool, what is the nature of the statement which you wish to make? Because, although you were not present this is a case which we have fully gone into, and we only want any new matter with regard to yourself, or anything you may have to propose. You need not go into the question of general eligibility or any thing of that kind?—I have shown on the plan two harbours of refuge, one of them, coloured green, enclosing an area of 1,000 acres, and another, showing by the breakwater, coloured red, 2,745 acres. I may mention that I have described them fully in the report which I have handed in to the Commissioners. But perhaps I may be permitted now to give a few short explanations.

27,989. We do not want to go into anything which is contained in your report. We shall examine it.—I think I may show the nature of the designs.

27,990. We shall find full details as to the expense, the area, and such matters in your report?—Yes.

27,991. I ask the question, because we have been so fully engaged that it has been impossible for us as yet to examine all the reports that have been sent in.

27,992. (*Capt. Sulivan.*) Do you think that the sand travels to the north?—I think it does. In the year 1850 I visited Hartlepool as surveying officer to the Admiralty. That was before these works were progressing—the west harbour works. I found the beach between the north pier and the entrance to the harbour free of sand. I found there was no accumulation. I think the sand is driven on shore in heavy easterly gales.

27,993. I presume sand passes over the rocks?—I think not.

27,994. Then why do you put a pier there, where there is no chance of the sand travelling, where the rocks and the distant land protect the place? If the sand did travel, would it not be necessary to close the point altogether?—No. I think it desirable to preserve the existing action of the tidal current both on the flow and ebb round the margin of Hartlepool bay; because, although the sand does not travel from the south up into the bay, still, in stormy gales, even at the depth of fifteen fathoms, there is such an action of the wave as to disturb the bottom and take up sand in solution. I think it desirable to preserve that current and not to have the water still.

27,995. Would not that be equally done if the south breakwater did not reach the rocks, but was a detached breakwater?—I have considered the question of shelter in this case, and propose to leave a considerable opening between the foreshore and the end of the breakwater, and in the case of the large one to remove the Longscar rocks altogether.

27,996. But why do you consider it necessary to enclose the south side entirely by a breakwater if you have no fear of the sand travelling?—Because of the action of the south-east seas upon the entrance of the old harbour. Supposing no shelter is afforded by the green breakwater, the tendency would be to drive the sand into the west harbour, because any sand that has accumulated there is from the action of the east seas direct upon the beach.

27,997. If the outer arm of the south breakwater were continued a little to the south, and all the inner part were dispensed with, would not that be sufficient for refuge purposes if there was no fear of the sand travelling?—For refuge purposes it would to a considerable extent, but it would not sufficiently cover the entrance to the west harbour in south-east gales.

27,998. (*Capt. Vetch.*) How do you propose to carry the breakwater from the shore?—I propose to carry it from the west point by staging and from the shore by a tramway.

27,999. What is the width of the proposed opening?—About 850 feet. The larger harbour is provided with two openings, one to the north-east, and the other to the south-east. I think the action of any wave passing the entrance and expanding over an area of 1,000 acres within would be very trifling.

28,000. You think the wave would subside according to the extent of space over which it passed?—Yes.

28,001. (*Mr. Coode.*) We have not yet had an opportunity of reading your report, and I will simply ask you whether it contains the length of the breakwater in either case, the estimated cost, the site from whence the material is to be derived, and the depth of water in which the works are to be carried on?—It contains the length of the breakwaters, and the cost of the breakwaters; but it does not contain the exact site from whence the stone is to be procured. As I have to furnish more detailed designs to the Commissioners on other matters, I can embrace the details now asked for in my report. But I may mention that there is a very considerable supply of magnesian limestone of very hard quality to be procured within a mile and a half of Hartlepool.

28,002. Are you aware whether that is the quarry discovered just before the visit of the Commissioners to Hartlepool?—I am so informed.

28,003. (*Chairman.*) I see that at the entrance of the proposed harbour there is a depth of 33 feet at low water. Should you expect that the sea would break outside the harbour?—I think not.

28,004. You think the harbour will be thrown out, so that it will not be affected by the break of the sea?—My impression is that the sea wave does not become a breaker at the depth of 5 fathoms.

28,005. Did you make any special inquiry as to the breaking of the sea in this particular locality?—I did, and I find that the white water is out a considerable distance beyond the line of the piers, but I believe that is the action of the wind and not a breaker proper.

28,006. By a breaker proper you mean where the body of the wave rolls over, that is what you call a breaker proper?—Yes. A vessel can steam hard to windward over the sort of wave which I mean. It is a wave affected by the wind simply. But if it be a percussive wave or breaker proper that would be impossible.

28,007. (*Capt. Sulivan.*) Can you tell us what the difference of the cost would be if the 3,000 feet of the

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inner edge of the breakwater were done away with, and the remaining portion had to be done by sea work instead of from the land ?—I think the expense of the main portion of the work would be so increased that I should only save about 60,000*l.*

28,008. You think you would save about that ?—Yes. That is my impression.

28,009. (*Mr. Coode.*) I think I understood you to say, that in the event of the larger design being adopted, you would take away the Longscar rocks ?—I would.

28,010. With what object would you remove them ?—I think they tend in some slight degree to impede the action of the flowing tide at the first period of its flood, and I think that the stronger tidal current being to the south, it would be advisable to remove these rocks so as to allow the equal action of the tide, which is arrested by these rocks at one period, and deflected by them at another period of the tide.

28,011. To what depth would you remove them ?—To the general depth of the adjacent beach.

28,012. On either side ?—Yes.

28,013. (*Chairman.*) After the Commissioners have had time to examine the plans they will probably like to put some questions to you respecting them ?—I am engaged in completing some plans and details, and shall be prepared, in the course of a few days, to appear before the Commissioners again, with those plans and the additional details which have been asked for.

Mr. Michael Scott examined.

Mr. M. Scott.

28,014. (*Chairman.*) What is your occupation, Mr. Scott ?—I am a civil engineer.

28,015. Will you state what is your object in tendering your evidence to the Commissioners ?—My object is to bring under their notice certain new arrangements to be employed in the construction of breakwaters.

28,016. Be good enough to proceed with your statement.—I would ask leave, before proceeding to describe these arrangements, to say one word on a matter that concerns my position with respect to them. It has been said to me that piers have been constructed before of stone and timber combined, and that these plans I now propose to describe are mere modifications of that which has been done before. To some extent that is true. It is simply a different arrangement of the materials. But I conceive that the whole science of construction is involved in difference in the mode of arranging the materials. It is true that the materials I employ are the same that have been used before, and that are still used by others ; but they are arranged differently, and I think by that different arrangement that I attain results which have not been hitherto attained. I merely refer to that, because I think it is essential that I should show that I had some reason for coming here before this Commission. For, if I could not show that there was some novelty in these arrangements, I probably would not have been justified in requesting permission to appear before the Commissioners at all. I wish also to refer to another point. I was present two days ago during part of Mr. Abernethy's examination, and I am desirous of saying a word upon a matter which was then broached as regards the materials of which the works I propose will be composed. First, as to the stone, there cannot be any difficulty about that. No stone of a high class would be required, and that I conceive to be an advantage. But with reference to the timber, there seemed to exist some doubt as to the power of obtaining timber of the requisite length. Now, on this point, I would in the first place observe, that in many cases it is more desirable to combine the timber by building than to employ what is called self-timber. For many strains they are stronger. But there really is no difficulty in obtaining this long timber. It is simply a question of a slight addition to the price ; and if the work generally is such as will enable us to employ with the long timber a large quantity of short timber, we are then enabled to work up good average cargoes. If excessively long timber only was required, even it could be obtained in any quantity. Within a few days' journey of the place where you are now sitting, there are large forests where any quantity of timber might be obtained,—timber of the best quality,—from 150 to 200 feet long, and of good dimensions. The chief difficulty consists in getting ships long enough to bring it to this country. And in the case of mahogany, a friend of mine is felling mahogany at this moment in large quantities, and of the largest and best description. The only difficulty he finds is, that there is no demand for timber of such large dimensions; otherwise logs of 60 feet long by a yard square might be readily obtained and imported into this country, at less than 5*l.* a load. Another point I would wish to explain is as to the Blyth works. Considerable reference was made to the settlement in one of the sections at Blyth. Now the formation of that section is triangular, and the reason why the settlement was felt in that particular instance, is that a very small amount of settlement at the base of the triangle represents a very considerable settlement at the top. In the last section, which is not triangular, after the stones were shaken together, as we call it, at first, we have not even perceived the least indication of any settlement ; and that the settlement does not materially affect the work in that case is proved by the fact that in a length of 2,000 feet I have not yet been able to discover the settlement of a single inch, although the work has been up, the greater part of it, more than two years. If the structure were raised upon an equable substratum it might be supposed, perhaps, that the whole had gone down, and that having gone down equally no settlement was observed. But it so happens that the ground on which it is based varies from the hardest rock to clay, and yet we do not observe any settlement in the work. Coming now to the plans and the arrangements I propose, I wish to say, in the first place, that I consider it desirable in deep water not to employ a form that will break the wave, starting from the principle that the wave will not necessarily break unless the form of the work break it. Therefore I would prefer that the sea face of the breakwater should be, if not vertical, nearly so. I think also it is desirable that the harbour face should be vertical or nearly so, inasmuch as it gives it the advantage of being a quay. Of course it will be understood that the models and designs I exhibit have reference to no particular locality, but were merely brought before you in order to enable me to explain the principle of the construction ; and therefore I should observe that the nature of the bottom and other local considerations would of course require variations of detail in each particular case, although I have employed the same principle in different breakwaters in different places. The ground may be hard, that would require one system of arrangement ; or it might be soft, that would require another, and so forth. One advantage I claim, not for my designs so much, but for the system generally of combining timber and stone is, that you thereby obtain continuity of face. If that can be obtained, then the work resists the action of the sea as a whole ; if that is not obtained, then the measure of the strength of the work would to a considerable extent be the weakest part. A point which I claim for my own design is that the work does not depend, so far as stability is concerned, upon any connexion with the ground ; the stability depends upon the weight of the stone employed. With a hard bottom, piling, of course, is inadmissible. By piling, I mean driven piles. I may here state, in explanation, that we call the timber in these works piles, a term which got into usage at the Blyth works, and we are

obliged to continue the name ; but in speaking of these timbers as "piles," it must be understood that they are not driven piles ; it is driven piles that I object to, and which I think are in all cases more expensive.

28,017. (*Sir F. Smith.*) Then you have adopted the term "pile" for that which, as I understand you, is not really a pile. Do you not think that it would be better to call it by some other name, as it may lead to some confusion if you continue to use the term "pile" when you do not mean a pile. A pile is a thing driven.—With all due deference, I think the term "pile" is generally used and generally understood as denoting these timbers.

28,018. I think it is improperly used in this case, and is not generally used.—I admit the term may lead to some confusion, but it is difficult to find another that will express what they are.

It would be very easy for you to adopt another term that cannot be misunderstood.

(*Mr. Coode.*) Why not call them "standards"?

28,019. (*Chairman.*) You see what the result will be when the report is published if you use a word in one sense which is generally used in a different sense ; that is, if you use a term in your evidence as denoting one thing which in another part of the report is used to denote a different thing.—I may mention, while on this point, that in one of the models here piles are represented ; but they are not driven with the intention of obtaining a hold of the ground, and so assisting to ensure the stability of the work, so much as that of affording a convenient method of filling up the spaces under water. I produce here a model of the section of a breakwater for ten fathoms at high water. (*The model was produced.*)

28,020. (*Sir F. Smith.*) Will you give us the high-water line ?—Here it is (*pointing to it in the model*).

28,021. (*Chairman.*) Will you state the scale of the model ?—Half an inch to a foot. This particular design consists of a series of frames, each consisting of two standards braced and tied together, and united at the foot by a cross-tie. A number of these frames having been prepared, it is proposed to float one to the end of the work, to raise it on end, to load it so as to sink it into its place, and then secure it to the frame previously erected by longitudinal ties. I feel some difficulty in describing the details of this in words, and I was going to suggest that, should the Commissioners desire it, I should be allowed to make drawings of each of these designs and send them in.

28,022. No, I think the description, if you proceed with it, will answer the purpose ?—I should state that the lower tie in this model is peculiar, consisting of pieces of timber ranged in the form and having much the effect of a ship's chain, being flexible to a certain degree. I do not know that in this model, which is one of the first that was made, there is much that is peculiar beyond that tie. Perhaps, therefore, I had better proceed to describe another model, which possesses some other novelties.

28,023. Do you wish to make any further statement with respect to this, or shall we ask you such questions as occur to us upon the model, as you have explained it. Or do you wish to make a general statement as to other plans also to be examined upon them altogether ?—I am entirely in your hands, and am perfectly ready either to be examined now upon this model, or after I have submitted the other plans I wish to bring under the notice of the Commissioners. I should state that I have other models and forms of construction to submit which, perhaps, I had better proceed to describe before I am examined ; but the course which the Commissioners may consider the more convenient is that which I am most anxious should be pursued.

(*Sir F. Smith.*) I think you had better go through this before we go into any of the others.

28,024-5. (*Chairman.*) Then we will take your examination upon this. There is one question I wish to ask. I understand the peculiar principle of this is, that there is nothing driven into the ground, but that it rests entirely by its own weight ?—It rests by the weight of the stone.

28,026. By the weight of the stone ?—Yes, by the weight of stone packing.

28,027. (*Sir F. Smith.*) I think you stated, Mr. Scott, that there had been no perceptible disturbance of the stone at Blyth ?—Not after the first settlement.

28,028. When do you consider the first settlement to have taken place after the first deposit of the whole weight ?—Well that would depend very much upon the weather—after you have had several heavy seas upon the work.

28,029. Is then the settlement a question of time or of the action of the sea ?—I think it is a question of the action of the sea to a considerable extent.

28,030. You say that since the "consolidation," as we may term it, of the works, that no perceptible settlement has taken place ?—I have observed none.

28,031. Have you taken any pains to ascertain for a certainty that there has been none. Have you made it a matter of study, of frequent observation and examination, to see that no settlement has taken place ?—I have, and have not observed any indications of settlement. The effect upon the work would be this :—At Blyth there are cross timbers placed on the stone, and if the stone had settled to any extent it would have been necessary to remove those cross ties, and repack the stone.

28,032. Would you not effect the object by putting in more stone without disturbing the timber ?—The timbers would require to be removed before the stone could be put in ; they are so continuous.

28,033. They are continuous, are they ?—Not exactly continuous, but so close as to form a sort of timber grating.

28,034. And the pieces or bars of that timber grating are so close together that there is no room for the stone to go between ?—No.

28,035. And you are prepared to say, as the result of your observation and actual examination, that there has been no settlement ?—There has been no perceptible settlement after the first settlement. As I have stated, when the stone is first packed there is a considerable settlement. We assume that to be the case; but since then, so far as my experience of the Blyth works is concerned, there seems to have been no settlement.

28,036. And that notwithstanding the foundation is, as you say, an unequal one ?—That refers to the framework ; that affects the settlement of the timbers.

28,037. But would it not affect the settlement of the stone also, if there was an unequal foundation ?—It would certainly affect it to a certain extent.

28,038. Where you found the foundation comparatively soft, you have not observed any settlement ?—No.

28,039. I think you state that you have got at the bottom of your framework in this model a sort of chain bearing ? A timber tie, timber placed, so as to form a sort of chain, something like the links of a chain ; is not that the expression you used ?—Exactly so.

28,040. Is there likely to be any tendency to spread at the base of this vertical timber ?—The chain is placed there to correct that tendency.

28,041. But you state that these timbers have no connexion with the chain except by the weight put on them, and that these are independent pieces ?—Oh no.

28,042. That is your plan ?—It really and practically is a chain, and the same connexion exists between these timbers as exists between the links of a chain.

28,043. Will you explain the mode of construction ?—I will explain the formation of a link, if you will permit me, and that will show the construction of the chain. A link is composed of two side timbers ; at each end between these two side timbers is placed a block of timber, and that constitutes one link.

28,044. But how is one piece of timber connected with another ; for instance, taking the timber in connexion with the upright timbers adjoining, is

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there any connexion?—This is one link (*pointing it out on the model*). Here are the side timbers; there lie the side timbers, behind which is not seen; there the blocks up to this end, and up to the other small blocks are placed.

28,045. I see they are a sort of clips?—And the side timbers in the second link are the same in dimensions, but reversed in position.

28,046. And this chain is perfectly flexible?—Not perfectly flexible in the sense of an iron chain, but it is sufficiently flexible for the purpose.

28,047. Then it is flexible?—To a certain degree, but if there should be an unequal settlement in the foundation, would not that affect the stability of your uprights in a certain degree if they are kept together by means of this chain?—No, I cannot anticipate any inequality of settlement that could possibly affect the uprights further than this, that it is possible that in the event of a very great settlement,—for the chain will admit of a great variation,—that one chain might be depressed more than the chain next to it; that would tend to draw in the feet of the uprights, and might possibly draw them in to the extent of a few inches, but that would not affect the stability of the work.

28,048. It would draw in the uprights, and the chain would break, or the blocks would give way?—The blocks would not give way.

28,049. Then as the other parts could not be drawn in in consequence of the power of the packing, it must be the reverse?—Perhaps I had better explain the way in which I deposit the stone. The hearting is deposited in the first instance in the centre of the chain; proceeding from the centre, we have the chain covered with stone, and a great weight is therefore put upon it before the stone is allowed to bear laterally against these uprights.

28,050. You keep them off the uprights?—Yes.

28,051. By packing?—Yes, by packing, near the middle of the chain in the first instance.

28,052. I presume that you put in the chain by means of the diving bell?—Oh no, it is all done from the surface. The whole is tied together and floated to the place, raised upright into position, loaded, and let down.

28,053. With the chain?—With the chain complete.

28,054. Then the whole goes down bodily, as we now see it?—Not exactly, Sir Frederic. The flexibility of the chain would be inconvenient, and cross spiked pieces are temporarily introduced to keep it extended.

28,055. Then you have pieces of timber spiked upon the links to keep the chain extended?—And to give it the necessary degree of stiffness.

28,056. And to give it the necessary degree of stiffness, what advantage do you gain by this chain formation over a scarfed piece of timber, not flexible from side to side?—Two important advantages; first, that it is not liable to be broken by the superincumbent weight of the stone, which a single piece would be; and secondly, that it enables us to work up small timber, which otherwise would not be useful.

28,057. Then, as I understand, you do not use the diving bell at all?—Not at all.

28,058. By what process do you propose to join the timbers together, and at the ordinary intervals, as shown in the model?—In a very simple way. In the last frame, before we proceed to erect another, pieces of timber are nailed to each side, representing the space that is to be left between the two frames.

28,059. As guides?—We have also longitudinal timbers projecting out, which act as guides in the opposite direction. The frame being then floated to its place, is raised so as to stand on end, is hauled close against the blocks, and made fast there by means of timbers attached to it temporarily.

28,060. And you think that is not a difficult operation, when exposed to a heavy sea?—I should not select a day when the sea was a heavy sea, for the commencement of the work.

28,061. But would it not be almost continuous when you once commenced?—No; I think not.

28,062. Why, you would not arrest the work for every gale of wind?—There would be no objection to arresting the work in the event of a heavy sea.

28,063. Then suppose there should be inequalities in the surface of the bottom, in the line of construction, either longitudinally or transversely, how would you deal with them; suppose a piece of rock, for instance, should stand up in the middle of the space where the chain-band is, how would you deal with it?—Any ordinary inequality within the space of the work would not affect the chain. We should have some idea beforehand of the nature of the ground and of the work with which we had to proceed, and arrange accordingly.

28,064. Do you mean that you would prepare the bottom?—In the majority of cases there would be no preparation necessary; and if upon examination I was of opinion that any preparation would be necessary, I would abandon this particular form of construction.

28,065. Can you give us the dimensions of these timbers, as they would be the full size of the uprights?—The total length of the uprights?

28,066. Yes. The framing is from the bottom of the platform to the top?—Yes, in this particular instance. It is not necessary that the uprights should be in one piece. We can make them of more than one piece of timber joined together, and these would be as strong as a single piece of the same length; but supposing the uprights to be in one piece, they would be almost 70 feet long.

28,067. In what depth of water do you adopt this mode of construction?—This is proposed for a depth of 10 fathoms; but I do not see any limit, so far as the dimensions of the timbers are concerned, for it can be got to any extent, but of course there is a limit.

28,068. But the greater the depth the greater would be the difficulty with regard to the weight to be moved and the apparatus for it?—Yes.

28,069. Will you give us the size of the timber?—The timbers of the frame below low-water mark are 2 ft. 4 in. by 14 in., and above low-water mark they will be about 14 in. square.

28,070. What would be the cost of that in 10-fathom water per lineal yard.—I mean of the timber work alone, irrespective of the stone, which much depends on local circumstances?—The cost of the timber work alone would be about 54*l.*

28,071. Per lineal yard?—No; per lineal foot.

28,072. I asked what would be the cost by the yard, and I was rather surprised at the answer. Does that include all the cross braces and the suspenders, the platform and all the apparatus for lowering and fixing?—It includes everything.

28,073. Then suppose we were proceeding with the construction of this pier from the end of the pier of stone which gives you your gangway, you would begin, I suppose, by putting in your first frame?—Just so.

28,074. And when the first frame is put in, what is the next process?—We proceed to weight the frame, and then place a second.

28,075. When you say you weight the frame, in what way do you weight it?—A convenient way would be to weight it from this platform (*pointing to it*).

28,076. Is that at the level of low water?—A little above the low-water level.

28,077. We may call it for convenience, I suppose, the low-water platform?—Yes; but it is not exactly at the level of low water, but above it.

28,078. Then say the platform a little above low water. Then having weighted this frame securely as placed, to what extent do you go on with your framing further before you put in any of the hearting?—Perhaps to the extent of three or four frames.

28,079. And then you would begin to put in the hearting?—Yes.

28,080. And that hearting, if I understand you correctly, is not intended to touch the outside uprights, but to be placed in the central portion of the

chain ?—It is intended to touch ultimately, but we tip in the centre first instance.

28,081. I mean in the first instance ?—We tip in, in the first instance, near the middle of the work.

28,082. Therefore you go on with the work of the packing in the exact order in which you go on with the frames ?—Yes, in that order.

28,083. And follow that order up to about low water ?—Yes ; but I do not propose to put in any packing above low water until the packing below low water has been consolidated by the action of the sea.

28,084. Have you any idea of the time it will take to execute each 1,000 yards of such a breakwater, provided the depth were nearly equal ?—Much would depend of course upon the locality and the special circumstances of each individual case ; but of this description of framing, probably I could execute at least 600 feet a year.

28,085. 600 feet a year ?—Yes. In fine weather a great deal more might be done ; but perhaps it would not be safe to calculate upon more.

28,086. Then your rate of progress would be 6,000 feet in ten years ; that is 2,000 yards in ten years ?—Yes, at the 10 fathom depth of water, and of this particular formation.

28,087. Is that the formation to which you give the preference under ordinary circumstances ?—Certainly not, as I have said, this is one of my earliest models, and I have made many alterations and improvements upon it since then.

28,088. (*Capt. Sulivan.*) Do you expect to have for every separate frame to make a model of the ground outside the previously deposited frame before you proceed to deposit the next frame in succession ?—Certainly not.

28,089. Then how would you be sure that the frames corresponded and fitted below water, seeing that the slightest inequality in the ground would throw out the work ?—We should have to sound, of course ; but it would not be necessary to go beyond that. Any slight variation of the bottom would not affect the plan of the upper work.

28,090. Might it not throw it out of the perpendicular, and so prevent it fitting accurately against the previous frame ?—It does not fit against the previous frame ; the only connexion with the previous frame is the longitudinal timber.

28,091. But it is supposed to fit vertically next to the previous frame, is it not ?—Yes.

28,092. And might not any inequality of ground, unless models are made for each successive frame, throw the centre out of the perpendicular ?—Even if that did occur, we could readily bring it into line again.

28,093. Yes, by straining the whole ?—No, without any straining ; by simply detaching the braces and refixing them.

28,094. How far do you think it would be loaded before you moved it to its place ; how high would you require the stones to be loaded to ballast it and take it down to its position ?—We do not load it, there would be no stones, no ballast ; it would sink of itself, by its own weight.

28,095. Then how do you fill in the whole mass of stone when it is in its place without a diver ; you say you do not use the diving bell ?—No.

28,096. Then how do you place the stones so accurately as to pass them through all this trellis work ?—The stone is tipped in so far as the mass below low water is concerned, and left to consolidate.

28,097. Tipped where ?—Over the top.

28,098. Then it has to find its way down through these diagonal timbers ?—No ; we use a shoot for the purpose, suspended from the top externally.

28,099. From the top ?—Yes.

28,100. Still, the stone must find its way through these timbers of the upper frame ?—No, the shoot goes off from the top at an angle away from the framework.

28,101. Then what prevents the stone from falling outside ?—The shoot turns it back at the reverse angle, turning in again under the half stage.

28,102. How do you pack the stone, and how do you shoot it into the upper portion of the framing so as to keep it far enough back ?—The stone packs itself ; and after the lower stone is consolidated, then we run a line of rails out from the shore under the upper platform over the small beams ; along this railway we bring the stone in waggons, and drop it through these spaces in the timber framing.

28,103. Then the stone comes upon some platform beyond the outer frame, and is then tipped over from the waggons and dropped through ?—The stone does not fall by means of a platform, but by means of a shoot.

28,104. Then the railway you spoke of to the upper part does not start directly from the shore between the platform ?—It may or it may not, that is of no consequence.

28,105. But if your railway comes over the platform the course of the stone in its descent will be reversed, and carried through the trellis work ?—The railway on the top of the work is only intended to tip the stone below low-water mark. It is tipped over, and that having been accomplished and the stone consolidated, we bring a line of rails inside the works from the shore, and the stone for the upper part is brought in waggons and dropped in by hand.

28,106. Do you suppose that the shoot underneath would enable you to fill the lower space entirely up with stones ?—Not entirely.

28,107. Then the upper portion of the lower space would have to be filled with stones, dropped through and finding their way down through these crevices ?—Yes, exactly so ; but these crevices, though small in the model, are large enough in the work to allow stones of any size to pass down.

28,108. And do you think by this means, by the stone falling through these crevices, that it would pack itself under water, in the lower frame, sufficiently close to support these ties against the weight of the upper stone bearing upon them ?—I propose to remove the low-water ties, so that when the stone is filled up to the diagonals we shall take care to have the stone projecting through between the diagonals to a considerable distance, and that is done by hand. Then we pack about it. The stones projected through the diagonals will admit of a settlement perhaps of two feet, and no pressure can come upon them. There is very little weight above them.

28,109. (*Capt. Vetch.*) You have been asked about the packing of the stone for the upper part and for the lower, whether you could manage to have it deposited and packed in a proper manner ; now, with regard to the packing, I will ask you whether the surge of the sea does not sufficiently affect that object ?—Yes, the action of the sea consolidates the mass for us. We have no occasion to pack where we have the sea to do it.

28,110. Do you find generally that the surging of the sea does tend to arrange and consolidate these masses of stone ?—No doubt of it.

28,111. You find this tramway on the diagonal braces effectual and convenient ?—Just so ; we have adopted that plan at Blyth.

28,112. And you bring the material upon it in waggons all the way from the shore ?—Yes, we do.

28,113. And you find no difficulty or inconvenience in that arrangement ?—No difficulty at all ; on the contrary, it is found convenient.

28,114. And you experience no difficulty in passing down the material to the lower part of the work by means of funnels, without disturbing the timbers ?—Not the slightest ; that I can say from experience.

28,115. Then in all cases you could by the application of these funnels obviate any danger to which the timber might be exposed, by passing down the materials through the framework ?—Most decidedly.

28,116. The only limit to passing down the stone is the size of the spaces between the timbers ?—Cer-

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tainly; so long as the space is sufficient for the stone to pass through there is no difficulty.

28,117. And you have no doubt that the surging of the sea upon the stones as they are thus dropped down one upon another arranges them, and by forcing those which may have a bad foundation into a better tends to consolidate the masses?—No doubt that is the effect.

28,118. In fact they are packed in this way better than if they were packed by hand?—Yes; I rather object to hand work, for it not only costs more, but is, I think, unnecessary. I rather prefer to have the interstices between the stones left, and that they should not be entirely filled up.

28,119. How long have you been employed in the direction of the works at Blyth?—About four years.

28,120. Have you ever experienced any difficulty in carrying out the work there?—None at all; I do not remember any difficulty.

28,121. Have you met with any disasters in the course of the work?—No; the works have never been touched; we have erected frames in very bad weather, and they have been exposed when hardly bonded to the action of very heavy seas, and in no instance have the works been touched or injured. We have never had a single frame removed in the whole progress of the Blyth works.

28,122. And in respect to the creosoting, how long have your timbers been creosoted in the works at Blyth harbour?—At Blyth I suppose it is between two and three years since the timbers were creosoted; I cannot give the date exactly, but I know that there was a portion of the creosoted timbers put up there between two and three years ago.

28,123. And has there no action taken place on the face of those timbers?—No action on the creosoted timber, but a very decided action on the uncreosoted timber.

28,124. What is your impression as to the stability of the timber which has been submitted to the creosoting process; how long, in your opinion, is it likely to last?—We have evidence of the creosoting process preserving timber exposed for the last seven years without the slighest action taking place upon it, and as I know cases in which timber has endured for twelve years without being creosoted, I think at the lowest calculation we may assume that creosoted timber will last for twenty years. There is a paper here, which I got from the patentee of the process, Mr. Bethell; if you will allow me, I will hand it in, as you will find therein various statements with respect to the durability of creosoted timber. (*The paper was handed in.*)

28,125. Could you give me any notion, provided all the materials were ready at your hand, of how much of this kind of work you could execute, proceeding from the shore, or a given point, how much you could execute within a period of twelve months?—I have stated that with respect to this particular formation,—but I must again observe that this is one of the earliest formations, and by no means the best or the most rapid of execution,—I could execute 600 feet a year. I shall have to state, with respect to other formations I propose to submit, their advantage over this in respect to rapidity of execution, as well as other matters.

28,126. Then, since you commenced operations, you have made improvements from time to time as you proceeded?—Yes; as we have proceeded improvements naturally suggested themselves. If you will allow me to revert for a moment to the previous evidence in reference to Blyth harbour, I would remark that Mr. Abernethy understated the progress of the work in the last sections we have erected. We erected there 130 feet in five days, and in six days we accomplished 150 lineal feet of the work.

28,127. Then from time to time you have been able to make improvements in the mode of execution?—I have.

28,128. And you expect, I suppose, as you progress in the erection of the same kind of structure, you may be able still further to accelerate and improve the mode of putting the work together?—It is but natural to expect that further experience will produce further improvements.

28,129. All difficult structures, I presume, commence in rude ways, and get improved by the ingenuity of mankind as they go on, until we arrive at comparative perfection?—Certainly.

28,130. (*Mr. Coode.*) The model you produce before us is, I understand, intended to apply to cases where the depth of water is ten fathoms?—It is ten fathoms at high water.

28,131. The works at Blyth are all above low water, I believe?—No; at present it is six feet below the lowest spring tide, that is, a portion of it.

28,132. What length of the work is below the low-water level at spring tides—I mean up to the line—as far as you have progressed?—I should think about 100 feet.

28,133. Then your experience of this construction of work below low water extends to a length of 100 feet in a depth of six feet?—My experience at the Blyth works, and the Blyth works only, amounts to that; but I do not say that the extent of my individual experience consists of that, and of that alone.

28,134. You made reference to Blyth as the place where this mode of construction was in operation?—Yes.

28,135. And at Blyth, as I understand, you have about 100 feet which is under low water?—Yes.

28,136. And that not to any very great depth?—No; I do not suppose it is more than two feet below the low-water level of spring tides.

28,137. I do not exactly understand the manipulation you adopt in regard to the erection of these frames: will you explain it? with respect to the erection?—Yes.

28,138. Are they put together with the horizontal ties and diagonals afloat, or are they put together before they leave the shore?—Yes, before they leave the shore.

28,139. And the chain ties; they are also made complete before you float the frames out?—Yes.

28,140. They are put together in the same way?—Yes.

28,141. And are we to understand that you float them out to their position?—Yes; we float them out.

28,142. What course do you then adopt?—By means of gearing on the top, and not heavy gearing either, for the frame is not heavy, we make fast to the upper part of it, raise it on end, haul it close to the previous frame, and then make it fast with temporary timbers.

28,143. How do you raise it on end? for I understand you to say that you float it out to its position?—By means of cranes projecting over the top.

28,144. How does the lower portion sink then?—We have ropes fastened to the bottom of the lower portion, with which we haul it into its place, and it sinks of its own weight.

28,145. This mass of timber sinks of its own weight?—Yes; the downward pressure per foot run is about $1\frac{1}{4}$ tons.

28,146. How do you obtain that weight, if the structure is made, as you say, of timber only?—Very easily; the creosoting adds about ten pounds a foot to the weight, and then the timber is not all immersed when it is on end. I can give you the exact particulars.

28,147. I should like to know the exact proportion of the timber below the low-water level, and the timber above the high-water level, if you please?—The weight above high water and below low water?

28,148. If you please?—I have the calculation containing the weights, and will give it in. The floating power of the immersed portion is 11 cwt. per foot run; that is the difference between the weight of the timber creosoted and the weight of the bulk of the water displaced. In this particular model, the weight may be taken at 11 cwt. per foot run, that is, of the immersed portion. The weight of the non-

immersed portion is 1 ton 16 cwt. per foot run, giving a downward pressure of 1 ton 5 cwt., that is, at half tide. At high water the floating pressure of the immersed portion is 12 cwt. per foot run ; the weight of the non-immersed portion is 1 ton 8 cwt., and the downward pressure 16 cwt. per foot run.

28,149. Then do I understand you that the floating power of this mass of timber is only 11 cwt. at half tide ?—The floating power is 11 cwt. at half tide.

28,150. At what points do you attach the ropes by which you bind each frame close to the adjoining frame ?—Above low water.

28,151. Then, by merely hauling them together at low water, you assume that you are able to bring them together at the foot in 10 fathoms water ?—They are not in close contact.

28,152. But it is shown in the model that they are in close contact ?—This model has been altered ; it is not perfect.

28,153. Would you adopt this model under any circumstances ?—I think it might be adopted in many.

28,154. Have you any better model to put before us ?—Yes. This model here, which is very bulky, represents the method of constructing the round head for the entrance of a harbour. Here is a model of the end of a breakwater. (*The model was here introduced.*)

28,155. (*Chairman.*) Will you proceed now with any statement you may wish to make with regard to this model ?—I have here to submit a model of the round head of a breakwater, such as is generally required at the entrance of a harbour. This is not so perfect as the section which I shall presently have to refer to, but it is intended only to explain the mode of constructing the round head.

28,156. (*Sir F. Smith.*) But had we not better have the breakwater ? There are some harbours where there is no occasion for the round head ?—If you wish it, I will show the model of the breakwater. This (*producing another model*) is a much more perfect model than the other ; it is the model of a breakwater to be erected on a rubble mound. The first operation is to place frames at a distance of 30 feet apart ; by the longitudinal ties on the top of the cross ties, to connect the two uprights forming the sides of the frame ; and from this stage to tip the rubble in the ordinary manner, so as to form a bank or mound, up to perhaps 15 feet below low water. The bank having been allowed to consolidate for some time, then between the first-mentioned frames I propose to erect intermediate frames six feet apart ; the spaces between these intermediate frames under low water would be filled by upright timbers put in from above, and above low water by longitudinal planking (as shown) ; and above the upper platform, which would also be plank, there would be a parapet of timber placed at the same angle as the face of the work. There are some peculiarities in this model, to which I am anxious to direct the attention of the Commissioners. The first is the means of connecting the feet of the uprights on the mound by employing a sliding tie composed of two beams of timber, one inside and one outside of the external pile, with blocks between them to keep these timbers apart, the distance of the thickness of the pile ; and the two pieces being secured together above water, are slid down to the bottom, and tie the feet of the main uprights together in the direction of the length of the work.

28,157. (*Chairman.*) This system of construction, as it appears to me, is precisely the same as that advocated by Mr. Abernethy ?—The principle is different.

28,158. How different ?—In this respect, Mr. Abernethy employs piles, and I do not ; nor are the arrangements I have been describing any of them Mr. Abernethy's arrangements, but are entirely different. I think they are of some importance ; for upon them will depend the possibility of constructing the work, and its advantages.

28,159. By the difference in the arrangements, you mean in the construction of the timbering of the frame ?—Yes.

28,160. And also that the standards in yours are not driven into the ground, but supported on the mass of rubble ?—Yes, that is the important point.

28,161. (*Sir. F. Smith.*) The former model represented a breakwater in which the frames were placed and contained in the whole mass of rubble ?—Yes, to the bottom.

28,162. If I understand this model, it is so far different that the mass of rubble is first deposited, and upon that a framework is made to contain the rest of the rubble ?—It is.

28,163. Is that when you have got your rubble on to a certain height, say how much ?—15 feet below low water.

28,164. Under all circumstances ?—Certainly not ; you may vary the height as you please ; I merely selected that in this case.

28,165. In this case, which the model of your invention represents ?—Yes.

28,166. You must give us something which may be definite, so that we may test your project. If you will say any dimension you please, we shall be able to form some idea what the mass will be ?—The whole system will be applicable to a greater depth of water than 15 feet, but I do not know that it would be desirable to go beyond.

28,167. We will take the former case of 10 fathoms of water. What mass of rubble would be deposited before you could begin to put up the framework ?—In this case the depth of the rubble deposited in the first instance is 24 feet.

28,168. In what depth ?—Ten fathoms water.

28,169. What is the scale of this model ?—A quarter of an inch to the foot.

28,170. The other being ?—Half an inch.

28,171. This is half the scale of the other ?—Yes ; having the same depth of water.

28,172. Under the same depth of water ?—Yes.

28,173. Then the height above the bed of the sea before you place the upper framework would be how much ?—24 feet.

28,174. Then what would you gain by this system over the other ?—Well, in the first place, the other system might not be applicable to a bottom so soft as that to which you might apply this. Another advantage of this system is that it is cheaper, and a further one is, I think, it may be more rapidly executed.

28,175. I suppose that that is in some degree a question of the cost of stone and the cost of timber, because if you had far to go for the stone, your second plan might not be the cheapest, inasmuch as you use much more rubble in it than in the other ?—Quite so, but of course that must be taken into consideration. If rubble is very scarce, I do not think this would be a desirable section to adopt. I would then attempt the other section, going to the bottom directly.

28,176. What do you claim for your invention ? is it not a great saving of rubble material ? Is that the first claim you make, economy of construction by the diminution of the quantity of rubble ; is it so ?—No doubt the quantity of rubble is diminished in the section first described, but it would not be so in this. I would claim much more than that. I would claim that you have an efficient face work in this particular form, and that it is very difficult to obtain that with stone. I start with the assumption that the form of the face ought to be perpendicular, or nearly so ; and I do not see that that can be readily obtained with stone, except it be at a great cost.

28,177. You do not say that you mean that going to a depth of 10 fathoms you would require an entirely vertical face ?—I only adopt that to 15 feet below low water.

28,178. Exactly. Do you propose in the former plan submitted, as well as in this, to have any stone face work ?—I am prepared to show how this work could be faced.

28,179. I do not ask you how it could be done, but

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what you propose as a system ?—In this case I would not propose to face it. I would leave it in the position in which it stands finished with timber work, and take advantage of that timber as long as it would last, and if the timber decayed, then I would propose to face it with stone.

28,180. In undertaking a great national work, I suppose you would not recommend the Government to undertake that work unless they contemplated going to a further expense in eventually facing it with ashlar ?—If it is a great national work, I believe it would be better to contemplate facing it subsequently than to renew the timber, although the timber could be renewed, and that very easily.

28,181. The timber could be renewed, and you think that would be less costly than facing with stone ?—No doubt.

28,182. You were so kind as to explain the process by which you have deposited your frames in the last model. Will you be so good as to explain how you propose to deal with them in this case ? How far apart are the frames ?—Thirty feet.

28,183. Then from the end of the breakwater up to any one frame will be thirty feet ; that is, from where the next is to be deposited. By what pressure do you deposit the next frame ?—I would attempt that with the frame complete ; but if I found that that was so difficult that the bad weather interfered with the process of depositing it, I think then I would place the timber standards alone, and then add the frame afterwards above water.

28,184. I perceive the timbers are unconnected except at the top, and by the diagonal bracing. If you were to separate them how would you keep the tops of the timbers at the required interval. I understand you would put in the two uprights and the sill pieces ?—Unless the frame was put in as a frame the sill piece would require to be abandoned. It would not be a matter of much importance in this particular case, because the rubble is tipped outside as well as inside. In fact, the principle upon which this could be done, assuming that there was any insuperable difficulty in dealing with the frames, which I am far from thinking would just amount to the plan which is adopted at Holyhead for placing their staging. The uprights that they employ there are very much larger timber than those in the model ; and they can place a whole row of them readily with very simple means.

28,185. I perceive that in this model you have a continuous sill ?—It is so represented simply to save labour in constructing the model.

28,186. The sill is to be the same sort of tie-chain that you have in the first model ?—Yes, as in the first model ; I should not attempt to make the sill all one piece of timber, because it would be too long.

28,187. What is the spread in 10 fathoms of water? —I think 64 feet.

28,188. You have no difficulty in getting timber of 64 feet in length ?—It is not difficult to get timber of that length ; but if you can employ small timber as advantageously as large, I do not see the advantage of using large timber. If you could save a farthing a foot in your timber I do not see why it should not be saved.

28,189. It is quite desirable if you make it equally effective ?—Therefore there is no reason for employing long timber. I did not say it did not cost more, but not much more.

28,190. In the case of the model before us, there is great economy of timber, is there not ?—There is.

28,191. And a great excess of rubble ?—An excess of rubble.

28,192. You consider that the facility of construction is greater by the plan represented by this model than by that shown in the last, inasmuch as here you have got a great interval between your frames ?—I think so. I think that the execution of this arrangement would be more rapid, but I do not know that it would cost less.

28,193. Do you think that in the case of framing a pier, at Hartlepool for instance, which would be a very long breakwater exposed to north-east or east gales, that you would be able to place those frames without much difficulty or expense ?—Our sea at Blyth is just the same as at Hartlepool as near as may be, and from my experience there I should not hesitate to undertake it.

28,194. I think you attributed the facility in placing the frames in the case of the first model to the proximity to each other ; here you have quite the contrary system to deal with. Would you float those out in this case ?—Yes.

28,195. But with a considerable interval from the last placed frame ?—The advantage of that interval is that the moment the frame is down you may tip rubble stones upon it.

28,196. The moment it is down ?—Yes. In the other case, as I stated, if we pursued that course we might interfere with the ground upon which the succeeding frame is to be placed.

28,197. The frames would require to be placed with considerable accuracy ?—Not the first frames. I do not consider accuracy of much moment. The intermediate frames we can place with great accuracy, with very great accuracy indeed.

28,198. But if the larger frames are not placed with accuracy the other ones would not correspond with them, because they are made to fit precisely ?—There would be no difficulty, supposing there was an inaccuracy in the adjustment of the first frames, in cutting the timbers at low water, and in renewing them; but I do not conceive that such accuracy is at all necessary. There is nothing that I see about the work that involves the necessity of it.

28,199. The frames must all be made of different dimensions ?—As far as depth is concerned.

28,200. Then of course, supposing the first frame placed, the next one going out to sea must either alter its form or must have a wider base?—Yes.

28,201. Then as you proceed every frame would be different ?—Yes, which I consider a decided advantage, because that provides for a difference in the length of the timber.

28,202. It requires much greater nicety of arrangement, every one having to be different so as to correspond with the soundings?—I do not apprehend the slightest difficulty in that respect.

28,203. Can you tell me the difference in the amount of timber employed in the two systems, the difference per lineal 100 yards?—In the plan represented by this model I should employ about 200 feet per foot run, and in that represented by the first or large model, about 270 feet.

28,204. 200 feet against 270?—Yes.

28,205. Under the same circumstances?—Under the same circumstances.

28,206. Can that be accurate looking at the materials here?—You forget that in this case the timbers do not go so far down, there is more stone and less timber.

28,207. Now, as regards economy of time, which is the most expeditious mode?—I think this would be the most expeditious mode.

28,208. Although you have got nearly double the quantity of rubble stone on the lower portion of the work?—The quantity of stone is, I should think, almost double.

28,209. How do you purpose to tip the rubble? —In this case it could be tipped through from the upper platform.

28,210. Working from the upper platform?—Yes.

28,211. Therefore your work must be done with very great nicety, in order that the tipping may follow immediately upon the placing of the frame, and keep the frame in its proper position?—I do not understand how that affects the question of nicety.

28,212. For instance, you would not attempt to place a frame until the material was over the sill of the preceding one. You would place it the moment you had got the rubble up to the previous frame ; or should you wait until the rubble had come nearly up

to where the next frame is to be placed?—It would be desirable to get the rubble upon the frame as soon as it was down.

28,213. In point of fact, you would hardly think it safe to place a second frame until the rubble was close up to it?—I do not see any danger. The surface exposed to the sea is nothing. If the frame is disturbed it would not affect the progress of the work, except as an interference with that particular frame. I should certainly try to place some weight upon that frame as soon as possible; but it is not a matter of great importance or necessity, nor does it involve any risk to the whole of the work.

28,214. You think you could depend entirely upon these comparatively large braces and longitudinals which run along?—It would be a stronger staging than any which has been employed hitherto, so far as I know.

28,215. I merely ask whether it is your opinion that the frame would keep its place in heavy gales of wind?—I do not propose that it should be so tried.

28,216. But suppose a gale of wind come on the moment the frame is placed?—The contractor would lose a small part of his timber.

28,217. And the work would be arrested?—A storm will always arrest sea works, at least any of which I have had experience. There is no staging that has ever been exposed to the sea that has not been most seriously damaged by gales of wind.

28,218. Perhaps your previous plan would not be so liable to be damaged as this, the timber being more continuous, and getting a more rapid lateral support?—I do not know; both have their advantages.

28,219. If you do not get great economy of time and money, perhaps the first plan is as good as this, if not better, as you have then more solidity—I think both have their advantages. I think this would have advantages in some situations, and the other, perhaps, in others.

28,220. You propose to creosote the whole of the timber, and the estimate provides for that?—The whole of the timber.

28,221. Will you tell me the cost per lineal yard?—I think I have stated it.

28,222. And the relative cost of the timber?—The quantity is about 200 feet per foot run in the one case, and in the other about 270 feet; 200 feet as against 270.

28,223. Now, assuming any position you please for the construction of a breakwater of either kind, and putting down the cost of rubble stone at what it would come to at that particular situation, could you tell me what would be the relative cost of the two estimates?—According to this plan as compared with the other?

28,224. Yes, at any locality you choose to select, giving the price of the material at that locality?—Everything will depend upon the cost of the stone.

28,225. Precisely. Take any cost you please at any locality you like, say at Hartlepool or Swansea?—To take a favourable case, so far as the price of stone is concerned, the model first described would probably come to 75*l.* per foot, and this which I am now submitting to the Commissioners would, at the same price of stone, that is, a low price, come to about 76*l.*

28,226. Surely that must be wrong?—In the one case the quantity of stone is increased, and in the other that of timber. They come to very nearly the same price.

28,227. The two systems come to very nearly the same price?—Yes.

28,228. Putting the economy of timber against the excess of stone?—Yes.

28,229. (*Capt. Sulivan.*) Is this estimate for the timber and rubble base and the filling alone, without any facing walls?—Without any facing walls, of course.

28,230. Have you made any estimate of what it would be faced for?—That so entirely depends on the situation. I should be very glad to do so in reference to any situation, but it so entirely depends on situation that it is hardly worth while going into the calculation except for a given place.

28,231. You said in one answer that if the timber decayed there would be camparatively little expense in renewing it?—That it could easily be done.

28,232. If these uprights decayed, or were cut off by the action of the rubble base, how would you easily get fresh frames down to the bottom through the old rubble base?—I should not attempt it. It would not be necessary, the old rubble base being there. All we want this staging for is to deposit the rubble base.

28,233. Do not I understand that if anything occurred that should injure the standards at the top of the rubble base, the internal pressure of the filling would be apt to force the whole thing out, and therefore the standards would require renewing if any accident happened?—This particular plan for frames upon a rubble mound was intended to be faced, and if such an accident occurred, and if the standards or outside frame had decayed and had to be removed, the rubble being a hard bottom, there would be no means of piling, inasmuch as the rubble is consolidated. If, however, you did pile, you would have the staging, and could apply steam power, and do it at a quarter of what it would cost to perform similar work by hand.

28,234. By steam power you would force the piles into the rubble stone?—No; in this case that is not applicable.

28,235. Therefore another system must be adopted?—I would employ something like a cage formed of timber, and loaded with stones, and lower it over the face, filling up with stone. It would constitute a renewal of the external face filled with stone, in fact, making a new face 10 or 12 feet thick along the whole face of the breakwater.

28,236. Then you would add a thick face of a new frame full of stone, as the other decayed?—I would probably. However, the better system in this case would be to face with stone at once.

28,237. Do you call that easily renewing your timber?—Quite easily.

28,238. Do you call adding a new face many feet thick formed of frames filled with stone an easy renewal of the timber of your present system?—I do, and not an expensive one.

28,239. But it is a substitution, and not a renewal?—It is not a renewal of the decayed timber. It is a substitution of fresh timber for the decayed.

28,240. The same thing would be necessary if, by the action of the sea upon the rubble base, your standards were chafed through at the surface of that base?—That is a contingency which I do not contemplate at all, and for this reason, that the rubble is 15 feet below low water, and I do not anticipate that the action of the sea would at that depth at all affect the piles; at the surface of low water and above it the action is extremely destructive. I have seen piles cut off, but at the depth that I have mentioned it will never affect them, so that that is a contingency which I do not contemplate. I may repeat again that this particular model is, when the timber decays, intended to be faced with stone, and I am prepared to show a method to accomplish that work which involves some peculiarities.

28,241. Put on one side the view which you entertain of its being a structure intended to be faced with stone, and looking at it merely as a staging from which to construct masonry walls of the ordinary class, have you made any comparison between the expense and the amount of timber used in a staging like that and that employed according to the present system for depositing a rubble base of the breadth you require, and afterwards erecting masonry on it?—A comparison of quantity or cost.

28,242. Either quantity or cost of that staging, looking at it only as a staging corresponding with the staging now used at other places?—I do not know of any case with which a comparison could be instituted, but I could do it.

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28,243. Could you not easily ascertain what amount of ordinary pile staging would be required if you constructed a base of the size you require in the ordinary way, and then compare it with the amount of wood and the cost of your framework, looking at it only as a staging from which to make a rubble mound ?—That I can do with the greatest ease, and will be very glad to send it to the Commissioners.

28,244. Do you think you can show that, irrespective of the stonework, for works of equal dimensions your framework as a stage will be cheaper than the present mode of staging ?—I do not think that the quantity of timber in this model would be less than in the staging which you might have designed for the purpose you name, but it is not only a staging. Suppose that it was required to build a wall, and perpendicular face, as I proposed to have here in this depth of water, no ordinary staging would do ; you must fill up behind that staging, or you would be exposed to the disadvantage they suffer from at Dover, where the works advanced at the rate of about 100 feet per year. If they had had a central mass or backbone to that wall, and then had to face it, that would be a comparatively simple process ; but the fact of having to build continuously from the end makes it exceedingly difficult and exceedingly slow, and therefore I should not say that it was fair to compare this framing with ordinary staging. It not only gives a power of tipping the rubble mound, which is all a common staging will do, after which you have to build from the end of the work, but also a power of, in the first place, forming a central wall, and of then facing, at a dozen different places if you please, along each side not exposed to the current.

28,245. Could not a common staging, fixed for depositing a rubble mound, after it had deposited that rubble mound, be made to answer exactly the purpose you are describing of building the walls on each side, and filling in again between them as you went up ?—The wall would be exposed to the sea without backing.

28,246. I presume that your wall, or stage and wall, as we saw in Mr. Abernethy's plan, would be exposed as it went up, unless it was filled in behind as fast as it rose ?—Yes ; but my wall would be built against the central mass.

28,247. In the same way, could not any containing walls as fast as they went up be filled in with material to back them ?—No doubt you might fill in with rubble, but the ordinary staging would not have the necessary strength. It would require to be much more strong than ordinary staging.

28,248. I want to understand whether there would be any saving in your mode of staging over the ordinary staging that might be strong enough to do the work in the way it is usually done ?—I do not, of course, know what might be constructed ; I can only say what I have seen, and I think, most decidedly, that there would be a very considerable saving both of cost and of time by employing this particular arrangement, and by avoiding the risk of a breach during the progress of the work. I have built a wall such as you have described, with stone-faced work backed with rubble, and I have had that wall swept away again and again.

28,249. Will you describe the particulars of that wall ?—It was not to be compared with a work of this magnitude. It is built with faced stones of considerable weight, and filled in with rubble at the back.

28,250. And that rubble borne solidly by some other containing wall ?—A wall on each side.

28,251. Was that wall constructed with stones of the same weight that you would put on a face like this of which we are now speaking ?—I think not.

28,252. If that objection applied, would it not also apply to the frame staging, such as Mr. Abernethy proposes, in which he speaks of several feet as left between the face and the backing until it is filled in between the wood and the stone ?—I did not see his plan, and therefore cannot speak to it ; but if I were proposing to face this work I would not leave any interval between the face work and the central portion.

28,253. You would build the face work against the timber, would you ?—I will briefly explain the process.

28,254. (*Capt. Vetch.*) We have had two models before us, models of two descriptions of work. The first one I understand to be applied to carrying out a breakwater upon uneven ground, just as the bottom presents itself, and in the one now before us you carry out the timber work, and at the same time go on depositing the material until you bring that material up to 15 feet below low-water mark, and I believe it shows the amount of rubble stones so dropped from the staging ?—Yes, dropped from the staging. The pyramidal part represents the rubble mound.

28,255. That shows the progress of the rubble work going seaward ?—Yes.

28,256. The staging is for the purpose of depositing the rubble stone in the divisions ?—Quite so.

28,257. So that will fill up the staging ?—Quite so.

28,258. I think you said that the staging uprights are 15 feet apart ?—30 feet.

28,259. Then you would have no difficulty in discharging, by tramways or by tipping from the staging, the rubble required to bring up an even bottom, which is your great object ?—I think not.

28,260. Having carried out an uniform pier, if I may call it so, of rubble work up to 15 feet below the low-water mark, you would then have the staging ready made upon which to build the stone structure ?—Well, this model does not quite represent that. According to this, the work is intended to be finished, first, as a timber pier, and to be allowed to remain in that condition until the timber showed symptoms of decay, and then, and not till then, to be faced with stone.

28,261. But if you are so disposed, having brought up the rubble mound to 15 feet below low-water mark, you might if you chose, with the staging already made, carry up the walls on either side and fill in ?—Then we should be exposed to the difficulty I want to avoid, the sea breaching the work in progress. We should be exposed to the difficulty of the sea breaking up that work while in progress ; and it would not be safe, I think, to build, except at one end, and continue, proceeding from that end. By finishing the work in the first instance with timber, I get a rubble heart up to the top, and that consolidates before the timber decays, and then I build the stone facing, removing the timber as it proceeds. There is a great difference between building at the end of the work, with the sea and tide running across, and building along the face, where the current is not much felt.

28,262. (*Mr. Coode.*) Do you apprehend you will be able to construct your work more rapidly on this plan than on that first produced ?—I think so.

28,263. What rate of progress do you assume you could make upon your second plan ?—I think by calculation it came out that we could construct and complete the superstructure of 4,200 feet in three years, about 1,400 feet of finished work per annum.

28,264. If I understand you, you do not drive the uprights or standards at all ?—No.

28,265. I think you objected to that ?—I object to driving on principle, if it can be avoided.

28,266. Wherein does your objection lie ?—There are a great number of objections. First, it is difficult to accomplish in a seaway. Next, it is expensive. It is slow compared with the placing of these frames ; and, so far as my experience has hitherto gone, it is vastly more expensive.

28,267. And liable to interruption by bad weather ?—I think so. Supposing, however, that the timber of this work decayed, then I should have no objection to piles being driven. You would just pile along each face, but then you would have the staging to work from, and no interruption from the sea, and you could apply steam power. My experience of steam driving, as compared with hand driving, is exceed-

ingly favourable to steam; I could give the exact ratio.

28,268. I do not think that is necessary; we will not now enter into that.—It is much more rapid.

28,269. You speak of the floating power of the water, or rather of the ratio between the floating power of the water and the sinking power of the frames which you would adopt in the case of your fresh model. Would you tell us at what rate per foot you have estimated the weight of the timber?—I think it is taken at 50 feet to the ton.

28,270. 50 feet to the ton, creosoted?—No, uncreosoted.

28,271. What sort of timber?—It was Memel timber. I think the calculation is taken from actual weight, but it is a year and half ago since it was made. It is Memel timber, and I have the particulars somewhere.

28,272. I should like to know the claims you advance to peculiarity or novelty in this particular model. You explained them with regard to the first, but not with regard to this?—First, there is the peculiarity of the sliding ties.

28,273. You stated that accuracy was not necessary in the position of the uprights or standards?—That question had reference to the first framing, where extreme accuracy I think is not necessary. I mean that it is not like fitting an ashler face, when you want to be within one sixteenth of an inch in line. Timber work is not of that character.

28,274. Would then these ties require to fit closely at the bottom?—I do not think it is necessary.

28,275. If they do not fit closely, how will they act as ties?—If we can get the two frames brought within an inch or two of the same line it will be quite sufficient. To that extent you require an accurate fit.

28,276. If there is an inch or two difference, there must be an inch or two of play in the uprights which you propose to let down. You propose to let the upright timbers through the openings in the solid ties?—Quite so.

28,277. You say that the fitting to an inch or two is not necessary?—I referred to the fitting of the frame timbers.

28,278. Supposing that these frames spread in a transverse direction—I mean transversely with reference to the centre line of work—how would you then propose to get the sliding ties down?—I do not suppose the small frames will spread large. I do not see why they should. In that case we have the power of making them perfectly parallel above water. With respect to the large ones, if any spread of that nature occurred, it would require to be remedied by cutting the timber, but that would only happen to one individual frame, or 30 feet of the work.

28,279. There would be a certain amount of fitting and cutting?—I do not expect there would be, but it is possible.

28,280. Would that not be necessary in consequence of some want of accuracy in the direction of the uprights?—I do not know. It can only refer in the first instance to the uprights that constitute the first staging for tipping the rubble. Suppose that we found that these uprights were displaced to a considerable extent, having a rubble mass tipped, and having the intermediate frames brought well forward, I could cut off the frame and put down an intermediate one on the top of the rubble mound. It is quite independent of what is below, and I do not apprehend that which is below adds anything to the value of the work.

28,281. How would you prevent the power of the sea lifting that intermediate frame off the top of the rubble mound?—By placing stones upon it. It has no buoyancy itself. The frames have no buoyancy, they have a considerable pressure downwards. We have no difficulty in lowering them temporarily; we have not lost a single frame at Blyth, where the coast is as bad as it would be here. They are immersed in proportion to their height quite as much as these would be.

28,282. You say the system which you first produced was not so applicable to a soft bottom as this. I see that the sills are rigid; if these sills are rigid, how are you to guard against a rupture in the case of a soft bottom?—These are not rigid; they are only so represented on the model to save labour.

28,283. You propose to use the chain tie in this instance, as well as the other?—I should prefer it.

28,284. Should you not apprehend that if a gale of wind were to come on before the frames were weighted, that the whole of that part which was not weighted with rubble would necessarily be carried away?—We should be exposed to that risk, but that is only the risk to which staging used in the erection of this kind of work is always exposed.

28,285. You mentioned Holyhead?—So far as the exposure of timber is concerned, it would be very much the same as at Holyhead, but then if the frames can be put down complete, we have the power of weighting here which they have not got at Holyhead. At Holyhead they can put no weight upon the pile, except perhaps, placing one stone at the bottom, and there is the action of the rubble against the side of the pile that cuts it.

28,286. Is there not a greater amount of horizontal and diagonal surface exposed to the sea in your plan than there is in the plan adopted at Holyhead?—I think not.

28,287. Is there any horizontal surface exposed to the action of the sea at Holyhead below the level of high water, and in your plan are there not both horizontal and diagonal timbers exposed to the action of the sea below that level?—No; I do not think there are.

28,288. Below the level of high water, the framing at Holyhead consists simply of vertical timbers?—I think so, but they are more numerous and a larger surface exposed.

28,289. Are the uprights nearer than 30 feet?—I do not know that they are nearer. I do not know. I do not remember. I cannot say. Our experience with respect to that point at Blyth has been exceedingly favourable. We find that it does not require more than a very little weight upon the frames to hold them comparatively safely.

28,290. You have already said, have you not, that your experience for working below water is confined to a length of about 100 feet in a depth of water not exceeding 6 feet?—I think the framework at Blyth is very much more exposed than this could be, for this reason, that in proportion to the weight of the frame there would be as much immersed; and, in addition to that, we have a very heavy sea running over that space where the work is erected, an exceedingly heavy or broken sea, more than I should expect would occur in a work of this depth. Although the water would be deep, the motion only extends to a certain depth below the surface. We have at Blyth as much of that as you would have in the deepest water on the coast of England.

28,291. Then it is your opinion that this work would not be so much exposed to damage from gales of wind as the work at Blyth?—In proportion to the extent of work. I am speaking of the piles.

28,292. (*Sir F. Smith.*) You propose to tip your rubble in the line of the breakwater from the framework?—From the framework.

28,293. How do you propose to deposit that portion which extends laterally beyond the line?—Either by shoots or by side tipping.

28,294. What will be the distance out to the foot of the slope in deep water?—Sixteen or seventeen feet.

28,295. Not more?—Not more.

28,296. From the line of the top to the foot of the slope?—It would be about so; and by using side tipping waggons, we should have no difficulty in throwing it out there.

28,297. (*Chairman.*) You were going into the question of facing the breakwater with stone, in your

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plan, for which you say there are some peculiarities, were you not?—Yes.

28,298. As you are resident in London, it will not be inconvenient to you that we should postpone your examination on that point, in order that the gentlemen appointed to be examined on this particular day may come before us?—Not at all.

28,299. Probably we may be able to continue your examination at a later period this afternoon, but if not, we shall meet again on Tuesday, and perhaps you will come then?—I will.

28,300. (*Chairman.*) What does the 76*l.* per lineal foot for this work include?—It includes the whole work complete.

28,301. That is, the staging for depositing rubble, the diagonals, and the intermediate frames?—Everything.

28,302. The rubble mound?—The rubble mound.

28,303. Both below low water, and filled up to above high water?—Yes.

28,304. How high above high water do you propose to fill the frame?—Right up to the top.

28,305. At what rate per ton have you assumed the rubble to be deposited?—I take the rate when rubble would be low in price; 4*s.* per yard.

28,306. What are the largest sized stones you propose to employ?—I do not think that that is a matter of much consideration. I would employ a variety both large and small; I think it is desirable they should be mixed.

28,307. Does the model you have produced represent according to scale the exact proportions of the timber scantlings?—As nearly as anything made in that way can; but I can give the exact dimensions. In some cases they are not correctly represented here.

28,308. What weight of trains do you propose to run over the work?—It would perhaps facilitate the work to employ heavy trains, but if we did so we should require to tie the baulks carrying the rails. If we were to employ trains of waggons carrying 8 or 10 tons, I should be disposed to tie those baulks.

28,309. You would add to the strength of the larger bearings?—Yes.

28,310. Would you not add to the strength of the transverse bearings in any way?—I do not think that that would be necessary.

(*Mr. Mather.*) I present a memorial from the seamen of South Shields, adopted at a public meeting.

(*Chairman.*) How many signatures are there to that memorial?

(*Mr. Mather.*) I think 449. There would have been more, but the sailors have been a good deal scattered.

(*Mr. Lindsay.*) Was that memorial left at any particular place, so that the seamen might sign it at their free will?

(*Mr. Mather.*) It was left at a place where they are in the habit of assembling.

(*Mr. Lindsay.*) And it was signed without any canvass?

(*Mr. Mather.*) They were not canvassed. It was signed of their own free will.

(*Mr. Mather.*) The conviction which is expressed in this memorial is one which has gained ground very rapidly among the class of men from whom it emanates, and if we had a little longer time the number of signatures would have been considerably increased. It is the opinion of all classes interested in these ports that they should be enlarged so as to enable ships to have access to them at all times. That opinion is daily gaining strength.

Mr. Edward Killwick Calver, R.N., Admiralty Surveyor of the East Coast of England, examined.

Mr. E. K. Calver.

28,311. (*Chairman.*) Before going into the question of the invention of the Wave Screen, we will take any examination which the Commissioners may wish to pursue with respect to the general question, because, if you recollect, I put no question to you at Hartlepool on the understanding that you would be subsequently examined in town?—I have prepared a general statement on each of the harbours, which I should wisht o read.

28,312. (*Mr. Lindsay.*) Does that statement which you are about to read bear upon the question of the silting up of the bays on the north-east coast of England, and more particularly upon Hartlepool Bay?—It bears upon the general effects which I believe will follow the execution of the works proposed to the Commissioners.

28,313. Will it bear upon the question which I asked you with regard to the supposed silting up of Hartlepool Bay?—No.

28,314. Then, if you have no objection, I would ask you, have you anything to add to the evidence which you gave on that point before the Commissioners at Hartlepool?—None.

28,315. You have nothing to add?—Nothing.

(*Chairman.*) We will now have the statement.

(*Witness.*) Before reading the statement I may mention that I have been employed on the east coast of England and Scotland for the last twenty-two years; during that period I have paid special attention to the movement of materials upon the sea coast, and the causes by which they appear to be governed. I am therefore prepared to give the Commissioners information upon nautical questions; the effects which have followed the construction of works, and those which will probably follow the execution of the various schemes brought before the Commissioners.

I have prepared a general statement of my views on the subject of refuge harbours upon the Eastern coast of Great Britain. The remarks I have to offer upon the question will have reference to the sea-board included between the Pentland Firth and the Humber, with which my experience is more immediately connected, and they will be limited to the application of a few recognized and well-established principles as a test of the merits and claims of each of the suggested sites.

Notes on the Selection of Sites for Refuge Harbours upon the Eastern Coast.

SITES.

Wick.

The case of Wick will be first considered from a general and not from a local point of view, viz.:—in its bearing upon the question of refuge for the passing trade, and apart from the special wants of the fishery of the district.

Geographical Position.—Wick, the north-eastern extremity of the entrance to Moray Firth, bears from Kinnard Head, the eastern extremity, north 68 miles; an east gale, therefore, blows dead into the Firth. A vessel in a gale, under the proper canvass, makes from four to five points lee-way, according to her quality, and the weight of the wind and sea; and it will be evident, that to any vessel near the above line, or even at some distance to windward of it, and becoming embayed, a harbour at Wick would be useless, as it would be impossible for her to reach it. Vessels often sail within this line, because their common track in westerly winds from Kinnaird Head to Duncansby Head is to the westward, or windward of it, so as to secure the advantage of what is termed a "short Firth," and, consequently, less sea. From such a position, Cromarty Firth offers a safe approach and perfect shelter, should a change of wind render it desirable, and thus, when a vessel becomes embayed in the Moray Firth, the refuge which she could not possibly obtain at Wick, is amply provided at Cromarty. As one of the proofs of the perfection of the latter harbour as a place of refuge, it is entirely free from the symbols indicative of loss in the Wreck chart, although hundreds of vessels annually seek its shelter.

Five-sixths of the cases of wreck and damage to shipping within the limits of the Moray Firth take place upon its southern shore, and probably result either from accidents while entering the imperfect tidal harbours on that side, or from being caught by an on-shore wind, while waiting for entry, and thus being placed upon a lee-shore. A refuge harbour at Wick would do nothing whatever in preventing this loss.

Although it may be proved by returns that two-thirds of the gales within the Moray Firth are from the south-eastward, which blow, consequently, directly upon the coast of Caithness, constituting it the lee-shore, that strand is singularly free from cases of wreck. This is the result of the coast not being a frequented one, being only used in general by small vessels bound to and from the harbours in the neighbourhood of Dornoch Firth, and by those bound by Tarbetness hugging the western land in westerly winds; and secondly, that when such vessels are caught by gales close in-shore, they either find shelter in the small harbours to leeward, in Portmahomack, the Little Ferry, or Cromarty, or they manage to weather the Wick land, and so pass on towards and through the Pentland Firth. If then, notwithstanding the coast of Caithness is the lee-shore in two-thirds of the gales which blow in the Moray Firth, and when a harbour at Wick might be presumed to be most required, scarcely any wrecks take place upon it, how can it be said that refuge for the passing trade is needed, and would be useful at Wick?

Much has been advanced about the dangerous character of the Pentland Firth, as bearing upon the formation of a harbour at Wick. If it is really a dangerous passage, which a vessel in south-easterly gales must necessarily run for at all hazards, and at the imminent risk of being lost, then the necessity for a harbour at Wick is apparent; but the case is entirely altered, if, by the adoption of common precaution, the Firth affords a ready escape under such circumstances.

Upon this point, the Wreck chart is very instructive. It will be observed, that only fifteen cases of wreck and damage are recorded against the Pentland Firth for the years 1852–56 inclusive, which, considering the great amount of the passing traffic, would assuredly have been otherwise, were the passage through the Firth necessarily accompanied by special danger. Too much stress is often laid upon single cases of wreck, as proving the necessity for refuge at a particular spot, whereas, if such cases were strictly analysed, and all the facts were fully brought out, it would be generally found that they resulted from circumstances which had little to do with the character of the coast, and that they had no real bearing upon the point at issue.

As respects the Pentland Firth, however, what is the fact in south-easterly gales? These winds, when opposed by the flood-stream, cause a highly dangerous sea in the Firth from side to side, but directly the tide changes, and the ebb, or lee-going stream, is fairly away, then the sea in the Firth is necessarily less than anywhere else in its neighbourhood; consequently, in the one case, the passage of a vessel could only be accomplished with extreme risk, and in the other, it is attended with no risk at all. This difference is clearly set forth in the North Sea Pilot, Part 2, where on p. 39, it is remarked respecting the Pentland Firth, that "during the "flood-stream in an easterly or south-easterly gale, it is "absolutely necessary to keep an offiing of six or eight "miles abreast the Pentland skerries until the flood-stream "has ceased. Three vessels were observed to founder on "the 18th August 1848, when attempting under these "circumstances to run against the flood, whilst others, "which kept their offing till the ebb made, effected a safe "passage to Scrabster road." This being so, any vessel crossing the Moray Firth in a south-east gale, and bound "north about," would have only to adopt the precaution of heaving to till the tide turned to enable her to pass through the Pentland Firth with safety; and it is not to be imagined that any seamen having the option, would attempt to use a harbour at Wick under such circumstances, with the chance of being locked in, when by heaving to for a few hours, he might pass through the Pentland Firth, and pursue his voyage without risk. It is true, that any vessel bound to the southward caught in a south-east gale, would be driven less out of her course by using a harbour at Wick, but this affords slight grounds for the formation of such a harbour.

Strategic Value.—The existence of Scapa Flow in the Orkneys, only 25 miles from Wick, with the several secure harbours surrounding it, forming collectively the finest rendezvous in Europe for a defensive fleet, entirely does away with the necessity for a station for war purposes on the Caithness shore. Scapa Flow is a secure and land-locked sea, with gentle tidal streams, moderate depths over good anchorage ground, offering with the harbours and anchorages about it every convenience, the most perfect security, and ample space for every class of vessel, and the most numerous fleets. The value and importance of this position in the event of a war with any of the Baltic powers is not to be over-estimated, for the chance of the western mercantile ports being successfully struck at by an expedition sent round the north of Scotland, would be materially lessened by the presence of a defensive squadron stationed in the Flow. The latter would be in connexion by telegraph with all the principal signal stations in Orkney, Zetland, the North of Scotland, and the Western Isles; and as the Flow possesses outlets to the eastward, southward, and westward, upon the first intimation of the presence of a hostile force the squadron could slip and follow it immediately, irrespective of the circumstances of tide, wind, and weather. It would not be easy to find a place possessing more completely all the important requisites for a naval rendezvous in time of war.

Wick bay, on the contrary, has a restricted area, which, except in the winter months, would be always required and occupied by the fishing boats and trading vessels of the district. Besides, everyone who has witnessed the nature of the sea sent home to the bay in easterly and south-easterly gales, must be aware that no vessel in Her Majesty's navy, with her guns and weights on board, could steam against it, let the necessity for quitting the bay under such circumstances be ever so urgent; and thus, while an enemy passing round the north of Scotland could be instantly followed by a squadron in Scapa Flow in any weather, another stationed in Wick bay might be locked in, and unable to move.

This exhausts the nautical aspects of the question, so far as general purposes are concerned.

Its Necessity.—The claims of Wick are really confined to its herring fishery, which is of a most extensive character, employing, as it does, from 1,000 to 1,200 boats, and about 6,000 men. A first requisite for the safe and successful prosecution of such a branch of industry evidently is accessible shelter in the immediate vicinity of the fishing grounds, to which the boats may resort on the first indications of a storm; and this they are nearly destitute of. Wick harbour, from whence the boats principally fish, is nearly dry at low water; the neighbouring creeks and harbours are too small to be available, and Cromarty Firth, at times attained by vessels in on-shore gales, is out of the reach of fishing-boats encumbered by nets and fish, and with their gunwales only a foot above the water. Losses frequently take place from the want of shelter, and they would be of still more common occurrence were it not that the boats remain in harbour in uncertain weather to ensure their safety, often to their serious loss and disadvantage in other respects. The want of shelter must be apparent to all, and it is unnecessary to enlarge upon it here.

The claims of Wick for assistance are as great as its necessity. If the saving of life be of the first importance in a national point of view, it is manifest that in this case it is exposed to special risks; and till a remedy is provided a wholesale loss of life and property must be always impending. It has also been fairly urged in favour of Wick that its fishery, employing men drawn from all parts of Scotland, and even from England, and increasing, as it does, the imports and exports of the country by a large amount, partakes more of a national than of a local character; and if it be right that the wants of every section of the sea-going community should in turn be cared for, then, as the case of the seamen employed in the foreign trade may be said to be provided for by the formation of the Channel refuge harbours, and that of the coasting trade will be met by the proposed harbour on the north-eastern shore of England, so should the fishermen, in like manner, be assisted by the erection of a refuge-harbour in the north of Scotland.

Nature of the required Harbour.—A harbour is required at Wick for the shelter of fishing boats; it should be easy of approach and entrance, and should afford perfect defence for the boats and small vessels using it. As it would not be required as a place of refuge for the passing trade, there would be no need to project it with special reference to such a purpose.

Looking at it from every point of view, I am clearly of opinion that a projection somewhat approximating to the designs furnished by the Messrs. Stevenson, and the late Messrs. Rendel and Bremner, would answer all necessary purposes.

There is much reason to fear, that any attempt to enclose the bay by upright-wall breakwaters from 12 feet below low-water mark, projecting from either shore, with an opening between them 500 feet wide in the centre of the bay, as indicated by the works A B and C D in the lithograph appended to the Minutes of Evidence taken before the Select Committee of the House of Commons, or by those on a more extensive scale, as L M and N O on the same plan, would result in failure. A fair following sea is an absolute necessity for a boat; with broken and confused water her safety is jeopardized every moment, for she no sooner rises to one sea than she runs the risk of being swamped by another topping her gunwale from a different quarter. Now it is to be feared that the heavy sea which sets into Wick bay would, on meeting the transverse solid work "full butt," be reflected from its face, and cause a confused and broken sea; harmless, perhaps, to a vessel of length and burden, but exceedingly dangerous to one of smaller size, and to boats. The

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width of the proposed opening, ample though it be, would not have the effect of preventing the formation of such an impediment in front of the entrance, and I have no doubt, after fully reconsidering the subject, that the evidence I offered upon it before the Select Committee of the House of Commons was essentially sound.

The work to protect the bay should begin a little within the south head, but be detached from the shore, in order to afford an escape from the destructive batter of the pent sea, and a southerly outlet for the boats in fine weather. From this, its southern terminus, the work, following, as near as may be, the six-fathom low-water depth, should extend with a gradual curve to the north-north-eastward and northward, and then, doubling in more rapidly, should leave a principal entrance into the bay between the northern end of the work and the northern shore. I have marked the suggested work in red on the accompanying lithograph. Among its principal advantages, such a projection would admit of the existence of a fair sea in the entrance, and of the safe passage of boats; it would cover in the whole of the body of the bay, and render it available for refuge; while, owing to the protection afforded by the Head of Wick and Proudfoot, the entrance would be in comparatively smooth water in easterly and north-easterly gales. The sea that would pass round the extremities of the work would run high upon the shores to about the positions marked A and B, but within these points it would be much less than it now is, owing to the comparative quiet that would be established over the body of the bay, and it would occasion but little detriment to properly constructed works along the foreshores for the purposes of the fishery.

Peterhead.

The geographical position of Peterhead has much in common with Wick, and the refuge illustrations already given in connexion with the latter place admit of a nearly common application to both.

The evidence I gave upon the subject of Peterhead before the Select Committee of the House of Commons, and which, after further consideration, I have no wish to alter, was briefly as follows; viz., that Peterhead being at a salient portion of the coast, where vessels with the slighest offing have the Firth of Forth and Cromarty Firth available to them in north-easterly and south-easterly gales, and as a vessel must be very close inshore to constitute the shore a dangerous one, a harbour at Peterhead would be comparatively useless for refuge, and I could not recommend any public expenditure for such a purpose.

This appears to be the broad fact concerning Peterhead, to which all others are greatly subordinate, and it deprives Peterhead of any just claim to be considered a site directly useful for the purpose of saving life and property. In one respect also the necessity for refuge at Peterhead would appear to be even less than at Wick, for whereas the Pentland Firth in south-easterly gales is closed against the passage of vessels during the continuance of the flood stream, and they are consequently obliged to hang out in the offing abreast Wick until the stream turns; no such impediment occurs at Peterhead, for a vessel can round it to the south-westward or westward before a north-easterly or south-easterly gale at any period of tide, and with nearly equal safety.

It has been said that many of the wrecks which take place upon the coasts between the Firth of Forth and Peterhead, and between Cromarty Firth and Peterhead, are those of vessels which could and would have sought refuge at Peterhead had it been provided there. The correctness of this statement can only be determined by a careful analysis of the wreck registers; but even allowing some of these cases to be established, it will be evident on comparing the aggregate loss on the coasts alluded to, with what it is on many sections of the east and west coasts of England, and the east coast of Ireland, that the claims of Peterhead of being indirectly useful are comparatively very small.

It has also been advanced, that the case of Peterhead is not greatly different from that of Holyhead; the harbour at which place is not sought by vessels for the purpose of refuge, so much as to avoid the risks and inconveniences connected with their being kept beating about at sea in adverse winds. The truth, however is, that the cases have little in common, and the comparison fails in one important and essential particular. A vessel neglecting the shelter of Holyhead has, on the occurrence of an on-shore gale, only the dangerous sands about the Dee and Mersey awaiting her on the one hand, or more dangerous embayment in Caernarvon bay on the other; whereas, a vessel may drive or pass to leeward of Peterhead on either side with impunity, having the Firth of Forth or Cromarty Firth under her lee, available at any moment.

The merit of a site for purposes of refuge may be viewed under two aspects; in some instances its value results from the dangerous character of the coast about it, while in others, it follows from its usefulness in preventing the safety of vessels from becoming jeopardized from their being kept at sea, or driven back upon their course by heavy weather. It is clear to my mind, that Peterhead does not possess the shadow of a title under the first head; I also believe that its claims under the second head are not such as to warrant an outlay of public money in the manner proposed.

It may be true that a large harbour at Peterhead would be exceedingly useful as a place of call, it might also be valuable as a place of stoppage in preventing vessels being driven far out of their course; but these are purely mercantile considerations, which have no necessary connexion with the question of refuge for the salving of life and property; and to supply Peterhead with additional accommodation at the public expense on any such pleas, would be, in fact, only to give it a commercial advantage over the neighbouring and competing ports.

The statements I made in evidence respecting the character of the suggested site, "that the water is deep, the "anchorage space small, and that it would require a con-"siderable outlay to form a harbour there," and which I have no doubt will be confirmed by the information acquired by the Commissioners, I need not further allude to here, as the mere fact of adaptibility of site is entirely subordinate to the question of the necessity for such a harbour.

I do not give a separate consideration to Fraserburgh, as its nautical characteristics, in their bearing upon refuge for the eastern coast of Scotland, are practically the same as those of Peterhead.

North-east Coast of England.

Bar Harbours as Places of Refuge.—The decision of the Select Committee of the House of Commons respecting the north-eastern coast of England, viz., that a harbour on a large scale is required to the southward of the principal coal ports, has been followed by a movement of the communities of those ports, having for its object the improvement of the present harbours, as all that is necessary to meet the requirements of refuge upon the coast. It will be well, therefore, to inquire into the soundness of such views, and whether it be possible to supersede the necessity for a single harbour of large size by any such means.

It is important to understand what are the requirements of refuge on such a coast as this. It is evident that the necessity must be measured by the largest description of vessel that frequents the coast; for whether light or loaded, they are as likely to become embayed, and to require refuge as the smaller ones. To stop short of this, and only to provide a retreat for light vessels bound to their ports, when loaded vessels, on quitting the latter, are subjected to a more than double risk, would only partially meet the case, and a large proportion of the vessels would be still exposed to wreckage and loss. A refuge harbour on the north-east coast of England, therefore, should at least be capable of admitting vessels of 20 feet draft at every stage of the tide; indeed many of even a greater draft, proceed to sea at high-water springs from the several harbours.

The harbours on the north-east coast of England are impeded at their entrances by bars of sand or similar material; and without here entering into a detailed explanation of the causes which have produced the feature, it will suffice to say, that on the coast in question, it arises from the action of the sea driving the material of which the shore is composed in the direction of the preponderating sea-stroke, the result of which would be the formation of a continuous beach across the entrance, were it not that the flow and reflow, due to the river, act as an opposing force; there is, in short, a perpetual contest going on between the effort of the sea to shut the entrance up, and a corresponding effort of the passing waters to keep it open. It therefore follows, that as the heaping power of the sea may be considered a fixed quantity, the size of the channel over each bar, as respects width and depth, will be determined by the proportion the power of the river bears to that of the sea. This is exemplified in the cases of the rivers of the district, where, for instance, the channel into the Blyth has a low-water depth of one foot, the Tyne about seven feet, the Wear three to four feet, Hartlepool three feet, the Tees eight feet, and so on; quantities which fairly represent something like the comparative sizes of these rivers, &c. Now, as the necessity for refuge may occur at or about low-water, it will be evident, that unless it be possible by artificial means to very materially increase the depth over the bars of the harbours upon the north-east coast, they never can afford the amount of refuge required, and which it is the object of the Commission to establish. Is it then possible to improve them to such an extent? *for the matter of depth is the vital point as respects refuge.*

The power of the sea to heap up obstructions is not affected by remedial measures; and the use of artificial works is nearly limited to the conservation of the power of the river, in other words, the narrowing of the area of its operation, that so, by increasing its force relatively to that of the sea, it may be more efficient for overcoming obstructions, and the direct result is, consequently, an increase of depth over the bar. All experience proves, however, that the utmost possible extent of improvement is confined to a small increase over the original capacity, and instances might be adduced where, after centuries of exertion and ample expenditure, the result has only afforded examples of the folly of attempting that which, in the nature of things, is impossible. Notwithstanding this experience, however, the expressions "removing the bar," "doing away with the bar," and "getting beyond the bar," are still frequently met with in documents recommending works, although it is clear that a bar is a condition of the existence of the outlet of a river which works can never remove, and can barely modify.

Confining myself to the north-eastern district for examples, Sunderland harbour is a case full of instruction; there the authorities, with a commendable energy, have been engaged in pier-building for upwards of 130 years, and the structures they have reared are alike creditable to constructive skill and to the enterprise of the port, but the gain, as regards depth at the entrance, has been exceedingly little. In Grenville Collins' chart of the port in the middle of the 17th century, a depth of two feet is shown on the bar; in Burleigh and Thompson's map of 1737, the depth is three-fourths of a foot, but as this depth, according to an explanatory note, was that of the "lowest ebb of a high "spring tide," the former quantity, two feet, may be safely accepted as the low-water depth upon the bar of the Wear while it remained in its natural state. Now the depth varies from 3½ to 4 feet, so that 1½ foot to 2 feet additional depth over the bar represents the gain in upwards of a hundred years, and the effect of extensive and costly works, for the great improvement of the port itself has not been due so much to the direct effect of the piers, as to deepening and cleansing operations within, by which the Stell Canch and other obstructions which were dry at low water have been removed, as will be seen by reference to the old plans of the port. It is, however, far from my intention to assert that the erection of the piers has not been followed by benefits commensurate with the outlay, or that additional works are unnecessary at the mouth of the river, but only, that as respects an increase of depth, the works hitherto executed have been nearly fruitless.

Take one more example, that of the Coquet Island. The necessities of the district requiring that some attempt should be made to improve it, works of an extensive character, involving a large outlay, were entered upon, the effect of which, as described by their projectors, would be "to render "the port equal to the Tyne and superior to the Wear, and "to maintain at the entrance a depth of from four to six "feet at low-water springs." I visited the harbour several years after the works had been carried out, and their effect fully developed, when, instead of a free and unincumbered approach as was predicted, an all but dry bar, of a horse-shoe form, extended across the entrance from pier to pier.

That the system will always so fail in materially reducing a bar may be expected when it is remembered that the extension of piers does not destroy the heaping-up power of the sea, but only transfers its operation to a more advanced position, and the extended works become, consequently, progressively charged on their exterior sides by an accumulation of soil, because, like groins, they will intercept the coast drift already alluded to, and thus prove the direct cause of the ultimate obstruction. This heaping-up process is clearly illustrated by the valuable series of plans attached to Mr. Murray's account of the improvement of Sunderland harbour, from which it will be seen that every extension of the north pier (the side from whence the drift arrives) has been followed by a corresponding extension of the flanking sand, and now the sandy low-water margin of spring tide ranges outside the north-pier head, which was built, so recently as 18 years ago, in a low-water depth of four feet and upwards. Every advancement of the piers having thus been steadily followed by the abutting sand, and by the bar, shows that wherever the actual mouth of the river may be established by the protrusion of works, nature will gradually accommodate herself to the new arrangement; the soil which is being constantly moved forward by the direct and oblique strokes of the wave will find a resting place, and be upheld by the works; and in the end, the bar will be formed at their terminations as before, with only the additional capacity to the channel over it, which is due to the extra impact of the coast streams upon it, and to any increase of power which may have been given to the river outset by the extension. Opinions may differ as to matters of detail in the projection of works, and the exact effect to be expected from them, but experience affords no warrant for the proposal to do away with the bar, or to get beyond it. I drew attention to this subject in my Treatise on Tidal Rivers, published upwards of five years ago. I therein remark, p. 96,—"It is "useless to project piers at the mouth of a tidal river with "the view of getting beyond the bar; wherever the outer "ends of such works are placed, the bar will still be found "in front of them. The intention, therefore, can only arise "from the want of a due regard to the cause of the "existence of the feature."

The advocates for extension state that the bar is the result of the pier-heads ranging with the line of beach, or foreshore, and that if the piers were advanced well into the sea, into what is termed a "natural depth," there would be no bar; but the natural depth alluded to is simply due to the unobstructed passage of the tidal streams along the coast, and the absence of a nucleus for the collection of soil in motion, which favourable condition would be done away with by the extension of piers, and there would be no means of preventing the latter being finally skirted by a beach or flat. The evil might, of course, be postponed for a considerable period, as the time necessary for its accomplishment would depend on the amount of moveable material and the extent of the works.

It is also urged by the advocates of extension that the sea has no propelling power at a greater depth than three fathoms at low-water, the depth at which it is proposed to establish the outer ends of the works; but such a supposition appears to be opposed to general experience. It is, for instance, anything but an uncommon occurrence for live shell-fish to be driven on shore in gales of wind round our coasts from greater depths than five fathoms. It was also ascertained during the North Sea survey, conducted by the present Hydrographer of the Navy, that shingle was moved from some offing ridges, through a depth of about twelve fathoms, towards the shore. Vessels sunk in depths of from nine to thirteen fathoms have occasionally broken up in gales of wind, and many other examples of a like character might be adduced to show that experience is against the above assumed limit to the sub-action of the wave upon the eastern coast of England.

I would refer once more, but very briefly, to my Treatise on Tidal Rivers, that the Commissioners may see that what I now advance respecting bar harbours is entirely consistent with my former views upon the subject. At p. 98 of that work I remark, "Each example of a river out-"let must be treated upon its own merits, yet in the appli-"cation of piers for improvement, it will be found in the "majority of cases, that *the first step is to accept the natural "position of the bar.*" I was then, and am still of opinion, that the advance of a bar seaward is objectionable, because, among other reasons, its frontage would then be comparatively steep, for like points upon a seaboard, the impact of the coast streams upon it would be more decided, and the additional sweep to which it would be exposed would give it a more sudden fall, and, as a consequence of this abruptness, the deep-water undulation which had been formerly gradually reduced by an easy slope, would arrive at the bar with its height undiminished, and when opposed by the ebb, would cause a far higher, hollower, and weightier sea than at present.

As the hollow and bursting character of the sea upon a bar during the ebb would be aggravated by improvement works, especially during freshes or floods, it is evident that river outlets are inseparably connected with a drawback which entirely unfits them for havens of refuge. Respecting these freshes or floods, it is worthy of special remark that they generally occur in easterly gales, adding to the dangerous character of the bar harbours at the very time they are required for refuge. Mr. Thomas I. Taylor, in his work on the "Improvement of the River Tyne," remarks, on p. 29, "For the last thirty miles of the course "of the Tyne and its affluents, there is seldom much fall "of rain from the south-west; the very heaviest floods of "the Tyne have, therefore, been accompanied by north-east "winds. Such was the case with the great flood of 1771, "which carried away the old bridge of Newcastle, and also "with many other high floods of the Tyne. The bleak "Scandinavian wind occasions in Northumberland, *in a "given time*, a more general and abundant precipitation of "moisture than any other," . . . . because, "owing to its "low temperature, it condenses the vapour contained in "our milder atmosphere," &c.

In confirmation of the above I may remark, I have been informed that the largest amount of damage done by a fresh in the Wear (when unaccompanied by ice) occurred in an easterly gale about twenty-five years ago, when the whole of the tiers in the lower part of the river broke adrift; the loaded vessels grounded on the flat, and, by forming a complete barrier across the harbour, dammed

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back the waters to the height of several feet. Vessels and keels were also driven out to sea without anyone on board them, and were then cast ashore and wrecked by the gale.

The same fact of an easterly wind, accompanied by much rain, was illustrated so recently as the 25th ult. On that day there was a strong south-easterly gale, with nearly constant rain, and on the following morning a heavy fresh was setting out of the Wear; so that had the wind backed easterly and northerly, as is often the case, a sea would have been created sufficient to endanger any vessel attempting the port for refuge.

The great desire which now prevails for the improvement of the north-eastern harbours is most natural; extensive works have been designed for the mouth of the Wear, and others of still greater magnitude are in progress at the entrance of the Tyne; but experience teaches to little purpose if it cannot be applied in foreshadowing the result in cases like the present. There appears sufficient ground for believing, that whether the entrances to the Tyne and the Wear be attempted to be improved by the extension of one pier, or of both, or by others curving like embracing callipers in front of the ports, the result in either case will disappoint expectation, and the same lesson will be conveyed that has been worked out in other places, that a limit has been placed to the improvement of the depth in the entrances to tidal rivers, beyond which it is impossible to pass.

I mentioned in my evidence before the Select Committee of the House of Commons that considering the increase of the effective scour and the impact of the coast streams which they would occasion, it might be possible to obtain, by improvement works, a low-water depth of 10 feet* over the bar of the Tyne, or about a third more than it has at present. Such a depth, however, would be quite inadequate for the purposes of refuge upon the north-eastern coast of England; for no harbour of the sort, to be adapted for the reception of a vessel of 20 feet draft at every period of the tide, and making due allowance for the send of the sea, should have a less depth than from five to six fathoms at its entrance at low-water springs.

If the opinions I have expressed be sound, it would manifestly be a waste of public money to bestow it for the improvement of the entrances of the north-east tidal harbours, to adapt them to a purpose for which they are altogether unfit. Any alteration in them could only have a local value, and should be carried out by local funds; but whether it might not be a far-seeing policy, and a wise financial measure, to advance money at a low rate of interest for their improvement to the greatest possible extent, is altogether another question, and quite beside my province to discuss.

The North-east Embayment, and a Harbour at Hartlepool.—All that I can offer upon the subject of embayment, and the need of refuge which results from it; that Hartlepool is conveniently situated for the purpose at the head of the north-eastern bight, at an easy tide's sail south of the large coal ports, and possesses a free and unincumbered site, will be found in my evidence before the Select Committee of the House of Commons, and in the Appendix No. 1 to the Minutes; it is therefore unnecessary that I should repeat it here. I observed, however, that in the subsequent examination of witnesses, reference was made by the Committee to what was termed "Mr. Calver's Theory of Embayment," although any practical seaman will be aware that what is termed my "theory" is nothing new; it is, for instance, declared in express terms by Admiral Sir James Ross and Capt. Sheringham. Nothing, I think, can more clearly indicate the merits of the case than the foregoing evidence; and if it were necessary to define the value of a harbour upon a point, as it respects refuge, it could only be characterized as a place which could be used before refuge was wanted, but which could not be reached after it became a necessity; and a mistake in position in such a case would be materially aggravated, when the necessities of trade led the vessels into the bight which caused the danger. I shall not dwell upon this point longer, and I would not have referred to it so frequently in the course of making these notes, were it not that it is to the principle in question that all pleas of necessity for refuge must be brought as to a touchstone.

But although it is needless that I should add to my evidence, pointing to Hartlepool as the most valuable refuge site between the Firth of Forth and the Humber, I would offer a few words in explanation of it, the accuracy of my statements, as well as the consistency of the views I have at different times expressed, having been called in question.

The objects of inquiry before the Select Committee of the House of Commons were, the necessity for refuge for life and property, and the places where to supply it; and my various replies, therefore, bore directly upon and were nearly confined to these two points. I mentioned (Reply 2312) that the greatest loss actually resulting from the want of refuge upon the north-east coast of England, takes place in gales from "east "by north, that being the direct embaying wind;" and also (Nos. 2314, 2240) that in gales from south-east, "refuge is not "required; then there is a fair and free outlet without any "difficulty," because "a south-east gale is not an embaying "wind." It has been objected that this is not correct in fact, inasmuch as the heaviest loss takes place in south-east gales. That a large number of vessels are lost occasionally in south-easterly gales, I am well aware (and I alluded to it in evidence), not because a south-east gale is necessarily a dangerous wind, and refuge from it is required, but as I stated (No. 2263), because "men will sooner risk their ports "when they are dangerous, than pass them," and obtain shelter in Holy Island harbour, or in the Firth of Forth, as it would be in their power to do. The evil, then, of the large coal ports being the "centre of a great crop of wrecks," I go on to state, in so far as it results from vessels seeking shelter in south-easterly gales, would be prevented by the establishment of an efficient harbour at Hartlepool. I am aware that it is denied such a result would follow; but I feel confident that when it became a question between twenty-four hours detention at Hartlepool, and the imminent risk of the loss of the vessel, the recklessness which is now so common would give place to the prudent dictates of self-interest.

The exact line of embayment in the lithographic plan intended to illustrate my evidence, has also been objected to. This line, however, was not projected by me without due care, for its northern termination is at North Sunderland point, where a vessel has Holy Island harbour available, and to the southward it ends at Robin Hood Bay; because I am of opinion that upon the coast south of that point, no necessity for refuge can arise, unless the commonest precautions be neglected, or except in the extreme case of a sudden gale catching a vessel very close inshore. It has been suggested, that to have reference to local traffic "the line should have been drawn from the mouth of the "Tyne to Robin Hood Bay, and to embrace the general "traffic it should extend from the outermost Farn Island to "Flamborough Head;" but, in reality, no such nice distinction can be drawn in practice. For instance, the coal fleets on leaving their ports in moderate weather, but with a foul wind, often stretch to the eastward, or outside the embaying line, while the passing trade in westerly winds are often sailing to and fro for weeks within it. Any attempt of the sort would only lead to a labyrinth of difficulty and probable misdirection in the end, and, evidently, the only safe way of treating the question is to consider the north-east embayment as one great bight bounded by one general and containing line, within which vessels using the coal ports or coasting must or may pass and be exposed to the risk of becoming embayed. An allusion was also made on the same occasion to a statement of mine, that "vessels would "keep an offing and pass on to the Firth of Forth, were it "not for the existence of the coal ports," a statement which had reference to the north-easterly bight in south-easterly gales, and not to vessels forced into it by gales dead on without the means of escape, as was suggested.

One more point in explanation. In reporting to the Admiralty on May 31st, 1855, upon Mr. Rendel's proposal for the mouth of the Tees, I recommended it so far as the north breakwater was concerned, because "it would render "unnecessary a large outlay at a neighbouring site (meaning Hartlepool) to secure a similar advantage, and where "there are physical drawbacks which do not exist in the "present case." There has been some misapprehension with regard to the expressions "large outlays" and "physical drawbacks," which have been understood in a sense they were never intended to bear, for they had reference only to Mr. Rendel's proposed close harbour there, which I had just previously been reporting against; and that they were not used by me to imply any drawbacks as actually pertaining to the site is clear, for in the same report I suggest a covering work for the protection of the bay, that "a permanent harbour of refuge might thus be obtained at "Hartlepool without incurring any of the risks involved "in the scheme reported against." One reason, among others, which led me to believe in the danger of forming a close harbour there, was the accumulation of foreign matter which had taken place in the body of the bay subsequent to the Admiralty survey of 1838, but whether the increase was temporary or otherwise will be learnt with certainty from the periodical examinations made by the haven-master, and from the investigation now being made by order of the Commissioners.

There can be, in my opinion, little doubt that, whether as respects its geographical position, or the character of its

* I may mention that this estimate had reference to Mr. Walker's original projection.

frontage, Hartlepool offers superior advantages to any place between the Forth and the Humber, and I have no hesitation in repeating what I have already stated in evidence, that "nearly all the loss of life and property which now "takes place in the north-eastern bight from actual stress "of weather," might be prevented by the establishment of a large refuge harbour at the head of Tees bay, abreast Hartlepool.

FILEY.

If only one harbour for saving life and property is to be formed upon the north-east coast of England, there are several reasons why a harbour at Filey should not be allowed to enter into competition with one at Hartlepool.

First. As in the majority of cases, on-shore gales find vessels generally distributed along the line of track between the coal ports and Flamborough Head, a harbour of refuge at Filey would be useless to nine-tenths of them, and they would, consequently, be forced into and become wrecked within the line of the north-east embayment, just as they are at present.

By adopting timely precaution, vessels caught in on-shore gales between Whitby and Flamborough Head, would (except under very exceptional circumstances) obtain the shelter of a harbour at Hartlepool.

A harbour at Filey would only (in reality) be a stopping place, whereas a haven at Hartlepool would be one of refuge, and directly useful for the salving of life and property.

Secondly. A harbour at Filey, from being necessarily projected on the principle of a prolongation of the "brig," light vessels caught short of their ports and forced to bear up in north-easterly and northerly gales, could not enter it, and they would be forced to pass on to Bridlington Bay, as at present. It is quite clear, that light colliers under small canvass, which never make less than about four points leeway, would be unable to fetch into the projected harbour in any wind to the northward of east.

From being so projected, conditions would be established eminently favourable to deposition upon a coast where the waters are always highly charged in blustering weather, and there would be a rapid accumulation of matter. The projector of Filey harbour in his report recommending it, remarks "there is no tendency to sand or silt up." This is quite true, and the statement would, no doubt, be applicable for centuries to come, provided the disturbing and transporting power of the wave and tide-stream were not interfered with, but once intercept them, and accretion will follow immediately. It will be apparent on referring to the depths on the plan, that a few feet of deposit would destroy the site for refuge purposes.

Thirdly. When the necessities of the north-east coast were provided for by a harbour at Hartlepool, if it were judged expedient to form another in the neighbourhood of Flamborough Head, Bridlington Bay should be preferred for the purpose, as it would render secure one of the most frequented anchorages upon the eastern coast; which anchorage, if it were defended by a covering work upon the Smithic, would never fill up; which would have the advantages of great space and an inner harbour; and which, while it would be of the greatest service to light vessels, would doubtless be reached by and afford security to many of the loaded ones, which are now occasionally forced to hover under the protection of Flamborough Head in scant south-westerly winds.

The summary of my opinion upon the refuge question, so far as the choice of sites upon the eastern coast is concerned, is, therefore, as follows:—

That a refuge harbour is urgently needed at Wick, as a security for the thousands of lives as well as for property, which are so much exposed in its important fishery, the largest in Scotland.

That a harbour either at Fraserburgh or Peterhead would not be useful for saving life.

That bar harbours are, and must ever continue to be, nearly entirely unfitted for refuge purposes in cases of extremity.

That a harbour at Hartlepool on a proper scale, projected and constructed upon correct principles, would afford refuge from stress of weather to the loaded vessels now commonly embayed and lost, with many of their crews, within the line of the north-east embayment, and even to as far as Flamborough Head. It would also receive light vessels caught short of their harbours, a circumstance of frequent occurrence; while the establishment of such a harbour would render unnecessary the risks which are now run by light vessels in pushing for their several ports in south-easterly gales.

That in no case, so far as the saving of life is concerned, should a harbour at Filey be allowed to enter into competition with one at Hartlepool; and that if it were required to form another harbour in the neighbourhood of Flamborough Head, it should be established in Bridlington Bay, for reasons stated.

Such are my opinions upon the subject now being investigated by the Commissioners. I mentioned in the beginning of these notes that they resulted from the application of a few recognized and well-established principles to the respective cases. They are principles to which I have always submitted every question of a like nature which has been referred to me for my opinion, believing, as I do, that a steady application of them to each instance, unless there be some local peculiarity in a case to constitute it an exception to the general rule, contributes to render a decision easy, as well as sound in character. A brief statement of them may, therefore, perhaps, not inappropriately conclude these remarks.

1. A refuge harbour, for saving life and property, may be defined as one with a free and unincumbered approach; having its position well marked from the offing by the character of the adjoining shores; so projected and constructed that its capacity shall be permanent; and also that vessels of all descriptions, from the largest downwards, that frequent the coast, may be able to enter and ride safely within it, under every possible circumstance of tide, wind, and weather.

2. Refuge is required when a coast is dangerous, which can only be so considered when the shore forms an indenture, and exposes vessels from stress of weather to the risk of becoming embayed without the means of extrication. The need of refuge in such a case is increased in proportion to the number of vessels and men employed upon the coast.

3. The head of a bight is the proper position for a refuge harbour, for the one simple and paramount reason, that vessels can reach it from nearly every part of the bight, when the latter is rendered dangerous by the wind blowing into it either directly or obliquely. An asylum harbour, placed in any other part of the indenture would, on the contrary, be only partially available.

4. A harbour upon a point or salient portion of a coast is not needed for refuge, because a vessel's necessity in on-shore gales begins only when she is actually within the line joining the horns of a bay, or, in other words, to leeward of the point. The fact, therefore, of leading a vessel from the offing down to a point, is to induce her to exchange a position of safety for one of comparative danger, because the operation of closing and entering any harbour must always be attended by circumstances involving a certain amount of risk.

5. A harbour upon a point would be indirectly useful for refuge when it can be clearly proved by *bonâ fide* returns, that vessels passing the point from stress of weather have afterwards become wrecked upon the shores right and left of it, either from the wind backing out and placing them upon a lee-shore, or from obscurity of weather, or from the various mistakes incidental to navigation.

6. As refuge, to be worthy of the name, must always be available, whatever be the circumstances of tide, wind, and weather, bar harbours are not fitted for the purpose, nor can they ever be rendered so. The low-water depth over the bars in this country varies between six and eight feet as a maximum, and two and three feet as a minimum, depths, which experience proves can never be materially increased by artificial works. As the necessity for refuge may occur at low water, it is evident that at such a time these shallow inlets offer no escape for vessels of the smallest class, nor do they afford any to the larger ones, even at high-water. Bar harbours are also subject to another inconvenience peculiar to themselves, namely, the dangerous breaking sea caused by the ebb-outset.

The foregoing observations embrace all I have to offer, and I have to apologize to the Commissioners for the length to which they have been extended.

28,316. (*Chairman.*) There is a question that I should like to ask you with reference to the plan which I have before me, which I find in a report of a committee of the House of Commons, showing the line of embayment. I see that transverse lines, which show the distances between it and the several ports, are drawn from it to a line along the coast. What is that line?—The line of 10 fathoms.

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Chairman.

28,317. Why is 10 fathoms selected?—A safe offing abreast each port.

28,318. Because 10 fathoms is a safe offing from the ports. Is that it?—No.

28,319. Why is this 10-fathom line selected and drawn upon this plan?—It is to show the depth of the offing at each of those ports between the line of embayment.

28,320. Because you see that if the line of the Tees, for instance, was drawn home to the shore, it would show that the mouth of the Tees is equally embayed with Hartlepool, but at present the plan shows that Hartlepool is more embayed than the Tees?—That depth of 10 fathoms laid down there is the position in which vessels would be that were hovering, about to enter the several ports. I thought it better to project the transverse lines to some definite line of that sort than to do it in any other way, which perhaps might meet with some objections.

28,321. You thought that was a better mode than projecting the transverse line to a depth of water, say 5 fathoms, or whatever it might be, in which the mouth of the harbour of refuge would be placed?—At the time I projected those lines I had no definite schemes before me, and I thought it was a safe plan to prevent any objections being made.

28,322. With reference to the plan of Wick Bay, upon which I see marked in red your proposed breakwater, I notice that it is curved in a bit to the northern and southern extremities. In your evidence you said, I think, that you were of opinion that the sea between the points B and C would be a cross sea from the shape of the proposed piers?—That was so.

28,323. Will you explain to me, if you consider that the form of your breakwater is more favourable for the prevention of a cross sea?—It is favourable because it offers no direct line of resistance to the action of the reflected or reverse sea. The sea meeting that work at a time when a refuge might be required instead of being reflected from it and run along it, and would be projected a certain distance from the end; but it would cause nothing like a confused sea.

28,324. Then, generally speaking, you would say that a bell mouth is favourable to a fair sea in the opening?—A bell mouth formed by an artificial work on each side I should not recommend there. There are several important reasons why a bell-mouthed entrance, so constituted, should not be attempted at that place.

28,325. I mean with reference to the sea, because this is laid down upon the plan as a bell mouth?—As a broad principle I would say that a bell mouth as therein arranged is the better.

28,326. It was simply with reference to the sea that I was speaking?—A bell mouth is better with one side formed by the shore ledges, from which there can be no reflected sea.

28,327. Your idea is that the sea runs along the pier, and does not interfere with the sea in the opening?—It does not; the practical effect of a bell mouth of an acute angle is to cut off a certain section of the undulation, and to admit of that undulation advancing in an undisturbed course, whereas with an entrance by piers of an opposite character formed by works parallel to the line of undulation, the simple effect is, that it causes a rebound, which rebound causes a confused sea, and, consequently, a dangerous one.

28,328. Therefore you are distinctly of opinion that when the sea strikes the pier, as I see it marked upon this plan, that there would be no rebound?—These works which I have projected could only receive a south-east sea, which would be oblique to the direction of the work, and the result of its being so oblique to the direction of the work is, that it would pass on and cause it to hug the work, and there would be no rebound.

28,329. Is your statement that it could only receive the sea in that direction founded upon observation, because I am under the impression that we were told in evidence, that with the wind from north-east to south-east the sea would be fair into Wick Bay?—The sea is always fair into Wick Bay, and would at the north end of the work be a very regular sea, whereas that same sea would cause a heavy reflected sea from the works I have already specified, marked O and N, and M and L, for the reason that they are directly opposed to the direction of the undulation; but the rebound ceases at a certain angle. I am not prepared to say what that angle is, but at a certain angle it ceases. When the angle between the direction of undulation and the direction of the works is decreased to a certain amount, there is no longer a rebound, and the waves, instead of being reflected, hug the works, and run along them undisturbed.

28,330. That is not a theoretical opinion merely, but one based upon constant observation?—Upon constant observation.

28,331. (*Sir F. Smith.*) You said that one of the elements of a good harbour of refuge is a well defined approach. Was not that the expression which you used?—Yes, it was so.

28,332. Is there a well defined approach to Hartlepool—can you say?—Yes, a very good one.

28,333. Will you tell us what it is?—It is defined by Hartlepool Heugh, a headland of limestone some 40 or 50 feet above high water at one end, and the Cleveland hills, some high eminences, on the other.

28,334. You consider that is well defined?—Yes, well defined.

28,335. (*Mr. Lindsay.*) You recommend the construction of a harbour at Wick, upon one ground and upon one ground alone—the very large fishing trade that exists there, and the saving of life among the fishermen which the harbour would effect?—I do.

28,336. And that so far as the passing trade is concerned, you do not recommend the expenditure of public money at Wick?—No, I do not.

28,337. Is the loss of life in the fishing trade greater than what it is in any other maritime pursuit do you know?—I cannot say from experience.

28,338. Do you know whether the loss of life in the fishing trade, especially about Wick, is greater in proportion than it is in any other maritime pursuit?—I am not aware.

28,339. What is the largest amount of life that has been lost at one time, at Wick?—I am not aware.

28,340. It was stated to us in evidence that in one gale 28 lives were lost in Wick Bay?—From my knowledge of Wick Bay I think that is very possible.

28,341. Are you not aware of the amount of loss of life that has taken place there during 20 years?—I am not aware of the particulars, I only remember the general facts.

28,342. Consequently you are not able to say how many lives a harbour of refuge would have saved if it had been constructed there 20 years ago?—No, I am not.

28,343. Well then, when you recommend the expenditure of public money for the saving of life to one section of the community and of one section alone, do you not think it would have been as well to have examined the proportionate loss of life among the fishermen compared with that in the home trade or any other maritime pursuit. Would it not have been as well for you also to have examined the facts so as to inform us what amount of life the expenditure of the public money there would have saved during the last 20 years?—I did not think it was necessary for me to inquire into that, as an element in forming an opinion. I know the nature of the fishing—that it is carried on in boats, and I know the nature of the coast and the gales of wind which often occur there; and I am aware that the fishing so conducted is exposed to special risks, and without knowing exactly the amount of loss of life which has occurred from year to year, I know that at any moment when there is the absence of the precaution which so generally characterizes the fishermen, there is, from the want of a harbour, the chance of a wholesale loss of life.

28,348. Well then, if you recommend the expenditure of the public money at that particular spot called

Wick, for the saving of life, would you consistently, if it rested with you to decide, refuse to any other port a grant of public money if they could show the expenditure of the money would save life at that particular spot?—If there was a large loss of life, I should be prepared to recommend an expenditure in the same way as here.

28,345. To carry out your principle, and to show you what it would lead to, I will tell you that it was given to us in evidence that at Wick, in one gale about 28 lives were lost, and it was upon that ground as I understood that a claim for Government aid was based. It was also given in evidence before us that at a place called Clovelly, in Barnstaple Bay, in one particular gale 29 fishermen lost their lives upon entering that small harbour, therefore if the public money was to be voted for the saving of 28 lives in one gale at Wick, could the Government consistently refuse to grant the public money for the construction of a harbour of refuge at Clovelly, where it had been shown that a harbour there at one time would have saved 29 lives?—If the amount of the fishing trade there is equal to that at Wick, and the want of a harbour is as great, I should for the same cause recommend an outlay of public money at Clovelly, but if there is not the same amount of fishing, nor the same risk of a wholesale loss of life there, I think Wick should have the preference.

28,346. But it might happen that the dangers of the particular coast were so great, that out of 1,000 lives the risk upon that coast would be much greater than at some other part of the coast where 2,000 men were employed and 2,000 lives were exposed to risk. Therefore you would not vote the public money according to the number employed, so long as it is confined to a particular class of the community, but in accordance with the risks which the persons so employed incurred if you voted it only for the saving of life. Now I have given you an instance where at one time 29 lives were lost, and I ask you upon what ground you could refuse to grant to Clovelly a sum of public money for the saving of life, while you would grant it to Wick for a similar purpose there?—I do not say that I would refuse Clovelly a sum of money, but I do say that in order of importance Wick is the first, because I am not aware that there is the same amount of fishing, or of risk at Clovelly. I recommend distinctly that the money should be spent at Wick, on account of the great number of men that are exposed to any sudden occurrence, whereby at any moment from unforeseen circumstances, a wholesale loss of life may occur, and therefore the practical effect might be that 1,000 men might be lost at Wick, whereas at Clovelly with only a small fishing, no such circumstance could occur.

28,347. Say that you voted 100,000*l.* for the saving of 20 lives per annum at Wick, could you refuse 50,000*l.* for the saving of 10 lives per annum at Fraserburgh, or Peterhead, or Clovelly, or any other place along the coast?—They should each be assisted according to their claims.

28,348. Then you would, wherever it could be proved, or wherever it was supposed that the expenditure of public money would be the means of saving one life per annum, you would vote a sum of money to that place in proportion thereto?—In proportion to that, coupled with the risks incurred.

28,349. Well now, Mr. Calver, do you not think that the claims upon the public purse would be very large indeed in the course of every year, and of every session of Parliament?—I do not say that I would enter upon it all at once. They should be taken in priority, according to their necessities, and as the public funds would admit of. I do not say that I would do all these things immediately. I would observe that there is a pressing necessity, as far as the fishing community is concerned, of immediately doing something at Wick.

28,350. Would it end there? Do you think that the expenditure of the public money for the saving of life would be confined to that?—Could you stop there without reference to other classes of the community?—No, of course not.

28,351. You could not stop there, you think?—No; life is as valuable and as much exposed in a coaster as a fishing vessel.

28,352. Take an extreme case, and suppose that it could be shown, as I have no doubt it could, that a very large amount of loss of life takes place from ships being badly found, from their having bad ground tackle, and various other similar causes, would you recommend that the public money should be applied to the purpose of supplying those ships with better ground tackle and other stores?—No.

28,353. How then could you grant it in the one case and refuse it in the other, if better found ships and better ground tackle would be the means of saving of life?—Those are defects which must be remedied by the owners of the vessels; the risk does not result from the dangerous character of the coast.

28,354. Does it not, then, really all come back to this, that the Government would not be justified in granting the public money, unless it be for purposes in which all classes of the community are interested. Does it not come to that in fact?—That is my opinion. I have said so in my evidence.

28,355. That the Government would not be justified in voting the money unless it can be shown that the whole of the parties to whom the money belongs may derive some benefit from its expenditure?—I have mentioned that I consider the foreign seamen have been provided for by the Channel harbours; the coasting seamen will be provided for by the works upon the north-east coast, and that the fishermen are the next in order.

28,356. If that is the principle, how can you recommend the voting of public money for one particular section of the community, the fishermen of Wick?—On account of the extent of the fishery, and the number of lives that are exposed.

28,357. Would the public, as a whole, derive any benefit from that harbour?—The public would experience damage in the case of a wholesale loss of life to which the Wick fishermen are constantly exposed, and must ever be, while the men have no harbour which they can take at all times.

28,358. Would a harbour at Wick enable the fishing boats to go to sea often, when they are now from going out on account of there being no harbour?—In my opinion, they would.

28,359. Consequently they would derive a considerable pecuniary benefit from the construction of the harbour there?—That is my opinion.

28,360. Consequently they would be able to bear a tax for the construction of such a harbour?—That is my opinion.

28,361. If that be so, why should they come to the public purse and ask for money?—I think the general public might bear a portion of the expense, and those who would derive a direct benefit from the harbour might also bear a portion of it.

28,362. You come now to a different proposal. You recommended the whole grant from the public funds before, but now you say a part only?—I have been misunderstood. Assistance would have been the better term. I do not mean to say that the Government should come forward with the whole amount.

28,363. Your meaning, then, is, that the Government should come forward with a portion of the amount that would be required?—Or perhaps the whole outlay at first, and imposing a small tax upon the community benefited, for the use of, or for the work itself.

28,364. You would not recommend that the whole sum that might be necessary should be given by the Government in the shape of a grant?—I think not. I think the community, who are directly benefited, should to a certain extent assist in defraying the expense.

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28,365. To what extent would you say ?—I am not prepared to say.

28,366. You do not think that Wick is necessary as a harbour of refuge for the passing trade ?—I do not.

28,367. And you also are of opinion that Peterhead is not necessary for the passing trade ?—I am of that opinion.

28,368. As a port of call, would Peterhead be of much advantage ?—I am not aware of that.

28,369. Would it be of much advantage, do you think, say to ships coming home from the Baltic in the fall of the year, when they often meet with long detentions from adverse winds ?—If it was considered necessary to provide accommodation for a purpose of that sort, I should be inclined to place it further down the coast.

28,370. What port do you consider better fitted for such a purpose as that?—Midway between Peterhead and the Tay, because while it would answer as a place of call for vessels coming home from the Baltic, and going in to obtain supplies, the same harbour would also render the coast secure in case of on shore gales.

28,371. Where would you find a site between the Tay and Peterhead ?—I have not considered the subject, except in a general point of view.

28,372. Are you not prepared to point out any place between these two ports which is suitable for a harbour of refuge ?—No I am not.

28,373. You have offered some very strong opinions as to the improvement or as to the folly of attempting to improve Bar harbour, and it seems that you are decidedly of opinion that the public money should not be voted for that purpose ?—I am.

28,374. Now so far as I could make out, you said that a pier was only another name for a groin. When run out it collected sand and made the land ? —Generally it is so. The general effect is that of a groin.

28,375. And I think I understood you to say, that a bar at the mouth of a river was principally formed of sand which was driven along the coast or washed in from the sea ?—Yes, that is my opinion.

28,376. And you said that if a pier was run out at right angles from the coast, sand would go on collecting behind it until it reached beyond the pier ?—Yes, that is my opinion.

28,377. And that it was a mere question of time, until it gets out sufficiently far to form shallow water outside, at the end of the pier ?—Yes, that is so.

28,378. Let us look at the Tyne, which is now before me ; if these are your opinions, what has the situation of the river Tyne to do with it, because this silting up would take place exactly the same if there was no such river as the Tyne at all here ?—I do not distinctly understand you.

28,379. I will repeat it, as I am asking for information. Looking at this plan, you see the south pier, as it is laid down in the chart. You say the sand drifting along from the south, collected from the south of this pier ; by degrees it creeps out to the end of the pier, and in time gathers at the mouth? —I refer to the drift from the north to the south.

28,380. Take it so then.—The great drift upon the whole of the east coast of England is from north to south. That is the general drift, and when that is not the case, it arises from special circumstances, which are easily explained.

28,381. That being the case, we will take the north pier. If the drift is from the north to the south, then the sand will go on collecting at the back of the north pier, until it creeps out to the pier end ?—Yes, that will be so.

28,382. Well,then, it will go on until it forms a bar right across, from the north pier end to the south pier end ?—I believe that a bar will be eventually re-formed nearly between the pier heads ; perhaps the shallowest ridge of it might be in the horseshoe form a little outside them.

28,383. That is the operation which goes on at all places, is it ?—That depends upon the nature of the case. All rivers are not encumbered with bars.

28,384. The answers which you have been giving to me have had nothing to do with anything coming out of the rivers. All they have had to do with, has been that which comes along the coast.—The movement along the coast line.

28,385. Well, if there was no such thing as the river Tyne at that particular spot, would that gathering of the sand take place then ?—I assume that you mean if it was an open place with no issuing river.

28,386. Suppose the coast to be as it is on the chart, and suppose there was no river Tyne there at all, but that the coast was exactly the same in all respects, only there was no river Tyne, would the gathering of the sand take place behind the backs of these piers if they were run out ?—Yes, just the same.

28,387. Very well, then. What you say affecting the running out to sea of these piers would apply to Hartlepool or to Filey, where there is no river, or to any part of the coast where the sand drifts along ?— Just the same.

28,388. Therefore your opinion did not apply to the site of the river, but to any particular part of the coast wherever you may run out piers at right angles with the coast.—Any part of the coast, whether opposite to the mouth of a tidal river, on the straight coast, or any other part, so long as the work is practically a transverse work to the line of the drift, the practical effect is the same whether at the mouth of a river or in any other part.

28,389. Say that you were to run out piers at Hartlepool, to which you are strongly favourable ?— I am a strong enemy to anything of the sort.

28,390. Then how would you make a harbour at Hartlepool ?—By covering works entirely.

28,391. You would say that if a pier was run out from the Heugh at Hartlepool the effect would be exactly the same as it would be with a pier run out here on the Tyne ?—Just the same.

28,392. It would be the same on any part of the coast?—Just the same where there is a coast drift and the work acts as a groin.

28,393. In fact then the river has nothing whatever to do with the creation of a bar. Your evidence goes to that.—I beg your pardon. Oh dear, no. The river presents an opening in which a bar may be formed.

28,394. You told me that the effect of the gathering of the sand would be exactly the same if there was no river Tyne here at all ?—Just the same. It would be a dead flat bank outside.

28,395. But the river being here has nothing whatever to do with the formation of that collection of sand ?—A bar strictly speaking is an impediment to getting into a river. You cannot have a bar in any other place. A bar is an obstruction on entering a river, and the existence of the river makes it a bar.

28,396. You have been telling me that if you could run out piers at any other part of the coast, sand would collect in the same way as it would do at the mouth of the Tyne ?—Yes, just the same.

28,397. And would form a bank with shallow water right between the two pier heads ?—The difference between the two cases would be that where there is no river it would become in the course of years a sand flat.

28,398. What is the difference between a sand flat and a bar ?—A bar is a stop or obstruction on entering a river.

28,399. Is not a sand flat an obstruction on entering a river ?—The difference is this :—The enclosure of a bay like Hartlepool bay would tend to produce a flat of sand enclosed between the piers, but where there is a river there is a bar.

28,400. But what is the difference between a sand flat and a bar ?—A sand flat would be dry at low water or perhaps at high water. A bar is an obstruction over which there is a certain depth of water at low water, according to circumstances.

28,401. Well, then, the formation of piers at any part of the coast where there is no river would create that which is even worse than a bar?—If there was no issuing river it would be a sand flat.

28,402. Therefore your evidence goes to the effect, that if you run out piers at any part of the coast with a drift of sand on either side, the consequence will be that you gather the sand at the back of the piers and finally close up the mouth or entrance?—Yes; that is so.

28,403. It does not apply to the site of a tidal river any more than it does to any other part of the coast?—Oh yes, but it is somewhat different. If you perceive, a river is not dry near the channel of the river, and this obstruction, which is termed a bar, is at the outer portion of the river, but if it was a mere enclosure by two piers with no issuing river, the difference would be that it would be a solid flat nearly dry up to high-water springs. There would be no bar properly speaking. It would be altogether dry, whereas a bar strictly speaking is a stop or obstruction upon entering a river.

28,404. Therefore, if piers were to be carried out at any particular part of the coast, it would be a greater advantage to carry them out on each side of a river than upon a site where there was no river?—That depends upon circumstances.

28,405. Because if the river would clear the sand away to a certain extent. Is it the case that it would do so?—No; it depends upon the nature of the piers at the mouth of a tidal river, whether they are effective or not. But I do not exactly understand the question.

28,406. If it is the case that these piers run out at right angles to the coast act as groins and collect the sand until it accumulates right at the end of them, right across the entrance; if that be the case as you say, would there not be a greater accumulation of sand within those piers where there was no river than there would be where there was a river to drive it partially away?—Distinctly, when you have river you must always have a channel.

28,407. You said the depth of water on the bar of the Tyne was 7 feet, I think?—About that, as I understand.

28,408. You also said that with the piers now in course of construction, if they were run out to a depth of 14 or 15 feet, you think that the tendency would be to increase the depth of water on the bar from 7 feet to 10 feet?—I think, as an estimate, it would be about that. That by carrying out the piers to 14 feet you would deepen the water on the bar from 7 feet to 10 feet.

28,409. Well then, why, by carrying them out to 30 feet, should you not deepen the water on the bar from 10 feet to 18 or 20 feet?—Because you involve the same amount of obstruction without increasing the force for overcoming it.

28,410. Now then say that these piers were carried out to a depth of 36 feet, would they be able to maintain that depth between them?—Again making an estimate as near as I can, I have no reason to say that you would have more than that. The only difference in depth would be due to the extra amount of tidal water which you admitted. I am not prepared to say it would produce much effect.

28,411. You are not prepared to say that a greater silting would take place then than does now, do I understand that?—No; my estimate is that with Mr. Walker's original projection, there might ultimately be upon the bar a depth of about 10 feet, and with the enlarged plan ultimately about 11 feet.

28,412. And that the bar would remain about the place where it now is or thereabouts?—Distinctly not; it would be between the pier heads, wherever they may be placed.

28,413. Do you mean to tell us that if we carry out the piers to 37 feet at low water, that in course of time it will fill up so as to have only 10 feet or 11 feet water there?—That is my opinion.

28,414. That is your opinion?—That is my opinion distinctly.

28,415. Because I asked this question yesterday of a very eminent engineer, and he looked at me as if I was asking the most extraordinary question it was possible to conceive. Then if we carried out the piers to 60 feet, do you mean to tell me that the bar would be carried out to, and that there would be but 10 feet water where there was 60 feet when the piers were constructed?—I do not like to say 10 feet or 11 feet exactly. The only difference would be due to the amount of the tidal water you admitted in your enlarged works, to produce an increased depth. I am prepared to say that if it were possible to take these piers out to 60 feet water, in the process of years you would have the bar restored there with only 10 feet or 11 feet of water over it.

28,416. You mean to say that if we carry out the piers to 60 feet, in the course of time the bar would also be carried out, so that you would only have ten feet water, where there is now 60 feet?—I think so; ten feet, or a little more, as the case may be.

28,417. If you were to carry them out to 100 feet, what would be the consequence?—If there was a sufficient supply of the coast drift, you would have the same thing restored there with the extra depth due to the extra enclosure of tidal water.

28,418. Then, if you carry them out to the middle of the North Sea, it seems to be a mere question of time. The bar that was at the mouth of the river would be carried right out to these pier-heads?—Yes, as a broad principle, that is the fact.

28,419. That is your opinion?—Yes, that is my opinion. I have also distinctly said that the depth upon the bar is not the only difficulty you have to deal with at the mouth of a tidal river.

28,420. During what winds is there most sea on the north-east coast of England; east or west?—I cannot speak from my own judgment.

28,421. Because you stated, and gave it very strongly that the principal freshets were generally during easterly gales?—I gave that statement from an authority which I quoted.

28,422. Would you be surprised if those who have for a long time resided upon the coast should tell us the heaviest freshets were during westerly gales?—I am not thoroughly informed upon that point. I have quoted a certain authority, which I believe to be reliable.

28,423. Although you have resided for some years upon the north-east coast, you cannot say, of your own knowledge, during what winds the heaviest freshets take place?—If I judged from my own observation, I should rather be inclined to say in westerly winds; but there is no determined rule.

28,424. You said that the most dangerous winds were from east and by north?—That being the wind that renders the north-east embayment the most dangerous.

28,425. And that in south-easterly gales ships would not be embayed between these lines?—No.

28,426. How do you account for the fact that the greater number of ships are lost in south-easterly gales?—Because they run for the ports.

28,427. Then, is there not the greater necessity that the largest amount of improvement should be done to these ports?—No; because the running there is not a necessity, and therefore I should not provide for it. It results from the wilful act of the parties themselves, and not from any stress of weather or from the character of the coast.

28,428. But if the Tyne was deepened to 20 feet at low water at its entrance, would not that be the means of saving a very large amount of the lives and property which are now lost in the bay in south-easterly and easterly gales?—I can only answer that question with respect to my belief in its feasibility. I do not believe it to be possible at all.

28,429. But if it were possible, would the Tyne then become a great harbour of refuge. If it were possible to have 20 feet at low water at spring tides,

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and to maintain that depth, would that be the means of saving a large amount of life and property ?—Not a harbour of refuge ; for no bar harbour, with an issuing river can, strictly speaking, be called a harbour of refuge.

28,430. What is a harbour of refuge, then ?—It is one with much depth of water, ease of approach, the absence of tide, good ground, and perfect shelter.

28,431. The first point is the depth, so as to allow ships to get in ; is it not ?—Yes ; that is the first point.

28,432. If 20 feet of water could be got and maintained at the entrance of the Tyne, would that admit the usual description of vessels frequenting the coast ?—At low water ?

28,433. Yes.—No.

28,434. If 24 feet could be got and maintained ?—No.

28,435. Then if 36 feet could be got and maintained —for that is the proposal that has been laid before us now—to carry out the piers to 36 feet at low water, would a depth of 36 feet at low water in spring tides admit the ships which usually trade upon this coast ? —As to depth it would.

28,436. At 30 feet would it ?—Yes, it would.

28,437. At 26 feet would it admit the usual description of vessels frequenting the coast?—The vessels which you must provide for are those of the greatest draught, 20 feet, and for them 26 feet would be barely sufficient.

28,438. Then if they had 28 feet at low water in spring tides, and could maintain it, that would admit all vessels at all times of the tide, going along the coast ?—So long as they were not prevented by the dangerous sea caused by the outset, when no small vessel could attempt it.

28,439. And it would consequently be the means of saving a great many lives, would it not?—I do not think so.

28,440. How so ?—I am not aware there is much loss of life in light vessels, which are generally lost there.

28,441. Would you require a depth of 28 feet at low water in spring tides to admit light vessels ?—I have mentioned my idea, that the necessity is measured by the largest vessels frequenting the coast, to call it strictly a harbour of refuge ; and as they go to the extent of 20 feet, and they may be caught in extreme peril, you must provide for them before you call it a harbour of refuge.

28,442. Would a depth of 28 feet admit those vessels ?—Yes.

28,443. If it would admit those vessels, would it be the means of saving lives ?—In proportion to the amount of risk to which such lives were exposed.

28,444. It would be the means of saving life ?—If life in such vessels is lost, it would ; but I am not aware that any large vessels have been lost.

28,445. It would be the means of saving the lives of those who were in danger, in vessels drawing 20 feet or under ?—Provided they could reach it, and did not arrive there at the time of the strong ebb outset.

28,446. And all these vessels of great bulk which are lost on entering the Tyne, might be saved, if there was a harbour with a depth of 28 feet at spring tides ?—The great majority of them would be saved.

28,447. The ships and the lives of those on board of them ?—If lives are lost, then the lives would be saved too.

28,448. You said if there was to be only one harbour made, you should give a decided preference to Hartlepool ?—Yes.

28,449. Why do you prefer it to Redcar ?—Redcar is not a suitable place for a harbour to be made.

28,450. What is your objection to Redcar ?—Because it is encumbered with rocks. There are two natural ledges there. It is not adapted for a harbour, because no harbour, could be formed on the rocks as a basis, except on the principle of a close harbour. It would not do to put a harbour on one side of Redcar, because the fact of having dangerous ledges stretching out seawards near such harbour, would add to the risk in running for it. For these reasons I certainly should not think of forming a harbour at Redcar, and especially not when I had such an eligible site as Hartlepool.

28,451. And you would prefer Hartlepool to Filey? —Yes for the purpose of saving life. Always bearing that in mind.

28,452. I suppose you include the saving of property as a secondary consideration. You also said that if a second harbour were to be made you would give the preference to Bridlington over Filey ?—Yes, I should.

28,453. Is it the case that laden vessels, in the usual track bound south, when they can weather away Flamborough head in gales of wind can generally reach the Humber ?—Yes, that is so.

28,454. Then as far as laden ships are concerned, a harbour at Bridlington would be of little value ?—It would give them the advantage of the better port of the two under the circumstances. Bridlington would be a better stopping place.

28,455. Would it be a better one than the Humber ? —Distinctly so. You could make a better harbour for saving life at Bridlington.

28,456. Than the Humber now is ?—Yes.

28,457. You said very frankly that when a vessel can weather away Flamborough Head to the south, as a general rule she can always reach the Humber ?—The Humber as a general rule is a good shelter in the most dangerous gales.

28,458. A most invaluable place for that purpose ? —I do not recommend the harbour to be made at Bridlington, I merely said that it would be the best of the two.

28,459. Now then as to light ships. When a light ship bound to the north can weather away Flamborough Head, are they generally able to reach down to Hartlepool at the bottom of the bay?—That depends upon the nature of the wind and its continuance.

28,460. I am speaking as a rule, as it applies to vessels that are found in that track ?—I have often seen them running back ; scores of them are caught in north-easterly winds.

28,461. When they cannot weather away Flamborough Head they can find good shelter in Bridlington Bay, is it not so ?—They can, but exposed to risk.

28,462. To what risks ?—Exposed to the risk of the wind chopping in.

28,463. That is the only risk which they are exposed to ?—That is the only risk.

28,464. Is it the case that many vessels bound south cannot weather away Flamborough Head congregate in large numbers there, and when the gale comes on they are obliged to run back to their own harbours, Hartlepool, or the Tyne, or perhaps so far north as the Forth ?—Yes, that is so.

28,465. If that be so, is it also the case that great numbers of those deeply laden ships founder in the winter time in running back from Flamborough Head to seek refuge in the bight of the bay, about Hartlepool, or are lost in attempting to enter bar harbours ?—That may be so.

28,466. Then would not a harbour at Filey be the means of saving a large number of those vessels which are so lost now ? Would it not be something more than a mere stopping place ?—No, not practically, because the vessels which now linger under Flamborough Head stay there until the last possible moment until the gale has freshened rather than give up track, and when they do bear up, the sea has become so heavy that they are lost in running to the north. If there was a harbour established at Hartlepool, vessels would bear up much more quickly and save themselves by it.

28,467. Would this large number of vessels which now congregate about the Head unable to weather it, easterly gales of wind ?—I have never seen that in easterly gales. It is always in south-westerly winds.

28,468. Then you do not think it is a fact that large numbers of vessels do congregate there, unable to weather the Head in easterly gales, about south-south-east?—No; in my experience I have never seen many vessels hovering about there unless the wind was well south.

28,469. When it is south-east?—I have seen them hanging about in very strong southerly gales; but generally in south-easterly gales they run northwards.

28,470. Where do the laden ships come from that are lost in running into Hartlepool, or attempting to get into the Tyne and Sunderland during south-easterly gales? Are not they vessels which have been unable to make a passage south, to weather Flamborough Head, and are obliged to put back?—Yes; they are so.

28,471. Would a harbour at Filey not be of vast advantage to them for saving them from running back?—Distinctly so.

28,472. If it happens that ships and lives are lost in attempting to make bar harbours, and it is the case that they run back from the south; and if it be the case that if a harbour was made at Filey they would be able to find shelter there, would not that harbour be the means of saving a very large amount of property and a great number of lives?—If there is but one harbour to be formed, I would form it at Hartlepool, because it would save life and provide for the contingency you mention; whereas, if there was only one harbour, and that formed at Filey, it would prevent the contingency of running back, but it would be of no use in decreasing the evils of the north-east embayment.

28,473. Would it not save many lives that are now lost, not merely from foundering at sea, but that are lost in attempting to find shelter at Shields, Hartlepool, or the Wear?—That would all be provided for by a harbour at Hartlepool.

28,474. I am speaking now more particularly as between Filey and Bridlington.—I beg your pardon.

28,475. Do you think that a harbour at Bridlington would be the means of saving a larger amount of life and property than one at Filey, taking into consideration the answer you have given to the question which I have just put?—I am not prepared to say, because I am not aware of the exact amount of lives lost in vessels to the east of the Head being pressed by on shore gales, nor of the amount of loss in light vessels anchored in Bridlington Bay being suddenly caught in it. I should say the loss was greater in vessels to the east of the Head, because they are laden vessels, whereas the light vessels, when they go on shore, will beach up, and the lives are saved.

28,476. Consequently a harbour at Filey would do more to save life than one at Bridlington?—As between those two places, I should rather say that it would.

28,477. How does that agree with your giving a preference to an expenditure of public money at Bridlington instead of at Filey, because you set out by laying it down as a great principle that the first object to consider was the saving of life?—A harbour at Bridlington would in one case be useful in saving life, because it would decrease the risk of loaded vessels. I have also said that a harbour at Filey would only save for a short time, whereas one at Bridlington would be a benefit in perpetuity.

28,478. (*Capt. Washington.*) A comparison was put to you between the loss of life at Clovelly and that at Wick. It was stated in evidence at Bideford that from 50 to 60 boats belong to Clovelly, are you aware how many belong to the district of Wick, and fished last year in that district?—I have mentioned it in my evidence, but I cannot as a matter of memory say; I believe 1,100 or 1,200.

28,479. It was given in evidence to us at Wick that 1,100 actually fish out of Wick, and 1,700 out of the district?—From my own observation I should believe that to be the fact.

28,480. About how many men sail in each boat?—I have heard five.

28,481. At that rate how many lives would be exposed to risk during the fishing season?—From 5,000 to 7,000.

28,482. And how many at Clovelly at the same rate?—300.

28,483. The comparison between Wick and Clovelly is as 7,000 to 300?—Yes, as respects lives, but it is also in favour of Wick that they really have no port to run for; practically, no port if the flood tide be running, whereas at Clovelly they are frequently able to get round Morte Point.

28,484. Are you aware that in the parliamentary return it appears that the amount of public money expended for the erection of harbours between the years 1840 and 1854 is 2,544,748*l.* on the coast of England?—I believe that to be the case.

28,485. During the same period and within 15 years 48,500*l.* was expended on the coast of Scotland, and on the coast of Ireland, 241,452*l.* Of that money on the coast of Ireland 90,000*l.* was expended on fishing harbours. Seeing the large amount of money laid out on the coast of England and Ireland, do you think it would be anything unreasonable to ask for an amount in similar proportion to be laid out on the coast of Scotland?—I think they have an undoubted right to claim it.

28,486. Leaving the fishery harbour to return to the refuge on the north-east coast of England. A great deal has been said in evidence about the necessity of a harbour near Flamborough Head to save laden vessels. I think you have stated in your evidence that nine-tenths of the vessels are spread along the coast between the Tyne and Flamborough Head?—On the occurrence of a south-east gale, that is my experience.

28,487. And supposing a refuge harbour was constructed in Tees Bay, how far would those south of Tees Bay and north of Flambourough Head have to run back to get into that harbour?—Taking the chances, as far as I can estimate them, the great body of the vessels would be distributed practically abreast of the harbour.

28,488. Would they have to run 20 miles?—Some of them might have to run 40, if they had advanced to near the head.

28,489. The maximum would be 40 miles?—I should say so, but I cannot say decidedly without having the chart before me.

28,490. Do you consider that there is any very great risk in a laden collier running back 40 miles to a certain refuge harbour under her lee?—If she has waited until the gale is heavy and the sea has made, I should think there was risk. I am quite ready to believe that vessels would founder under those circumstances. I should quite think it possible that such casualties may have occurred, but they would be prevented if a refuge harbour was provided in the north-east bight, because the ships would then bear up in good time.

28,491. (*Capt. Sulivan.*) Can you explain how it was that in one south-east gale 28 vessels allowed themselves to be wrecked between Flamborough Head and Whitby, with great loss of life, if it is so easy in dangerous gales on the east coast to get back to Hartlepool after they have been to Flamborough Head?—Before I can answer the question I must know exactly the special circumstances connected with each vessel. As a general fact, I cannot imagine that any vessel or vessels could be wrecked between Whitby and Flamborough Head without having either neglected common precautions or having been caught under very exceptional circumstances.

28,492. I believe, as a rule, the colliery masters are good seamen, and well accustomed to the coast?—Excellent seamen and thoroughly acquainted with the coast.

28,493. Do you think that in one gale 28 men would have allowed themselves to be wrecked on one short part of the coast by the neglect of the usual precautions, or would not the circumstance of the loss of these ships rather convince you that stress of

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weather alone drove so many vessels on one part of the shore in one gale of wind ?—I cannot imagine it, unless the gale came on very suddenly, or they had neglected the commonest precautions on the occurrence of a gale, that common precaution being to haul off into a safe position before the sea made.

28,494. We have had it in evidence in many places that large numbers of vessels leave the coal ports together in high tides, and instead of being scattered evenly over the whole of that embayment line, congregate in flocks near Flamborough Head ; that when the wind draws round to the southward and south-east it is a more common thing that vessels are caught in numbers near the Head than that they are spread along the shore. For all that class of vessels, would your remarks about the number that would fetch Hartlepool, founded on their being equally distributed along the coast line, apply ?—My remark about the embayment line and the shelter to be obtained by vessels so driven back, has reference to what I believe to be the common circumstance, and not to exceptional circumstances. I should apprehend, from my own experience, that vessels never collect in strong easterly weather near Flamborough Head.

28,495. South and south-east, I said ?—It could not have been a strong wind, or they would not have closed up, that is clear. It might have been a south-easterly wind, but not a south-easterly gale, because they could not congregate in a south-easterly gale.

28,496. I refer to vessels that have left the ports with a slant or favourable wind, and the wind drawing by south-west and south to south-east as they got under the head, causing them to congregate in large numbers ; that is the fact to which I allude. To vessels congregating in that way when a south-easterly gale comes on, your remarks as to the vessels being distributed over the whole line will not apply ?—Distinctly not ; if such circumstances do exist, they would have to run back the whole distance.

28,497. Will you tell me whether vessels are in the habit of leaving the coal ports at all times of the day and night in the ordinary way in which they leave a harbour that is not a tidal one, so that they are likely to be scattered on their voyage, or do they leave at tides in numbers, and so get in clusters along the coast ?—Quite in knots from the various ports, but separated from each other on account of the distance of the ports.

28,498. Then if vessels leaving with a slant from the Tyne had got half way across Tees Bay, vessels leaving Hartlepool would be more likely to have got down near Flamborough Head ?—They would.

28,499. Even in that case we might take it for granted that the vessels would be in clusters here and there at different parts of the coast instead of being scattered along the lines ?—You cannot exactly call them clusters after leaving the port some time, because the difference of sailing separates the vessels ; but when they first leave the ports they are practically in clusters from each port.

28,500. You were asked by Mr. Lindsay whether, if there were no river Tyne, the piers now being run out there, would be closed up by the sand until the harbour was entirely choked up ?—Choked up, yes.

28,501. Would that merely tend to show that no pier harbour from the shore should be erected where there is that moving sand ?—I do not quite understand that question.

28,502. Would the effect of that merely be to show that no person should think of making a pier harbour from the shore where there is a large amount of travelling sand ?—Distinctly, as a general principle.

28,503. And would you on the other hand think of applying that objection to a point of the coast, if you could find one where a small beach was bounded by such a rocky shore north and south, that there was very little fear of there being any travelling sand at all ?—I should apply it the same there as at any other place, because the movement of the sand is continuous to a considerable depth, wherever the wave has an action ; and, assuming the frontage to be sand, there is a movement, as I have mentioned before ; the preponderating sea strikes in whichever direction that may be.

28,504. Along a rocky shore is the sand moved the same as along a sandy one ?—Yes, below the low-water mark. There is no sand on the rocks because no sand will rest on rocky ledges ; why, I do not pretend to explain. There is some peculiar action, but the undertow of the wave bursting on the ledges will prevent the material lodging upon them, but if you go out beyond the original ledges then the effect is exactly the same as if it was a sandy frontage.

28,505. If nature on any part of the coast has made a distinct wall by a projecting reef, and there is no tendency inside that natural breakwater or in the corner of that bay to deposit increased quantities of sand, would that satisfy you that there is no tendency at that immediate part of the coast for sand to travel into that bay ?—Not at all, because by the erection of works you altogether alter the circumstances.

28,506. I do not ask you about works. I say if nature has herself placed a wall which makes a corner of a bay where no sand is accumulated, would that show you that in the present order of things there is no tendency for sand to accumulate in the corner of that bay ?—No ; in the one case there are forces in action which could not remain after the erection of a solid transverse wall. You now get a tremendous weight of wave and current coming over the ledge, and that is a thing you could not get with a transverse solid wall reaching above high water. You would entirely destroy the motion and make a perfectly still corner in which the débris would lodge. The cases are not parallel.

28,507. You are alluding to Filey ?—No ; as a general principle.

28,508. Taking the case of Filey and knowing the shape of that bay, if there is any sand travelling from Flamborough Head northward along that shore, would not the projecting point of the bay and the Brigg have induced a tendency for the sand to accumulate in the northern corner of the bay ?—Up to a certain point, when the accumulation of the sand would be in equilibrium with the wave stroke and the current. After that, whatever be the amount of sand travelling along the coast, there is no effect shown, because the forces are exactly in equilibrium. Nature has adapted herself to the circumstances, and you get permanency.

28,509. You express the opinion that the erection of a harbour at Filey, might cause an accumulation of sand, although you were perfectly satisfied that one at Hartlepool might be constructed, without causing any accumulation ?—I have in view works of an entirely different character.

28,510. I am not going to ask about the character of the work, but if engineering skill can provide against the accumulation of sand, when there is so much on the shore as at Hartlepool, why should not similar skill provide a harbour at Filey, which should be safe from sand ?—In my experience I never knew anything of the sort to be provided against. Whenever works have been carried out where there has been matter like coast drift, or matter held in suspension, it has always resulted in a loss of depth.

28,511. As you suppose that works can be constructed at Hartlepool, I am right in supposing you consider that ?—Yes.

28,512. Why cannot works be constructed at Filey Bay, where there is much less sand north and south, which shall equally obviate any objection on that score ?—For one simple reason, that to make it a harbour of refuge, the covering must be formed on the principle of a prolongation of the Brigg, or it could not be a harbour of refuge.

28,513. Why could not a detached breakwater, leaving a passage at the Brigg buoy, be constructed for Filey, if necessary, as well as a detached breakwater for the Heugh, leaving a passage between it and the Heugh?—There is a material difference in the cases. I may remark that if you have any work in

view, my replies will be clearer if I have a plan of that work before me.

28,514. I have no work in view. I am only asking, with reference to your knowledge of the present shape of the coast, and the amount of sand in the neighbourhood, why, if a harbour can by engineering skill be designed for a sandy coast like Hartlepool, which shall leave the currents free and prevent silting up, the same precautions guarding against the same evil cannot be adopted at Filey Bay, where there is much less sand?—The circumstances are altogether different. If there is any drift along the margin of Filey Bay from south to north, the presence of any covering work would admit the accumulation of that drift without the possibility of removal. I cannot assume a covering work to be in Hartlepool Bay so that the same effects will follow.

28,515. If the sand were to travel from Tees Bay to Hartlepool, and if you had no covering work to that bay, would not the general appearance of the land, putting the Heugh in the place of the Brigg at Filey, be very much the same, and the effects be likely to be the same?—I do not think the cases are at all similar. In the first place, after increased experience, I at once object to the statement of any sand, as a general thing, travelling from the Tees to Hartlepool.

28,516. Then why should you suppose that sand is travelling northward to Filey Bay, where there is no river whatever, and a rocky shore on both sides; if the water in a sandy bay, including a river in it like the Tees, carries no travelling sand?—Because in Filey Bay the full effect of the sea stroke in moving the sand must be from south to north. The preponderance of the stroke will be from south to north, and therefore if you put out a groin there, I should be prepared to find it bank up upon the south side.

28,517. Is not the natural projection of the point at Filey now a groin, which would have the effect of collecting the sand in the northern corner of the bay, if such a drift existed?—It does, but the collection will be immensely added to if you have a covering work which shall prevent the sea stroke acting, because the sea stroke could then only come in, and not out.

28,518. You really think from your knowledge of the coast that along the two miles of sandy beach at Filey, with a large rocky projection a few miles to the south of it, to cut of all the travelling sand, a larger amount of sand is travelling along the shore there than along such a sandy bay as Tees Bay, with the whole stroke of the south-east sea setting along it, and a very considerable length of shore, and the sand from the ebb of the Tees river added to it?—That is not the way I understood the question. Do you mean to ask if it is possible to form an artificial harbour at Hartlepool Bay without detrimental results, and would not it be possible to form the same at Filey?

28,519. Yes; but in the one case you express your opinion that there would be no danger to silt up from the sand, and in the other you said you feared there would, and I was therefore anxious to know why you should fear there would be travelling sand when there is hardly any on the coast, and a rocky point a little to the south; and should not fear it when there is such an amount of sand as there is in Tees Bay?—In Filey Bay there is an immense sand track.

28,520. For two miles south of it as far as the chalk cliffs?—As far as the Speeton cliffs I should be prepared to find that there is a constant movement going on, but in giving my answers to these questions I can only reply in view of some hypothetical work. If the plan of Hartlepool was put before me, I would sketch the work I mean, and the same in the case of Filey, and would detail the effects.

28,521. Leaving out all works, and coming to the sand as it is at present, why should you suppose there is a greater tendency for sand to travel along the shore of Filey Bay to the northward than you suppose there is along the sandy shore of Tees Bay?—My replies have no bearing on quantity, they really only have a bearing upon the effect. Let the quantity at Hartlepool be large, it is possible to provide a work there which will prevent any detrimental results, whereas let the quantity in Filey Bay be ever so small, I do not see that any work really constituting it a harbour of refuge could be projected without its erection being followed by the prejudical results which I have mentioned—the accumulation in consequence of the drift.

28,522. The present Brigg at Filey answers somewhat to the pier which has been run out from the main point at the Heugh?—There is a parallelism.

28,523. There is, I believe, already an accumulation at the back of that pier at the Heugh?—I do not know it. I should expect to find it at the back, but not outside on the sea side. In the inside, or harbour side, I should expect to find some, but on the sea side I should not expect to find sand until the work advances below low-water mark.

28,524. Will you explain why, if there is a tendency of the sand to move in Filey Bay, the whole of the inside corner of the Brigg and the point has not been filled up by the sand?—For the reasons I have already stated, that in that case you have a sea and current acting over the Brigg at the top of the tide; there is a current and the sea generally throughout the tide, which, with a large solid work like that at Hartlepool, you have not, and therefore in the one case the sand will be washed away in accordance with the conditions that exist, while in the other it will remain and accumulate, because it has a quiet corner in which the sea can only bring the sand, but cannot take it away.

28,525. Would not the effect be, if you were right, that until you came out on the Brigg, when the sea could have an effect in clearing the sand away, the corner would have been filled up by the sand, where the sea has no action over the Brigg; I mean under high-water mark in the corner?—Oh no; because while there is no artificial work you get a far better outlet for the tide and the sea sweeping from south to north.

28,526. If there is a detached breakwater only, should not that outlet remain just the same as well as the outlet you propose round the Heugh?—No, for this reason, because when there is a variety of tide streams you can never exactly prevent an artificial work from, to a certain extent, producing a stoppage, and therefore if you were to put such a detached work at Filey——

28,527. I do not say with a detached work.—You have assumed a detached work, and in general terms I can only say that although in the construction of such a work at Hartlepool the prejudicial results might be avoided, it is also quite consistent that these works at Filey should involve them all. But I have great difficulty in answering: I always have when I have no definite plan before me.

28,528. I am not asking you on any plan. I am asking generally about the present contour of the shore and the movement of the sand?—My anxiety is to give my real opinion, whatever it is worth, but I am very anxious that it should not be mistaken. I have, sometimes, by answering questions before Committees of the Houses of Parliament, without having a plan before me, been led into difficulty.

28,529. To go back to Wick, you were asked whether you thought it just to lay out a sum of money at Wick, say 100,000*l*., on the ground of its being such a large fishing interest, and loss of life, without giving a proportional sum to any point on the coast that had a smaller interest or a smaller loss of life. Now, have you not proposed on national grounds that there should be a large outlay of public money on the east coast of England, because there are very large interests and very great loss of life concerned on that coast?—On account of the large trade and of the character of the coast.

28,530. And yet you do not recommend that on

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some points on the coast, say between Dungeness or Portsmouth, where a smaller loss of life occurs, that there should be a smaller outlay ?—I do not say that no outlay should take place there, but I would provide for the great risks first.

28,531. You recommend a large outlay in consideration of the amount of danger on the east coast of England, though there might be other parts of the coast where smaller losses of life took place which could not be provided for by the Government, as in that case ?—I should provide first for this coast, where there are great risks to meet, and then, if the public funds admit of it, I would appropriate them in the same direction to provide for other cases, according to their importance.

28,532. Would you not consider it quite just, for the same reason, to provide for an extreme case, having a fishery such as Wick, though you could not do so for the smaller points on the coast ?—Distinctly; because, looking at the character of the coasts generally, I could not say that such a necessity could exactly exist.

28,533. Would not the principle suggested to you on the examination I refer to, if carried out, apply equally against making large harbours of refuge for general shipping, as it would against making a harbour of refuge for the fishing trade ?—It would.

28,534. Therefore, there would be no principle against making a harbour at Wick for the fishing trade more than there would be against making one on a large scale on the east coast of England for the general trade ?—They stand exactly on the same groundwork, as it affects the saving of life.

28,535. (*Capt. Vetch.*) I believe the great object we all have in view is the saving of life and property. You have been asked some questions about Wick. Are you aware that in 1848 no less than 50 lives were lost in that vicinity, of men belonging to Wick and two or three adjoining ports ?—I believe that that was the case.

28,536. Do you think that the life of a fisherman is just as valuable as that of a sailor ?—Just the same.

28,537. Is there not rather more respect due to it, inasmuch as those fishermen generally have wives and families depending upon them ?—In that view the lives of fishermen are more valuable ; I should be prepared to find that sailors generally have not so many persons dependent upon them as fishermen.

28,538. Are you aware that there are generally no less than 1,500 boats fishing in the neighbourhood of Wick ?—I believe that to be the fact.

28,539. Then, if these contained about four men each, that would give about 6,000 fishermen at sea at a time ?—I believe that to be the fact.

28,540. I have received to-day or yesterday a certificate from Wick, stating that about ten days ago a gale came on very unexpectedly, and raged two days, and during that time such heavy seas were thrown into Wick Creek that it was white from one end to the other, and not a boat could have lived in it ?—I have seen it under these circumstances repeatedly, having myself resided at Wick.

28,541. Supposing a storm were to arise suddenly when these 1,500 boats were out at sea, what would be the consequence ?—If the flood tide was running at the same time, I should be prepared to expect that half of them would be lost.

28,542. Is not that a fearful contingency to look in the face, to any man who has a heart in his bosom ?—It has ever been present to my mind.

28,543. Would such a man hesitate one moment to urge the Government, or any other body he could prevail upon, to do all that they could to prevent such a contingency ever arising ?—Distinctly ; during the time the fishing lasts, the men are daily exposed to that wholesale risk.

28,544. So much as regards life ; but I suppose that boats are as much property as vessels. If 1,500 or half of that number were lost in one season, that would be a loss of at least 120*l.* a boat, I presume ?—I think that is about the price of the boats.

28,545. Did you ever happen to hear that the fishermen at Wick are willing to contribute, to the formation of a harbour, 1*l.* or 2*l.* per boat ?—I am not aware of it.

28,546. Then, as regards the saving of life and property, has not Wick as good a claim to Government assistance as if it was a port for common vessels and common sailors ?—As good a claim.

28,547. Particularly, owing to the number employed in that neighbourhood, that is to say, there might be several fishing places along the coast, but if they have only a comparatively small number of men employed about them, that would not reduce the claims of Wick for the protection of the Government, as the most prominent case that could arise ?—It would not affect it in the least.

28,548. I have a question to ask concerning the bar harbours, and the formation of bars. I think you started in the first instance by stating that all river harbours were bar harbours ?—No ; rivers issuing under certain circumstances have bars, but there are some rivers without bars. If a river partake of what is called the estuary character, and the wave and the tide can only act in the exact line of the river inwards and outwards, there could not be a bar ; but, on the other hand, if a river issues at right angles to the line of the coast, that is the most likely position for the formation of the worst bar.

28,549. Speaking of river harbours not of an estuary character, is it not the fact that the bar is caused by the outgoing current, the river water meeting the stroke of the sea, and that the sea bringing the sand in one direction, and the river carrying silt out in another, they meet at some neutral point, and there, where it is comparatively still water, they deposit their contents ?—That is not my belief, because I have always observed in watching narrowly the operation of the ebb-stream from the river that there is no such conflict. You will find that the ebb of any river goes out in a body, without disturbance, right off into the sea for a considerable distance, and beyond the position of the bar, which at once leads to the conclusion that the formation of the bar is not due to any opposition of forces of that character.

28,550. Leaving out river silt altogether, does the river current, meeting the tide current coming in,—one coming out and the other going in,—would not that be apt to create a bar ?—It would not be at all a practical cause. As I view it, it is simply the operation of the sea by a marginal drift endeavouring to shut the river up. Were it not that a river was issuing, it would be a dry beach instead of a channel.

28,551. (*Mr. Coode.*) I believe that one of the principal advantages of Wick as a harbour would arise from the fact that it is the nearest port to fishing grounds occupied by 5,000 or 6,000 men ?—That is so.

28,552. Should you not think that an equal number of men occupied in fishing off the east coast of England would have a claim equal to that of the 5,000 or 6,000 fishing off the north-east coast of Scotland ?—If, like them, they were collected in one spot, and exposed to the same risk, they might ; also bearing in mind that I think Scotland, as a section of the country, has distinct claims.

28,553. You think Scotland has stronger claims to the advance of public money than any other part of the country ?—I think so, especially in view of a certain feeling which I have seen arising of late years. I have lately seen a statement as to a want of fairness in the distribution of the national funds for national purposes. It is a point I do not understand much about, but it enters into my view.

28,554. That being a question of political economy, I would rather not enter into it. The liability to accumulation on any part of the coast would, I presume, depend on the material travelling along that coast, would it not ?—It would.

28,555. Are you aware that close harbours have been made without any accumulation taking place ?—The only case of this sort with which I am ac-

quainted, and about that I received information from others, is Kingstown harbour, but in the other close harbours with which I am acquainted, when matter is held in suspension, I have always observed an accumulation, and the deeper the harbour the more rapid is the accumulation, for certain reasons, which are at once apparent.

28,556. Then Kingstown is a case in which a harbour has been made, and there has not been any accumulation ?—Practically, there is no accumulation. I believe, as a matter of fact, that there is a little accumulation, but nothing of any importance. The water there is uncharged with matter, and there could not be any accumulation of any moment, nor can the waves ever be charged with matter. The water is not charged, except at the time the harbour is emptying itself. The water arrives from an iron-bound clean coast, and is as clean as the Atlantic, as I am told, which results in a freedom from accumulation.

28,557. You say that Bridlington Bay would not fill up, if an artificial work were constructed in front of it ?—If it was properly arranged and constructed.

28,558. You are doubtless aware that there is already a sand bank of very considerable extent in front of Bridlington Bay ?—There is.

28,559. Can you tell whether within the last 40 or 50 years there has been any accumulation within that bank ?—I am not aware. I am told that the bank has a nucleus of chalk. I do not know it of my own knowledge.

28,560. I think you yourself have reported that there has been an accumulation on the south side of the pier, projecting from the Heugh at Hartlepool ?—As a matter of memory, I do not think I have, about the pier at Hartlepool.

28,561. I speak of the work which was commenced there a few years since, extending from the Heugh in a south-easterly direction ?—I think the accumulations which I referred to were in other situations, and arose mostly from suspended, and not driven matter.

28,562. If we have heard in the course of the inquiry that there are a great number of laden vessels attempting to get to the south that cannot get round Flamborough Head, they would not be served by a harbour in Bridlington Bay ?—Distinctly not. It would be of no use to them.

28,563. What is your experience of the direction in which the heaviest gales turn in the North Sea ?—They are rendered dangerous by working easterly. Vessels are enticed by the wind hanging southerly. They stretch to the south and struggle against it. If they hang on too long, and it comes easterly, it places them in difficulty.

28,564. Do not the heaviest gales often wind up by blowing very hard from the north-east ?—I think that is my experience.

28,565. Then, in the case of those vessels of which we hear as running back from Flamborough Head, would not the tendency of the direction of such gales be to prevent them from reaching the northern ports ? Would not the wind be more apt to prevent them than to favour them ?—That I am not prepared to say. If it flew in suddenly from south-east to north-east it would, but if it come in the usual course, gradually backing, a man, if properly cautious, would reach the northern ports.

28,566. Still these gales do occasionally fly round suddenly, do they not ?—I think you can scarcely term it suddenly. Perhaps there would be an interval of a few hours between several points ; gradually backing I think, that is my experience. I have seen it from moderate southerly winds flying suddenly to north-east. At the back end of last month, I was very much attracted by a circumstance which occurred. There was a good number of light vessels bound to the coal ports, and distributed opposite the several ports of Seaham, Sunderland, and so on, apparently bound to the Tyne. They were caught by a north-easterly wind short of their ports, and could not struggle against it, and all bore up to the south. I found out afterwards they went to Hartlepool, and I observed that a few days afterwards they were all towing back to the Tyne with steamers ahead. It is a circumstance I have seen occur before in my experience, and is therefore included as one of the collateral points which would render valuable the establishment of a harbour at Hartlepool.

28,567. You say that sand will not rest on a ridge of rock. Will sand in travelling along the shore be arrested by the existence of shingle upon the shore ?—I have no case at present in my memory.

28,568. As you have given an opinion that sand will in no case rest upon a ledge of rocks, I should wish to know whether you can give an instance where you have found sand arrested by shingle and accumulated in the interstices ?—I am not aware.

28,569. Do you not think that if sand were travelling along any part of the coast, and were to meet with a shingle beach, it would be arrested by the shingle ?—A shingle beach transversly to the shore ?

28,570. No ; a shingle beach along the line of the shore. If sand were travelling along the shore would it not be found mixed with the shingle ?—If I hear the exact case I will tell you immediately.

28,571. I am asking you as a general principle ?—I cannot in this case speak to a general principle, but to special circumstances if I know them.

28,572. You said you would not recommend the formation of a harbour at Redcar. Had your answer reference to the site between the Scars, or had your answer reference to the coast at Redcar generally ?—My reply had reference both to a harbour formed on the principle of a close harbour upon the Scars themselves, and also to any harbour, whether close or open, anywhere about the Scars.

28,573. Either towards the north-west or south-east ?—On either side, or even within a mile, I should consider it objectionable.

28,574. The only objection that I remember you mentioned was the projection of the Scars themselves; that the harbour not being so far in advance as the eastern end of the Scars, or rather the Scar projecting beyond the proposed work, it would pick up vessels attempting to enter ?—The neighbourhood of the Scars to a harbour formed on one side.

28,575. Was your objection on the ground of the eastern end of the Scar being likely to pick up vessels attempting to make or to leave the harbour ?—The Scars, as a whole, without reference to either end, either to the north or south Scars, taking the Scar as a ledge of rock close to a neighbourhood in which a harbour is projected, I should consider that a great disadvantage indeed. It renders that harbour to a certain extent, taking the common chances, a dangerous one.

28,576. Your objection would not be done away with if one of the piers of the harbour was run out upon the Scars ?—Distinctly not, because the groin objection comes in, and I have already explained that along the whole of the east coast of England the movement of the soil is with the preponderating sea stroke, which is from north to south. I have a few practical examples of that. The movement of the soil upon the east coast of England from north to south is determined by the preponderance of the sea stroke ; in other words, that movement is from north to south, because the heaviest gales and the heaviest seas come from the north-east quarter.

28,577. Do you mean both sand and shingle ?—The movement of material. The first case I will give is Holy Island. It is joined to the mainland by a narrow neck of land to the north-west, and not by a ridge to the south-east, which would not be the case unless the soil was moving from north to south. Warkworth pier is charged on its north side by a high sand. Sunderland north pier is charged on its north side as it goes out, and whenever upon this coast a transverse work is run out for protecting the land or other purpose, I have always found them, without an exception, charged upon the north sides. All along the Holderness coast

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to the Spurn points, wherever these things are erected, they are charged with sand upon the north side. Upon the Lincolnshire coast the groins are charged upon the north sides, and also all along the Norfolk coast. Yarmouth north pier is exactly the same as Sunderland north pier and the Southwold north pier, and so along the entire sea-coast of Suffolk to Landguard Point. All these piers are charged with sand upon their north sides.

28,578. Have you examined whether, in all states of the wind, the movement is the same?—Under all circumstances the abiding result is, their being charged with sand on the northern side.

28,579. Then, if you found a projecting ledge of rock or artificial work, without any accumulation on the north side, would you take that as an indication that there was but a small amount of material travelling along that part of the coast?—As affording you no clue to the movement of material. The movement of the material is only to be developed by the establishment of works to give you any guide. No common observer of the coast about Lowestoft would ever have supposed that there was very much material moving about there. There was nothing to indicate it; but directly the north pier was put out the movement of material became very apparent, and in a few years it had moved out to the extent of 500 feet of solid land; whereas, to the common observer there was nothing at all before that to indicate that there was any material drift there. I say, as a general thing, that you cannot develope either the presence of any movement or its amount without you commit yourself to the construction of works.

28,580. In the case you have just alluded to, would you tell us the depth of water that existed, before the pier was thrown out, at the point at which you now find the low-water line?—About 17 feet at low-water springs.

28,581. Then is the fact this,—that there has been an accumulation of sand to the extent of 17 feet, since the advancement of that pier?—Yes; within the same harbour, from other causes of decay and deposition, there was in two and a half years an absolute deposit of 10 feet in thickness, of light sand.

28,582. Was it sea sand?—Yes, light sea sand.

28,583. Not mixed up with alluvial matters, or material from the débris of the cliffs?—Not to any appreciable extent.

28,584. (*Chairman.*) Do you think your breakwater at Wick would be outside the rollers where the water breaks?—Not in the height of the gales.

28,585. There would be breakers outside of it?—A topping sea, but not breakers properly so termed, not the breakers of a body of water.

28,586. But breakers that would be dangerous to fishing boats running in?—Oh, yes, when the gale is thoroughly established, no boat could look near it.

28,587. From what you know of Wick Bay could it be possible to put a breakwater far enough out to get rid of that danger from the breaking sea?—I think not.

28,588. How far out should you be prepared to say that you know the water breaks in Wick Bay in heavy gales?—I have seen the sea topping over the whole of it from point to point.

28,589. Right across from point to point?—Yes, in the height of the gale.

28,590. You have no estimate of the breakwater which you propose for Wick?—I have merely projected it to exhibit a principle, without any reference to the expense of it.

28,591. You have formed no estimate of the expense of the breakwater on Smithic Bank, I presume?—I have not.

28,592. Will you explain to us what kind of breakwater you would place in Hartlepool Bay?—The only breakwater, holding the views which I do, that I should think of placing at Hartlepool, keeping in view all the circumstances, would be a work which I have named the Wave Screen, which is described in a pamphlet which I think is now before the Commissioners.

28,593. What would be its position?—I have in the same pamphlet indicated the line which I think such a work ought to occupy, always bearing in mind the modifying effects of the tide and other circumstances, of which I am not at this moment thoroughly in possession.

28,594. I think this pamphlet is not in evidence before us?—It is not.

28,595. Will you be good enough to state, for the information of the Commissioners, where you would put a breakwater. At what part of the bay?—I have already pointed that out in page 59 of the pamphlet.

28,596. The pamphlet is not in evidence before us, and I should prefer your giving it to us in evidence. You can read an extract if you please?—I could not project it without instruments and careful measurements.

28,597. Read the extract which you desire to put in evidence?—Here it is (*witness read from pamphlet*), "The true principle of such a work was "present to the mind of the writer when giving "evidence before the Select Committee upon July 27, "1857, as the following extracts from the replies will "show, viz., It (the harbour) would be open to the "sea, but not to endanger it for refuge purposes. I "have mentioned my idea of a refuge harbour to be "a protected anchorage. The exact projection (of a "breakwater) would be determined upon finding out "the exact set of the tide streams, and one or two "other points of information. Speaking generally, "it (the breakwater) would be curved with the di-"rection of the tidal stream if it could be so pro-"jected. My object being not to interfere with the "set of the tide throughout, and I think that is per-"fectly consistent with affording all the refuge that "is required. The breakwater I have in view would "protect the whole space of the bay." The cut illustrating this is shown upon page 59.

28,598. Would the harbour you propose in Hartlepool Bay be exposed to a line of sand drifting along the coast?—The effect of any accumulation opposite the Hartlepool Heugh, of sand drift would be, if my views are correct, rather to go outside the screen, because the concentrated ebb set would have a tendency combined with the flood set to work the material outside the screen. The general effect would, I think, be that; but it is a point I am not now inclined to speak of very decidedly.

28,599. You said, as I understood, that the drift of the material along the east coast of England is from north to south. Is that clearly established in your mind?—That is the result of my 22 years' experience.

28,600. Because I think we have had it given in evidence, and very strong evidence too, to the contrary; but such is not the result of your experience?—I am perfectly well aware that there is a north drift in special cases. At the mouth of the Tyne for instance. I should be prepared to expect a northern drift over the Herd Sand, and there are one or two other places, such as Scarborough Bay; or where any bay lies recessed within the line of the preponderating stroke, the drift would be in the opposite direction; but taking the coast as a whole, it is an unquestionable fact, that the movement is from north to south. I may also mention, to put the matter in a broad light, the effect of centuries, shown by the present state of Lynn Deeps and the mouth of the river Thames. The material deposited there is not the result of matter arising from the disintegration of the country thereabouts; but it consists of matter which, travelling from north to south, has been deposited at the mouth of the river Thames and in Lynn Deeps.

28,601. Then what is this sea drift? Is it the disintegration of matter from the shores which forms the sea drift, and comes south, or is it swept up from the bottom of the sea?—It is brought from sandstone districts, in a northerly direction.

28,602. The disintegration from the sandstone districts of the north?—Yes.

28,603. Therefore a thorough examination of the

coast, and a comparison of the nature of the drift which is found, with the geological formation of the country, would be a proper test?—It would be a clue, but not an absolute test. Coupling it with the particular facts I have mentioned, it would show the general fact that the drift arrives from the north.

28,604. As to matter which is held in suspension, does the tide from south to north bring most material?—There again it is common over the whole coast. As a general fact you will find the water heavily charged in gales of wind, from the Tweed right to the Thames. I can't say distinctly that there is much difference as respects portions of the coast. There is only a difference as respects the distance from the coast. The closer on shore you have the water highly charged. A little further off it is less highly so, until we get to 15 fathoms, and there, as a rule, you will find the water uncoloured.

28,605. Would you be disposed to attribute much effect in silting to matter held in suspension?—It all arises from matters held in suspension.

28,606. As distinct from the sand drift, from what drifts along the coast I mean, that matter which is still held in suspension?—That is the precise cause of all *silting*; there is a drift of matter which cannot very well be suspended, except for a very short time.

28,607. One more of the nature of a mechanical action?—They are both mechanical actions.

28,608. But one is more of that nature than the other. It is driven along the shore?—The other is also mechanical. It is the motion of the sea that causes the movement of particles, which gives the mechanical power.

28,609. I understand you to say that, supposing the larger plan shown by Mr. Walker for these piers was carried out, the arrival of the sand at the piers and the formation of a sand bank at the pier heads, is only a question of time?—That is my belief. The re-formation of the bar between the pier heads.

28,610. The sand banks of which you speak, where there is no river, would not exist where there is a river?—Oh no.

28,611. Then it will become a bar?—Yes; there would be a channel to a certain extent.

28,612. But that bar, if I understand you rightly, would not necessarily be at the pier head?—It might be some little distance away. It might be a little within or without, but my impression is that it would be a little convexed outward from the line between the pier heads. Ultimately we should have a bar at the pier heads very little different from that which we have now, and, as it affects refuge, practically the same.

28,613. Referring also to a statement that was made to us by Mr. Walker, that in his opinion the depth of water of 39 feet which I see between the pier heads might be reduced to about 30 feet, and that a regimen or normal state would be obtained, you entirely differ from him in that opinion?—Yes; the regimen would, in my opinion, be a ten-feet bar.

28,614. Also with reference to a further statement of his, that there would be what he termed an inclined plane from where the bar now is to the pier head, from ten to thirty feet, that is entirely in conflict with your opinion?—It is entirely contrary to my opinion.

28,615. Why would not the inclined plane exist?—It could not exist if a bar was formed, as I believe it would; the fact of the bar re-forming, of the same character as respects height as at present, would be rather to have a tendency to shallow backward. The heaviest débris and sand from the river would not run up an inclined plane; if even it was dredged to 18 feet, the tendency would be to retain the débris from the river; the heaviest materials would, to a certain extent, go to the inner side of that bar; and therefore, if my views be correct, it would matter very little whether they dredged or deepened within, after the bar was formed. The tendency would always be to restore the depth within to what was consistent with a ten-feet bar.

28,616. How is a bar formed?—To put it in the most simple form, bars upon the coast which is now under review are formed from the sea, assisted by the tides drifting materials from north to south, the practical effect of which would be to shut the rivers up by a beach, if there was not a river issuing, which makes a channel across this obstruction in proportion of its own power to that of the accumulating forces. Perhaps I may be permitted to mention that these views of mine are not new with me, but are all contained in a pamphlet which I wrote some five years ago, since which time I have seen no reason (but the reverse, in fact) to alter the opinions which I then expressed. On the contrary, my convictions have increased by experience, and I am now inclined to put them a little stronger than I did then.

28,617. By the preponderance of the sea-stroke, do I understand you to mean that there are more gales from the one direction than there are from the other?—That is not exactly the reason for the preponderance of the sea-stroke. There may be the heaviest gales from the north-east and the heaviest sea from the north-east. A single gale from the north-east may, by its force, neutralize a good many from the south-east.

28,618. In fact, there is a greater mechanical power exerted by the north-easterly winds than there is by the south-easterly winds?—Distinctly so.

28,619. I think you said something about the iron-bound coast of Ireland as a reason for Kingstown Harbour not being exposed to any sand drift. In another part of your evidence, however, I gathered from you that an iron-bound coast is not necessarily clear from sand-drift, because there may be sand drifting along, of which we know nothing?—There may be, but I am acquainted with the fact that the water in Kingstown Harbour is uncharged; and looking at the coast I saw that the water could not be charged, from the circumstance of there being nothing there to do it, and that the water could only be charged with the light sand in the neighbourhood of Dublin; but at that time Kingstown Harbour would be emptying itself, and when it was filling it could only be filled with clear water.

28,620. Are calliper-shaped piers favourable to a fair sea through the opening?—Very favourable.

28,621. Will you state your reasons for thinking so?—They are favourable to the extent to which they approach to transverse piers, or piers projected right out seaward. The practical effect of such is to cut off a certain amount of the undulation which advances undisturbed through the canal. So far as the calliper-shaped piers approach to this condition, so far do they ensure a favourable sea; and if you were to reverse the shape and let the piers approach each other, pointing inwards, you would have the worst possible condition, because you would have a reflected sea acting exactly across—the most favourable being transverse piers, and the most unfavourable bell-mouthed piers. A bell-mouth is a doubling in instead of out, doubling in landwards, and the effect is to cause a deflected sea from each work, which makes the worst possible sea.

28,622. There was a question asked about vessels bearing up from the Head to Hartlepool. Would you be disposed to say that vessels in the condition in which they ought to be sent to sea, laden colliers in such a condition as respects sea-worthiness, would experience any danger in running from Flamborough Head to Hartlepool, even in a very heavy gale?—Not from my experience. I have been running with them under such circumstances.

28,623. The danger on running from Flamborough Head to Hartlepool arises mainly from the inferior character of the vessels, does it not?—It may arise partly from that, or it may partly result from their hanging on till the last possible moment, and no shelter being provided for them to the north. They are unwilling to give up track, and keep hanging about imprudently, and then they are lost.

28,624. But I put to you this case: If the vessels were in such a state of seaworthiness as they ought

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to be, would they be, generally speaking, in any danger while running back in a heavy gale from Flamborough Head to Hartlepool ?—No, in no danger whatever.

28,625. You spoke of the depth at which a wave acts. What is the greatest depth at which you have known a wave to act ?—It was quite clear to my mind at the time of the North survey, that the result of the wave's action was to move shingle towards the mainland through a depth of 12 fathoms.

28,626. Are you satisfied that there is a motion at the bottom of the sea in 12 fathoms depth ?—Distinctly so.

28,627. Uninfluenced by any special form of the bottom ?—Uninfluenced by that, and resulting merely from the undulations of the sea conveying their own impressions to that depth.

28,628. You have stated in your pamphlet, which I have read, that there are three causes for harbour depreciation. You say, " Harbour depreciation pro- " ceeds from three principal causes, which I do not " here specify." What, in your opinion, are those three causes ?—That was written some years ago, and I cannot now, as a matter of memory, exactly say what the causes were which I had then in my mind.

28,629. I am anxious to know what these three causes are ?—I shall have to speak from memory as to the causes which were then present to my mind. I may mention as a primary cause, river encroachment at the upper part of rivers. The second cause would, I think, be, according to what I then had in my mind, the non-projection of works upon right principles ; and the third reason I am not now prepared to specify.

28,630. We shall have you before us again, and if you can by that time recollect the three causes you referred to, and will name them to me, I shall be obliged.—I will read over the pamphlet attentively, and most likely I shall be able to do so.

28,631. Are you acquainted with the Tay ?—I am.

28,632. If we had the good fortune to have the Tay upon the north-east coast of England, should you not consider it to be a very capital harbour of refuge ? —The Tay, under general circumstances, is an excellent harbour of refuge.

28,633. I judge merely from the chart. Are there any circumstances connected with it which prevent it from being a good refuge ?—There is a bar at the mouth of the Tay, and the sand lays a considerable distance off. It is possible that in south-east gales a sea may be caused upon the bar, which to a certain extent would interfere with refuge.

28,634. Have you personal knowledge which enables you to speak as to the eligibility of the Tay as a harbour of refuge ?—Not strictly with a view to refuge ; the result of my experience is contained in the North Sea Directory, whatever that may be.

28,635. With reference to your opinion that upon a straight coast the middle point of the straight coast is the proper place for a harbour of refuge : taking the coast from the Tay to Peterhead, would not Aberdeen pretty well meet that definition ?—Anywhere midway ; midway upon a straight coast, wherever that site would be. I have no special site in view.

28,636. Are you sufficiently acquainted with Aberdeen to speak of it ?—Yes, well.

28,637. (*Capt. Washington.*) As you seem to have made tidal rivers a subject of study, I should like to ask whether you consider that in dealing with a tidal river it would be desirable to deal with it as far up as the tide flows, and not merely with its mouth ?—I think that is of the utmost importance.

28,638. You consider that in the case of the Tyne it would be desirable to remove all obstructions as far as Newcastle Quay, including the old bridge at Newcastle, and to encourage the tide to flow up to its utmost limit ?—Anything within the river Tyne which interrupts the tidal propagation, and the works which you have mentioned do interrupt it, ought to be removed ; in fact the utmost amount of tidal contents should be invited by decreasing the friction.

28,639. Are you aware what is the loss of rise of tide between Shields Bar and Newcastle Quay ?—Speaking from memory, I think about five feet.

28,640. Do you think that that state of things ought to be remedied, and do you apprehend any difficulty in remedying it ?—If all the obstructions upon the sides and in the bed of the Tyne were removed, the evil would be to a certain extent cured, but I am not prepared to say that it would be altogether done away with.

28,641. Might not the bed of the river be lowered, as was done in the case of the Clyde ?—The increase of tidal quantity has that effect.

28,642. Might not the bed of the river be deepened by dredging ?—It ought to be in the first instance, in order to remove all obstructions which the current unassisted cannot carry away.

28,643. Do you consider the free application of the dredge one of our most powerful instruments towards the improvement of harbours and rivers ?—A most valuable aid as a means of getting a river into condition, but not of maintaining it. It is an expensive process to maintain it by dredging.

28,644. Ought not a river once put into what engineers call " train " to maintain itself ?—It ought.

28,645. Is not it fair to think it would do so ?—It ought.

28,646. But if you require to increase the depth it must be done by dredging, as in the Clyde ?—It must.

28,647. (*Capt. Vetch.*) Coming back to the drift along shore, I suppose it would follow from your observations that material coming down from the north would fill up all the quiet nooks round the south side of a headland ? More or less it will so.

28,648. And that in fact the Herd Sand is a case in point : that the Herd Sand is owing to the promontory of Tynemouth Head running out and affording shelter, and that it takes its shape from being interfered with by the river ?—Yes, a triangular sheltered position.

28,649. And the waste of shore proceeds from north to south, where it is in a state of decay ?—The drift is from the north to the south.

28,650. The material which falls down is carried away to the south ?—Yes. There is one memorable instance ; the whole Holderness coast for a distance of thirty miles is being cut away at the rate of a few feet per annum, and the material so carried away is lodged at the head of Lynn Wash, and forms most beautiful land.

28,651. Are you aware that the Holderness coast is cut away year by year, at the rate of seven feet per annum ?—It is so.

28,652. That cliffs 20, 30, and even 40 feet high, are so cut away ?—I should think the average is about 40 feet.

28,653. All the material going along the beach seems to be carried to the south ?—Yes.

28,654. You know from what is going on at Spurn Point that the same thing takes place there ; everything training down to the south ?—It is so.

28,655. In fact, by referring to history we find that many parishes formerly belonging to Holderness have vanished into the sea ?—Yes ; I have myself seen a steeple in the sea.

28,656. The only place to which the material can be transported is the Wash ?—Yes ; it receives the whole of it.

28,657. That drift from the north is perhaps in connection with the northerly winds in some degree, because I understand from all sailors that a northerly wind brings the heaviest swell into the North Sea ?—Perhaps. The heaviest wave undulation is said to have occurred with northerly and north-westerly winds doubling round out of the Atlantic ; the greatest mass, if I may so term it. But the most dangerous and heaviest sea under other circumstances is that from the north-east.

28,658. We hear of what seemed to be a case in point at Wick. It was remarked by some person there that upon one occasion, when there appeared to be a perfect calm at sea, yet in a very short time there were breakers and rollers from Wick Head right up to the upper end of the creek ?—I have seen it so.

28,659. Breaking seas when there was still water outside ?—Yes, on a calm day.

28,660. That I suppose you would attribute to the Atlantic swell running up into the creek and meeting the shoal ground ?—Yes, to a westerly gale in the Atlantic, not reaching, but sending its swell home.

28,661. You would not be surprised if it came with a south-west wind in the Irish Channel ?—No.

28,662. I crossed that channel in the month of October last to Kingstown, with a south-west gale, and found a breaking sea with a driving surf running into Kingstown Harbour ?—I should expect it to do so; looking at the circumstances of the case, I think, I could have predicted such an occurrence.

28,663. With the same westerly gale I saw the sea running up into Dublin Bay; the sea breaking, and the wind off shore, carrying away the surf to sea ?—I should expect it.

28,664. So I fancy the Atlantic wave has, generally speaking, a great deal more to do with our shores than we are aware of ?—It has a good deal.

28,665. (*Mr. Coode.*) You say that in a gale of wind, you have seen the sea discoloured to a depth of 15 fathoms ?—Yes.

28,666. Did you refer to extraordinary gales, or to fair average gales ?—A fair average heavy gale. I am constantly witnessing it from being on the coast.

28,667. Where about ?—Near Sunderland. I have a mark for the depth.

28,668. You are prepared to say that there is a movement of matter in suspension to a depth of fifteen fathoms ? That is my belief.

28,669. In short, you would not agree with the evidence given at Sunderland, that sand and light matter will not move in a greater depth of water than eighteen feet ?—Oh dear no !

28,670. You speak now from actual observation ?—From the observation of twenty-two years directed to all these points; in fact, I have made them a favourite study.

28,671. Have you ever had occasion to direct your attention to the nature of the material forming the bar at the Tyne ?—I have not. It is a prolongation of the Herd Sand. I should be prepared to find in the body of the bar some river debris, masses of stuff, stones, refuse, and so on, but 99-100ths of the bar would be sea-sand.

28,672. Material brought in from seaward ? — Drifted either along the shore or from seaward.

28,673. Material brought by the sea ? — Brought by the sea.

28,674. And you apprehend that the existence of a bar just outside the piers at the Tyne would entirely prevent the existence of an inclined plane such as Mr. Walker spoke of ?—It would immediately destroy anything of the sort if it existed, for the reason already stated. I may also mention that the rearrangement of the entrance of a river by works advanced into the sea, besides involving the serious drawback of abruptness of frontage, to which I have alluded, acts both ways; it increases the force of the flood as well as that of the ebb, and therefore, although the tendency of the increase of the ebb is to send matter out, the effect of the increase of the flood is to send it in.

28,675. So that although there might be an additional quantity of matter carried out, there would also be a greater quantity carried in ?—Yes. I may mention as a broad principle, that the great object is to accept the natural position of the bar, and then to act upon it by artificial works. What you ought to aim at is a concentrated ebb and diffused flood, the bar being really a balance of the power of the river on the one hand, and that of the sea on the other; therefore, if you could concentrate the ebb over the channel of the bar with no perceptible flood, that would be the best possible condition for procuring depth.

28,676. You regard that as the broad principle to be acted upon, in attemping to improve a tidal harbour ?—That is the case. I have heard certain cases referred to, as illustrations in support of artificial works at the mouth of the Tyne and the Wear, but they have really no bearing upon the question. The three cases to which I allude are those of Scrabster Roads, in support of the Wear, and Dover and Yarmouth in support of the Tyne, with which, however, they have nothing in common. You can draw no inference from them as to what would be the result at the Tyne and Wear.

28,677. I fear there may be some little misunderstanding of your description of calliper piers, and I would ask, rather by way of illustration than for any other purpose, whether, when you spoke of calliper piers, you did not mean piers that approach each other as they advance seaward, and by bell-mouth piers, piers that recede from each other as they advance seaward? —I do; calliper piers are those which approach as they advance seaward and curve towards each other, and bell-mouth piers those which recede from each other as they advance. I may also mention in support of the view that I am expressing as to the primary cause of the bar, that you never find a bar at the mouth of a river when the sea and the tide set in the direction of the entrance; there can then be no sea or tide across the entrance, and that being the case, the cause for the formation of bars does not exist: I will instance the Thames. It is in the direction of the tidal influence, and there is no sea, except in the direction of the channel. The Shannon is the same, and the Forth the same. There are also others, in fact you might go round the whole coast, you will see it indicated that where the tide and the sea do not set across the entrance there is no bar, but wherever they do there is. In fact, if you allow your reason to act with these two facts before you, you can be at no loss as to the cause.

28,678. The Humber is another case ?—The Humber is, to certain extent, a case in point. It runs transversely to the tidal set, the sea may act across it, and there is the nucleus of a bar, but it is far seaward. That is an enormous river, and of course it has special features.

28,679. Do you consider the Tay as good a harbour of refuge as the Humber ?—I am not immediately prepared to compare them, but I do not see any broad difference.

28,680. Have you ever heard of the proposition to construct island breakwaters in front of tidal rivers, with a view to the removal of bars, and to prevent their formation ?—I have heard that such an idea has been originated by a Mr. Glover, a clergyman, but I do not at all know the plan.

28,681. It is that to which I allude ?—I only know that the idea has been suggested, but of the mode of application I know nothing. I have never seen a projection, and therefore can form no idea of it.

28,682. Do you imagine that the application of the principle of an island breakwater to the mouth of a river, would have the effect of preventing the formation of a bar ?—I cannot reply to that. I must see a plan of the work, and would then indicate clearly what I believe would be its effect.

28,683. (*Chairman.*) Referring to this plan, in which Mr. Abernethy's proposed pier at Aberdeen is marked in red, what is your opinion of it ?—I do not know the express objects of the work.

28,684. The object of the work is to give thirteen acres of refuge, in which vessels could lie until the tide enabled them to go up the harbour ?—With only the work shown upon the plan.

28,685. With only that work ?—It cannot be done.

28,686. Why ?—Because the sea would find its way into the space, and that heavily.

28,687. It does not follow that because the line in

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which the sea runs is cut off by a breakwater it will not come round?—It will double round sufficiently to prevent vessels within being in a safe position. Then it would have to be deepened, and I do not see any power except artificial power for maintaining it.

28,688. For maintaining the depth?—For maintaining the depth.

28,689. It is not proposed to create any depth?—The effect of the work will be to decrease the depth.

28,690. An opening is to be left for the tide to go through?—Practically that would have no effect in preventing the lodgment of matter.

28,691. Your opinion is that that space would fill up?—It would be a sack to receive material. Perhaps upon being informed of the views of the projection, and carefully considering the subject, these opinions of mine might be slightly modified.

28,692. On Tuesday you will be examined as to the wave screen.—In support of that invention I shall only be able to advance principles. As to the mode of construction and so on, I of course know nothing. But since I published my pamphlet upon the subject, the gentleman who has carried out the only work of the kind in this country, Margate pier, has written to me to say that he was perfectly astonished to find that that pamphlet embodied all the experience which he had gained during the construction of that work, and that he was thoroughly convinced not only of the truth of the principle, but also of the practicability of constructing such a work at a very small cost. That is Mr. Bastow, who constructed Margate iron pier.

28,693. Will you write and ask him to be here on Tuesday, at ten?—I will.

Mr. GEORGE GRANT FRANCIS examined.

Mr. G. G. Francis.

28,694. (*Chairman.*) You have a statement to make to us?—I have put what I have to say in the fewest possible words in the form of a written statement, which, perhaps, I had better read.

To the Royal Commissioners on Harbours of Refuge for the United Kingdom.

GENTLEMEN,

PURSUANT to the request of the Commissioners, and the arrangement made at the time I gave evidence at Swansea, I have now the honour to present the following information illustrating my evidence in chief, and confined to the Bristol Channel above Hartland Point, as defined by the Select Committee of the House of Commons at pp. vii and viii of its Report on Harbours of Refuge, 1858.

1st. A table of the Tonnage and Shipping of the Bristol Channel proper, or above Hartland Point, for the year 1857,

By which it will be seen that it has one sixth of the tonnage and one quarter of the shipping of England and Wales; and nearly half a million of sailors engaged on its waters.

2nd, Some account of the Loss of Life and Property which has occurred during the last twenty-five years on the north side of the Bristol Channel, and taking the Mumbles as a centre.

From the absence of registered statistics, I have found great difficulty in obtaining the facts under this head, but from trustworthy sources I have obtained six different lists, which, though unfortunately imperfect, yet exhibit in a marked manner the want of a Harbour of Refuge on this coast, a want which must necessarily increase with the rapid extension of the commerce of the district. I have ventured to present the lists in their original condition for examination by the Commissioners, but they can easily be reduced to any given form for printing, if so desired.

3rd, Photographs of the beaching ground at the Mumbles.

To show the character and value of the flats at the Mumbles for the smaller class of vessels, and the reason why loss of life is not so frequent at the Mumbles itself as upon other parts of the coast. I have obtained the four photographs marked a, b, c, and d.

4th, The stratagetical value of the Mumbles.

I am now able to inform the Commissioners that during the long French war, the Government found that the most convenient place in the Bristol Channel for the convoys to assemble was at the Mumbles. It was the rendezvous for the entire channel, and the gun brigs "Bloodhound," "Intelligent," and "Conquest" were employed for years in convoying the merchantmen westward as far as Plymouth. In the present day it has been determined to erect a powerful Battery on this head, and a well-known Lighthouse has long existed there, so that the naval, military, and civil authorities appear to have been singularly unanimous in selecting this locality as a common gathering ground for this channel.

5th, Touching the question of Ships from other ports than Swansea frequenting the Mumbles roadstead.

I have heard but one universal declaration, that it is, and always has been, used by ships from all the Channel ports, but probably the annexed letter (marked X) from the lighthouse keeper at Swansea will be more satisfactory to the Commissioners than any general statement of mine.

As illustrating the inquiry,—How many vessels have been seen there at a time? I have found a note that when Colonel Vicars and myself visited the site of the proposed Mumbles Battery in 1854, we counted 280 vessels lying in the roadstead. And on the very Tuesday evening after the Royal Commission sat at Swansea, eight vessels only were counted at the Mumbles; on the following morning no less than 104 sail of ships were lying there in safety, driven in by the change of wind, and having reached it without a pilot!

Lastly. Supply of Stores at Lundy Island.

On this subject I have gone into the question with several competent merchants, and looking to the great variety of stores required to be kept, varying indeed from biscuits to masts and sails, and the long and uncertain periods between the times of demand, together with the necessity for the erection of special store-rooms there, they are of opinion that the extra cost of articles of almost every description would have to be set down against the shipowner at from 50 to 100 per cent. over that from localities which possess the ordinary appliances of ports with large populations.

I have, &c.

London, December 4, 1858. GEORGE GRANT FRANCIS.

Mr. Clayton read the following memorial upon the improvement of the Tyne:—

The Memorial of the Tyne Improvement Commissioners

Humbly showeth,

THAT your memorialists observed with much satisfaction the appointment of a Royal Commission to inquire into the best means of preventing the lamentable loss of life and property by shipwreck.

That your memorialists feel the deepest interest in this inquiry, representing as they do the commerce of the river Tyne, in and out of which river pass annually nearly one-half of the shipping frequenting the north-eastern ports, and about one-eleventh of the whole traffic of the ports of the United Kingdom, and they earnestly hope that the result of the present inquiry may be the adoption of adequate measures for the saving of life and property on this dangerous and much frequented coast.

Your memorialists have already laid before you evidence in support of the views which they have formed as to the best means of affording the required protection against shipwreck, reserving their engineering evidence to be given at your meeting in London.

Your memorialists believe that the most effectual means of diminishing the loss of life and property on this coast would be the improvement of the entrances of the existing harbours, and that one or two great refuge harbours would not alone answer the purpose contemplated.

It is found in practice that the masters and crews of ships invariably press on, almost at any risk, to their harbour of destination, and that if compelled to put back, they seek to make their port of departure. This is confirmed by the fact which Mr. Thomas John Taylor's evidence will establish, that almost without an exception the wrecks at the mouth of the Tyne are of vessels bound thereto, or seeking refuge therein, or which, having sailed from the Tyne, have put back from unfavourable weather. In such cases increased depth and greater shelter at the entrance of the Tyne would immensely diminish or wholly remove the risk. The greatest proportion of wrecks at the mouth of the Tyne occur with south-easterly gales, and to light ships caught to the north of Tees Bay and bound for the Tyne, or ports north of the Tyne,—the protection of which, a harbour of refuge in Tees Bay would not secure.

And taking a more general view, one single harbour of refuge, while it would not meet the most frequent and most urgent cases, would not realize all the advantages which have been set forth even on such a possible occasion as

when a sudden gale overtook a fleet to the windward of it; because, of the vessels running for it the earliest arrivals would occupy the deepest anchorage, irrespective of their size; and larger vessels, as they arrived, might find no anchorage space unoccupied, and be obliged to take the beach; and this on account of the impossibility at any practicable cost of constructing a harbour sufficiently large to allow, swinging at their anchors, the numerous and always increasing fleets which necessarily accumulate in the coal trade.

Besides this, the enormous estimated cost of any artificial harbour of refuge in deep water; the consideration that it will almost certainly exceed the estimates of its promoters; and the uncertainty that the intended depth of water will be maintained, or that the nautical advantage expected will be realized, must always induce the utmost caution before the national funds are awarded for such an undertaking.

Your memorialists believe that the application of the public money, as they recommend, to the improvement of the existing harbours, is not liable to these objections, while it would more effectually provide for the safety of life and property.

Your memorialists feel some delicacy in alluding to the schemes put before you by other parties; but they, as well as the rest of Her Majesty's subjects, are interested in preventing the waste of public money which would result from its application to schemes which, if executed at any cost, could not effect the end proposed, though they might improve the financial position of joint stock companies.

Even supposing that a general harbour of refuge could be made at any practicable cost, and of any practicable extent, and that vessels could and would use it—notwithstanding the necessary delay, risk, and expense of doing so—there would remain an urgent necessity still for the improvement of the present trading harbours; for, in any case, vessels must reach their port of destination, and encounter all the risks of entering it.

The attention of your memorialists, from the time of their constitution as Conservators of the River, has been constantly directed to the improvement of the mouth of the Tyne, with a view to the saving of life and property, and they have more than once memorialized the Government for national aid towards the accomplishment of such a truly national object. They have also obtained an Act of Parliament for the erection of piers, taxing the shipowners (who voluntarily consented thereto) in order to raise funds towards the undertaking.

Your memorialists are now accordingly engaged in the construction of piers at the mouth of the river, for the purpose of improving the depth and safety of the entrance. These works are described in Mr. Walker's report and plan of November 1853, and the extent of the present contract and the progress made in its execution have been already detailed in the evidence of Mr. Messent, the resident engineer.

The estimated cost of completing those piers is 400,000*l.*, and your memorialists have power, and do levy a pier due of twopence per register ton on ships arriving from foreign ports, and one penny per ton on all ships arriving coastwise, for the purpose of obtaining the necessary funds. The annual produce of this tax is about 12,000*l.*, and is increasing.

Your memorialists, encouraged by the appointment of a Royal Commission, and the evident intention of Her Majesty's Government to devote a grant of public money to the purpose of refuge on this coast, requested Mr. Walker to report to them his views as to the possibility and cost of converting the Tyne into a harbour of refuge. His report will be laid before you and supported by his evidence.

By his extended plan, the piers are proposed to be advanced into 36 feet at low water, instead of 15 feet. Mr. Walker expects that these works will occupy 10 or 12 years in execution, but that their beneficial effect will be much sooner felt, and that the result will be to secure a passage of 18 feet depth at low water from the sea to Shields Harbour.

To secure this great benefit, however, an outlay of a further sum of 400,000*l.* will be required, making the total sum necessary to complete the extended piers 800,000*l.*, but this cannot be done without the aid of a grant of the sum of 400,000*l.* from Parliament.

Regarding what the Tyne Improvement Commissioners have done, and are doing, for themselves, and the great benefit to the country at large which will result from the Tyne being made a harbour of refuge to the extent which will be effected by the piers now in the course of formation, and their proposed extension, and considering how vastly beyond the sum named will be found any estimate for any one general harbour of refuge, your memorialists submit that a contribution of 400,000*l.* on the part of the Government is reasonable and just, and would, in fact, be a contribution by the nation precisely equal to the sum which the port spends out of its own resources to accomplish this great national object.

There is ample accommodation for ships in Shields Harbour, which has frequently contained more than 700 ships lying afloat at most efficient moorings. Besides this, the moorings in the rest of the Tyne have, at the same time, accommodated other 500 ships. The Northumberland Dock already opened, and the Jarrow Docks nearly completed, will together hold an additional number of 700 ships, making in all nearly 2,000 vessels. Such an extent of mooring accommodation, and facilities for classifying vessels, according to their size, can be found only in a river harbour. And it is to be remembered that when Shields Harbour and the other coal harbours are full of ships, it is because nearly all the vessels are in port, few being at sea exposed to danger.

By Mr. Walker's extended piers the largest vessel frequenting the Tyne could find shelter within the pier heads, if necessary, until there was depth of water to pass up, which there would be for a great part of every tide; while the smaller vessels would go up without waiting, and not remain to crowd the anchorage within the piers.

Your memorialists are aware of the objection that the Tyne is liable to heavy freshes or land floods, which cause a very strong outward current at the bar, and prevent vessels entering. This, no doubt, has happened at rare intervals, but to a much less extent than has been stated. But such freshes or land floods always happen either with westerly winds or in calm weather, and their occurrence is no practical objection to the Tyne as a refuge harbour.

The national aid which your memorialists seek would be repaid, not only in the diminution of the immense sacrifice of life and property connected with the coasting trade (which has ever been the best nursery for the hardy race of seamen who have so ably maintained the honour and power of their country), but also by the port becoming a station for small frigates and gunboats, by which the coast and its commerce would be most effectually protected.

(Signed) Joseph Cowen,
Chairman of the Tyne Improvement Commission.

Tyne Improvement Commissioners' Office,
December 2nd, 1858.

The Commissioners adjourned till Tuesday.

Tuesday, 7th December 1858.

PRESENT:

Admiral Hope (Chairman).

Sir Frederic Smith.	Captain Vetch.
Mr. Lindsay.	Mr. Coode.
Captain Washington.	Mr. Evans, Secretary.

Mr. E. K. Calver, R.N., re-examined.

28,695. (*Chairman.*) Mr. Calver, is the gentleman whom you mentioned on Saturday here?—The gentleman who constructed the pier at Margate?

28,696. Exactly so?—Yes; Mr. Bastow of Hartlepool; he is here.

28,697. The understanding was, that we should

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call on you this morning for an explanation of your proposed new principle of the wave screen?—Yes.

28,698. But before doing so there is a question I wish to ask. In your former evidence you stated that a lee-going tide runs down to the sea?—I did.

28,699. By that expression am I to understand that it is the result of your experience that a lee-going tide makes less sea than if there were no tide at all?—It is so.

28,700. That is the result of your experience?—It is.

28,701. And in the same way that a weather-going tide makes a greater sea than the ordinary sea or lee-going tide makes less?—Yes; and exactly for the same reason.

28,702. I was not quite sure whether I correctly understood you?—I will merely add one word. I mentioned that it did for the same reason exactly, because as the wave is the result of the friction of the wind upon the water, the weather-going tide as it takes the water to windward increases the sea by increasing the friction, and so the lee-going tide as it takes the water to leeward reduces the friction and decreases the sea. I may add, that after very close observation extending over a period of 22 years I have never seen the slightest deviation from that broad fact.

28,703. Before going into the subject of the screen, is there anything you wish to add to the remarks you made when last under examination?—Since I was examined on Saturday, I have remembered a few facts which bear upon the information required by the Commissioners, and which I think they ought to be possessed of. In the first place, I explained to the Commissioners that on the east coast of England, on every part of that coast which received the true sea, not interrupted by local causes, I invariably found that the movement of the soil was from north to south; and I explained to the Commissioners that that effect was the result of the preponderance of the sea, without specifying whether that preponderance arose from the sea caused in the north-east gales, or to the sea which we find on the eastern coast of England, and which is merely the residue of the Atlantic Sea, a sea which as a body is perhaps superior in magnitude to the sea of the north-east gales. I also explained that in certain positions on the north-east coast the movement of soil was from south to north; but that that movement proceeded from exactly the same causes; that was, the preponderance of sea acting exceptionally from the general rule from south to north. I now wish to produce a more minute example, to show that if even you take it down to the smallest practical example you will see the same law constantly operative. Before the Commissioners arrived in Sunderland, I walked round the works, for the purpose of refreshing my memory, in case they should require any information from me about that port. Amongst the other places I visited there was the south dock; the seaward face of the south dock. The Commissioners are perhaps aware that that is an artificial work, formed and protected on its seaward side by a series of transverse groins, formed of stone, and running in a direction transverse to the line of beach. While walking along there I observed that up to a certain point the groins were charged upon the north side, and as I walked southward I found that they were charged upon the south side also. Now, whenever I observe a fact of that sort I immediately make a note of it, and endeavour to ascertain the cause. I looked seaward, and reflected a little, and I at once saw the cause. In the centre, or rather opposite the centre of these groins, is a ledge of rocks, marked by a beacon called the South Beacon, and the consequence of the proximity of those rocks in that position is, as it affects these works, to destroy the sea in its progress to the northern works. Therefore the only effective sea that can arrive at the northern works is from the north-east, and hence the movement of the soil has choked up this northern side. On the northern division of the works, these south rocks, which have the effect of cutting off the sea from the north works in the same way have the effect of destroying the north-east sea in its progress to the south works, and the consequence is, that the most effective sea is from the south, and therefore these groins are charged on the south side as well as the north. The Commissioners will therefore observe, that whether as respects the whole line of coast, the results of modification, or minute examples, that the same law is constantly operative.

28,704. The chart shows a groin which I see is charged on both sides; is that consistent with the fact?—Is the chart correct? The groin is in a central position. But this plan was made a number of years ago. If I had now to make a survey, I could better illustrate the effect. There are documents and plans in the possession of the dock company which would be very instructive upon this point, if they exhibit the effect.

28,705. Did you observe whether the central groin was charged upon both sides?—I did not particularly look for that, but I apprehend it would be so.

28,706. Do you wish to add anything further to your statement?—Only in general terms.

28,707. Then before you proceed may I request that on your return to Sunderland you will examine that portion of the beach, and send us an exact plan of it?—I will do so.

I mean particularly with reference to this central groin, that we may be sure of the fact that there is one groin in respect to which the deposit is shown to be on both sides.

28,708. (*Mr. Coode.*) What number of soundings did you take? Can you give us anything like a contour line of the rocks?—It is merely a large mass of rocks, lying out like a groin, upon which the sea bursts, and so becomes destroyed. It is a ledge of rocks upon which the sea breaks up.

28,709. (*Chairman.*) In effect these works form a prolongation of the groin in fact it is a groin in itself?—Yes, virtually a groin in itself.

28,710. (*Mr. Coode.*) It is in fact as if it were two bays, the central groin forming a headland which divides the water into two small bays?—It is so.

28,711. And that is precisely the effect, is it not?—That is really and practically the effect.

28,712. (*Chairman.*) Will you proceed, Mr. Calver?—The next point to which I would desire to add a little illustration is that of the depth to which the wave extends. I mentioned to the Commissioners on Saturday that the result of some of my observations, taken by me during the progress of the north sea survey under the command of the present hydrographer, led to the inevitable conclusion that there was a movement of the soil or material — that material being shingle—to a depth of twelve fathoms towards the shore. We observed the different beaches along the coast of Suffolk: but in studying the character of that coast, both in respect to its structure and general formation, we saw distinctly that the shingle could not have arrived from the north across Lynn deeps, because Lynn deeps form, as it were, a sack to receive the material that may pass that way. It is quite clear that anything attempting to cross the mouth of the Lynn deeps, any material of that kind, would lodged in the deeps, as a general receptacle. This led to inquiry. Capt. Stanley being then in temporary command of the *Blazer* during the absence of Capt. Washington, and his father, the Bishop of Norwich, being a very scientific man, he was induced to direct his attention to the point. He was pleased to consult me in reference to it, and I recommended dredging operations in the offing. I had studied the character of the coast a little, and to a certain extent indicated the region to dredge in. We went accordingly, and dredged in the offing there at a certain number of miles away from the shore,—I cannot now exactly specify the distances, and we found ridges of shingle lying parallel to the main exactly of the same cha-

racter as that upon the beach, but a little more angular. Another fact we discovered was, that in sounding the spaces between these ridges and the main,—in the great majority of cases, in nine out of ten, or I may say in 99 out of 100, the bottom was plain sand, but occasionally there was a pebble. Now putting the two things together, the character of the shingle in this, which I may term its primal bed, or the source of supply, with the fact that we found the single pebble, the traveller, as it were, between the bed and the beach, led us to the conclusion that the shingle was supplied from these ridges ; and therefore I said, on Saturday, that I was prepared to state distinctly that we had obtained proof that the wave possessed a power which had a propelling effect at a depth of 12 fathoms.

28,713. (*Sir F. Smith.*) Were the travellers from the beds to the main in great numbers ?—No ; it is true that the travellers were not in great numbers ; but I believe, if you could uncover the bottom of the sea, you would find a large sandy waste dotted over here and there with pebbles travelling towards the main.

28,714. (*Chairman.*) Does that conclude your observations upon this point ?—I would ask permission to continue my remarks upon the depth of the wave. In the report of the voyage of the *Samarang*, which is the result of Sir Edward Belcher's experience, we find that the effect of waves have been known to reach to a depth of 200 feet below the surface ; and the harbour master of Holy Island mentioned to me that the *Pegasus* steamer, which sunk in his district of coast, and lay there for a long time, at last broke up in a heavy north-east gale, with a depth of 13 fathoms over her. Sir Henry De la Beche, a most careful observer, in his evidence given before a former commission in reference to the harbour of Dover, says, that he has observed the water discoloured to the depth of 15 fathoms, as showing the result of heavy gales of wind ; and the same authority tells us that molluscs, making bivalve and invalve shells, are uncovered and driven on shore during heavy gales, from a depth of even seven fathoms water ; and he remarks, that the late Professor Forbes mentioned to him that the venus cassina, a large shell, which is not known to exist alive at a less depth than seven fathoms, is often thrown up during heavy gales, and cast upon the coasts of Ireland, the Isle of Man, and the coast of Scotland. Sir Henry de la Beche further goes on to observe, that in such cases as these, not only is the power of the wave equal to the uncovering of those animals which live beneath the surface of the mud, the silt, or the sand, but also to drive them ashore, against the exertions they may make to avoid it. The sizes of these animals are, moreover, such as to show that if they can be driven and moved about in this manner, the silt and the sand may be readily moved and driven also. It was likewise mentioned to me by a commander in the navy, an officer of very close observation—I will mention his name, in order to give the Commissioners an opportunity of calling him before them, if they wish—I refer to Captain Ward, now, I believe, connected with the Humane Society.

28,715. (*Sir F. Smith.*) The Life Boat Society ?—The Life Boat Society. Captain Ward, in a note he addressed to me, mentioned what I consider a very interesting fact. He says, "You will see that the "depth of our anchorage at high water, that is at "Santandar on the north coast of Spain, was 40 feet. "I do not think that the height of the wave from the "crest to the lowest part of the bottom could have "been more than five feet, as the wind was off shore "on that coast ;" and the fact he alludes to was this, that looking down through the water, which in that locality is uncharged with matter, he found at the depth of 40 feet that the wind of the previous day had left ridges on the bottom and ridges in a direction transversely to the wind, showing that it was due to some other cause than the mere action of the current. That, I submit, is a very interesting fact, for here we have evidence of a wave of five feet sending its impression to a depth of eight times its own column. This, probably, may be sufficient upon this particular point, as I am anxious to avoid overloading the subject. The only thing I would state, in addition, on this subject of depth, is the fact that opposite Sunderland Harbour, one of the ports proposed to be operated upon by means of certain works which have been brought before the Commission, are a number of ballast buoys, in ten fathoms water, within which no keel, vessel, or other craft is allowed to drop one single bit of material of any sort, under very heavy penalties, which are inflicted by the magistrates with great rigour in every case where the law in this respect is infringed. This shows at all events that the appreciation of the inhabitants of that district is against the assumption which has been produced before the Commissioners.

The next point to which I would refer, and I will do so very briefly, is respecting bars. I mentioned in general terms on Saturday, that the primary cause of the formation of bars on our coasts was, the transverse motion of the wave and current crossing the debouching river ; and if the Commissioners will take that as a doctrine—and while there are many facts which tend to bear it out, none have been adduced to the contrary—it will at once recommend itself to their minds as the cause. Looking at the matter in a broad light, I said, that where the wave goes transversely across the entrance there would always be the worst bar formed, and that when there is no such cause in operation there can be no bar ; and you will find that to be the case universally. But there was one particular example that occupied my attention at the time, and that is the case of Lowestoft on the coast of Suffolk, where there is an aggravated movement of the material which commonly causes the bar. In 1832 a harbour was formed there, by connecting a lake, which was close at the back of the beach, with the sea, duly defended with piers and gates. If the parties who were called upon to project that work had kept this law in view to which I am referring, they would have instructed those who wanted the work that the harbour could not remain open, inasmuch as there would necessarily be a most aggravated bar ; but, not recognizing this law, the parties promoting the work gave in their report the most elaborate reasons why there should be no bar. In consequence of this, the work was carried out, and the result was that the entrance to the harbour was soon choked up by a bar.

28,716. (*Chairman.*) Will you state what that report is, and where it is to be found ? I should like to see it ?—I believe it is the report of the Tidal Harbours Commission, but I am not quite sure. I merely state the fact, about which I have no doubt. Well, as I have said, the harbour became eventually choked by a bar, and that was one of the causes of its abandonment. They have now carried out a different harbour altogether. The case of Lowestoft is additionally instructive ; and I felt it my duty on Saturday, just sketchingly, to revert to it, because I thought that those who contended that the origin of a bar was due to matter projected out from a river were not exactly correct. It is very true that the materials projected out from the river into the main ocean may add to those which go to form a bar ; but I mentioned previously my distinct view, that in bars like that of the Tyne the river outset was conveyed in an unbroken body far beyond the region of the bar ; and the only thing it does is to add a certain amount of material to the bar. Now upon this point Lowestoft is very instructive ; for when the lake was opened it filled up, clearly showing that the bar at any rate was not due to the matter projected out of the lake, because it filled up as rapidly as the bar formed. And it may be also of interest to the Commissioners to know, that even in the outlet of the south dock at Sunderland, a work that I had the honour to recommend myself, as a broad departure from the original conception, that in that work, although it is pointed in a direction somewhat parallel to the coast, that even there,

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as I have every reason to believe, there is a little tendency to form a bar. That concludes all I have to offer upon this particular point.

28,717. Before you leave Lowestoft will you tell us whether the system since adopted there furnishes any further illustration of the theory you have put forward? Is it more parallel?—It does not; it does not throw any additional illustration on the subject of bars; but it is, as I submit, very instructive as to the filling up of close harbours. In that respect it is full of instruction; but upon the subject of bars it throws no new light. The next point I will briefly allude to is that of the Tyne. In a broad way I stated my opinion on Saturday, that the bar there would re-form if these works were carried out. I mean either those large works which have been proposed to the Commissioners, or if the works they are now prosecuting are completed. And here is one point to which I would invite the special attention of the Commissioners. I have explained that the origin of these bars is really the drift of the material along the shore tending to shut the river up. It has been stated in evidence in my hearing that the bar at the Tyne is deepening. I do not know if that is so or not, but I should expect it would deepen. The very protrusion of the north pier to such an extent would have the effect of shutting off the material; and I am prepared to state that during the progress of these works the bar will get deeper and deeper; in fact, that the summit of the bar at various periods will practically form an inclined plane to the very termination of the works themselves, up to the time of their completion. But after their completion then will follow another process. If I am right with respect to the origin of the bar, nature will gradually accommodate herself to the altered circumstances: the north side of the works will bank up, while the effect of the addition of soil will be to shallow the frontage, the shallowing of the frontage will raise the bar, and reverse the incline; so that from the time that the works are completed, the shallowing will commence, and the formation of the new bar will be in progress. There is another matter which I think is extremely interesting, in the consideration of this subject. Taking the east coast of England, I know of no case of a point with anything like the assumed depth in front of 30 feet. There is no point along the eastern coast of England with the tidal streams, acting with perfect impact upon it, that has not a shallow frontage. It is true that the shallow frontage may be formed partly by the rock or by the foundation that formerly existed; but the fact of sand lying upon it shows clearly, that if you produce an artificial point it will in the end be fronted by such an incline as we find opposite every such point on the coast.

28,718. (*Capt. Vetch.*) That will hardly hold good, I think, at St. Abb's Head or Flamborough Head?—There we must judge by analogy. I would take the coast within a certain district. I do not put this forward as a universal law; I merely confine its particular bearing to the coast upon which these works are proposed to be carried out. The works proposed are not at St. Abb's Head nor at Flamborough Head. And then, again, the coast you allude to is a different one, and requires to be studied specially in reference to the locality, applying to the special circumstances of each locality certain ascertained laws; but on that part of the coast where these large works are proposed to be erected, at the Wear and at the Tyne, I know of no such circumstances as would take it out of the operation of that general law.

28,719. Will you explain the difference there is between the circumstances of St. Abb's and Flamborough Heads and the Tyne and Wear?—I cannot off hand. Before giving an opinion, I should prefer to study the subject, lest I might be held to an opinion given without due consideration. In my evidence on Saturday the Commissioners will remember that I quoted the case of Warkworth as being very instructive respecting the bar; but I also want to bring it in now in illustration of another point. I mentioned that at Warkworth the movement of the sand was from north to south, and I may add that it is in its physical characteristics very much like the Tyne, but reversed, having a point out to the south and a flat to the north, while at Tynemouth we have the flat to the south and the point to the north. After I made the Admiralty survey in 1848, extensive works were carried out; a north breakwater, as represented in the plan. When those works were completed the first effect was to deepen this flat. The effect was to deepen the flat within directly; and it proceeded from this simple cause, that while in a state of nature the constant drift kept the flat high and deflected the river to the southward, but the moment they erected the works across the flat the source of supply was interrupted, and the river began to cut out from the north-west, forsaking the place when they wanted deep water, and then they had to build a solid quay to deflect the river to the southward. Now, applying this to the Tyne, and making use of this experience, I should expect the effect of these works would be to lower the Herd Sand, and that the tendency will be exactly in the same way to bring the river to the southward. I believe it has been stated in evidence,—indeed I heard Mr. Walker state it,—that the whole body of the sand was lowered. I should expect that, and that the general effect of the works would be to lower the Herd Sand. I expect that the whole tendency will be to lower the sand, and that the effect of the south work will involve the necessity of constructing another work.

28,720. (*Chairman.*) As at Warkworth?—As at Warkworth. Looking at the Tyne works as a whole, I am prepared to predicate three effects: the re-formation of the bar at the pier heads; the deepening of the Herd Sand; and the banking up of the sand to the southward of the south pier. I have only one or two more remarks to make, in conclusion. In the evidence I have given, and in the support I have endeavoured now to give to it, I have brought under the notice of the Commissioners ascertained facts, as an index of the probable result of what the effect of these works that are being promoted before the Commissioners would be. I have done this for one special reason; because in the course of my study of these subjects I have found that the operation of nature is always uniform. A similar cause invariably produces similar effects. When I observe the state of knowledge in such matters is so defective, the impression of my own mind is, that in an important case like that of providing refuge harbours, involving the expenditure of an enormous amount of money, it would be a very unsafe course to sanction works, if we find them only backed up by theories opposed to common observation. A concluding remark I would offer is this:—If I am not mistaken, it is possible that a witness or witnesses in connexion with the parties who promote these works may appear before the Commissioners, and if anything should be offered by them which might appear to the Commissioners to take away from the value of my evidence, I trust I shall be permitted an opportunity of explaining it. That completes all I have to offer.

28,721. In your evidence on Saturday the case was put to you by Mr. Lindsay, as to what would be the results at the mouth of the proposed works at the Tyne, supposing the Tyne not to exist; do you recollect that?—I do.

28,722. Then, to a certain extent, or in some degree, does not this case of Warkworth afford us a proof of that, inasmuch as the river Coquet is comparatively of small amount?—It does certainly, to that extent.

28,723. There is a certain analogy between the case supposed by Mr. Lindsay and Warkworth, inasmuch as the river there is very small as compared with the whole area included?—It is so.

28,724. And here I find at the mouth of the works a circular bar, a horse-shoe bar, with only one foot upon it?—It is so; and in connexion with that bar I

may mention, that it occupies a position within which we could carry five feet or six feet when in a state of nature ; that is a bar due to the works, and that is a very interesting fact.

28,725. If the Commissioners could obtain the original survey of Warkworth by the Admiralty it would be very valuable indeed ?—It would be a very instructive document to study.

28,726. (*Sir F. Smith.*) Have you any idea of the breadth of the bar, taking the corner of the river ?—I have not examined it since I made the survey in 1849. I do not know its existing state at all.

28,727. Do you know what it was at that time ?—Oh yes ; at that time it was about 800 feet from 6 feet on each side.

28,728. Is not that the length ? I want to know the width ?—The bar then measured from 12 feet on the river side to 12 feet on the sea side for about 1,500 feet or a quarter of a mile.

28,729. And do you suppose that if the works projected by Mr. Walker should be carried into effect that the existing bar would be removed, and that another bar of similar proportions would be placed beyond the works ?—Yes. The bar would no longer exist as an obstruction in its present position, but it would be removed outwards with the execution of these works. It will eventually exist as a bar, but not exactly of the same character, as I explained on Saturday. It will have a steep frontage, and therefore be a more dangerous bar than it it now.

28,730. What was the external or seaward slope of the bar when you made the survey ; what was the slope it presented to the wave ?—At the period of the Tyne survey there was a slope of 18 feet in a distance of 1,100 feet of horizontal distance.

28,731. That is a rise of 18 feet with a base of 1,100 feet ?—Yes, a rise of 18 feet with a base of 1,100 feet.

28,732. And you believe when the works are completed, and the new bar is formed, that the external slope will be steeper ?—Yes.

28,733. The vertical rise will be greater ?—Exactly. It takes the place of a point at sea. In that case you get a steep slope, and with a bar you get a gentle slope.

28,734. And to what height do you suppose that the bar will rise, or rather what depth of water do you suppose there will be over the bar when the worst shall have happened ?—I mentioned on Saturday that that was a point I dared not speak to very decidedly ; but I stated in a general way my opinion that if the works were carried out it might be possible, on account of the scour, the prevention of the dispersion of the ebb by the projection of the north pier, that a depth of two or three feet might be produced, in addition to what the depth was in the unprotected and natural state, but that I thought not more. I said, in considering the subject, you might take it that the state of any bar is the balance of power between the river to keep it down and the sea to keep it up, and in carrying out that idea in the present case you have merely to consider what additional force you give to the river outset, and in exactly that proportion you increase the depth.

28,735. Do you imagine it possible so to construct the works within the harbour as to deflect the ebb tide between the breakwater and the breakers, so as to prevent the meeting of these two forces ?—I think I have already explained that there is no opposition of forces.

28,736. I thought you said that the flood tide from the ocean met the ebb tide or freshes from the river, and causes the bar, where the power of the two forces concur ?—No ; that is the view I contest. I say that the bar is not due to any opposition of currents, except to the extent I have stated,—that the river does lend a certain amount of débris, perhaps to the extent of 1-100th of the whole accumulation.

28,737. If that be so, is the heaving-up force of the sea at the entrance of the river greater than at the shore north and south of it ? If there is a heaving-up force sufficient to produce the bar at the entrance, there will be a corresponding force north and south of it, will there not ?—By artificial works you form a nucleus for the power of the sea to develope itself. If works do not exist the incline remains unaffected for centuries ; but if you put up artificial works you give the sea the means of showing its heaving-up power, and it would be as great towards the south, and the effect would be that any additional power that you give to the river would be so far to prevent such heaving-up from developing itself.

28,738. Then you think the question of projecting the piers further to seaward does not affect the general result ?—That is my belief.

28,739. It is merely a question of degree ?—Yes, it is merely a question of degree.

28,740. In fact, if you get into very deep water you will still have a bar, but it will be less injurious because it will be on a lower level ?—Yes ; but you have another and steeper bar, which has a most important bearing on the question of refuge. The steeper the bar, the more dangerous it is. On a natural incline the undulations are gradually reduced, and when you come to a bar in a natural state that bar has a sea upon it not half so dangerous as the sea produced upon a slope which is the effect of artificial works.

28,741. What examples have you to illustrate that ?—The commonest observation.

28,742. As to steepness ?—Every part of the coast, where the frontage is steep or shallow : the undulations are always carried with enormous force against a steep incline, and on the other hand they are greatly reduced. In every part of the coast, without exception, you will find that effect produced.

28,743. On the whole, you think the public money would be injudiciously expended if it were expended on the improvement of the Tyne ?—Yes ; considered as a matter of depth, you would find little gain, and the providing a refuge at the mouth of tidal rivers involves that which is dangerous. That is not a place where refuge should be supplied.

28,744. (*Capt. Vetch.*) Supposing that the river Tyne was not a great trading place, you would not select that as a place for a harbour of refuge proper for passing vessels ?—No. In considering the question of refuge, I leave out the mercantile character of the port ; but I object to it because it is the outlet of a river possessing an ebb which is increased by the freshets, and hence causes a dangerous sea.

28,745. I am leaving out of sight the question of trade. You would not recommend that site as a harbour of refuge for the passing trade ?—No ; on no consideration whatever.

28,746. (*Mr. Coode.*) Then the sum and substance of your evidence with regard to the river Tyne is shortly this, that the proposed works, if carried out, will simply postpone the time at which a new bar will be formed ; that the new bar will have a steeper slope in consequence of the works being projected further seaward ; and that the effect of the deeper slope will be to concentrate the power of the breaking sea into a single wave, instead of distributing it over a great number of waves ?—That is so.

28,747. And that the entrance to the Tyne will, in fact, be more dangerous than it is at the present moment ?—That is my belief.

28,748. You made reference to the fact, that on the north-east coast, in every case where there is a projecting work or point, there was an accumulation of sand either on one side or the other ?—Yes.

28,749. Then how do you explain the fact of the absence of sand either on one side or the other at Filey Brigg ?—I endeavoured to explain that on Saturday. There is no absence of sand within Filey Brigg.

28,750. But immediately on either side, and at the point above high water, there is no sand whatever ; there is a quarter of a mile of the Brigg above high water, on either side of which there is no sand ?—The cause is easily explained.

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28,751. Will you be good enough to explain it?—Filey Brigg is a narrow ledge, and at the top of high water there is a heavy bursting sea upon it. If you consider the ledge simply with respect to the sea, I would say there ought to be more material within it than without it, because in bursting over that ledge, which it does, the principal effect would be on the outside, where the first strike of the wave is. But you must also consider the effect of the ledge with respect to the current. On the inside of the ledge there is a rotatory tide or eddy tide constantly operating on the inner part of the brigg, but not the outer part. And therefore the result is this, that although there ought to be more soil within the brigg, if you consider it simply with respect to the sea, still, if you consider it in connexion with the concentration and action of the current within the inner part, you would then expect to find it exactly as it appears.

28,752. You mean that there is a considerable quantity of sand carried along by the water on that part of the coast, but that it is prevented from being deposited by the motion of the water?—By the natural power, whether of the wave or the current, being uninterrupted.

28,753. If this quantity of sand is carried along, how does it happen that the ledges of rock there are not filled up with sand along the shore to the north of the brigg, and on the brigg itself?—I think I explained that on Saturday. Where there is a heavy bursting sea you never can get sand to lie about a little narrow ledge. I think I drew your attention to that as an important point. Many persons believe that because sand is not seen lodging on ridges it is not moving, but that is never the case, for where there is a rocky foreshore, and the wave is large in proportion, there is the action of the undertow, which prevents any material resting. It is the same with shingle as with sand.

28,754. That is within the reach of the wave, and when the undertow comes into play?—Yes.

28,755. But assuming that large quantities of sand are carried up, should you not expect a deposit of sand in the hollows of the ledges?—That is a point to which I dare not reply. I can give any reply with respect to Filey, inasmuch as it is a place recommended to the Commissioners. I object to speak of broad principles in connexion with a small local example, but give you my opinion in connexion with the great feature of the briggs.

28,756. My question had reference not merely to the brigg proper, but the rocks north of it. There, in the cavities of the rocks inclined from the shore, the water is deposited in large quantities, and remains in a state of rest, and there is no accumulation of sand. Is not that the case?—Yes; directly the water is in a state of unquiet the sand is taken away. Around Hartlepool you will find cavities with plenty of sand, but directly the sea comes its action is brought into play, and takes away the accumulation. In all bays, although not uncovered, the light material which is suspended in unquiet times is deposited in still water.

28,757. This allusion would hold good below the level where the action of the pure wave would come into play. But my question has reference to the higher levels of rock, only just reached by the broken water during gales of wind, and where the action of the unbroken water does not come into operation?—As I have already said, I cannot give any reply to a question of that kind. There are certain ascertained facts of which I can speak, but in my view of the case these minute matters are not material to the question.

28,758. You conceive they are not indications of the quantity of matter which may be contained in suspension in the water?—No. In the case of Lowestoft no person, let him have watched ever so intently, would ever have supposed there was such an amount of marginal matter in motion. But the moment the transverse work is put out it is charged to the extent of several hundred feet.

28,759. If you have two bays, with respect to one of which there is no indication of a tendency to deposit, and with respect to the other there is a decided evidence that there has been, or is, a tendency to deposit, should you not think it safer to construct the artificial work in front of the bay which showed no tendency rather than in front of that which did show a tendency to deposit?—I trust the Commissioners will allow me to decline giving answers to hypothetical questions. If you mention any place I will give you distinct replies, but I dare not give a reply in connexion with certain principles which may be misconstrued.

28,760. Then I will take the case of the two bays of Filey and Hartlepool, and suppose works of a similar character designed for the front of each bay?—Works of a similar character cannot be designed to produce the same effect in these bays.

28,761. Generally speaking, I suppose it is possible to construct artificial works in these bays?—But they are of a different character; they are examples of a different order altogether. There is no connexion between the two; and I say that you cannot project a work of the same character to produce the same effects in these two bays.

28,762. In order to prevent the tendency to deposit, I presume you consider it desirable to keep up a certain amount of motion within any bay?—It is desirable to preserve the whole motion, if possible, because permanency is the result of the motion. But as that cannot be so with regard to refuge harbours, you must destroy the motion. The great point in projecting a harbour of refuge is this, how little can you interfere with the motion so as to render it consistent with refuge. The object is, as I have said, to preserve all the motion if possible.

28,763. Granting the accuracy of the broad principle you lay down, do you mean to say that it is impossible to construct any work in front of Filey Bay which shall be without a tendency to deposit, but that it is possible to construct one in front of Hartlepool which shall be free from a tendency to deposit?—I do not think it quite impossible; but I say that whatever the work may be, and of whatever character it may be, the work in Filey Bay will have a greater tendency to decrease the depth within that bay than a work at Hartlepool will have a tendency to decrease the depth in that bay.

28,764. Do you think there will be as great a tendency to silt up in Filey Bay as in Hartlepool Bay?—There can be no tendency to silt up in Filey Bay while in a state of nature.

28,765. Has there been a tendency to silt up at Hartlepool?—Decidedly. Up to the year 1846 I have shown in evidence that it did silt up considerably.

28,766. (*Sir F. Smith.*) Am I to gather from what you have just said that all harbours of refuge should be disconnected with the shore on both sides, in order to disturb as little as possible the natural action of the sweep of the sea?—That is the simple point to be aimed at. The object should be to disturb as little as possible the motion of the wave and the current. I may also observe, that the current is not to be undervalued. It is of course the usual agent of depth in rivers. If you are to preserve a large current through a harbour, or if you are able to increase the current, while you cut off the wave, you will still preserve the means for keeping your depth.

28,767. Your answer to my question is in the affirmative?—Yes.

28,768. You would disconnect the piers in harbours of refuge from the shore?—Yes.

28,769. Applying that principle to the neighbourhood of the Tyne, I gather from your observations that you do not recommend anything being done at the Tyne for the purpose of forming a harbour of refuge. But supposing it should be thought desirable to expend public money for refuge purposes in that district, should you be disinclined to make any application of that money to the formation of a harbour of refuge south of the mouth of the Tyne, though unconnected with the Tyne, by projecting piers from the

shore, and giving deep-water refuge within those piers ?—In no case opposite that coast. I am clearly of opinion that upon that coast, whether at the mouth of a tidal river or in a bay, no refuge should be supplied by a space contained within piers projecting from the shore, because by that means you will insure the loss of your harbour.

28,770. I clearly understand your meaning. That is a repetition of your former answer, that piers should be unconnected with the shore. But supposing that the piers might curve, much or little, or be in a straight line, would there be any objection to forming a harbour of refuge to the south of the Tyne, unconnected with the shore, and by piers either parallel to or coming from the deep-water line towards the shore, as shown on Mr. Walker's plan ? —I think that nothing on the plan of Mr. Walker's projection should be permitted on the coast.

28,771. That is, in connexion with a tidal harbour. But my supposition is, that it might be desirable to form a harbour of refuge unconnected with the Tyne, but to the south of it, by the construction of some breakwater to afford shelter in storms ?—I can only say this, that if works projected are transverse to the current they should not be permitted.

28,772. Supposing them to be parallel to the current, would that be an objection ?—Not at all.

28,773. So that it would be possible to construct a harbour to the south of the Tyne, which would answer the general purposes of a harbour of refuge ? —It would be quite possible, so long as these principles are kept in view.

28,774. Would it be injudicious to form a harbour of refuge by means of a breakwater in front of the shore to the south of the Tyne, and quite unconnected with the Tyne ?—I have strongly recommended a work of that character at Hartlepool.

28,775. Would you see any objection to having something of the same kind to the south of the Tyne, but unconnected with the Tyne River ?—Not considered as a work ; but if you consider it as a site, from its geographical position, I am opposed to anything about the Tyne for the purpose of saving life.

28,776. Will you tell me why ?—Because you could not reach it, in many cases. You can always get towards the head of a bight, and I consider the head of a bay the proper place.

28,777. Might it not happen that the Tyne or the neighbourhood would be as good for a refuge ?—As the exception, but not the rule.

28,778. Supposing a harbour of refuge on your system to be constructed at Hartlepool, do you not think that a harbour on the same principle might be constructed to the south of the Tyne, although it would not give so much shelter or security as that at Hartlepool ?—A harbour of that character might be constructed opposite to the Tyne. It might be constructed in the neigbourhood of the Tyne. But, all things considered, I should not recommend a harbour to be formed there for the purpose of saving life.

28,779. Do you not think that immediately in the vicinity of a great port of commerce there should be some refuge unconnected with the port, but near to it ?—I think it is very desirable for the locality for their own purposes to supply that refuge ; and just in the same way as it is possible to screen a frontage like that at Hartlepool, which will afford a large amount of protected space at a small outlay, it might be supplied at the mouth of the Tyne, and it would be for the interest of the locality to do it.

28,780. Would not that screen be better placed at the south of the Tyne than at the mouth of the Tyne ?—No, I think not. I presume that the mouths of tidal rivers may be screened, allowing the principle to be correct, in such a way as to put them in a comparatively better state, and deepen the bars.

28,781. (*Capt. Vetch.*) You have adverted to the Tyne again, and to the great arms proposed by Mr. Walker to increase the depth of the channel. Have you taken into consideration the amount of backwater to be received and returned in consequence of the space enclosed by those arms ?—I have.

28,782. And do you think that the 600 acres of flux and reflux of the sea would not materially help to preserve the depth of the mouth ?—There will not be 600 additional acres of water.

28,783. How many acres would the pier enclose ? —I am not sure.

28,784. Supposing it to be 400 acres, would not those 400 acres, receiving the tide, and discharging it through the narrow entrance, keep the channel open ?—The principal part of the water on these 400 acres is now discharged over the bar. The effect of the piers would be to direct the current, but they would not direct down much more than passes at present.

28,785. But at present the water escapes over the Herd Sand ?—Yes, up to a certain portion of the ebb.

28,786. Up to half ebb ?—I am not prepared to say that.

28,787. But it would be confined to that period ?— Yes.

28,788. The entrance would be confined to a much narrower space ?—Which is prejudicial.

28,789. In what manner ?—It would be beneficial not to have any flood set over it at all, because as the ebb rolls the material out the flood rolls it in. It is not desirable to have any flood set.

28,790. Do you consider that it is the sea stream at flood tide, or the stroke of the wave, that brings in the flood sand ?—I think it is principally the stroke of the wave.

28,791. Then, if it were calm weather, the flood tide would have its effect at the entrance ?—It would have an effect, but not much. As a general rule it is not advisable to add to a flood current, considering the depth over the bar.

28,792. I think we have always been in the habit of considering that the greater the amount of water going into and returning from tidal harbours the better ?—That is a broad principle, and it is correct.

28,793. Supposing these piers were carried into a much greater depth, say, for the sake of argument, 10 fathoms, would you consider the scheme subject to the same evils that you expect from the present ? —Precisely the same.

28,794. If the piers were extended to a depth of 10 fathoms into the North Sea, would not the flood ebb tide be the means of carrying away any sediment at the harbour mouth ?—I think not. The flood sea stream would not act directly between the piers ; it is transversely across them. The only stream between the piers is that which is due to the demand of the river as a receiver.

28,795. Supposing these piers to run out so as to become a little Flamborough Head, and the tide to run across at the rate of four knots, would you not keep deep water in front ?—Yes ; but still you would have a bar much steeper, as I have endeavoured to explain.

28,796. Upon that principle, then, any extent to which these piers might be carried would have no beneficial effect in improving the river ?—The effect of the prolongation would be merely to retard the ultimate result. When they were carried out, nature would adjust herself to the altered condition of things, and you would have the restitution of the features which I have endeavoured to describe.

28,797. Then why has not the south side of Flamborough Head and the whole of Bridlington Bay been filled up with sand long ago ?—The case of Flamborough Head has no connexion with that of the Tyne, so far as I can see. You have a concentrated flow from the south. You have a deep channel within the Smithic. But there is no instruction to be gathered from that case. In such cases you will never find any accumulation, nor would you in the frontage of the Tyne, so long as no artificial works of this character are put there.

28,798. But if this would occur at the Tyne, would

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not the same effect take place at Bridlington and to the south ?—I will put the parallel in this way : if you were to put a river through at Flamborough Head you would have a bar before it.

28,799. Do you consider that a material deposit would take place in such a tideway as that at Flamborough Head ?—Yes. There are two tides, that which is due to the coast, and that which is accelerated by the works ; that is the sea side ; but it has no effect in stopping the formation of a bar within. The increase on the ingoing current is due to the extra space you supply within.

28,800. If you consider Flamborough Head an artificial work, running out a certain number of fathoms, it produces a strong tide across it ?—It does.

28,801. The run of the whole tide is cut off ; the part cut off becomes aggravated as the point proceeds into the sea ; a large volume of water must pass through a smaller space, and therefore a great tide stream occurs at Flamborough Head. Now, if you project a pier out from Tynemouth into the North Sea, ought it not to have the same effect ?—Yes. But in the one case there is an opening, and in the other there is none. Flamborough Head gives you no information beyond that of having a steep frontage.

28,802. But the current that would come into such an artificial harbour would be so insignificantly small, compared with the great tidal current, that it would really amount to nothing ?—Yes. It would be very small ; but within the region of that tidal current there is a wave stroke setting the sand in motion, and the opening forms an aperture into which the sand falls.

28,803. Coming to another point. I believe you have seen a great deal of the North Sea ?—I have known it for 22 years.

28,804. If a favourable wind arises for vessels to proceed to London from the Forth, the Tyne, Sunderland, Hartlepool, and other places along the coast, can you tell me any good reason why these vessels, from so many different ports, and of such different speed of sailing, should accumulate in such very large numbers at Flamborough Head when the wind comes on from the south-east unexpectedly ?—No. In my experience I have never seen vessels congregated there except in south-west winds. If the south-west winds are of a certain strength and continuance, vessels proceeding to the south collect there, but beyond that point they dare not go. But in all cases I have observed that directly the wind backs to the west, which it always does in heavy gales, there is a loose, and away they go. In all my experience I have never seen vessels crowded there except in strong south-west gales. When Flamborough Head acts as a sort of breakwater they are able to hold their own, and wait till a change of circumstances takes place. During the 22 years that I have known the North Sea I have never seen such a congregation off Flamborough Head, except under these circumstances.

28,805. There are certain times when a stream of vessels is anticipated ; those which get south of the head pursue their voyage, while those which are prevented by the wind are detained at various places after sailing from their ports of departure ; is not this owing a good deal to the inequality of sailing ?—Yes.

28,806. They would be secure in a storm from Flamborough Head to the Firth of Forth ?—That is my experience. Whenever a collection takes place off Flamborough Head it has arisen from a continuance of south-west winds, which allowed them to congregate up to the head, but did not permit them to proceed beyond it.

28,807. (*Mr. Coode.*) Which is the prevailing wind on the east coast ?—From my experience it is the south-west.

28,808. The congregation of the vessels at the head depends on these winds ?—Yes ; and if the wind is strong they dare not go beyond the head.

28,809. Is it or is it not the case that vessels do frequently congregate in large numbers to the north of the head ?—I think I have seen from 200 to 300 sail. That is a mere guess.

28,810. Then you concur in the evidence which has been given, that this is a matter of common occurrence ?—Not common.

28,811. Do I understand you to deny that this is a matter of common occurrence ?—I merely speak from my own observation. I do not deny anything.

28,812. As far as your own experience goes, you are not prepared to say that it is a matter of common occurrence ?—I have observed it, but not so frequently as to call it common.

28,813. Still is it a matter of fact that vessels oftener congregate there than at any other part of the coast, and in larger numbers ?—I think so.

28,814. And if so caught, and the wind backs round suddenly to the east, would it not be most desirable to have a harbour of refuge close under their lee ?—I think so ; a harbour of stoppage. But supposing the vessels were so congregated, and the wind did back out, the sea does not rise so immediately as to prevent their making an offing.

28,815. Supposing it has been given in evidence before a Committee of the House of Commons that many vessels have been driven back two or three times from Flamborough Head, incurring great danger, do you not think it desirable that the risk should be avoided or diminished by this construction of a harbour of refuge ?—If a harbour is to be supplied to prevent detention, a harbour at Filey would be very useful ; but if you distinguish between detention and life-saving purpose, Filey is not the place for the harbour. It would be useful where vessels are congregated, because those vessels so congregated, and forced to stretch off to the north, would at once go into the harbour at Filey. It would be extremely useful in that way.

28,816. Would not a harbour there prevent those wrecks which occur from vessels being driven back, and being unable to get into Whitby or into Tees Bay ?—If the case is as you have stated, then it would be useful.

28,817. Would it not tend to diminish the chances of wreck and the foundering of vessels in heavy weather ?—It would, so long as no other harbour were supplied to the northward.

28,818. (*Chairman.*) Will you now proceed with your statement as to the wave screen ?—I appear before the Commissioners as the advocate of the wave screen. I am no longer in the independent position I have hitherto occupied. I have hitherto spoken as a public servant, making use of my experience for public aims and objects, and having no connexion whatever with the works before the Commission, and therefore, so far as position is concerned, favourably placed for judging dispassionately ; but instead of occupying a position somewhat analogous to that of a judge, I now appear as an advocate. The effect of this may be to influence my judgment ; but the only thing I can promise the Commissioners is, that, so far as I can guard against such an effect, I will endeavour to do so, and will only state certain things which I conscientiously believe to be facts.

The invention, of which the object on the table is a model, I have named the Wave Screen. The name is descriptive of its purpose. It is to screen the place enclosed by it from the effect of the waves, either wholly or in part, and its general aim and object is to supersede the necessity for breakwaters in forming harbours of refuge, for two special reasons, which are highly desirable to accomplish ; on account of their being projected generally in opposition to natural laws, and also on account of their enormous expense. It is a point to which considerable attention is directed at the present day, how to supply refuge for saving life and property without causing such an enormous exhaustion of the public funds, in too many instances being a mere exhaustion without any benefit. This invention is the result of three facts, open to the commonest observation, connected with

waves, with breakwaters, and with harbours formed by breakwaters. First, as respects the wave. I think I have mentioned to the Commissioners that since I have been employed in my present civil employment I have adopted one course. Whenever I have observed a fact I have noted it, and the consequence has been that I have a considerable body of facts. The ultimate result of that is, that I collect the facts, I reflect upon them, and then I analyse them. Now respecting the wave I have observed, as every observer ought to notice, that the deep-water wave is an undulation as respects its main mass; that is to say, the highest formation of that wave, as respects substance, has only a vertical motion. The substance oscillates vertically, and every seaman will have observed that his vessel in a calm remains motionless in the water, horizontally concerned. This deep-water undulation comes to the vessel, raises her up, passes from under, advances to the main, and is broken, showing very clearly that the substance of the water is horizontally motionless. We also observe that the same law holds good in gales of wind as in calms. Any seaman will often have observed these enormous undulations advancing towards a ship hanging to windward, and an instant afterwards she rises to the top, falls into the trough, and the undulation passes to leeward, just the same as it does in a calm, showing that, with the exception of its crest or summit, the same law is operative, that the main motion of the wave is simply an oscillation. The same thing holds with comparatively very shallow water. If I am advancing with my ship towards a bar harbour, my vessel keeps sailing through the water, the undulation comes astern of me, passes me, and breaks eventually upon the bar, but I can keep sailing through the water, showing that the same oscillatory movement of the water is continued even into shoal water. I may remark, before I go on, that the various illustrations in connexion with the views I am now advancing will be found in the pamphlet illustrative of this invention which I now put in, between pages 1 and 17.

Secondly, as respects breakwaters. Those in common use are of two kinds. I have called them, for purposes of my own, the long slope, as at Plymouth, Kingstown, and numerous other places; and the upright wall, as that now being formed at Dover. The Commissioners, in perusing the pamphlet to which I have just alluded, will have observed that according to my view the long slope breakwater is projected upon incorrect principles, and in total disregard of the character of the wave. I always find that success is certain if the application of observation is correct. So that in any one case it is only necessary to apprehend a law of nature, and the adaptation of means to meet that law is extremely simple; and inversely, if your means fail, it is to a certain extent a proof that you have not apprehended the law. Now the history of long slopes presents one uniform series of disasters, and I may state that generally a long slope cannot be finished. It is, in the first place, utterly incorrect in principle, and, in the second place, it is a permanent source of expenditure. When a mistake of the sort is made the penalty for making that mistake is continually levied; and as the power of the sea is continually operative, so the powerlessness of a long slope to resist that sea, is continually displayed. The upright wall breakwater happily has resulted from a clearer appreciation of the law. But it is a singular fact, that up to 1844, when a commission, with objects similar to the present one, was issued by the Crown, of which the present Hydrographer of the Navy was a member,—that absolutely up to that recent date amongst the scientific men of this country there was a most singular conflict of opinions about the nature of a wave; and any one who will go to the study of the events that then occurred, and of the various opinions which were then offered, will feel considerably surprised that such ignorance could have existed, because if they had been less scientific, but more practical, there were things under their very eyes, which, applied to the commonest powers of reasoning, must have led to one inevitable conclusion. Though the upright wall breakwater is, to a certain extent, correct in principle, it has elements properly belonging to it which are most unfavourable. The various illustrations of these points connected with breakwaters will be found in the same pamphlet, between pages 18 and 30.

In my remarks hitherto about breakwaters I have considered them simply as structures, without respect to the harbours to be formed by them. These breakwaters, or moles of the sea, as commonly used are projected transversely into the sea, enclosing a certain amount of still water, as they interfere with, intercept, or destroy the wave itself, and therefore that protected space which was originally exposed to the fury of the wave is rendered comparatively still. I have on several occasions while giving evidence mentioned to the Commissioners that the only reason why matter is held in suspension around the coast is on account of the mechanical power imparted to the water; that is the case whether as respects coast drift or the lighter particles held in suspension. The one simple cause is, that the particles of water have a movement imparted to them, and therefore we perceive that the motion of the water which existed before the space was so enclosed no longer exists, and therefore the power which caused the suspension is entirely destroyed, and as the matter obeys the law of gravitation it immediately falls. The water on the coast of the country is generally charged with matter, and in all the close harbours that I have examined I have found that they fill with suspended matter in a degree proportionate to the amount of quiet obtained and the amount of matter suspended. I have met with no exceptions, in my experience. Last year I had an opportunity of examining the harbour lately formed at Holyhead, and there I saw that the same thing holds good. I found that in the course of that survey that there was something like from 15 to 18 inches of earthy matter in the deeper portions of the harbour. The parties who were prosecuting the works,—interested parties, I may observe,—suggested to me that this might be due to the debris from the works themselves. But during the course of my stay at Holyhead there was a strong north-west breeze. Then I looked about, and I saw that the water was highly charged with matter, and that supplied me at once with the cause of the accumulation.

28,819. (*Chairman.*) Therefore, in your opinion, Holyhead is silting up?—It is.

(*Capt. Washington.*) That is a strong remark to appear upon the minutes, without there is some authority for it, or that question is gone into.

28,820-1. (*Chairman.*) In your opinion?—I state it as a fact. So far as I connect it with a cause, it is my opinion that it will continue to fill. I state so because that is in harmony with all my experience. Wherever you have a little matter your harbour fills in proportion to the matter. I shall be most careful not to advance anything which I am not quite prepared to support. Respecting deposition, there is no difference between the long slope and the upright wall, because they produce similar degrees of quiet, and the effect upon suspended matter is exactly the same. For various illustrations in support of these points, I would refer the Commissioners to the pamphlet already quoted from, pages 31 to 34.

And now I come to the wave screen, which is a work of a different order, but intended to supply refuge. The model is an approximate representation of the invention. It is not complete in its details. It is only sufficiently so to develope the principles. But I also produce a drawing, which I put in, and which will supply the details in a greater degree, but not details which I pledge myself to adhere to. But they are so far useful as showing one mode in which this invention, if correct, may be brought into practical

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operation. The invention, to describe it in simple terms, is practically a line of piles, cylinders, or tubes driven vertically into the bed of the sea, and a leading principle of its projection is, that it should be formed in the core of the tidal streams, as nearly as that is consistent with supplying refuge. What I mean by the core of the tidal streams is, the medium or central point between the maximum strength of the flood and the maximum strength of the ebb. The structure or screen is supported on the landward side by inclined stays, and it is held together by longitudinal ties and link bars, and is intended to have a gangway or other walk along its summit, and to be lighted at night. The model is constructed according to the usual scale of a quarter of an inch to the foot, and the drawing is to the same scale. In the pamphlet which I have written in illustration of this invention I have generally endeavoured to confine myself to principles, and illustrations in support of them ; but in describing the structure, I have indicated, to some extent, the materials of which it might be composed. The main structure or screen, driven vertically into the bed of the sea, consists of two divisions. The lowest line of nails in front represents the low-water level, and the little nails above represent the high-water level. According to this scale, there will be a low-water depth of 36 feet, and a vertical rise of the tide of 15 feet. I have mentioned that the main structure or screen is divided into two portions, the junction being some distance above the lower stays. The lowermost portion is the lower course, and the upper portion the upper course. And I mentioned, under the head of materials, that the screen might be composed of pine-scupper nailed, pine cased in greenheart, or wrought-iron cylinders for the lower course, and either cast-iron or wrought-iron cylinders for the upper course, and for the upper half of the larger stays, the ties, flanges, link bars, or shoes, could also be of wrought iron. But as I mentioned on Saturday, respecting matters of construction, and the material of which it is to be composed, the sizes and so on, they are really matters of which I know nothing, and therefore I shall pass them over. The Commissioners will learn from others all that they may desire to know upon this subject. Here the question arises, (which is the sum and substance of the whole), Is that structure adapted to a law of nature, and if so, to what force will it be exposed ? I have explained in this pamphlet, and for reasons which the Commissioners will be able to read for themselves, that I arrive by the simplest inference at the fact, that each cylinder in the main structure will be exposed to a force representing a pressure of less than a ton, plus the effect of the surface stroke, whatever that may be. If that be correct, the next question is, what amount of resistance is that structure calculated to afford ? But first, as respects the force to which it will be exposed, it is not percussive, for if it be correct that the deep-sea wave, or the wave of undulation, where this is to be placed, is oscillating, then the movement of the mass of the wave cannot be percussive, in the true sense of the term, for to strike a vertical object with percussive force it must have a horizontal motion, and all observation and analogy lead to the fact that the great mass of the wave is not percussive : nor is it, strictly speaking, hydrostatic pressure, that is, a pressure imposed by water on any vertical object, so arranged as to have the water at a higher level on one side than on the other,—for instance, like dock gates. It is not that, because the line of the wave is not a horizontal one. A wave is angular, and therefore, strictly speaking, it is not hydrostatic pressure. Then what is it ? If my views are correct, it is the pressure arising from the weight of the body, and it is just the same as if it arose from the weight of a solid resting against a wall. There is no difference whether it be water or whether it be a solid ; and therefore, in my opinion, the principal force to which this structure would be exposed would be the weight of the wave, whatever that might be; and I have explained, therefore, in accordance with these principles, what I believe that weight would be. The next point is, what is this structure calculated to resist ? I am sorry to say that I have not sufficient mechanical knowledge to determine such a point with precision. I could not do it, and therefore the plan I adopted was this :—After the idea struck me,—for really it was an idea,—it was after that loss in the winter before last, when I was pondering very intently upon the probability of the head of the bight being furnished with refuge, and having a very clear insight into the character of waves, my thoughts ran thus,—if it be true that the main motion of the wave is an oscillation, why provide such enormous works when other means will suffice, because it is very beautiful to observe that by simple attention to the laws of nature it is possible to produce very large results with very small means. You will see that beautifully displayed in the works of the Dutch engineers. They observe the laws of nature, and produce most singular results by the most trifling means. I did not presume to determine what the screen is calculated to resist. The plan I adopted was this :—I have scientific friends in different parts of the country, and to them I proposed the question, giving them certain elements. I found from the testimony of practical men, such as engineers, and so on, that to extract one of these cylinders out of the clay, assuming it to be 18 inches in diameter, and driven 10 feet down into the clay, it is no uncommon thing to break an inch and a quarter chain. In fact, I believe that chains of greater magnitude have frequently been broken in the endeavour to extract piles of this description. Therefore I supplied the problem, and sent it to Portsmouth and Yarmouth, to Oxford and Cambridge, and Edinburgh and Glasgow, and Newcastle, and to various other places. Some of the replies I have got here. The elements of the problem I gave were these :—If it takes so many tons to extract a pile out of clay, and if this structure be supported by inclined stays, the feet of which are fulcrums or points of rest, tell me what pressure will that structure bear, or rather a single section of that structure, supported by its two stays,—what pressure or push will that bear at 51 feet from the ground, my question having reference to the structure or model which the Commissioners have before them ? When I mentioned the distance, I said 51 feet, because that in this particular breakwater represents the high-water level of spring tides, when the greatest stress would arise, and I wished to have the maximum. The replies which I have received are not entirely satisfactory to my own mind, but as an average they are far beyond what I could have expected. The most satisfactory reply which has been given to the various questions has been given by an engineer of considerable eminence ; but I trust the Commissioners will not, unless it is necessary, require me to mention names, as that might perhaps be a breach of confidence. The party who has given me the reply most satisfactory to my own mind is an engineer of considerable eminence, who has carried out most important works, and is in constructive talent, only second to Robert Stephenson. I will call him A. He treats in a very simple way, which at once comes home to my mind ; whereas the formulæ supplied to me from Cambridge and elsewhere I certainly do not profess to understand so thoroughly ; but the way he has treated it seems to be very beautiful, and is illustrated by this sketch marked S, which I hand in. These solutions have reference to one section of the screen, and one cylinder driven into the ground supported by its own stays. The sketch practically represents the screen in section. The dotted line represents that driven below the bed of the sea. My question was to this effect :—What resistance will that structure afford at the height of 51 feet from the bed of the sea ? The engineer has treated it in this way :—He has considered the bed of the sea a wall, with the wave screen occupying the place of what he terms a cantilever ; and he says it is to be treated thus :—

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"You tell me as the result of your investigation, that it will take a tension of 50 tons to extract such a structure driven so many feet into the clay, therefore it is to be arrived at in this way:—You want to know what weight must be suspended to produce a tension of 50 tons upon that cantilever;" and he tells me that it would require at 51 feet a weight of 39 tons, and that represents what I want. My reply to him was this:—If you give me one ton, that is all that I require, which is immediately apparent. For if a section of this screen is equal to one ton, when standing by itself, and only supported by its two stays, it is apparent to the commonest sense that when it forms part of the structure receiving the combined support of the whole, its resisting force is enormously increased,—20-fold, 30-fold, or what may be the point I dare not predict. But it is self evident that there will be a large increase of resistance. The average power of resistance given in the replies was something like 20 tons. If this be true, and if my inferences, founded upon the facts which are contained in the pamphlets, are true, then it is clear that this structure will have an enormous surplus of strength over and above what it requires to resist the force brought to bear against it. In conceiving this structure, and in writing the pamphlet, I had to depend entirely upon my own observation and reasoning power, and therefore, as a mechanical structure, it is the result of my own unaided reflection; but not being practically acquainted with mechanics, and with the carrying out of works of this kind, I had a certain amount of diffidence about the structure; and therefore, when brought into contact with engineers, it became a very interesting point of discussion as to the mechanical character and force of the structure, and I was not certain that I had hit the exact means for bringing into operation that which I believe to be the law. One engineer, B, who has carried out a considerable number of works, and who has been something like 30 years a member of the Institution of Civil Engineers, when I produced this structure before him, suggested an alteration, but it was a radical departure from the principle. He did not contest the law, but he took exception to the means. He said that instead of having a screen supported by inclined stays it would be better to have another line of cylinders inside supported by a platform, and secured above by certain oblique ties, I think he termed them, crossing each other transversely. I told him that I had considerable diffidence in differing from him, but at first sight several objections presented themselves to my mind. I said one of the great things to arrive at is cheapness, and I observe that his plan involved double the amount of materials. I also saw that there was another disadvantage, because it gave a great amount of resisting force within the region of the stroke of the surface wave,—the topping wave. The late Mr. Rendel gives a beautiful illustration of the danger of putting any surface not required within the region of the surface stroke, arising out of circumstances connected with certain works he was carrying on in Mill Bay. It struck my mind at the time, and agreed exactly with what I had observed. He stated as a broad fact, that they endeavoured to support some upright structure with inclined stays, and they found that it would not stand. But directly they took away the inclined struts and ties from the surface it stood. The reason was apparent, and very instructive. Therefore, when this friend suggested this to me, I immediately started this objection:—Now, I said, I have a third objection to make, but I am not very confident about that. I am afraid that there would not be the same amount of mechanical resistance, and that while your suggestion involves a greatly increased expense,—while it involves its own destruction by the constant stroke of the surface wave and the constant working,—you also have not the same amount of mechanical resistance; but on that point I dare not be very certain. A post or two after I received a letter from him, in which he went into the subject, and in the most candid way he said that on analysing the matter he found that my plan had double the mechanical force of that which he had suggested. The only other suggestion I received was from the celebrated engineer whom I have termed A, and whom I first mentioned. He kindly asked me to visit him, and said that my plan had had a considerable effect on his mind, but he durst not say whether it was correct; but he said, "I will tell you what, if it be correct, I will show you the means of constructing it at half the expense." The sketch No. 2, which I produce, embodies the ideas suggested by him. It represents cylinders driven at certain intervals into the bottom of the sea. But he said, "If the points which you advance are true, there is no necessity for driving all the cylinders to the bottom;" and therefore he suggested that only every third or fourth cylinder should go into the bottom of the sea. I thanked him for the idea, and saw that it would reduce the price 50 per cent. I said I dared not form an opinion about it until I had reflected upon it; but directly I had got home I found that it was a departure from what I believe to be correct principles. The leverage of the upper part would be enormous. Then if my views are correct, it is a necessity that as the wave has an undulation which extends from the surface to the bottom the cylinders themselves should in every case be extended to the bottom of the sea. Therefore, for these two reasons, I am prepared to say that the mode suggested by this eminent engineer is not that in which the screen should be carried out.

I have only, in conclusion, to indicate one or two principal effects of such a structure, assuming it to be constructed. The one great result would be, that it would not interfere with the mechanical motion of the water, and therefore the harbour formed by it would be permanent as to depth. From being adapted, I believe, to the law of the wave, these waves would be dealt with by the structure most simply, and most economically. The crest of the wave, the principal cause of vessels parting from their anchors, would be entirely destroyed. A portion of the undulation would be admitted to assist in maintaining the depth; and I have explained that the object would be so to arrange the cylinders as only to admit 50 per cent. of the undulation, and 50 per cent. would not be prejudicial to the vessels anchored there, so long as the waves were void of topping. Practically a harbour so formed would be a protected roadstead, but it would be a roadstead of far superior character to those with which we are commonly acquainted, such as those of Yarmouth and Lowestoft. I have been riding there in my little surveying ship when there has been a heavy sea, and vessels have parted from their chains, and the vessel which I have been in has been in peril; but in the roadstead formed by this screen there will be no such peril. A nautical advantage is this, that on account of the character of the structure the entrance would be so designed as to admit vessels into it dead before the sea, when such a harbour was necessary for refuge. The nature of the screen would render it independent of faults of construction, and it also admits of being shifted to meet local changes. I mean, suppose at the original construction the proper projection had not been duly considered, and a mistake had been made, you have a power of remedying it. All the details in illustration of these several points will be found in the latter part of the pamphlet alluded to.

The next and last point is the price. In the same pamphlet I have given a rough approximation of what would be the cost. Those which I now produce are of a more accurate character. The first has been very kindly supplied to me by Mr. David Stevenson of Edinburgh, an engineer of considerable eminence and experience, the general result of which is, that the wave screen formed of piles scupper-nailed for the lower course, and cast iron for the upper course, would amount to 285,176*l.*

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per statute mile. This estimate is calculated for statute miles, and would therefore be less than for nautical. Since I have received these various replies, I am quite clear upon one point, that I have supplied far too much resistance, and therefore I am quite prepared to say that the structure only requires alternately a longer and a shorter stay; that is, one stay alternately long and short for each cylinder. These estimates embrace two stays for each cylinder. With this alteration, the estimate just given in represents a sum of 256,250*l.* per statute mile. Before I pass on, I think it right to mention to the Commissioners that Mr. Stevenson, in supplying that estimate to me, said, "The estimate is necessarily very general, as in estimating such a work it is impossible to foresee so as to put a money value upon the difficulties to be overcome. I do not think, however, that the work would cost materially less; it might be more." The next estimate I put in is one of a very important character. It is that supplied to me by the only person in this country who has carried out a work in the sea of a somewhat similar character, and therefore it invests his opinion with a particular value. This estimate is from Mr. Bastow, the contractor for the new pier at Margate, which I am informed is a structure and work of a somewhat similar order to my proposed wave screen. I put in that estimate, and appended to it is a testimonial from the parties for whom he constructed that pier, bearing witness to his energy and ability. His estimate, reduced to the same terms as those of Mr. Stevenson, is 211,872*l.* per nautical mile, the structure to be of pine scuppernailed for the lower course, and cast iron for the upper. The third estimate has been prepared by Mr. Casebourne, of West Hartlepool, who has been continually building works in the sea since the time that harbour first commenced, and therefore has considerable experience. That is for a structure of a similar order as respects materials, and his estimate for a nautical mile is 218,846*l.* I have also three other estimates from Mr. Casebourne, one for a screen of wrought iron entirely, another for a screen with a lower course of greenheart and an upper course of wrought iron, and a third for a screen with a lower course of greenheart and an upper course of cast iron. In a letter, however, which I have received this morning, Mr. Casebourne tells me that these estimates are incorrect, owing to his having made a mistake in the number of yards in a mile, and he supplies the correction in this paper, which I will put in with the estimates, not having had time to make the necessary corrections.

I will now bring my remarks very briefly to a conclusion. I mentioned that in promoting the scheme before the Commissioners I should confine myself to broad principles, and would not presume to interfere with mechanical details and matters of construction, of which I really literally know nothing. One of the parties who has supplied an estimate, Mr. Bastow, the builder of Margate pier, I had not the pleasure of his personal acquaintance until last week; but last week, the very day before I came up to London, I received a letter from him, to say that since the publication of my pamphlet he had considered the means of construction, and although he had supplied me with the estimates according to my own views, he had prepared an estimate according to his own. I thought I could not extract sufficient information from him by post, so I telegraphed to Mr. Bastow to come over and meet me. He did so, and on Thursday last I had the pleasure of making his acquaintance. The day before I came up to London, Mr. Bastow showed me the drawing which I hold in my hand, and which he had named the plan of a breakwater; but as I perceived that it was a wave screen to all intents and purposes, even as to materials, I suggested to him that he had better call it Calver's Wave Screen, designed by himself, which he has done. I am not prepared to say that this structure embraces all that I should be prepared to recommend, for there are one or two points on which my views would not harmonize with Mr. Bastow's. They are principally these:—I should have two stays, alternately an upper and a lower one, the foot of the inclined stays to form a fulcrum. I should prefer to adhere to my original plan of upright fulcrums perpendicular to the plane of the ground, to be sunk by their own gravity. The other details I know nothing about, or whether it is possible to construct a cylinder according to this form or not. Mr. Bastow also with that drawing kindly supplied an estimate, which I will put in with it.

28,822. (*Capt. Washington.*) Different from the first you gave?—Differing entirely. Entirely confined to this drawing.

28,823. (*Sir F. Smith.*) The amount is 289,297*l.* 4*s.*; but it does not say whether for a nautical or a statute mile?—In receiving the assistance of Mr. Bastow's testimony I should not like the Commissioners to be misinformed. Just in the same way that I do not occupy the same position that I did on former occasions, so, to a certain extent, I may say that Mr. Bastow is not a disinterested witness. He is a worker in iron, and therefore, to a certain extent, the interest he would undoubtedly have in carrying out works of this character might influence his judgment. I think it my duty to mention that; but in Mr. Bastow you have the great advantage of a person who has carried out a work of the sort, and therefore the Commissioners will have the benefit of the experience gained in that work.

Lastly, my object in promoting the scheme is for saving life. That which I seek at the hands of the Commissioners is not a decision as to its truth or untruth. That I cannot expect; for when the idea came into my own mind it startled me, and it was not until I had elaborated it carefully, as I mention in the pamphlet, that I perceived it to be the truth. But what I seek is this, that if, on going into the subject, the Commissioners entertain the possibility that, after all, it may be correct, that they will recommend a test of the principle. Happily the structure is of such an order that a test involves very little outlay. A test would be extremely useful, in whichever way it resulted, for at the present day scientific men are divided into two parties. One party contends for the oscillation of the wave, and the other for its percussive effect. And I may draw the attention of the Commissioners to a remark of one of the most scientific men, and one of the deepest thinkers in this country, Professor Airey. In reference to this principle of the oscillation of the wave, he said, in his evidence given before the Harbour of Refuge Commission of 1844, that "he did not think that professional men were aware of the vast importance of this peculiarity in reference to such questions as that before the Harbour Commission." Its vast importance, in my mind, is indicated by this invention; therefore a test would be useful in this way, that it would clear up the point. If it failed there would not be much loss; but if it succeeded, I need not point out to the Commissioners that it would be a boon of the most enormous public value. I have only advanced the wave screen as a means for saving life; but if the principle be correct, the saving of life is only half its use. For, in consequence of its being suggested to me by engineer C, that such a structure would labour under a difficulty in times of war, it occurred to me that, if the principle be correct, it is possible so to adapt it for purposes of war that it might be made a most effective means for the general defence of the country. If the principle be correct it carries that in its wake. I think I have now mentioned all the points which are of importance; but I shall be most happy to communicate any further information which the Commissioners may desire.

28,824. (*Chairman.*) In your comparative estimate of the expense, do you consider that description of breakwater would be so permanent that the necessity of renewing it, say at the expiration of 50 or 100 years, is not to be taken into account?—It is to be

taken into account, but to be weighed with the enormous advantages of it. I give in the pamphlet certain facts, obtained from parties who are authorities, to show the Commissioners the probable duration of such a structure. Of course duration is one of the elements for consideration, but that is to be considered in connexion with its simplicity, its cheapness, its universal adaptability, and also in connexion with the fallacy of the system at present pursued.

28,825. With reference to the first sketch which you handed in (that marked No. 1), will you be good enough also to put in the original demonstration, because I do not think the sketch is sufficiently explanatory. I want the original paper of the engineer, or a copy of it ?—I can hardly at present supply that.

28,826. You cannot put it in ?—Yes ; but I think the Commissioners will permit me to consult the party, or it would be a breach of confidence. It was a confidential communication between myself and him, and it becomes a question whether he would like it to be made public.

28,827. It is a mathematical demonstration, I understand ?—But it is a point upon which the Commissioners themselves may obtain any amount of information they desire. The question may be proposed to any man of science or practice ; but I feel I have no warrant to produce anything of this sort. These solutions were given to me as confidential communications, and without permission I could not hand them to the Commissioners.

28,828. (*Chairman.*) I think you misunderstand me. I did not want the name of the engineer, but only a copy of his paper, because I do not think your representation of it is sufficiently explanatory. I do not want the name, and therefore I should think you can have no difficulty in giving me what I desire ? —Oh, distinctly I beg your pardon. Without the name there will be no breach of confidence at all.

28,829. I presume he would rather have his own demonstration sent in than an explanation ?—I am not aware.

28,830. (*Sir F. Smith.*) You have produced a drawing prepared by Mr. Bastow, the contractor for the improvements at Margate ?—I have.

28,831. Have you seen his work, which you say is in some degree an illustration of your principle ?—I saw a representation of it in the *Builder* some years ago, but not since.

28,832. Therefore you know nothing of the work as constructed by him ?—Not at all.

28,833. Have you seen anywhere any work of piles submitted to the direct action of the sea which would give you any idea of the force of the sea upon them, and their resistance ?—The question brings into my memory a very valuable example. In the Solway Firth there is a newly-formed place called Silloth. Opposite this port of Silloth is a transverse jetty of open piling. It is generally dry at low water, but at high water, on account of the great rise in the Solway, it has a considerable depth of water. In the spring of last year I had occasion, in the course of my duty, to visit Silloth. The vessel which I have for surveying purposes is a cutter of 120 tons. She was lying opposite this work, with two anchors a-head, one of the chains being calculated for a vessel of 200 tons instead of 120 tons. In the height of the gale the *Seaflower* parted both chains, and drove ashore, the very time when a long steamer, named the *Silloth*, lying under the protection of the jetty, and absolutely transverse to the wave, was only held by warps.

28,834. Do you know the saluting platform at Portsmouth ?—I do not.

28,835. For the protection of the front of the saluting platform at Portsmouth, about 1821 or 1822, owing to the escarp wall having been considerably acted upon by the waves, a line of piles of from fifteen to eighteen inches diameter were placed a few feet from the foot of the wall. Would you be surprised if you were told that between 1821 and 1855 a great proportion of those piles were destroyed by the action of the sea, so as to be obliged to be renewed ?—I should not be at all surprised that the piles so placed were destroyed.

28,836. Will you state why you are not in any similar apprehension as to your structure ?—Because my piles are situated entirely differently. The great portion of my piles, or the structure which I have designed, is situated, if my views be correct, in a region horizontally motionless, and the only percussion which such a structure would be forced to resist would be that of the stroke of the surface wave, Entirely a different case from that of piles on a beach, with the friction of a constant batter acting upon them, and constantly exposed to a percussive force through the whole depth.

28,837. Would not the action of the wave be the same in the one case as in the other ?—Entirely different.

28,838. Why ?—Because in one case it is a breaker and in the other an undulation.

28,839. The lower part of the piles at Portsmouth are acted upon considerably below the level of the breaking wave ?—I am not aware of their position.

28,840. I merely mention the fact to you to see if you account for the difference ?—In this case, to give a sound opinion, I should require to see the platform battery, and the position of the piles, and to calculate the forces acting upon them. I could not give a sound opinion without seing the exact situation.

28,841. With regard to the duration of this structure, would there be any great difference as regards the material of which it is formed in the one case over the other ?—In the estimates I have called for I have had provided for pine scupper-nailed for the lower course, and cast iron for the upper. To a certain extent that is indicative of my opinion, the object of scupper-nailing being to resist the action of the worm.

28,842. The same thing was done at Portsmouth. —The piles at Southwold Harbour, driven in forty years ago, and defended by scupper nails, are perfectly sound; and the late Captain Ellis, when I made inquiries about them, said that they would apparently last half a century more. They were within the region of breakers, and not placed in the position which would be occupied by a structure of this sort.

28,843. Is that the reason why you propose to make the upper portion of the wave screen of a different material from the lower ?—I do that. I adopt metal for the upper course, because you can constantly get at it, and apply preserving coats, the same as you can to a steamer's bottom, a pier, or any other thing formed of iron, and therefore I adopt a different material. But I mentioned that the lower portion of the structure also may be formed of malleable iron, because Mr. Mallett, who is a great authority for all facts about the endurance of iron in sea water, states very decidedly that such a material may be employed for such a structure as this.

28,844. Do you propose to put in the lower piles by screwing or driving ?—I do not know.

28,845. That is undetermined, it seems. In what mode do you propose to join the upper portion to the lower ; by what mechanical process?—Beyond showing an upper and a lower course, I prefer not saying.

28,846. You have not quite determined your mode of construction ?—I have, in my own mind, but whether that is at all the best one I am not fitted to say, because I am not practised in mechanical construction

28,847. To what extent do you suppose you reduce the force of the breaking wave against anything behind it by your mode of construction ; by this open work ?—It destroys the breaking wave altogether There is no breaker, properly so called, in water of a certain depth. There is a surface crest, which is entirely different in character and in effect from that which we term the breaker, which is the wave doubling over in a body, and bursting on the shore or any other object. In the region where this structure is intended or calculated to be placed, there is no such

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force. There is a doubling over and tumbling of the surface crest, and a running down the front incline of the undulation, but nothing analogous to a solid percussive breaker as on the shore.

28,848. You expect an almost still-water basin beyond ?—Still water, in so far as the surface crest is concerned, but with half the undulation preserved within. My object would be to preserve as much of the undulation as is consistent with the security of vessels.

28,849. I suppose the intervals are equal to the size of the piles ?—I cannot predicate. I might find out the passage of water through pipes or bridges, and to a certain extent form some conclusion as to the passage which would be left to pass a certain amount of water in a given time. But in the estimates, I have assumed the intervals to be equal to the diameter, and so on, without venturing to say how much interval should be left to produce the effect which I should like to arrive at.

28,850. Your structure would not give the same stillness of water which would be produced by a continuous breakwater made of stone, would it ?—Still water ; as far as the surface crest, just the same. Only in a harbour formed in this way there would be an undulation, which is not the case with a harbour formed by a stone breakwater, and it would also have a perfect current action.

28,851. Then you get nearly all the advantages you require, except protection against wind ?—Perfect protection against wind.

28,852. In gales of wind would vessels lie as easily at anchor as they do under a stone breakwater ?—Nearly the same.

28,853. There would be no tendency to drive them from their anchors, so far as wind is concerned ?—Not any, so far as the wind is concerned. Of course every undulation to a certain extent would bring a little strain ; but I should take care that the undulation was not of such a character as at all to give a tendency to trip.

28,854. Have you at all made up your mind as to the mode of placing your screens in the ocean ?—Yes.

28,855. Could you describe that process, commencing with the first pile ?—My views, perhaps, are not very reliable on this point. I should drive 20 or 30 single uprights by means of a floating driver, with a corresponding number of temporary piles abreast, and then have a platform between them with the pile-driver traversing upon it.

28,856. Of what material do you propose to make the stays ?—The lower stays of the same material as the lower course of the screen, and the upper part of the longer stay of the same material as the upper course.

28,857. As the ground at the bottom of the sea would naturally not be perfectly level, how do you propose to arrange about the stays, which in all probability will every one require to be of a different length ?—They find their own position. They have a swivel connexion with the structure, and are sunk into the bed of the sea by gravitation.

28,858. By gravitation only ?—By gravitation. I do not drive. I do not attempt that.

28,859. They take their bed first of all ?—They take their bed, and sink below the surface, being defended at the lower end by a heavy iron-palm perpendicular to the surface of the ground, which provides a fulcrum.

28,860. You think that is applicable to all soils ?—Not all soils.

28,861. To what is it applicable ?—To sands, clays, or materials of a similar order.

28,862. In a rocky soil it would not be applicable ?—I am not prepared to say. I cannot now suggest the best means for securing it on rock.

28,863. You might secure vertical piles, but not the stays ?—Not on rock. If I could secure the vertical piles there would be no difficulty about the stays.

28,864. You might, I suppose, screw into moderately hard rock ?—I am not practically informed upon this point. I cannot say. I have an idea about it, but it would not be of much value if I gave it.

28,865. Then, assuming that the stay is placed on the ground by gravitation, it is to be fixed, I suppose, to some horizontal ribband, and you would be obliged to cut the end if it did not correspond ?—I have provided for that. The stay or strut is loaded at its lower end with a shoe of a certain amount of weight and a certain form, to sink it down to the bottom ; and the reason I adopted that is on this ground :—I have often observed that the effect of the current on the bottom of the sea is to sink heavy materials below the surface of the ground, and therefore, when I wanted to support this structure against the force to be brought against it, it came immediately into my mind that you must provide something which will sink below the surface. Now, whether it sinks much or little, it matters not, when it has got to its permanent position. Then I connect the chain, which will not prevent its sinking lower, but will prevent its coming out.

28,866. I do not clearly understand your mode of fixing the stay at the upper end. Have you determined upon that ?—In a general way.

28,867. How do you regulate them ?—The upper stay is represented on that model, and a chain in connexion with it, which the lower stay or strut has not, and that is because the surface crest of the wave may act upon the upper stay, and might trip it.

28,868. Are the upper ends of the stays in any way halved into the material, or how are they connected ? You would have to regulate the length of every strut as it came up to the bearings ?—No ; I can make them all of one length, and let them go to their own depth.

28,869. Then if a strut should be rather too short for a particular spot, it would draw upon the upright ?—Yes ; then I supply a longer strut.

28,870. Then they must be regulated according to the position ?—Yes. Suppose this structure were, for instance, to be placed on a frontage like that of Hartlepool, part of it would be in 30 feet at low water, and the other parts in only 24 feet.

28,871. The stays must differ throughout ?—Differ throughout ; and it is very easy, if they are too long, to saw off a little.

28,872. Do you imagine that there would be any tendency in your upright portion to yield and give over a little ?—Not at all, on account of the small force brought to bear against it, compared to the mechanical resistance supplied. I may say, if these views are correct, it is impossible ; but by the inclined stays I provide for that.

28,873. The tendency will be to incline the screen inwards ?—It would be, if the screen was unsupported, and therefore a support is provided, which, if I am correctly informed, supplies an enormous surplus of power over the force to be brought against it.

28,874. Will you explain in what manner it is to be applied to defensive purposes ?—I should not venture to give a definite opinion about that without having consulted a military engineer and an artillerest ; but I am quite convinced that if the principle is correct such a use might be made of it. The upper part I should treat like a vessel's broadside. Assuming this screen as a mile in length, I should defend it by a certain number of guns put at various positions along that screen. To do this, at the position of each gun, on the seaward side, I should adapt a plate of iron exactly like that now applied to the mortar batteries, with this difference, that in applying it to the screen I should have some elastic backing, or give it an inclination from the perpendicular, so as to prevent a solid stroke. I should put along the screen single guns at certain intervals. These guns would be on small platforms sufficient to receive them. And if my views are correct, I believe it is very possible to be done ; and the advantage would be this, that it would be a structure which you

could scarcely assail without the party assailing it getting more damage than he would give, seeing the upper part would be of malleable iron instead of cast. Also it would not involve the employment of a large public force. If I put a screen of this sort opposite any district, I should give it to that district to defend it. In other words, it should be defended by the locality.

28,875. (*Sir F. Smith.*) They would rather defend the shore by being on shore, would they not?—I should think each port would find plenty to act as local volunteers, in the same way as local fencibles in former wars; that is my idea.

28,876. Do not you think it would be very easily destroyed by the fire of the enemy's cruisers coming in?—I think not, for reasons which I could specify. I may mention that I have not gone thoroughly into it, but only partially.

28,877. You mean to case it with iron?—Case it seaward with iron; that is, opposite each gun.

28,878. Is it not found that that casing of iron is not shot-proof?—That is correct, when it is a casing to a solid body which opposes an effectual resistance; but I think it possible, that if you put a plate of iron, with an india-rubber or other elastic backing, or slope it well, that shot would not penetrate it: that is my idea; I do not know whether it is sound. It is an idea which might be elaborated, but having come into my mind, and as it is connected with this subject, I thought it right to mention it.

28,879. (*Capt. Washington.*) I think you said the screen would be placed broadside to the stroke of the sea?—It will.

28,880. In all cases you would propose it should be so placed?—It will be broadside to the sea, advancing from abreast, but it might often have an oblique sea, wherever it was placed.

28,881. Taking the case of the east coast of England, the exposure would be nearly east. Supposing it to resist that, would it equally resist a north-east and south-east stroke, which would take the line of piles in flank?—It would resist it the more effectually the more oblique it was, though, as far as the direct sea is concerned there is no question as to its resisting it.

28,882. I am not speaking now as to the quieting effect on the water inside, but as to the structure itself?—It possesses ample power of resistance to every stroke of the sea.

28,883. Both the direct and the oblique stroke?—Its power of resistance is quite apparent. The engineer conducting the work at Portland mentions, and it is a very important point, that piles resist the sea even above the submass of tipped matter on which a breaker is generated. If that be the case, and the piles there resist the breaker, and admit of locomotives and other things working upon them in the heaviest gales, it is quite clear that in the region of comparatively motionless sea the success of this is certain.

28,884. According to your scale, how far apart would the piles be?—This model is arranged for equal spaces, but I do not tie myself to that space as the one to be adopted in practice. I might go from equal spaces down to one half.

28,885. In any staging or structure of piles are the piles placed so closely as that?—The engineer at Portland mentioned certain piles, and I observed certain piles at Holyhead. I am not aware of any other. But about the power of resistance I propose this case:—If a wooden pile standing upon a rock without any support resists a 12 or 15 feet breaker, then if a pile is put in water nearly altogether motionless, possessing 10 or 12 times the force of resistance of the other pile, it is quite undoubted that if the first pile stands the other will do so infinitely better.

28,886. I think I understood you to say, in your evidence, that all the present breakwater harbours have been more or less unsuccessful?—I do not say all are; but as a system it has been an eminently unsuccessful one. The practical examples of this I give in the pamphlet which I put in.

28,887. Do you consider Kingstown as being unsuccessful?—I do not say so, as a harbour, for the simple reason that happily the party constructing that put it in a very good position. It is uncharged because the water is uncharged. But considering Kingstown as a structure, and that it was necessary to have a close harbour, then I should have said, without knowing the district, except by plan, that an upright wall would be better than the form of breakwater adopted. To that extent, I think Kingstown is constructed on erroneous principles.

28,888. But it does stand, I believe, without requiring any very great repairs, and proves to be very useful?—The returns will show whether there is much expense for repairs. I am not aware, but I should, as a general thing, expect expense. With the long slope breakwaters you can never practically finish them, if you get an oblique sea upon them.

28,889. Do you contemplate that if your wave screen were erected, there never would be any repairs required?—No.

28,890. Then is it fair to apply a different reasoning to stone harbours than to timber?—Yes, for this reason, that in the stone projection the evil results from a fault of principle, and here it results from a want of duration, and the practical effects are enormously different. This screen would involve a very different outlay to that of the stone breakwater, even supposing you had to restore the lower portion of it at the end of a century.

28,891. You contemplate that no repairs would be required within a century?—Not as far as the action of the sea, the worm, and matters of that sort are concerned; certainly not. The reasons for forming that opinion are embraced in the pamphlet, where I have given sufficient details to show that my opinions are founded upon facts.

28,892. To come to another refuge harbour, that of Portland; do you consider that that has been unsuccessful?—I have not been at Portland since 1844, when the Commissioners visited the place; but if the case of Portland was put before me, with my present experience, assuming that experience to be sound, I should not perhaps be prepared to recommend it precisely as it is; certainly not the work as it is.

28,893. You have made a very bold statement, that the system as at present pursued is faulty and wrong, and should not be followed?—That I believe.

28,894. We, the Commissioners, are endeavouring to arrive at what is the right thing to do?—Truly.

28,895. I adduce to you two harbours which appear to be successful, which have proved very useful, and are maintained at a very small annual cost. As far as we know, Portland, when finished, will be maintained at no annual expense, will require no repairs?—The cases to which you have alluded are not faultless in character, as I have said; but what is true at Portland and Kingstown is certainly not true of other parts of the coast where there is much matter in suspension. A harbour which is perfectly allowable at one part of the coast might not be so at another. As you have no absolute principle of projection, you must study each site; and, as a general rule, if you want to put a harbour upon a coast where the water is charged with matter you must not form it as a close harbour.

28,896. Then you do not mean to say that the stone breakwaters, placed where they are, faulty; but that if it was attempted to apply them to spots where there was a great deal of stuff in suspension, that then they would be faulty?—Then they would be faulty.

28,897. That was all you intended to imply by saying that the system was faulty?—Yes. To Portland and Kingstown as works you can take very little exception, except as to their expense.

28,898. Should you have recommended the wave screen at Alderney?—I do not know Alderney. I should not recommend a work there at all; not the expenditure of a penny.

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28,899. I do not ask that question?—I do not know Alderney. I only know its geographical position, and I should not have been prepared to recommend any work there with a view to national defence.

28,900. Is it quite judicious of you to decry all these harbours, when, upon two of the principal ones being mentioned to you, you say that you have not visited them, and really know nothing about them?—I know them by plan, distinctly and thoroughly, just the same as if I was to visit them. I do not require to visit the place to ascertain the character of the coast, when I have a chart.

28,901. In these two cases of Portland and Alderney, would you, supposing that harbours were to be constructed at those places, have recommended the adoption of the wave screen, instead of stone breakwaters?—I should always recommend the wave screen where applicable. If the soil of the frontage is of such a character as to admit of the application of the wave screen, I should always recommend its adoption merely as a measure of economy.

28,902. Should you have recommended it at Dover?—Distinctly so; so much so, that if it rested with myself as a dictator, I would now stop the work there, and finish it with a wave screen. In these cases I speak very decidedly. I give my distinct opinion, in order that I may not be mistaken.

28,903. At Holyhead, upon a notoriously rocky coast, should you have recommended the wave screen in preference to a stone breakwater?—If the wave screen could have been formed, decidedly so; but whether I could or could not I should not have recommended the harbour as at present projected; I should not even have dreamed of it. Holyhead Harbour involves several radical errors in principle.

28,904. My question was, as to the material and mode of construction; not as to the plan?—Distinctly, if it had been possible to put the wave screen at the Holyhead site, I should have recommended its adoption, because the wave screen would have supplied you with everything which you required at one tenth of the expense which is now being incurred.

28,905. Would it have been possible to have placed it there?—Distinctly.

28,906. It would?—I am not aware whether you could drive it, but if that be possible then it might be placed. I cannot speak to these points, but the contractor of Margate Pier will be able to do so.

28,907. You stated that Holyhead Harbour is silting up, will you give your reason for saying so?—Finding silt in it, and the greatest quantity of silt in the deepest portions.

28,908. That some silt will be found in it?—Silt varying in thickness from between 15 and 18 inches in the deeper portions. When I discovered the fact, certain parties suggested that it might arise from the débris from the works in progress. I could not form an opinion until a gale of wind came on, and I saw that the water was charged with matter; then I had no doubt as to the cause.

28,909. Where do you think the stuff with which the water was charged came from?—I have not studied the matter enough to give a reply. I can only state the fact of the water being so charged.

28,910. But you do not think that the tumbling down of the large mass of stone which has been tipped there is sufficient to account for a slight silting up in the different places in which you might have found it?—Distinctly not. It is a matter of easy solution. Take a portion of the silt and analyse it, and you will find out whether or not it comes from that source.

28,911. Have you done so?—No. I am not a chemist. There is the material there; and when I state that fact the Commissioners have the guarantee that it can be tested. All these matters are perfectly susceptible of proof.

28,912. Did not I understand you to say that the silting up could not arise from the tipping of the stone?—I do not say that it could not; but I say that when the charged state of the water supplied me with a reason for it, I at once formed my conclusion that at any rate that supplies a means of silting, and it being the case that the water is charged to a very great extent, I can distinctly say that Holyhead Harbour will gradually decrease in depth. I may mention that Holyhead Harbour as you now see it has only been carried out by degrees, but even though that has been the case, the silt has formed to the extent which I have named.

28,913. As you have insisted a good deal upon the faulty nature of the Holyhead plan, will you point to any instance in this or any other country in which a plan for a refuge harbour has been dashed off at once, without alteration, and has proved complete and successful?—Speaking in general terms, the cause of faulty projection, so far as my experience goes, is ignorance of principles, and the result of failure in every case with which I am acquainted can be traced to the disregard of natural laws. The present system of carrying out works is essentially faulty. The formation of a harbour is not a mere matter of construction. I should employ a man qualified in constructive art to build the work; but that is a very different thing from the higher science, which deals with laws, and their application. If I wanted to build a harbour for the saving of life, I should adopt a very simple course; I should employ a man who was thoroughly acquainted with the natural laws of the movements of the waves, and their results; I should employ an engineer, a man who was in the habit of constructing works; and I should also employ a nautical man: the projection of a harbour, in short, should be the result of a combined opinion. What, however, is the system now pursued? Of course I do not wish to speak offensively. The Commissioners have asked for my opinion, and I am giving it. The system at present pursued is this:—Parties at the ports want works, and they are at no loss in finding an engineer to carry out those works. The engineer goes down. He may or may not be acquainted with the subject with which he has to deal. In forming the works a great number of things are to be taken into consideration. Not only must you be acquainted with the natural law, but also with the special circumstances under which that law is to be brought into operation. The engineer goes down to where the works are wanted, and will carry them out. He may or may not have had a nautical opinion, or he may have had the best of nautical opinions; but the practical result is, that he has to select that by which he shall be guided; in other words, the value of the nautical opinion is determined by the engineer. Another thing which I consider to be essentially faulty is this:—The persons who carry out the works have a beneficial interest in them; and, allowing them to be men of the most unsullied honour, I would apply to them the same law that I would apply to myself. If you connect my self-interest with a subject you supply me with a ready means of acting with a faulty judgment. What is the system in the case to which I am now referring? The works are carried out, and the engineer is paid according to the amount of the outlay.

28,914. I think you are speaking of private harbours. I was confining myself entirely to public government harbours, in which case the engineer is paid by salary?—It applies equally.

28,915. The government engineer is paid by a salary, and therefore the observation as to having an interest in the expenditure cannot apply to him. The contractor may have, and naturally ought to have, an interest?—I am now speaking of the supreme authority, if I am not misinformed.

28,916. The government engineers are paid by salary; that is an undoubted fact?—Then, speaking of private harbours, taking that of the Tyne for instance, if there is no objection.

28,917. I would rather keep to the public harbours that I have mentioned?—Then, whether they are paid by salary or by a per-centage for overlooking, there is a natural tendency to extensive works,

because the pay depends upon the work. Now there is also another point.

28,918. I should like you to keep to the plan of the harbour at Holyhead, with which you have found fault?—The sum and substance is, that the general system is essentially faulty.

28,919. You admit, I think, that Portland has been as successful as any other harbour?—I have not inspected it.

28,920. But from the plan?—I should require to examine it for myself, and to have the facts ascertained. I have not been acquainted with that district since 1844.

28,921. You are aware that the same engineer who planned Portland Harbour planned that at Holyhead?—I believe he did.

28,922. You are also probably aware that he would have planned a much larger harbour, but he was crippled in funds, and obliged to limit his design?—I am not acquainted with that fact. I simply take things as they appear before me.

28,923. That certainly was the case. Can you have any doubt that the late Mr. Rendel obtained the best nautical opinions he could get before he decided upon his plan?—I have no doubt of it; but Mr. Rendel had the determination of the value of those nautical opinions.

28,924. Ought not the person who is charged with the work to have that?—Distinctly not, because it is a nautical question. It would be like my dabbling in construction. A judge is learned in the law, a cobbler in making shoes, and you do not put one in the place of the other. Every man ought to be educated for that with which he has to deal.

28,925. All I wish is to show that the late Mr. Rendel is not responsible for the altered plan of Holyhead Harbour; that as an engineer he is not responsible for the plan of that harbour as it at present stand?—I am very glad to hear it. I was not at all aware of the circumstances. I merely took the harbour as it is, and then tested it by laws. I limit myself to that.

28,926. To return to the wave screen; the places for which you consider it most applicable would be on a sandy coast, or where there is silt held in suspension?—Sand, clays, and so on, but particularly adapted to, in fact it is a necessity for, those places where matter is held in suspension.

28,927. (*Capt. Vetch.*) Have you examined Holyhead lately?—Not since the summer before last.

28,928. Did you observe on the outward face most exposed to the sea that the stones which were originally very angular are now converted into round boulders and shingle?—I did not. I went outside the work to see whether the original state of bottom was still preserved, and found that it was, while that of the inner part was thickly covered with silt.

28,929. I thought perhaps that that circumstance had had some influence upon the description of the work?—No.

28,930. Coming to the question immediately before us, the wave screen; of course if only one of these piles or cylinders was erected, when the sea beat upon its outward face the level of the work inside would almost instantaneously rise to the same point, therefore upon a single pile there would be no pressure?—Not much.

28,931. But if you put them very close together you would have a great pressure upon the side from which the wave came, and considerable want of support on the inner side?—By putting other cylinders on each side of it you approach in a degree to a long line of resistance, and add to the force acting upon it in a like degree.

28,932. We will suppose, for instance, that the cylinders were put very close together, say within an inch of each other, in that case the pressure on the coming wave side would be felt long before support would be given to the inner side?—I hope I have not been misapprehended. I do not imagine that the intervals will require to be anything like so small as an inch or anything of that sort. On the contrary, I am rather inclined to believe that in practice equal intervals will be found to be that which is desirable.

28,933. My object is to get at the principle of the thing. Clearly, if a single pile is erected in the sea, the pressure would occur so instantaneously upon all sides that there would be no effectual preponderance, or only very little?—That is so.

28,934. But if you put three or four piles close together, the pressure of the sea on the side from which it comes would be for a while considerably more than that on the other side?—That would be so.

28,935. And therefore it is important to have the distance between the cylinders so regulated that it shall not induce that heavy pressure on either side?—Yes.

28,936. I want to ask you whether you have arrived at the conclusion that equal intervals, intervals equal to the diameter of the cylinders, is the best arrangement?—So far as I can determine, I should think that equal intervals would be sufficient, because with so curved a structure as I propose it is only at one portion that the undulation would advance from abreast of the work. At the other portions the direction of the undulation would be oblique.

28,937. It is quite clear that if cylinders were put very close together the pressure on the outside would be considerably more than that on the inside?—Much more; in proportion to the mass, whatever that might be.

28,938. Therefore you have placed the stays on the inside?—Yes; in fact it is to resist that. Take the extreme case. To a certain extent the screen occupies the position of the broadside and bulwarks of a vessel that are exposed to the surface stroke. There you have a continuous line, and the bulwarks and boats are washed away. In the case of this structure it becomes a question of mechanical resistance. Is or is not this screen stronger than a ship's bulwarks and boats?

28,939. You have placed the cylinders nearly upright?—I adopt the upright form as a matter of principle, in accordance with the character of the wave; and I should also adopt it because I perceive that from its capacity to bear weight it is available for purposes of war.

28,940. In adopting that I presume that you intend that a wave striking the column should run up, and by its own gravity have a tendency to fall back?—In answering the question I must take exception to the word "striking." The great mass of the wave does not strke; it only undulates. It is only the crest which strikes.

28,941. Yes; but if it is impeded, and cannot go on, it must go upwards?—The surface crest would strike the work, and partly go through it, and be altogether destroyed; but the undulation merely meets the screen; it has no stroke; no momentum like the surface.

28,942. Still if it cannot undulate onwards it will go upwards?—It will, and rebound backwards.

28,943. And by its own pressure bring it back?—Yes; in fact it will run back to the extent I have mentioned in the pamphlet.

28,944. It is much better to send it upwards than onwards?—Distinctly.

28,945. I put these questions in order to see exactly the principles on which you propose to adopt that form of breakwater?—Although half the undulation would go through, still there is another half or portion of it which would be reflected backwards, just the same as is the case from a perpendicular cliff with a profound depth of water in front. There you find no breaker; there the undulation meets a resistance, and returns exactly upon its own track. It would in a degree be the same here. The only difference would be, that this screen would not present a continuous line of resistance, as the cliff or other object does.

28,946. (*Mr. Coode.*) I believe you very strongly entertain the opinion that a current moving in opposition to the direction of the wave causes a breaking

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sea, which sea is attended with a considerable amount of percussive force ?—Yes.

28,947. Then in the case of a wave rising against the outer portion of this structure, the water would become elevated within, to a less degree than it is outside ?—That is so.

28,948. The water without the structure is free to recoil, unimpeded by any obstruction from the screen itself ?—That is so.

28,949. Whereas the water within the screen would be momentarily retained at a higher level than that without ? The water within the screen not being able to fall so rapidly and freely would for a short period of time be retained at a greater elevation than that without ?—No. The water through the intervals would occupy the place of a cascade running into the harbour.

28,950. Would not the effect of the falling of the wave be, that for a short time the water within would be heaped up at a greater elevation than that without ? —No.

28,951. You think not ?—Oh dear, no.

28,952. Then you think that the water within the screen would be free to fall to the same level and within the same time as that without it, and that there would never be any difference between the level of the water within and without the screen ?—Distinctly, for reasons explained in the pamphlet. The water will be much higher without than within. The elevation will be outside the screen, not within it.

28,953. But in the same way that the elevation is caused without, will there not occasionally be an elevation within ?—No.

28,954. I should like you to explain why there will not, because, seeing that the wave without the screen is free to recoil unimpeded and unobstructed by the screen itself, I should like to see how it is that the water within will resume its level as rapidly as the water without ?—Because, while the superior undulation which is outside the screen is retiring in height, the inferior undulation within the screen will also be retiring in height.

28,955. Will the water within the screen recede as rapidly or will it fall in as short a time as that without ?—Distinctly ; practically it will.

28,956. You are prepared to say that at no time will there be any elevation of the water within to a greater height than the level of the water without ? —So as to apply pressure from the inward outwards ?

28,957. I am not speaking so much of pressure. Will there be a difference of level ?—None whatever, in practice, except in favour of the outside.

28,958. There will never at any moment be a greater elevation within the screen than without ?— There will not.

28,959. Then assuming that there is a greater elevation outside, would not the tendency be to create what we may call a cascade on a small scale, within ?—There will be ; in fact the inferior undulation will be to a certain extent caused by each cascade.

28,960. Then the pressure on either side of the screen will be constantly varying ?—No ; it will always be in favour of the outside. I cannot see anything else.

28,961. At any rate the pressure will vary, because at one moment the levels inside and out will be equalized, and at another you admit that the water will be heaped up on the outside ?—Distinctly. At one time there will be a force exerted, and at others there will not.

28,962. You adduced just now a parallelism between the pressure on this screen and that upon a cantilever, with which I quite agree. Would not the resistance of these cylinders depend upon the resistance of the foot of the inclined stay ?—The power of resistance would depend upon the operation of the fulcrum.

28,963. I see you state in your pamphlet that " the foot of each stay is furnished with a heavy shoe," and so on, " to be buried beneath the tidal current." I would ask, if the soil be so soft and so yielding as to allow of the shoe being buried by the action of the tidal current, do you think that it would offer sufficient resistance to the strains which these inclined stays will have to undergo ?—Distinctly. If the force is great and the soil soft you must increase the resisting surface of the shoe, the surface being below the general bottom of the sea.

28,964. Will the strain vary according to the state of the weather ?—Yes.

28,965. Then you would make your shoe of such an area as you assume would be sufficient to resist the greatest amount of strain which it would have to undergo ?—That is so.

28,966. Then if you put them down, and it ultimately turns out that their area is not sufficient to resist the strain, will not the effect be that the stays must drag over the uprights with them ; that the upright cylinders will follow the inclined stays as they settle into the bottom ?—That would be the tendency ; but in practice you would see what surface you required, and increase it as was necessary. It is only a question of supplying sufficient resistance to meet the force which will be exercised.

28,967. How are you to do that if you have no idea of the strains ?—I do not venture to predict what surface you may require for certain soils. I merely say that I know these flat palms will sink below the surface, and will supply a fulcrum, a perfect fulcrum, even in soft soil, by increasing the surface. It is matter of practice for an engineer to know what surface is required to withstand a push ; that I do not go into.

28,968. You imagine that a soil which would readily admit of the palms or shoes sinking below the surface, would offer a resistance sufficient to encounter all the strains to which the uprights would be subjected ?—Ample, with an ample surface ; there is not the slightest doubt of it.

28,969. And that there would not at any time be any fear that the upright cylinders would be strained by the yielding of the shoes ?—No ; especially if you consider the character of the wave, and the nature of the structure. A wave is not altogether to be considered as acting in one uniform line with an uniform force. It is true that upon three or four or even a dozen of the cylinders there may be the strain to which you refer, but you must remember that while there is a considerable amount of force pressing upon one part of the structure there will be very little upon another, and then you bring into play its character as a whole. The amount of resistance required in extreme cases is supplied by the cylinders not so acted upon, and that brings in the principle of structural continuity.

28,970. Would not each upright cylinder in turn have to undergo a considerable amount of strain from the force of the sea heaped up outside ?—No ; for the reasons stated in the pamphlet. I may also mention here, that I designed this structure upon certain principles out of my own mind. I do not at all tie myself to the mode of bringing those principles into operation as represented by the model. I should rather expect that a practical engineer, in the habit of constructing works, might suggest some means far superior to these inclined stays. I have only constructed this model to show one mode in which the principle may be made practically useful.

28,971. Still as you profess that by this new system of yours we shall get greater economy than has yet been reached, I ask whether the cost will not depend upon the means employed ?—Yes.

28,972. Therefore, before we attempt to form an estimate, we should be satisfied that the means for which it is calculated are sufficient to attain the object which we have in view ?—Always bearing in mind the first cost, because the increase of expense in a thing costing a farthing is very different from the failure of that which costs a sovereign. That is a very important principle to keep in view.

28,973. A great deal has been said about the work at Holyhead. Are you aware that when the late

Mr. Rendel designed the harbour at that place, he was charged with having made it too large for the wants of that particular part of the coast, and that in consequence either a commission or a committee of inquiry was nominated by the Admiralty to examine into the whole question ?—I believe that that was so.

28,974. If that be so, I presume you do not mean in any way to charge the engineer in that case, at least, with having treated the subject improperly ?—I dare not venture to sit in judgment upon the conduct of Mr. Rendel; far from that. I can only say this, that if there had been a distinct grasp of principles, Mr. Rendel or any other party who had projected the harbour would not have recommended it, whatever the circumstances might have been.

28,975. I understand your views to be that the harbour at Holyhead is designed in opposition to what you believe to be correct principles ?—That is the fact.

28,976. And that the error of principle consisted rather in the line of the proposed work than in the mode of construction ?—As you have put that question, I may indicate what I consider to be the errors properly belonging to it. It is possible to form a work at Holyhead of such a character as to insure permanency of depth within it, and it is also possible, with a work somewhat shorter than the present work, to have inclosed double the present space. Those are the two points I would specially connect with the opinions I give; and it is also nautically defective.

28,977. With regard to the inclosure of a given amount of space by a given amount of work, would not the result depend upon the views that were entertained of what might be a sufficient area, when these works were commenced ?—The matter of the necessity of the district I know nothing about. I can only say, whatever the necessity may be or might have been, that necessity should have been met by works projected according to correct principles; beyond that I do not go. I do not know what the necessity of the district was, or the exact history of the projection of these works. I know nothing about them. I merely speak of the works as a matter of principle. With respect to the party who carried them out, I say nothing.

28,978. Still, as you have made reference to the amount of area that might have been enclosed by the same amount of work as now constructed, I ask you whether the amount enclosed must not depend on the position at which the works had arrived when it was decided that an extension was necessary?—It is quite correct, and it may account for the form in which the harbour at present appears. I do not know anything about the history of it. I really do not know anything about the persons or the necessities. I am merely dealing with principles. I do not know the exact history of the transactions by which such a harbour was determined upon, or the mode in which it was carried out. I only take it as I find it.

28,979. As you have offered some very strong remarks upon the mode pursued, in case of a determination to undertake any public work, and as those objections have rested mainly on the fact that nautical authorities have been disregarded———?—I beg your pardon. There is a mistake. I merely so far questioned the wisdom of allowing any engineer a supreme authority in carrying out such a work to analyse and determine upon the value of the nautical evidence; that is all.

28,980. Is it not the fact that in the case of all our large refuge harbours, nautical authorities have been consulted, and that their views have been allowed to carry a very considerable amount of weight, if not the paramount weight, in the determination of the plans adopted ?—I believe it may be said, in general terms, that the system pursued is to give the work into the hands of some party celebrated for his position as an engineer. The system pursued, taken as a whole, is essentially faulty. The practical effect is, as I tell you, as respects nautical evidence. It is a wrong system.

28,981. You have just admitted, I think, that nautical evidence is taken in every case ?—It is.

28,982. And is allowed to have considerable weight? —It is taken, but the party who designs the work, and analyses the value of that evidence, is not a nautical man. That is, I think, wrong; very wrong. In fact, as I said, these sort of things should be the result of three distinct opinions, and one party should never have the designing of works intended for nautical purposes.

28,983. Are you not aware that if nautical evidence be not taken after the design is finally completed, that the design is in most cases based upon nautical evidence bearing upon it ?—Quite correct; perfectly correct; but the value of it is generally determined by the party who designs the works. I only take exception to the system. It is no new thing with me; for many years I have held the same opinion, and increasing experience confirms me in the general soundness of my views.

28,984. With regard to this silting at Holyhead, you have said that it is earthy matter ?—Apparently earthy matter.

28,985. Are you aware of the source from which that earthy matter is derived ? Do you know of any earthy matter travelling along the coast generally ?— I merely mention a fact which is easy to prove, that is, that the waters in Holyhead Bay are charged with matter. I do not tell you where it comes from. I take the simple fact, and then I say you get a cause of ultimate loss.

28,986. When you say Holyhead Bay, do you mean the bay without the works, as well as within ?— Oh no; the water without the harbour.

28,987. Then if the bay generally were charged, would not this discoloured water be found to extend on either side of the proposed work to a considerable distance ?—The whole bay for a long distance out, from what I observed on that occasion. That embraces the whole of the refuge harbour.

28,988. Might it not be possible, if there was some little disturbance within, that the silting matter might be raised and brought into suspension, and that a great portion of it would be carried away by the ebb tide ?—Silt is formed. The balance is silt.

28,989. That is as regards the soil in the bottom of the harbour; but I ask if the discoloured state of the water may not be due to the matter being raised and held in suspension, and carried away by the ebb tide ? —Distinctly not; where is the wave to suspend it ?

28,990. Is there no disturbance within any portion of the new harbour ?—Disturbance, but not to suspend matter within the refuge harbour.

28,991. You are prepared to say that there is no such disturbance as would raise this matter into suspension ?—Over the deeper portion there is not.

28,992. Over the shallower portions ?—There there is very little soil, for the reasons which are given in my pamphlet.

28,993. Are you aware that a considerable extent of beaching ground has been formed on the shore of the new harbour at Holyhead ?—I am.

28,994. Do you know from whence the material was obtained to form it ?—I think I was informed that it was the débris of the quarries.

28,995. Have you ever heard that the material forming that beaching ground consisted of material taken from the crevices in the rock forming Holyhead Mountain, and that it consisted mainly of broken quartz, in sizes of about road metal, down to small chippings, intermixed with a small portion of soil ?— I know it is generally the débris of quarries, but of what character I do not know. I know it is small.

28,996. You are not aware that the material forming that beaching ground has been taken from the source I speak of ?—I should think it had.

28,997. Might not that prove to be the source of a considerable amount, if not all, of the earthy matter which you describe as in the bottom of Holyhead Bay ? —A little might be given to it; but, again, that is a thing easily susceptible of proof. What is the amount

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you tipped in, and what is the loss; or, rather, what is the amount within the harbour?

28,998. Do you not think that if the water in Holyhead Bay had generally been charged in the way you speak of, some indication of this earthy matter would have been found in portions of the bay, before the commencement of the works?—No, not while the bay was in a state of nature.

28,999. Do you say that no portion of that bay within Soldier's Point would have been sufficiently quiet to allow a deposit of matter?—Not of matter of this sort; not a particle.

29,000. Are you aware that it was objected to Holyhead as a site, that the bottom was very unequal?—I fully remember that.

29,001. If the bottom were so unequal, do not you think it likely that matter of this kind would have lodged in the inequalities, if the water of the bay had been charged in the manner of which you speak?—The inequalities of a rocky bottom, with a wave and current acting upon it; distinctly not. I should not expect a grain to be found under such circumstances.

29,002. That is always supposing that the whole of the bay was exposed to the action of the wave; but was there not some portion of the bay which was comparatively sheltered within Soldier's Point?—No.

29,003. You have spoken of piles at Portland and Holyhead resisting breakers upon rubble?—Yes.

29,004. Are those piles to be compared to the piles in the wave screen as shown in the model now before us? Are the circumstances parallel?—If you confine the question to the matter of the force to which they are exposed, I should say that the effects in the one case are very instructive as to what would be the effects in the other.

29,005. You adduce the circumstance of the piles at Portland and Holyhead not being broken as a matter in favour of the wave screen; and the inference which I understood you to wish to draw from the circumstance is, that because the piles stood at Portland and Holyhead they would stand in the wave screen. Was that the inference you wished to draw from your answer?—Yes; the facts at Holyhead and Portland, with respect to the standing of piles, are eminently suggestive as to what would be the result with a structure of this order.

29,006. What is the distance between the piles at Portland and at Holyhead?—A considerable distance; I should think 10 or 12 feet.

29,007. Should you be prepared to find it is 30 feet?—I should not be at all surprised.

29,008. Such is the fact. The piles are 30 feet apart, longitudinally and transversely, therefore the amount of resistance offered by them is hardly to be compared with that which would be offered by piles only 20 inches apart?—Not without you take into consideration the difference of circumstances, certainly not.

29,009. Is it not the fact that the piles at Portland and Holyhead now subject to the breaking sea are supported in the midst of an enormous mass of rubble?—That is so.

29,010. That they are supported up to above the level of the water?—I believe that is the case.

29,011. Therefore but a very small portion of the length is exposed to the action of the sea?—That is the case; but the fact cuts two ways. While you support them by the sub-mass, you add to the battering power of the sea.

29,012. Therefore the circumstances are not analogous?—No; and I merely say that they are eminently suggestive. It occurs very much to my mind that if piles stand, although so supported, in the midst of a breaker, then those which are not in the region of breakers, but in still water, and have very little force opposed to them, would, as a matter of the simplest inference, stand too.

29,013. In the one case the pile derives support from being supported by a mass of stone, and in the other it does not?—But the latter has not a tithe or a hundredth part of the force acting upon it which the former has.

29,014. As to the means you propose of resisting impact, which is somewhat uncertain, to say the best of it, it depends upon a shoe or palm resting upon a bottom sufficiently soft to allow that shoe or palm to sink by the action of gravity and of the tide?—In answer to that, I may say that I do not pledge myself as to the means even in a case of that sort, though I believe them to be all that is required. I have already mentioned that these are the mere means that I have devised as a support; but I do not advance them as perfect. I should rather say that a person who has been in the habit of carrying out works would be more calculated to give a structure of this sort support than I should be. I merely confine myself to broad principles, and do not dabble with things I have had nothing to do with.

29,015. Still, coming to the question of cost, that must depend on the means employed and the mode of structure which is adopted?—Truly.

29,016. If the mode of structure is altered, the cost would be altered too?—In the same proportion, but the difference would be trifling.

29,017. You have some objection to the works at Portland. Would you be good enough to say in what respect they are improperly arranged?—Do you mean considered as a structure?

29,018. To whatever your objection applied?—Considering the work at Portland as a structure, I object to the principle of it. It is tipped. This forms a submass, and so far supplies an agent for its own destruction and for constant future expense. I object to it on account of its defective principle as a structure. Then as to projection, I also object to it on account of the comparative close character of the harbour formed by it. You could have supplied all the covering to shipping without involving the risk of its filling up if there is any matter in suspension about Portland. If there is not, then that latter remark about projection does not apply. Then also I object to it on the score of expense. The lives of our men are suffering, and it is necessary to devise means for giving them security. Now it will not do to go and exhaust the public funds upon these things, which really are a sink-hole for money, when it is possible to devise means which will produce all the necessary results without any such drawbacks.

29,019. Are you aware of the cost per lineal foot of the works at Portland?—I am not.

29,020. Are you aware that it is the cheapest deep-water breakwater which has ever been constructed in this country, and probably in any other?—I have heard it so stated.

29,021. If that be so, is Portland open to the objection arising from want of economy in construction?—In the degree to which Portland involves a useless expense, to that degree, whatever it may be, it is faulty; the degree I do not specify. Whether it costs 1,000*l.* per foot or 100*l.*, I do not know.

29,022. Are you in a position to prove satisfactorily at this moment that any portion of the expenditure at Portland has been useless?—I do not know the work, except the broad principle of it, and the position in which it is placed.

29,023. Then do not you think you should have acquainted yourself a little more with the circumstances, before you bring forward Portland, or any other case, as an illustration of a general principle?—No. I am sufficiently acquainted with the circumstances to form a sound opinion. Beyond that I do not require information. I am quite content to take the character of the work as I know it to be, and the principles. The general statement is that it costs 130*l.* per foot run.

29,024. The cost of that work as a breakwater, irrespective of the superstructure, which has been adopted solely for harbour purposes, is 85*l.* per lineal foot, in a depth of water averaging something like eight or nine fathoms. I have told you that I should like to know if you can give some idea of the proportion of useless

expenditure which you think has been incurred at Portland ?—Even if it were only two thirds of that amount, or even a half, I should not be prepared to put a work of that principle into the sea, because the principle is faulty, and involves future expense, and you must take the future expense into the estimate.

29,025. What future expense do you apprehend the work at Portland involves ?—I am not aware ; but I believe it is a tipped breakwater, and as that is exposed to the direct and oblique strokes of the wave it must be always subject to wreckage.

29,026. What will that arise from ?—Either from the under tow of the wave, or the oblique stroke, driving material as on the beach.

29,027. What will be the effect ?—To undermine any structure you may have put upon it, or if there is no structure to be undermined, then, allowing the materials to be moved, you will have the constant expense of lifting these from the extremity of the work.

29,028. That will depend upon the materials being moved to any extent during gales of wind ?—Yes.

29,029. If you were told there is no material disturbance, and no superstructure of masonry, which really is the fact, what, I ask, will be the future expense ?—Then I say that if there is no sea so acting upon it, and no matter so to be deposited, then the structure is perfect in these two points, and then, as compared with the wave screen, the only question is one of expense.

29,030. But in connexion with the wave screen, you admit that after a certain time there may, and probably will be, a necessity for the renewal of some portion ?—Oh, nothing is everlasting ; iron will not last for ever.

29,031. Of what material should you propose to construct the wave screen ?—The conclusions I have come to are contained in this pamphlet. I can add nothing to what is in it.

29,032. As you allude to the pamphlet, upon the wave screen, I see that in it you propose wood, you propose cast iron, and you propose wrought iron ?—Yes ; cast iron below ; below the surface of the water. For that portion which cannot be got at I propose several materials as the result of information which I have received. These are pine scupper-nailed, pine cased in greenheart, or solid greenheart, or wrought iron. I do not mention any other.

29,033. As you propose pine scupper-nailed, I should wish to ask whether it is not the fact that the use of pine scupper-nailed has been almost entirely abandoned by engineers ?—That is a point I am not acquainted with. I have judged from the information brought before me by reliable persons, amongst others, Captain Ellis of Southwold, Captain Smythe of Yarmouth, and from information supplied by Mr. Walker.

29,034. Can you adduce any instance in which piles scupper-nailed have been used on any large scale within the last five or six years ?—No ; but as a very useful example I will mention the instance of Southwold. Sir Samuel Brown, who was a very talented and observant man, recommends the use of pine scupper-nailed.

29,035. But still, as the modern experience of engineers has been against the use of scupper nails, I ask if you think you would be safe in adopting them ?—I do not adopt them ; I merely suggested it.

29,036. If some other course is to be pursued, that would affect the question of expense also ?—Truly if the substitution could not be made for the same price I am not tied to materials.

29,037. You will produce some one who will speak more particularly as to the cost of the proposed work ?—Yes; I will produce the contractor for Margate pier, who, I am informed, is remarkably skilled in matters of this sort.

29,038. You spoke of the depth at which silt, sand, and shells had been moved, in the course of some of your observations. Am I to understand that there is any material movement, in a depth of twelve fathoms, which you quoted, or that what there is at that depth is only a minor action, which would not affect works exposed to the force of the sea ?—The exact nature of the action I cannot describe. I can only say that there is an action, and what the balance or effect of the action is. Just in the same way as sound is conveyed by certain impressions from an original impulse, so is the movement of the particles of the surface wave conveyed down to the bottom ; but of the exact way in which this effect is produced I know nothing.

29,039. Are you prepared with any examples which would give an idea of the depth at which the wave action would be found to exist, to any great extent ?—I have mentioned one or two examples, which may be trusted in, in this wave-screen pamphlet, and also in my evidence.

29,040. You have no others you could offer ?—I might. On this subject I have a body of facts ; but I am not prepared to say that there are any especially useful which occur to me at this time.

29,041. (*Mr. Lindsay.*) In the case of this wave-screen, do you propose to drive the piles into the ground ?—I do not mark out the mode of construction; that I would leave to persons practically acquainted with the subject. So far as I am fitted to form an opinion, I should think there would be no difficulty in doing so. I should have no hesitation in undertaking it.

29,042. You mean the wave screen to be a breakwater ?—Distinctly not ; I consider breakwaters very faulty ; we want effects and not works, and to produce those effects which are endeavoured to be produced by breakwaters.

29,043. You mean this to be in lieu of a breakwater ?—Yes ; to supersede them.

29,044. Therefore you must fasten the piles some way or the other to the bottom ?—I put them ten feet into the bed of the sea ; that is, the main structure or vertical position of the screen.

29,045. At what distance apart ?—At that distance apart which is calculated to produce the effect desired, the effect being to admit half the undulation into the harbour ; or if that half undulation was found prejudicial in practice, then to adopt other means to reduce it.

29,046. About what distance would that be, as a general rule ?—That is a question of hydraulics, and I have not gone into it ; but you could arrive at a fair inference before establishing the structure. You would only have to form a few sections before it would become apparent immediately whether you had adopted the proper intervals.

29,047. As a rule, would they be two or three feet apart ?—The model I have arranged has vacancies equal to the diameters of the cylinders ; equal spaces.

29,048. That is only a foot apart ?—A foot and a half, in this model.

29,049. I think you said, in reply to Captain Washington, that the wave does not strike ; that it is merely the crest which does ?—The crest of the wave in deep water, until you come into shoal water, when it is converted into a breaker on the beach, moving forward horizontally. It strikes with the same force as a solid. There is no difference between a fluid and a solid in that respect. The force with which a solid strikes is the result of the velocity and the quantity of matter, and it is the same with a fluid.

29,050. Therefore as the wave, in your opinion, would not strike in the position in which this screen would, as a general rule, be located, you think the force of the wave would not destroy it ?—Distinctly not. The structure is of that mechanical form and power which would render it independent of anything in the way of wave-force. A wave which easily destroys a vessel's bulwarks and boats, would be thoroughly destroyed beating against a structure of this sort, with one long line of continuity uniting all its parts.

29,051. You must often have seen, when the deep

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water comes up to the base of a mountainous cliff, the force or roll of the sea, or the stroke of the wave you would call it, has in the course of time hollowed out that rock. Now if the roll of the wave, or, I would call it, the stroke of the wave, makes such an impression on this hard rock as to hollow it out in the course of time,—makes caverns in them,—do you not think a structure such as this would very soon be destroyed ?—No, because the caverns you refer to are not in the region of simple undulations, but are cliffs with a certain amount of sub-mass, over which a breaker to a certain extent is formed. The two cases are not at all parallel. In this instance the structure is perfectly perpendicular, and possesses nothing in its character to create a percussive effect. The consequence is, it would not be subject to percussion; but in the case of the cliff it is entirely different.

29,052. I have seen cliffs at the base of which there was a depth of six or seven fathoms water, and I have seen the rocks there, against which the sea rolled or struck, completely hollowed out. If that is the effect in that depth, with the wave acting upon these hard rocks, do you really now, speaking to you as a sailor,—do you think that that structure of yours would resist the enormous force that would constantly be playing upon it ?—I do ; I have not the slightest doubt about it.

29,053. (*Sir F. Smith.*) In a strong gale of wind, blowing against the inside of your work, might not there be a tendency to lift out your struts ?—No ; because the little wave or lipper which could be formed over a refuge harbour would have no effect whatever, because in that case it is altogether in still water up to the screen itself.

29,054. In point of fact you think that in no case will there be any tendency to loosen the piles from their sockets ?—Not the slightest.

29,055. (*Mr. Coode.*) I see in your work you state that you apprehend that it will not be possible to form this wave screen entirely from a floating platform, but you will have to resort to staging ?—It would be possible, but not desirable, on the score of expense and detention.

29,056. You propose, in the event of having resort to staging, to adopt "common staging, as at Portland ?" —I merely sketch it out to show the possibility. I do not say whether it should be adopted. That should be left to a person in the habit of making these works.

29,057. Have you taken into account the cost of any kind of staging (in such a depth of water) that would enable you to construct the work at all times ? —I am not acquainted with such matters, but parties who will follow will give all the information.

29,058. Do you not apprehend that this wave screen will offer some resistance to the passage of the tidal water in and out, during the greatest strength of the ebb ?—A little it will, when not in the core of the tide. To that extent it would ; but when in the core of the tide it would be like a long vessel in a tide-way.

29,059. The effect will be to cause the water to heap up slightly within as compared to the water without ?—Not at all.

29,060. What would be the effect upon the ebb tide ?—You observe that one of the principles of projection is its being formed in the core of the tide, and no such thing, as you suggested, could happen there. It is one of the principles that it should be in the core of the tide.

29,061. Then if you had a wheeling tide you would construct the wave screen in the form of a wheel ?—Give me a case, and I shall be happy to give you a reply.

29,062. I will give you the case of Hartlepool, mentioned in the pamphlet ? — Then I have something definite to go upon.

29,063. Will you look at the Admiralty Chart of Hartlepool Bay, No. 1628, and tell me if the line of the wave screen you have laid down in the engraving in your pamphlet, corresponds with the direction of the tidal streams as shown upon that chart ?—Possibly it does not. I should think most likely it does not.

29,064. That being so, can it be said that the screen you propose to construct will be in the line of the tide in the case of Hartlepool ?—My evidence on Saturday plainly went to this, that in the wood engraving in this illustrated pamphlet, to which the attention of the Commissioners has been drawn, I propose it as a means of showing the application of the principle ; but I distinctly stated that that is not to be taken as the exact line of the structure. Before I should venture to project anything in front of Hartlepool, I should get the whole of the tide streams, and find out what was the core or mid-direction of the strength, and so project it. Before I should venture to draw upon paper a single line representing the work to be carried out, I should supply myself with all the information that was necessary to be known. For instance, this wave screen, in the pamphlet, is projected, as nearly as my knowledge would admit of its being done, in the core of the tide streams. It is also projected over what is a clean bottom of clay ; but beyond that it indicates nothing. I do not say that is the work to be carried out, but it indicates the principle and the approximate position of the work to be carried out in Hartlepool Bay.

29,065. Do you think that in bays generally, in this country at least, you will find a suitable line of bottom, and a favourable direction of tide, so that you could insure all the conditions which you require for the successful carrying out of your scheme ?—I think that when you could not find a site upon the east coast adapted for a work of that sort, would, so far as I am acquainted with the matter, be the exception, and not the rule.

29,066. Then you think that on the east coast you will find the direction of the flood and ebb so to harmonize and correspond with each other that you would have no difficulty in laying down your work on the line of the tide, and at the same time taking that line which should afford the best protection to the bay within ?—It depends entirely upon the locality. I have to apply the principle to a locality, which is Hartlepool ; and I have shown in the woodcut how the principle has to be applied to that place. But if you wish it to be projected in any other locality, mention it, and I will apply it.

29,067. I would rather confine myself to Hartlepool, and ask how you would apply it there ?—As I have indicated in my pamphlet, assuming that that is the direction of the core of the streams, and assuming also it is over a clear bottom. Until I found that these two things were clearly established, I should not commit myself to a single portion of the work.

29,068. Have you not assumed that which the Admiralty chart before us shows not to exist ?—Distinctly not. The marks upon the Admiralty chart shows facts. It may or may not be the fact about that special direction which I have sketched out ; but I think I should not be far wrong, and that that would really be the core of the tide streams.

29,069. Is that so in the case of the tide stream indicated by the Admiralty chart before us ?—Sufficient for the application of the principle ; but those on the chart are absolute facts.

29,070. Undoubtedly the facts, as I see them exhibited on the chart, do not correspond with the facts or assumptions on the woodcut ?—But on the Admiralty chart there are only flood arrows, and in projecting a work you must take into consideration the ebb also. The core of the tide is the result of the mean between the two. What you see on the chart gives no clue as to the position in which a work of that description ought to be placed.

29,071. As you have taken the mean, at certain periods of the tide the set must necessarily be across or oblique to the line of work ?—I have stated that it is in the core of the tide streams ; but I told you I would not presume to put a stroke upon paper, so far as that stroke indicated future works, without being

fully in possession of every item of information which ought to be known.

29,072. Seeing that in very few places the lines of the ebb and flood would be found strictly to correspond, would you take the line of the ebb or that of the flood ?—I should take a line between the two. I most distinctly and respectfully decline to give any reply which would be connected with hypothetical plans or places. I must have something definite to go upon. I must know the whole of the facts and circumstances, otherwise I have nothing upon which to give a reply.

29,073. Do you believe you could find any one place upon the east coast of England where the ebb and flood tide were so truly in any given line, that, in regard to any work which you might lay down, you could ensure that the line of ebb or flood should not, at some period, set across that work ?—I can find plenty of sites where the wave screen can be applied to perfect refuge harbours, keeping in view all the principles to which it is necessary to adhere. Beyond that I cannot reply, but of that I am quite clear, because I am acquainted with the whole east coast, and I perceive many sites where it could be brought into play. To show that it involves no practical difficulty, such as you suggested, I should have no objection to put the wave screen opposite a tidal harbour at a certain distance, although to a certain extent the ebb of the river would be transverse to the work ; but so far as the prejudicial effects were concerned, they would be nil.

29,074. Then I understand your evidence to be to the effect that you will have no difficulty in so placing the wave screen opposite any bay on the east coast of England that you shall have no material velocity of tide setting out through the piles or cylinders ?—I do not reply to that, beyond the extent to which I have already answered it.

Mr. Samuel Bastow examined.

29,075. (*Chairman.*) Will you state your occupation to the Commissioners ?—I am an engineer and contractor.

29,076. I understand the object of your appearing here is to give us some further information respecting this wave screen, drawn from a work which you have actually constructed ?—I may state that I am here at the request of Mr. Calver, to give the Commissioners any information which I can possibly do upon the construction of the wave screen, and more particularly with regard to a plan and estimates which I have furnished to Mr. Calver, and which differs very much in its details from his structure. From Margate Pier, to which reference has been made, I believe that in some respects inferences may possibly be drawn as to facts, and I would speak more especially with regard to the head of that pier. During the progress of that work I had frequent opportunity of observing its effects in stilling the water, which were very manifest. A vessel, such, for instance, as a steamboat which plies there from London, and to receive which the pier was constructed, could lie very comfortably on the lee side, when she could not approach from the other side. That was when the wind was in certain directions. Having noted these observations, and having seen Mr. Calver's pamphlet about the wave screen, I believe that the principle advocated by Mr. Calver might be found to be exceedingly useful in providing shelter for ships in stress of weather, as applicable to harbours of refuge ; and having been applied to by Mr. Calver to furnish him with an estimate for his particular description of screen, it gave me an interest to look more carefully into the nature of the structure itself, and the result of these observations was to produce this plan, which differs very much from Mr. Calver's proposed structure. I am now speaking, not of the principle, but of the material adopted, and of the method of construction.

29,077. (*Sir F. Smith.*) You are the contractor for the improvements now making at Margate ?—The improvements have been completed some time.

29,078. They have been completed some time, and the work is no longer in progress ?—They are quite complete.

29,079. What were those works ?—I might perhaps show the plan.

(*Sir F. Smith.*) Yes ; but you had better give a description also, that it might appear upon the minutes.

(*The witness produced a plan of Margate Pier, and then proceeded with the following explanation.*) The structure at the head is supported upon wrought-iron piles screwed into the chalk. These vertical piles are 10 feet apart in the direction of the length, and nearly the same transversely. There are 57 of them, which support the structure above. The low-water line is about three feet below the top of the screw piles. Upon the top of them is a cast-iron cap, keyed on to a head bored out conically. On the top of these caps are four logs of timber bolted together, making what are called sleepers, and on the top of that is raised the framework of timber.

29,080. This structure is not exposed to much action of the sea ?—Very considerably so.

29,081. In what depth of water is the extreme end ?—Nine or 10 feet at low water, with a rise of tide of from 10 to 12 feet.

29,082. About 3½ fathoms altogether ?—Perhaps about that.

29,083. It is not subject to great exposure. Did you find any great difficulty in getting the piles into the ground ?—Not any.

29,084. All screwed in ?—All the piles at the head are screwed in. The others are cast-iron, which are driven in. I may also mention, while on that subject, that although it is a chalk formation into which we screwed the piles, we met with beds of flint, which made it very considerably more difficult ; but still we did get the piles down through the flint, with a little extra labour.

29,085. You did not make this pier with reference to affording shelter behind ?—No.

29,086. Simply as a means for landing passengers ?—Exactly so.

29,087. What was the cost per yard run ?—It is about 400 yards in length, and the cost was 15,000*l.*

29,088. You have how many piles in the head of the pier ?—At the head, 57.

29,089. What was the mode of construction for the intermediate piers ; the same ?—No ; very different. The piles are of cast iron, and in three lengths. We cannot drive cast-iron piles into the solid chalk without previously boring a hole, in the same way as you would bore with brace and bit into a piece of wood, taking out a core, making a hole two inches in diameter less than the outside of the pile, and then driving it into the chalk.

29,090. The object of your appearance here is twofold, I imagine ; one to give your opinion of the value of this sort of screen, as a protection against the action of the wave, and the other to show us the facility of construction, coupled with the probable cost ?—Chiefly the facility of construction.

29,091. Your plan differs from Mr. Calver's, and I presume you think it the best of the two ?—Certainly.

29,092. Will you explain how it differs ?—It differs first with regard to the placing of these tubes. He calls them piles ; I call them tubes. I propose to screw these wrought-iron tubes down into the clay or mud, or soil of any description, by means, in the first instance, when I commence, of a barge, and small steam engine and machinery, so adapted to that object, that they could be put down very readily. Mr. Calver proposes to construct the bottom portion of his screen of wood, and I think it would far better be of iron.

29,093. Would wood be more perishable ?—Yes ; and for other reasons. My tubes are two feet six inches in diameter, and the spaces, say the same. That may be determined hereafter. I am not now prepared

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to say that that should be the exact space. The mode of proceeding would be as is imperfectly represented upon this drawing, which, together with the plan, I will put in. I should commence about midway with the proposed shelter or screen, and secure some 40 or 50 tubes, and then on the top of the first course should raise my platform, by putting transversely half baulks of timber, and strapping them together at the top with a leg, every four or five or six tubes, and stiffening them transversely on the top, and so keep removing that as I proceeded, continuing to stay them as I went on by other gangs of men finishing that which I had passed over.

29,094. Do you propose to stay, as recommended by Mr. Calver, or by some other process ?—My plan for that somewhat differs from Mr. Calver's. There is only one set, instead of two, attached at the top by a joint and pin, which will be continuous along the inner part of the tubes, and would be made of wrought iron.

29,095. Do you give any definite depth under the surface line ?—Decidedly.

29,096. Does it depend upon the tidal height, or the soil in which it is fixed ?—Do you mean the length to be inserted in the ground ?

29,097. Yes ?—I propose 10 feet. I believe that will be quite sufficient.

29,098. It has no reference to the length above ground ?—It has. But I think that the back stay, with an insertion of 10 feet, is sufficient to make it safe and strong to resist any force which might be brought against it.

29,099. Mr. Calver told us that the stay would take its bed by means of its gravity. That, I presume, is your plan also ?—Yes.

29,100. How will that be in chalk ?—In chalk you would require a different method. It is not proposed for chalk.

29,101. Then it is not of general application ?—If you wish to have a screen erected on a chalky bottom, I would offer something different in the way of a stay.

29,102. This is not of general application ?—It is of general application in clay, sand, or muddy bottom. With regard to the process of insertion, you will observe that the cast-iron screw is not placed at the bottom of the tube, but 18 inches from the bottom, so that that portion would sink into the clay, and form its position at once, before you began to screw, and hold there until you got so far down. The core, of course, would not be disturbed in the action of screwing it down, but it would be inclosed within the boiler plate, which is proposed to be half an inch thick.

29,103. I perceive that your estimate is for a larger amount than Mr. Calver's ?—Yes ; it is in a different material ; more costly.

29,104. For what reason do you prefer a different system ? If economy is to be the object, why do you adopt a system which is to be more costly ?—It may be a question with me whether his is an economical system.

29,105. You doubt the estimate ?—I do not doubt his estimate. I doubt the material of which he proposes to construct the screen.

29,106. You think it is not a judicious material ?—I think not.

29,107. Do you imagine that the proximity of Mr. Calver's piles has nothing to do with the great question of the screen ? Your intervals are much larger ?—I think that the principle is right ; but it is not possible for me, without some practice, to determine the exact distance at which the cylinders should be placed from each other. I am satisfied that the distance proposed by me would produce comparatively still water on the inner side ; but of course the degree of stillness would vary according to the size of the openings.

29,108. Your chief reason for departing from Mr. Calver's plan is, that you get a different material to work with ?—Yes ; and I think at the same time a stronger structure, without increased or corresponding expense by using larger tubes.

29,109. You heard Mr. Calver's evidence, in which he stated that by his mode of construction he should obtain a strength far beyond the requirements of the case ?—Yes.

29,110. You do not doubt that, I suppose ?—Not at all.

29,111. Then why should you, at a greater cost, provide a still stronger structure ?—It is simply stronger on account of my using a different material, and I should say would be more economical in the long run, because it would be more durable.

29,112. You have, I suppose, had considerable experience of iron tubes exposed to the action of sea water ?—I have.

29,113. Under such circumstances does any considerable oxydation go on ?—None, that I can discover ; not when they are in the first instance coated with two coats of purified gas tar. I cannot find any oxidation in that part which has been coated. I cannot tell how long it may take to remove that coating by abrasion or otherwise.

29,114. Did you say that your tubes were to be of cast iron ?—Wrought iron ; made of malleable boiler plates, rivetted together in the same manner as a steamer's funnel.

29,115. Your experience goes to show that in the case of wrought iron exposed to the action of sea water there is no oxydation ?—I should not say that exactly, but I think it is inappreciable.

29,116. Of what are your stays to be ?—Wrought iron.

29,117. They will, I presume, have to be made to particular lengths, according to the depths of the soundings ?—If the bottom varies very much, of course it would be necessary to regulate the length of the stays ; but if the difference of level was not great, that would be unnecessary, because the joint which connects the stay with the tube would accommodate itself to a little difference in the bottom.

29,118. Suppose that, as a general rule, you had a soft soil to deal with, but accidentally came upon a part which was of a rocky character ; that would altogether arrest your progress with this work, would it not ?—No, decidedly not. I am of opinion that I could screw the tubes through the solid rock, or rather into it.

29,119. In point of fact you think, that although it might be more difficult, it would be no impossibility ?—No impossibility whatever. The screws on the end of the piles which I screwed into the solid chalk at Margate are 30 inches in diameter, and I have frequently screwed three of these down in one tide with 35 men and a common capstan head.

29,120. Was not something of the same kind done at Rochester Pier ?—I am not aware.

29,121. (*Mr. Lindsay.*) What is the thickness of the plates in the plan before you ?—Half an inch.

29,122. Are you aware that sometimes corrosion takes place in a ship's bottom to such an extent that plates an inch thick are eaten through ?—I am not aware that up to the present time any appreciable amount of corrosion has taken place in ship's bottoms.

29,123. Shall you be surprised when I tell you that I have seen an inch plate in a ship's bottom eaten completely away in eight years ?—It seems strange.

29,124. Do you mean to say that corrosion would not take place under the water line in these wrought-iron tubes which you intend to screw down ?—I believe not, if they were coated as I have previously mentioned.

29,125. Would not the friction of the water in time wear off the coating ?—In time it might, but I cannot tell how long it would take to do so.

29,126. Would it not wear off in a very short time? —I believe not.

29,127. How long do you give it ?—From my experience, I should give it 60 years.

29,128. When it was worn off corrosion would commence ?—I do not know that.

29,129. Is it not the case that when water plays upon uncoated iron corrosion does takes place ?—I believe that corrosion would go on much quicker if there was no water playing upon it.

29,130. Do you think, now, that after you had screwed down your tubes in a depth of seven fathoms they would be able effectually to resist the roll and stroke of the wave ?—I do believe that, in the position in which it is proposed to place this, in six fathoms at low water, they would be able to resist any sea which could come against them.

29,131. In your experience you must at times have seen the force of the sea so great that it has carried away immense piers and hollowed the very rocks ?—Yes.

29,132. And that being so, do you, as an engineer, think that you could so fasten these tubes in a depth of six fathoms at low water that no sea would injure them or tend to throw them out of their places ?—I do, because the two cases are very different.

29,133. What is the difference ?—In the case of this screen, I do not present any solid surface to the sea.

29,134. You present a surface that offers resistance to the wave ?—To a certain extent.

29,135. You fasten the tubes into the ground ?—Yes, and also to each other.

29,136. Consequently they offer resistance to the wave ?—To a certain extent they do.

29,137. The extent depends upon the amount of surface which is exposed to the wave ?—Just so, and also the shape of that surface ; its configuration.

29,138. (*Capt. Vetch.*) You saw the old pier at Margate ?—I did.

29,139. Did you observe that there was a considerable force of sea occasionally striking one side or the other, generally the west side, I think ; that there was a good smash of sea running through ?—On both sides, I think.

29,140. And now that you have put up your structure you have found that the wave is to a considerable extent prevented passing through ?—I have spoken of that being its effect.

29,141. You are prepared to expect that if a screen like this was put up, with intervals equal to the width of the tubes, you would to a great extent keep out the sea ?—I think it would be comparatively smooth water on the lee side.

29,142. When the sea might be dangerous on the weather side it would be safe on the sheltered one ? Yes, decidedly.

29,143. That is what you expect would arise from such a proposition as this ?—It is.

29,144. Do you think that equal intervals would be a good proportion of open space to solid material ?—My present experience would lead me to say that that would be a good proportion.

29,145. You could not propose any better proportion ?—I would not suggest anything different, just now.

29,146. Until you had tried the effect ?—Just so.

29,147. With respect to the coating of the iron tubes, you have no doubt at all about their endurance? —I have not.

29,148. You are aware that there are lighthouses on the east coast, two between the Thames and Harwich, which are coated with that material, or something like it ?—I do not know of any.

29,149. You are aware that we have been in the habit of building swivel bridges upon iron cylinders in navigable rivers where there is sea water ?—Quite so.

29,150. And that these are very extensive structures. Are you aware that any of them have been corroded or decayed ?—It is possible that they may have ; but I am not aware that such has been the case to such an extent as to prevent iron being still used for the same description of structure.

29,151. You are aware that they are still building iron swivel bridges in tidal water ?—Quite so.

29,152. And that engineers are not afraid of trusting them ?—I believe not.

29,153. Coated with that substance to which you have alluded ?—I should say that the bridges to which you allude would be painted with a paint of a peculiar kind called oxide of iron, or something of that sort.

29,154. I am speaking of those, the supports of which are to be sunk deeply into the beds of the rivers ?—I beg your pardon. In that case I should suppose they would use what I have mentioned, or something like it.

29,155. You have no doubt about the durability of iron under those circumstances ?—None at all.

29,156. (*Mr. Coode.*) You have just been asked some questions respecting bridges. I would ask you whether it is not the case that the tendency to oxydation is much greater from the action of sea water, than it is in the case of a river bridge ?—I do not think it would be.

29,157. Do you not think the sea water has a greater tendency to create oxydation than the river water has ?—I have not observed it.

29,158. The tubes you have shown in this drawing are adapted to six-fathom water, I think ?—Yes.

29,159. Do you purpose to make them of half-inch plate ?—Of half-inch boiler plate.

29,160. Have you read Mr. Calver's pamphlet upon the wave screen ?—I have.

29,161. Do you remember a passage in which he quotes Mr. Mallett, whom he, justly, says is a great authority upon these matters, in which Mr. Mallett reports that from three tenths to four tenths of an inch in depth of cast iron, and about six tenths in depth of wrought iron, will be destroyed in a century in clear sea water ?—Yes, I have read that.

29,162. Six tenths of an inch is one tenth greater than the thickness which you propose to adopt ?—Yes ; but Mr. Mallett may have been wrong in what he has advanced.

29,163. Still is not Mr. Mallett held to be an authority ?—I do not know. It depends upon what his practical knowledge and experience was at the time he wrote that article.

29,164. You know that he was considered to be a sufficient authority to be intrusted by the British Association for the Advancement of Science to report upon this matter?—Very possible. I may here observe, that when Mr. Mallett wrote that, it was a matter of theory, and not the result of observation.

29,165. I see it stated here, in Mr. Calver's book, that it was mentioned in his Second Report of 1840, and that the deduction from his various experiments indicated the result I have just stated?—It would be very difficult, as you are aware, very difficult, to reduce it to anything like that quantity from the very small and inappreciable quantity he could observe during the time he speaks of.

29,166. Those were the deductions at which he arrived from his experiments ?—Very possibly so ; but a very small variation would make a considerable alteration in the deductions.

29,167. I presume you would consider that Mr. Mallett, being intrusted by a body like the British Association to report upon such a subject, would be careful not to report so strongly as that, unless he had believed that he had good reasons for so doing ?—I should not question Mr. Mallett upon this subject, generally ; I have no hesitation in admitting that he would do it to the best of his ability, and be very careful about it ; but it is very possible that he may have got a very bad case, or that he received the information from some one who had observed this under peculiar circumstances. If it had been the result of the experience of a larger number of individuals than himself, I would have placed more reliance upon it.

29,168. Still that was the result of the experiments

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which he made expressly for the purpose, was it not?—That was so.

29,169. You said that the stays would require no alteration, unless the bottom varied very much indeed. Will you tell us the amount of alteration in the bottom which your tubes will admit of?—From two to three feet.

29,170. Does not that imply that there would be a play of something like two to three feet in the joints?—Oh dear, no.

29,171. How do you propose to get over that difficulty?—The top joint will always allow it to be lifted up and dropped down, and if there is a variation in the bottom it forms a little different angle with the tubes to which it is attached. Supposing there was a hole in one place, which was not the case with the preceding stay, and the stay was dropped there it would approach the tube nearer than the preceding one, and form a little different angle to the tube.

29,172. Then the feet which rest upon the bottom are at varying distances from the tubes, according to the depth?—Exactly.

29,173. What steps do you take to ensure the feet having a firm hold on the bottom, and forming perfect resisting points?—We should put a diver down to examine and to fix it.

29,174. A diver then is to fix it?—Yes.

29,175. Then is he to fix the shoe alone, or the shoe and stay attached?—The shoe will be connected to the stay by a pin and joint. The stay is to fix itself with a little working of the party at the top.

29,176. The diver would have to deal with the stay of something like 55 or 60 feet in length?—He would not deal with it; he would have simply to guide the shoe to the foot. The party on the barge would lower it into its place, and he would place it, and a little working at the top would fix it. If the shoe is three feet square, with four prongs or teeth, it takes hold of the clay.

29,177. You feel certain that a thickness of half an inch of wrought iron would be sufficient and durable enough to last for something like 50 or 100 years?—Considerably more than that.

29,178. (*Chairman.*) The estimates which you have sent in through Mr. Calver were of course complete in themselves?—Yes.

29,179. You will put in that plan, and the estimate for it?—Yes.

29,180. (*Sir F. Smith.*) These estimates, do they provide for the diver?—Yes. There is a certain amount allowed for pile fixing and everything complete, separate from all other matters.

29,181. (*Mr. Coode.*) What amount have you put down in this estimate for the plant?—5,000*l.*

29,182. To what extent will that provide plant for the works?—A barge, a little steam-engine, and the machinery attached to it, which the plan shows, and the small amount of staging which may be required.

29,183. Within what time do you anticipate that you could construct a mile of that work in the manner shown in the plan?—In two years.

29,184. With one barge and a steam engine?—Oh, I beg pardon; that is the commencement only. I should commence, as I stated before, in the middle, and secure 40 or 50 yards, and then put the little steam engine on a travelling platform, and commence at each end simultaneously.

29,185. How will that platform be arranged?—It moves on friction rollers, as projected.

29,186. Would you place it as a permanent platform?—No; it would be at the top of the lower tubes.

29,187. The height of the travelling platform would be about five feet above the level of low water spring tides; rather below the half-tide level?—Yes.

29,188. How would you prevent it being washed away in gales of wind?—I see no difficulty whatever about that.

29,189. At high water, according to your drawings, your platform would be immersed something like 10 feet?—Yes.

The witness put in the plans and estimate.

Mr. Thomas John Taylor examined.

Mr. T. J. Taylor.

29,190. (*Chairman.*) Will you state what has induced you to take an interest in the works at the mouth of the Tyne?—I have an interest in them on account of being resident upon the banks of the Tyne, and also because I have an interest in collieries and shipping. Although I am not a river engineer, but a mining engineer, it has been my duty to pay great attention to the river works which have been constructed on the Tyne for the purpose of shipping coals. For many years past I have given a good deal of attention to the subject, and in 1852 I published a work on the Tyne Improvements.

29,191. We have a printed statement which has been supplied to us. Will you proceed, after that has been read, to add anything that you may have to offer?—You probably allude to the report which I sent in to the Tyne Commissioners?

29,192. Yes; Mr. Clayton furnished us on Saturday with the report.—Of that report the proper appendix is the summary of wrecks,—the analysis of wrecks within the bay extending from the Fern Islands to Robin Hood's Bay, which I had the honour of laying before the Commissioners, through Mr. Mather at Tynemouth, and which I believe is now your possession. I have a copy here of the appendix to my report, my expectation being that the Commissioners would examine me as to the facts and circumstances recited in that report.

Earsdon, November 26th, 1858.

The Chairman of the Tyne Commissioners.

Dear Sir,

I HAVE perused the report, and examined and considered the plan for extension of Tyne piers, prepared by Mr. Walker, the cost of the proposed extension being estimated by Mr. Walker at 400,000*l.*, and of the entire project at 800,000*l.*

The contemplated extension of the piers into 35 feet at low water possesses the advantage of rendering available the workalready constructed under the original plan; otherwise the suggestion naturally occurs, that a line of direction from the shore, without a bend inwards to the proposed pier-heads, would have been preferable, as constituting a more effective stilling basin.

Regarding the depth of water to be obtained at the entrance by the proposed pier extension, it would be rash to give a definite opinion, especially as the result will be greatly influenced by the future measures adopted for the improvement generally of the extensive tidal basin of the Tyne, so as to bring the operation of the flood and ebb currents, and also the land freshes, to their maximum of beneficial effect. At present, as the Commissioners are aware, there is eight feet rise at the bar (spring tides) before the flood tide begins to lift at Newcastle; and in the extreme western section of the tidal basin it is high water at the bar before the tide is felt at all, the current continuing in fact to flow upwards in this section when the tide is ebbing at the bar. This impounding of the ebb tide, and corresponding retardation of the flood, obviously preclude the greatest attainable amount of benefit being derived from the scour of the tidal water; and it is also manifest that the extension of the piers so much the more requires the adjustment of the river bed generally, inasmuch as a greater depth of water than before is required to be maintained at the entrance.

Keeping these remarks in view, we are not without examples in the Tyne itself which at least furnish analogous data for estimating the depth of water that will be obtained between the piers. Thus we find, in a channel of nearly similar width, opposite the new quay, North Shields, a depth of 18 and 19 feet at low-water spring tides.

As regards the general question of a harbour of refuge on this part of the coast, a great bay is formed by a line drawn from Robin Hood's Bay to the east side of the Fern Islands, the sea length of which is 80 miles, and the extreme depth to the shore at low-water mark 13 miles.

The trade of this bay is very great, representing, in fact, a larger amount of shipping traffic than that of any equal length of coast in Great Britain. The following statistics

are from the Board of Trade and Admiralty Returns, being the average of years from 1852 to 1586 inclusive :—

Ports.	Annual Traffic Ships.	Annual Wrecks.	Proportion of Wrecks to Traffic, One in
Blyth - -	2,370	4⅖	538
Tyne - -	45,000	24	1,875
Sunderland -	18,794	19⅗	959
Seaham - -	4,019	3⅖	1,181
Hartlepool -	19,066	20⅗	925
Tees - -	6,355	2⅖	2,648
	95,604	74⅖	1,285, Average of the whole.

Whitby is excluded, as beyond the local limits.

Outside of the line drawn, as before mentioned, is the track or fair-way of passing vessels which do not in fact enter the bay. The "Wreck Registers" for 1852, 1853, and 1854 (not continued in detail after 1854) record only one vessel, not *belonging or trading to the Tyne*, as being wrecked at our port during those three years. This single vessel was timber laden, bound from Stettin to Dundee.

The obvious conclusion to be drawn from this circumstance is, that protection is required, not for the general passing traffic, but for the special purposes of our local maritime trade, referring to the traffic of the bay as carried on at the several ports enumerated.

To the fact, that very nearly the whole of the vessels wrecked either *belong or trade to the ports within the bay*, it may be added, that the great majority are wrecked at or near the entrance of the ports. Thus, of 273 vessels stranded or wrecked in the years mentioned, 229 casualties took place at or adjacent to those ports.

It would be invidious to make comparisons between one suggested locality and another, as regards the most suitable situation for a harbour of refuge. So large a shipping traffic requires multiplied points of safety. And it may be considered the most proper course for the parties interested in the respective ports to assert their claims upon Government for aid in improving those ports, as a more effective means of protection, under the circumstances described, than any single harbour could afford. The following remarks on the subject are, however, submitted to the Tyne Commissioners :—

1st. Though the heaviest gales and seas on this coast are from the north-east to east-north-east, yet the largest proportion of wrecks takes place in gales from east by south and east-south-east.* With a wind a point or two to the southward of east, vessels from the south, where the great traffic lies, are enabled to reach the bay. Now, with the wind from east by south, or east-south-east, vessels rounding Flamborough Head can make the Tyne, except in extreme circumstances, so that a harbour of refuge southward of the Tyne is in such case unnecessary for vessels bound to the Tyne.

2d. If a fleet left the Tyne, which has nearly half the traffic of the entire bay, and were suddenly met by a gale of wind from the south-east, which frequently happens, none of those vessels would be able to reach Hartlepool, but must either return to the Tyne or make their way to Leith Roads.

3d. With a wind from east-north-east, vessels could leave the Tyne and proceed southward two points free, which cannot be so surely said of vessels in the southern portions of the bay. This point is of importance. The trade requires not only access to but also convenient egress from port, especially where an article of such constant consumption as coal is needed for the London and coasting markets, the saving of delay being a prominent consideration as regards both cheapness of transit and regular supply, and consequent cost to the consumer. To the case of less bulky and more valuable cargoes than coal this argument does not apply with the same force.

4th. The Tyne is very nearly in the centre of the bay. On the contrary, there are, south of Hartlepool, only 24 miles of sea-line and 166 square miles of area; and north of it there are 56 miles of sea-line and 486 square miles of area. So that three-fourths of the entire bay are situated north of Hartlepool.

5th. The Tyne has the advantage of deep water very close to its entrance; while, it may be remarked, that one of the drawbacks of ports in the bottom of the bay, which have not the backwater of river to scour out a channel, is, that they are approached over shoal ground. Such is the natural character of the most receding parts of a coast: it being obvious that the silt, which travels along it in more prominent situations, is sheltered and deposited within the innermost portions.

6th. It is difficult to understand how a harbour, which consists of an extension seaward of the actual line of coast, without backwater to maintain an open channel, can be otherwise than a constant source of expense in freeing it from depositions.

7th. Redcar has been proposed for a harbour of refuge, and is free from the objection of a shoal-water approach, but, in other respects, it is in the same category with Hartlepool; viz., as regards its comparative inutility to the Tyne, and the hindrance of vessels from getting to sea so as to make their passage with an east-north-east wind. Neither is Redcar a place of trade, nor, therefore, possessed of those facilities for repair which may be required by vessels in distress; and as a special harbour of refuge, unless constructed and kept up by Government or by a passing toll, it must be made and maintained at a cost which would entail much greater expense upon vessels frequenting it than would a port where a large trade and available revenues are already in existence. The coal trade, it may be added, is extremely sensitive of expense, and will not bear extra charges in the same degree as more costly products, especially since railway competition has been sanctioned and established by the legislature, a circumstance which of itself constitutes a strong claim upon Government.

Influenced by the foregoing reasons and circumstances, I have come to the conclusion that the local improvement of the ports within the bay is preferable to the construction of a general harbour of refuge. Assuming this position to be a tenable one, the claim for the aid of Government in improving the ports does not appear less strong than for a general harbour, inasmuch as the same object is attempted to be attained in a more generally useful and comprehensive manner; and it may be added, that as the question is not one simply of trade, but which concerns the saving of life, it is to be hoped that such claim will be met by Government in a liberal and adequate manner.

I am, dear sir,
Your very faithful servant,
T. JOHN TAYLOR.

* WINDS AND WRECKS, 1852, 1853, 1854.

	Stranded or Wrecked.				Foundered at Sea.				Stranded after Collision.				Foundered after Collision.			
	N. to E.	S. to E.	N. to W.	S. to W.	N. to E.	S. to E.	N. to W.	S. to W.	N. to E.	S. to E.	N. to W.	S. to W.	N. to E.	S. to E.	N. to W.	S. to W.
Vessels in ballast.	57	72	4	7	1	0	0	2	1	0	0	0	0	0	0	2
Ditto with cargoes.	45	63	17	8	5	2	6	9	0	1	1	0	0	3	0	7
	102	135	21	15	6	2	6	11	1	1	1	0	0	3	0	9

	Stranded.	Foundered.	Collision.	Total.
Vessels in ballast -	140	3	3	146
Ditto, with cargoes -	133	22	12	167
	273	25	15	313

It appears from this statement that the greatest proportion, not only of light vessels, but also of laden vessels, have been wrecked in south-east winds during the three years.

In point of fact, few vessels bound to or from the Tyne are wrecked in the southern portion of the bay. The wrecks of vessels trading to the Tyne out and in during the three years, are by the returns 105, of which there were four light vessels and eight laden vessels wrecked at at or near Hartlepool, Seaton, and Redcar; the proportion thus wrecked being, therefore, about one-ninth of the whole.

29,193. (*Sir F. Smith.*) You have, perhaps, heard or seen the evidence which was given by Mr. Walker in reference to the Tyne improvements ?—I have.

29,194. Do you concur entirely in his views ?—I may say I do concur entirely in the views of Mr. Walker. I concur with Mr. Walker especially as to the depth of water which will be obtained at the entrance of the proposed piers. I mean the proposed extension of the piers.

29,195. Do you believe and put faith in the statement which has been made to us, that there will always be a bar at the mouth of the Tyne, however far you may project your piers ?—I think there is some confusion of terms as to a bar. If a bar was established outside the piers, it would be a bar having

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deep water upon it. I do not mean to say that the entire 36 feet, to which the piers are intended to be carried out, would be realized, but something short of it; something practically so deep as not to bring it within the ordinary signification of a bar. It might, for example, be 26 or 27 feet, but not anything like the present shallowness of water on the bar of the Tyne.

29,196. Do you imagine that the present bar of the Tyne would be removed by the projection of the piers?—I think so.

29,197. What reasons have you for believing that?—I think the current will be brought to operate directly upon the space between the outer piers.

29,198. Do you imagine that any improvement in the river itself would tend to the object?—I think so. I think the improvement of the tidal basin generally of the river would tend most directly to that object.

29,199. You are not the engineer of the river, are you?—No.

29,200. Is it intended at all to improve the river?—It is intended.

29,201. Do you expect from that very happy results?—I think it would be attended with very happy results. Already there have been certain works executed, and more are in progress; but a great deal still remains to be done; for example, nothing has been done in Shields Harbour, which is one of the most important points for improvement. Nothing whatever has been done, with very trifling exceptions, in the upper part of the tidal basin, extending west of Newcastle Bridge for a distance of 10 miles. That is a very important part of the tidal basin.

29,202. Are you prepared, as an engineer, to recommend the outlay of the whole 800,000*l.*, with a view to the carrying out of Mr. Walker's larger plan.—I am.

29,203. Do you think that anything short of that would effect any decided improvement?—I think not. I think, if you will allow me to go a little into detail, that I can show you that the piers projected out 15 feet water would not answer any very efficient purpose. I think it is very possible that, being situated upon the actual sand bank that is formed at the mouth of the river Tyne, those piers would not answer any good purpose; and it is necessary to extend them beyond that sand bank to get into deeper and better water, because if these inner piers, as projected, had even a depth of 18 or 19 feet between them, it is possible that, they being upon a sand bank, the bar might be found outside; whereas, with the piers in 36 feet water, I apprehend that if a bar was formed at all, it would be a bar that practically is not entitled to be considered as such, or to be regarded as an impediment to the navigation.

29,204. Merely a shoaling of the water, you mean?—Merely a shoaling of the water.

29,205. Have you at all gone into the calculations upon which Mr. Walker has based his estimate?—I have not. I left him to sustain his own estimate.

29,206. Then, in recommending the larger improvment, are you fully satisfied that it will not exceed a cost of 800,000*l.*?—I would not undertake to say so, because, as I have already stated, I have not gone into the estimates.

29,207. Is there any amount of money that would justify the Government in not being parties to the increased outlay?—I think the matter is so serious a one, that I hope the Government would be liberal in regard to it.

29,208. Are you inclined to think upon the whole that the improvement of the Tyne, and the piers projected by Mr. Walker, would do more to save life and property, but especially life, than any harbour made at any other part of the coast would do?—I think so. I prepared with a great deal of care the analysis of the wrecks and casualties that have taken place within the bay. By the bay, I mean from Robin Hood's bay to the Farn Islands. That statement is in the possession of the Commissioners; and the conclusion I came to from that statement, which I drew with great care, and which was revised several times, because it appeared to me to be a statement calculated to settle the question, was that the Tyne was the most eligible place for a harbour of refuge.

29,209. Is not the Tyne very much crowded at certain times of the wind?—Yes; but there is great space in the Tyne. A very considerable number of vessels can lie in Shields Harbour, and there are two docks now in the Tyne; one is finished, the Northumberland Dock, and the Jarrow Dock will be opened next spring. An Act has also been procured for a third dock, if sufficient accommodation is not to be found; but in the harbour and the two docks mentioned there will be accommodation for about 2,000 ships.

29,210. You think the dock accommodation will be such as to clear the river sufficiently to take in vessels for refuge to any required amount?—Yes.

29,211. There has been a good deal of evidence given against the formation of a harbour of refuge in a tidal harbour. Do you think there would be any difficulty in constructing a breakwater to seaward of Mr. Walker's piers, at such a distance as to allow the passage of the tide between the breakwater and the shore, that would have nothing to do with the formation of bars, and would be useful as a place of refuge?—A breakwater being liable to admit on one side the action of the north-east sea, which is the heaviest sea on our part of the coast, could hardly be constructed in such a way as to shelter vessels sufficiently, at all events in comparison with piers.

29,212. You are aware that it has been contemplated to form a breakwater in advance of Hartlepool, to form a refuge for vessels?—I have heard so.

29,213. Is there anything in the configuration of the coast, or in the geographical position of the mouth of the Tyne, which prevents a similar construction from being made there in advance of the mouth of the Tyne?—I think it will not be so effectual as the projection of the piers would be. With the projection of piers, vessels would have the opportunity of getting into safe moorings and berthings in the harbour and in the docks, but the assumed construction of a breakwater outside does not seem to me to promise the same amount of shelter.

29,214. That is a question of degree. Your reply goes to the degree of shelter. My question is a positive one. I wish to know whether, in your opinion, it would be practically useful or not; I am not saying, in the same degree as the making of the improvement of the Tyne, but whether it would be practically useful to make a breakwater of the description I have mentioned?—By incurring a very enormous expense a breakwater might be constructed outside the Tyne; but the idea always has been—the plan of projecting piers was for the Tyne the right one. A breakwater to be constructed there would be very expensive.

29,215. More expensive than one at Hartlepool?—No; I do not mean more expensive than one at Hartlepool. I believe there has been no specific plan or estimate made for a breakwater at the mouth of the Tyne; so it is very difficult upon the spur of the moment to give an answer to your question as regards the expense.

29,216. There have been estimates made for Hartlepool, so that I believe you may know exactly what the cost is estimated at of the schemes proposed for the improvement of Hartlepool; keeping the amount in view, which is very considerable—I think nearly a million and a half of money—do you not think that, for the same amount, a breakwater might be constructed sufficiently in advance of the Tyne to afford a considerable refuge for passing vessels without disturbing the traffic of the port?—I think it might.

29,217. But upon the whole you are disposed to give the preference to the improvement of the mouth of the Tyne by Mr. Walker's piers?—To Mr. Walker's extended project I certainly should, on

the ground that such extenson is preferable to a breakwater.

29,218. You think, as an engineer, you would thereby get sufficient water to take in all the ordinary trade of the Tyne at low-water spring tides ?—I think so. I have said in my report that I calculate on getting 18 or 19 feet water at low-water springs, which means at low water neap tides about 22 feet, and with an hour's flood at spring tides 21 or 22 feet water.

29,219. (*Mr. Lindsay.*) The principal objections which have been urged before us against the Tyne have been want of depth, the freshets, and the want of space. I want to examine you somewhat minutely upon those points. There have been most conflicting opinions expressed before us in regard to the piers being able to maintain the required depth. One eminent engineer tells us we may be able, if the piers are carried out to the depth of 35 feet at low water, we may be able nearly to maintain that depth. Another engineer tells us that to whatever extent you carry out the piers you will also carry out the bar with them. Now, as you have lived, I believe, all your life upon the banks of the Tyne, and have watched the effects of the tide, will you give us your opinion upon these important points ?—As so much has been said upon these points, I will first lay this chart before you, which shows the river Tyne and the works proposed to be carried out. (*The chart is handed in.*)

29,220. Be so kind as to explain this so that the reporter may be able to take it down, and so that disinterested persons may, upon reading it, be able to understand it?—The inner line of piers as proposed to be carried out in 15 feet water, does not, it will be observed, cover the extremely irregular shore current which passes along that line ; the water deepens gradually to 16 feet, 17 feet, and so on ; that is to say, that outside the inner piers the sand bank would continue, and therefore the probability is that there must be shallow water formed outside of these piers ; not anything so shallow as the present bar, but perhaps 12 or 13 feet water, where there is now a depth of from 14 to 16 feet. It is pretty well admitted that within the piers there will be a depth of 18 feet of water, or perhaps 19 feet ; the argument for which is, that there is a similar depth at the New Quay, in very similar circumstances, and the analogy is so strong that it would be difficult to get over it. But these inner piers being upon the sand bank, it follows, that although there might be 18 or 19 feet water between them, we may have only 12 or 13 feet outside. On the contrary, if we carry the piers out to 36 feet water, still having 18 or 20 feet within the piers, we should have a right to assume that there will be no greater proportional reduction in the depth of the external water than there would be without the inner piers—that is, that in the case of the inner piers it would be from 14 or 16 feet to 12 feet ; with the larger piers it would be from 36 feet to 27 feet ; so that the river bar formed beyond those piers—if you call it a bar—would be navigable for the largest vessels which frequent that part of the coast. The piers being advanced fairly beyond the coast line into a free sea current, I apprehend, if any shallow water is established, there will be still so great a depth that, practically, it may be considered as not a bar at all ; or at least, if it can be called a bar, one which will really have a sufficient depth of water over it for the purposes of navigation.

29,221. From what you have said, I gather that you think there is a chance if the larger scheme is carried out of the water shoaling for about eight feet ? —It is possible, judging from the similar proportion which would arise at the other piers.

29,222. You think it is probable that the depth of water could be reduced by eight feet ?—I think so, upon the ground which I have stated.

29,223. I do not clearly understand why it should stop when it gets to only 28 or 30 feet ?—Upon the principle which I have explained, that the current along the shore at that part is a free current sufficient to carry away the silt which is held in suspension. That such is the fact at the present time is apparent, because 36 feet of water is now maintained.

29,224. That is caused by the ebb flow of the Tyne, the tide running along parallel with the coast ?—Yes.

29,225. Therefore, if you carry out your piers as is proposed to the outside of that line, the bulk of the sediment which is brought down the river will be caught by the ocean tide, and scattered ?—Not only that which is brought down the river, but that which is transmitted along the coast, which is a larger quantity.

29,226. It will, at the particular point, be met by the ocean tide, and will be distributed ?—Yes.

29,227. What is the cause, in your opinion, of the present bar of the Tyne ? Is it caused by the sediment from the river, or by the sand which is washed up from the sea, or is it partly from both ?—My own opinion of the formation of a bar is one that I may express in very simple terms : it is a sand bank. That of the Tyne I take to be a continuation of the Herd Sand. If we should suppose there was no river there, that sand would extend over to the Tynemouth Rocks ; but there being a river, that river cuts its way through, and so you have a bar at the entrance.

29,228. Then, from what you have said, I suppose that if any engineer, or any man who had really studied this question, was to tell you that the effect of carrying out these piers would only be to carry out the seven feet bar so as only to make seven feet of water where there is now 38 feet, you would perhaps be inclined to say that the man who stated that, knew nothing of the question ?—No ; but I should say that he was wrong.

29,229. Or would you deal more generously with him, and say, that probably he had not studied the question sufficiently ?—I do not know about that. I do not know the circumstances, and therefore I can't speak of them. The gentleman of whom you speak may be right in saying that a bar would be formed outside —in a qualified sense. I explained that a bar may be so formed, but not, however, a bar with only seven feet of water on it, but one with 27 feet.

29,230. That was a point which struck me forcibly, and I put the question on two different occasions distinctly, and the answer I received was, that it was a mere question of time, and that where there is now 38 feet of water you would only have in the course of time, resulting from the construction of these piers, only about seven or eight feet of water there ?—I think, if the gentleman to whom you allude had studied the subject of the along-shore current more closely, he would have been of a different opinion.

29,231. Your opinion is, having watched the effects of the current here for a long course of time, that if any silting does take place it will not silt up to a greater extent than eight feet, but that it will leave a depth at the proposed entrance for all time to come of from 28 to 30 feet at low-water spring tides ?—Not within the piers.

29,232. Where then ?—Outside the piers. We are talking of the bar being formed outside, and the depth of water between the piers is in my report assumed to be about 19 feet.

29,233. At what part within the piers ?—Immediately between them.

29,234. That is between the two outer piers ; in a straight line between those piers where there is now a depth of about 38 feet, do I understand you to say that in the course of time there may not be more than 19 feet water ?—There may be more, but if there should be more than 19 feet it would be owing to other circumstances. There will be the addition to the tidal water of the river, caused by these piers. The Tyne Commissioners also contemplate making great improvements in the river by training and conducting its current, which will lead to a freer discharge and ingress of the tidal water. This circumstance will have a material effect, I do not

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doubt, so as to add to the depth of 19 feet, but to what extent remains as yet to be proved. It may be up to 24 feet or 25 feet, but I will not undertake to say that just now. What I alluded to was the formation of a bar beyond the piers.

29,235. Tell me more particularly what would be the effect of extending these piers out to a depth of 38 feet water ?—I have already said that the depth of the channel which the river is capable of keeping clear is, so far as we can judge by analogy from the New Quay, is a depth of 19 feet, and which will be the depth at low water between the piers ; but outside the piers no bar would be formed, or if one was formed it would only be such a bar, as practically speaking, could be no impediment to the navigation of the river. I also said that there might be an addition made to the 19 feet depth, partly by reason of the additional amount of tidal water that would be gained by the construction of these piers themselves, and partly by the improvement which the Tyne Commissioners contemplate making in the river. These may possibly make an addition of five or six feet to the depth between the piers.

29,236. Upon the chart which you have put in the depth within the proposed piers is marked at 36 feet. Is it not so ?—Yes.

29,237. And you tell me that, in the course of time, there may only be about 19 feet water within those piers; is that so ?—Yes.

29,238. Where there is now 36 feet ?—Yes, where there is now 36 feet of water.

29,239. Then the fact is that the existence of those piers will be to make the water a good deal shallower than what it is at present within the piers ?—Within the piers themselves it may be so, but it will be a great deal better upon the present bar, which it is our object to improve.

29,240. Then the substance of your evidence upon that point is, that outside of the pier you think that you will be able to maintain a depth of 28 feet or 30 feet of water, but that within the piers you do not expect to be able to maintain a greater depth than 19 feet or 20 feet ?—With such addition as may be made hereafter from any improvement, such as I have before alluded to.

29,241. Then you think that you would be able to maintain that depth of water up to Shields ?—Certainly I do.

29,242. How will you maintain it—by dredging, or by the scour of the river ?—I think, probably, it may be found necessary to construct inner works within these piers, for the purpose of conducting the current. It is very possible that such may be the case. Dredging is a very expensive process, which is to be avoided if possible, more particularly because the currents of the river are capable, if properly directed, of transferring their own material.

29,243. I want to know what life and property would be saved, in all human probability, if these piers were carried out to the extent proposed, and we can only judge of what would be the probable effect in that respect from what has gone before. Now you give in your report the number of wrecks which have taken place in the Tyne ; would all those ships which have been lost in entering the Tyne have been able to find shelter at any time of the tide, if these piers had been there then ?—I cannot say that all the vessels which have been wrecked there would, but a very large proportion certainly.

29,244. What proportion do you think ?—Five-sixths.

29,245. Three-fourths, perhaps ?—It would be very difficult to say what proportion, but a very considerable proportion would have been able to come in.

29,246. A very considerable proportion, perhaps about three-fourths of the vessels that have been wrecked in the Tyne would in all human probability have been saved with the lives on board of them, if these piers had been constructed ?—Yes.

29,247. That is your opinion ?—Yes, that is my opinion.

29,248. Consequently, if these piers were carried out to the proposed extent, the Tyne would become, considering the description of vessels that frequent the coast, a harbour of refuge in the strict sense of the word ?—I think so.

29,249. Then you are of opinion, after calm consideration, that the Tyne would, if these improvements were carried out, be the means of saving a large amount of property and life, and therefore you, in your report to the Tyne Commissioners recommend that they should ask the Government for a grant of money to carry out the works to the extent proposed by Mr. Walker ?—Yes, I have distinctly stated that in my report.

29,250. You have done so, because you believe it to be the means of saving lives and property to a very large extent ?—Yes.

29,251. One word about these wrecks. I see that the loss of vessels in the Tyne is stated at 1 in 1875, and the loss at Hartlepool is 1 in 975 ; therefore it appears, by that statement, that the loss of vessels at Hartlepool is about two to one of that which occurs in the Tyne. But is it the case, that of the number of those vessels a larger portion of those which are lost at Hartlepool are got off, than are wrecked in the Tyne ?—That is so.

29,252. The number of vessels which are lost at Hartlepool are vessels run on shore because it is a sandy beach, for the purpose of saving life ?—It is understood to be so. That is my opinion. I speak from information ; not being a nautical man, I cannot give a positive answer. But speaking from information, I should say it is so. I may also remark, that a small proportion only of vessels from the Tyne are wrecked in the neighbourhood of Hartlepool, not more than one-ninth part, perhaps.

29,253. Now as you have cleared up some knotty points in my mind, as to the depth and the maintenance of the depth, I want to ask you about the freshets. Are they most frequent in easterly or westerly gales ?—In both.

29,254. Are they more frequent in easterly gales ?—Not more frequent. There have been some heavy ones with easterly winds, especially with north-east gales, but the greatest number are in westerly winds ; the westerly part of the basin of the Tyne is a remarkably rainy district. The easterly portion about Tynemouth is one of the driest districts in the kingdom, while the western portion in the neighbourhood of Scotland, near to the Keilder, is one of the wettest. At Keilder there is a very heavy rainfall, with westerly winds, often when none falls in the eastern part of the basin at all, and then the floods come down without our having any rain in our district at all.

29,255. Have you ever measured the rate at which the freshets run out ?—At what part of the river ?

29,256. More particularly at what rate do they run out across the bar, meeting the ships running in an easterly gale ?—During the ebb, from $2\frac{3}{4}$ to $5\frac{1}{2}$ miles. The first part of the ebb not so rapidly, but the latter more rapidly.

29,257. At what part of the river is that ?—In Shields harbour.

29,258. That is the narrowest part of the river ?—Not the narrowest ; the narrowest is further down in what are called the Narrows. I am speaking now of very heavy freshets ; but the greatest velocity which I have mentioned does not last longer than during the latter portion of the ebb—during a very short period of the ebb.

29,259. That is a freshet running at the rate of about five miles an hour ?—About five miles an hour.

29,260. How often in the course of the year is there such a freshet ?—Four or five times.

29,261. Should you consider it dangerous for a ship to run in with such a freshet as that running out ?—Not if she has a wind strong enough to bring her in. It is not dangerous, it lasts for a very short time. There are, say, five floods during the year, which seldom last more than a day, or perhaps 36 hours ; thus the velocity is only at the later period of ebb

tide, so that, say, five times two hours, 10 hours or something like that, would represent the dangerous period during a twelvemonth, if we are to consider that there is danger at all.

29,262. Then, if there is the danger which has been alleged, the danger only extends over 12 hours in the 365 days ?—It appears about that, from the calculation.

29,263. Then, as you have stated, these freshets generally happen during a westerly wind ?—During westerly winds. There are exceptions ; some very heavy ones occur with north-east winds.

29,264. They generally happen during westerly winds ?—Yes, generally ; because the greatest quantity of rain falls in the western part of the basin.

29,265. They will sometimes happen during calms ?—Not generally. Generally speaking, when there is a good deal of rain in the west, we have rather a heavy westerly wind blowing down the valley of the Tyne.

29,266. Then, in fact, it must be a matter of very rare occurrence when ships would be obliged to run for shelter to the Tyne, with an easterly gale, which are the dangerous gales on that part of the coast ?—It would be a matter of very unfrequent occurrence to meet with freshets in such a case.

29,267. If we take the number of floods at five in the year, and put one of them as being with an easterly or north-east wind, that would be the measure of the danger that you speak of ?—Yes.

29,268. Now as to the next point. What number of vessels have you known to be moored in the Tyne at one time ?—1,250 vessels in the river ; but including the Jarrow and Northumberland Docks, it is calculated there will be accommodation for 2,000 vessels.

29,269. I want to know how many you had in the river ?—One thousand two hundred and fifty moored in the river at one time.

29,270. When your dock accommodation is complete, what number of vessels will they be able to hold altogether ?—Seven hundred or eight hundred in the two docks, making about 2,000 vessels in all.

29,271. You will be able to 2,000 vessels in all, including the docks and the river ?—Including the docks and the river.

29,272. Where vessels could lie afloat at all times of the tide ?—Yes.

29,273. Now say that there is no grant to be given to the Tyne, and there was only one great harbour to be made on the north-east coast of England, how many vessels ought that harbour, in your opinion, to be able to contain ?—It must be very large, very considerable. I think that its required magnitude constitutes one of the strongest reasons for multiplying the points of safety with such an enormous traffic as that of 90,000 vessels a year.

29,274. Do you think if only one harbour was to be made, that that harbour would be sufficient if it was only able to contain 500 vessels riding at anchor ?—I think not ; and that would require a very immense space.

29,275. Have you seen the plan proposed for Hartlepool Harbour ?—I have seen two or three designs, but I do not know whether I have seen the one you allude to.

29,276. Can you state the largest number of vessels either of these designs which you have seen would be able to hold at anchor ?—I made a calculation of, and one was about 150, or scarcely so many as that.

29,277. What was the estimate for that particular harbour ?—I have not seen any estimate. I do not know that any has been made.

29,278. Then such an estimate as that, from what you have stated, would be quite insufficient for the wants of the coast ?—Yes.

29,279. And therefore that is one reason why you think that the public money ought to be voted to assist in improving the existing harbours ?—Yes, to assist in improving the existing harbours. I have come to that conclusion after mature consideration.

29,280. Do you think that a harbour at Filey, and the proposed improvement of the Tyne to the extent which you have just named, would be sufficient to meet the wants of the trade along the coast ?—I have already stated my opinion very fully in my report, that all the harbours should be improved with a view to increase the aggregate amount of safety to vessels frequenting our coast.

29,281. Then do I understand your opinion is, that, to meet the present wants of that coast, all the three harbours, the Tyne, the Wear, and the Tees, should be improved, so as to admit the usual vessels at all times of the tide, and that there should also be a harbour further south, somewhere in the neighbourhood of Filey ?—I do not see the necessity of a harbour further south, provided all the local ports are improved.

29,282. You think that if the local ports were improved in the way which you have just named, that that would be quite sufficient to meet all the wants of the coast ?—I think so. It is a mere truism to say that a harbour of refuge constructed anywhere would do some good ; but I think the preferable plan is to improve the local ports, and that there would be a greater increase of aggregate safety by improving them than by constructing such a harbour of refuge.

29,283. (*Capt. Washington.*) To follow up the last question. By improving the local ports you mean that you would recommend the improvement of the Wear and the Tees, as well as the Tyne ?—Certainly, and I might even go beyond that. I do not see why Blyth should not have a share of improvement.

29,284. Blyth has been a good deal improved ?—Blyth has been a good deal improved. It is naturally very favourably situated, and the engineer has availed himself with considerable skill of the position of the place to construct works, which answer the purpose for which they are intended very well.

29,285. Has any great depth of water been gained by the works ?—About two feet is gained by the works. That has been gained by dredging, because the bottom is hard clay and stones, but it has maintained itself without silting up again.

29,286. You think there is a probability it will be maintained ?—I think it will.

29,287. You have made the subject of the improvement of tidal rivers very much your study ?—Yes.

29,288. I think you are the author of a work published in 1851 on the improvement of tidal rivers, but especially applied to the Tyne ?—Yes.

29,289. I think you have expressed the opinion to-day that it is desirable with a view to the improvement of a bar, also to improve the upper parts of the river ?—Certainly.

29,290. It is your opinion that rivers should be treated as a whole, and not as a part ?—Undoubtedly, most strongly my opinion.

29,291. Then you would not be in favour of engineering solely for the piers independently of the other ports of a river. You would not apply engineering skill solely to the piers without extending it to other ports ?—I should like to see it extended to every part of the river that is capable of being improved, and I may add that the Tyne is capable of very great improvement indeed. For example, the first part of the tidal wave, the first of flood, travels up to Newburn at the rate of only three miles an hour. It is $5\frac{1}{2}$ hours getting there, about 18 miles from the bar.

29,292. In what time does it reach Newcastle ?—At high water in an hour, but I am speaking of the first of flood, which is the best criterion, because when the tidal basin gets filled there is a different velocity of the tidal wave.

29,293. That will be three hours, will it not ?—Yes.

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29,294. If I remember right the tide has risen eight feet at Shields before it is felt at Newcastle quay ?—Yes.

29,295. Does not that show an extremely bad state of the river ?—Yes, when it is coupled with the great improvement which might be made, and for which I have always argued.

29,296. I have heard that the tide ranges 10 feet at Newcastle quay ?—I believe it does.

29,297. And 15 feet at Shields bar ?—It does.

29,298. Consequently there is a loss of five feet there ?—Yes.

29,299. No tide reaches Newcastle quay until it has risen eight feet at the bar ?—It does not.

29,300. Then there must be a hill somewhere between. Is there such a thing ?—There is a mountain of sand between Newcastle and Shields bar.

29,301. So I imagined, and, in fact, the tide goes so far, heaps up against that, and as soon as carried over it rushes down, not up to Newcastle bridge ?—Yes. Another consequence is that the ebb tide is impounded to the extent of about 3½ hours. When the tide begins to flow at Shields bar there is still 3½ hours ebb left in the river.

29,302. There is another obstruction—the old Newcastle bridge; should that be removed ?—I think it should. I believe that the Tyne Commissioners contemplate removing that bridge. I think, from what the chairman has informed me, that they have it in serious contemplation to remove the bridge and replace it by another, the piers of which shall be on a line with those of the high-level bridge.

29,303. The tide flows a long distance above Newcastle ?—About 10 miles.

29,304. Is it desirable it should be encouraged to do so ?—Unquestionably. At present only one seventh of the tidal water reaches that 10 miles of the tidal basin.

29,305. Do you think that it has any beneficial effect upon the bar that the stream should reach it nearly on a level instead of with a rapid descent ?—I think that, as a general question of river training, the more nearly on a level the stream reaches the bar the better. I do not conceive that a river can be in a proper state unless that is so. You cannot have a free ingress and egress of the tidal water, and a consequently maximum effect upon a bar, unless the river is in that proper training.

29,306. I think you said you attributed the bar principally to the drift along the beach; or, in fact, that the bar was a part of the beach which had been cut through ?—Exactly; that is my opinion. I consider it a sandbank which, like any other, might be laid down in a sheltered situation; and without the river it would constitute, in the case of the Tyne, a continuous sand from the Herd Sand to Tynemouth rocks.

29,307. You do not consider that the deposit of the bar is caused by the meeting of the river water and the sea ?—No, I do not, as I have explained.

29,308. That being the case, if the river were placed in train, and a passage once dredged through that bar, is it not possible that the opening might be kept without carrying out very extensive piers into deep water ?—I think not. If the current had space to diffuse itself, the maintenance of a deep channel could not be depended upon.

29,309. In the case of the extended piers, I do not quite understand how you propose to carry the current out so as to keep the depth at the entrance ?—I mentioned that some inner works would be necessary to conduct the current; but the exact nature of those works I should not at present like to state.

29,310. You do not think it would be worth while to try a first experiment by carrying the piers to a certain extent, and improving the river to the utmost, and seeing what effect that would have, rather than going to the more extended works ?—I should still be afraid of a bar forming outside of the first projected piers, because they do not pass sufficiently into the line of unentangled sea current to carry away the silt.

29,311. Do you think that a bar would be formed by the drift going round the north pier and along the south, or how ?—I apprehend your question to imply that the drift in the North Sea is principally from the north.

29,312. Do you contemplate that that drift would travel along the north pier, and form a bar along the outside ?—Yes; and that the wave action, still referring to the short piers upon the ground external to the piers, would throw up a sandbank there, not to the same extent as at present, but still sufficient to constitute a bar which would be injurious to the navigation.

29,313. Do you think that any shelter, enclosed between the extended piers, could be made available for refuge, or would it silt up ?—I do not place any dependence upon the shelter that could be obtained in the shape of a harbour within the pier basin. I think, in all probability, it would silt up, excepting a space that would be excavated by the current. But it would still answer the purpose of a beaching ground. The security for vessels would be found in the harbour and docks.

29,314. That, in fact, there is ample space ?—That there is ample space.

29,315. You spoke of the depth of the river opposite the new quay at Shields, and that that depth might, in your opinion, be obtained at the pier heads ?—Yes.

29,316. You reasoned from that as to the depth which might be obtained there ?—Yes, I reason from that, as the section at the new quay is nearly the same as that at the piers.

29,317. Then, in truth, it would be desirable that the sides of the enclosure within the piers should silt up to maintain the same section nearly ?—If they do not it would be necessary to construct some internal works for the purpose of guiding the current.

29,318. And in reducing the river into train, you would use the dredger freely ?—I would use the dredger. It would be indispensable to use it in many cases, but I should feel disposed to dispense with it as much as possible.

29,319. You would use it wherever there is gravel or hard material ?—Yes, I would take care to direct the current so that it should be made the instrument for keeping the bed clear, on the principle that it is sufficiently powerful in that part of the river to carry away the silt.

29,320. Is it not often the case, that when you remove a course of gravel several feet of sand are carried away ?—Yes, it is.

29,321. Are you acquainted with the Clyde at all ?—I know it generally.

29,322. You are aware of the works that have been carried out there ?—Yes.

29,323. Do you see any reason to suppose that the same results would not follow in the Tyne if the same engineering were applied to it as to the Clyde ?—I do not see any reason to the contrary; but I confess I should prefer not adopting precisely the same plan adopted in the case of the Clyde.

29,324. I do not refer to that, but applying such engineering skill as is considered applicable to the Tyne ?—Certainly; I should be quite of that opinion, speaking more particularly of removing points and projections, diminishing the radii of the curves, and constructing works for straightening and regulating the stream.

29,325. The free admission of the tidal water ?—The object of the whole would be to admit tidal water freely, and also to pass it out again freely, but these objects are to be obtained by what really constitutes the science of river engineering the lowering of the bed of the river. That principle I would extend through the whole of the tidal basin. I think the velocity of the tidal wave might first be increased to double what it is now, which would cause double the amount to flow in the upper part of the tidal basin.

29,326. Considering the importance of the experiment to be tried upon the improvement of the Tyne,

do you consider that the public funds might fairly be applied in trying that experiment?—I do; the experiment is a very great one, and would set many contested principles at rest. An experiment upon so large a scale has never been tried yet. It would quite justify the application of the public funds to the purpose.

29,327. If it were successful, might it not be very advantageous to other rivers around the coast?—As an example, it might be very advantageous. Reference having been made to the Clyde, I may state that the engineer of the Clyde has been engaged to be the engineer of the Tyne Commissioners.

(*Capt. Washington.*) The Tyne Commissioners could not do better than engage the best engineering skill in the kingdom, and apply it to the river. I am glad to hear of the appointment.

29,328-9. (*Capt. Vetch.*) I think I understand that your opinion is, that the north shore of the Tyne mouth is the weather shore?—Yes.

29,330. And that the south side is the lee shore?—Yes.

29,331. Consequently you are of opinion that the drift of sand or other small material comes from the north to the south?—I think so; the set is from the north to the south. The entire drift of the North Sea tends in the direction from the north to the south.

29,332. Acting upon these natural laws, then, the Herd Sand has been the effect of a constant motion of material travelling down to the south, and finding a quiet place?—Travelling from the north, and finding shelter upon that spot.

29,333. Had there been no river Tyne in existence, that would, in fact, have covered the whole extent of the bay abutting against Tynemouth?—Yes.

29,334. And that it is owing to the river Tyne that we have any entrance at all?—Yes.

29,335. That, at a certain depth, a pier head being carried out would anticipate the travelling of that sand, and that the sand, still continuing to travel, would fill up under the lee of the new promontory?—Yes.

29,336. And that, if carried out to the extent first proposed, there would be additional shelter given for the sand to deposit, and that it would continue to grow out further?—It is very posssble that it might.

29,337. Now I presume that the bar at the Tyne as elsewhere, is partly constructed by the force of the sea wave of the North Sea running in upon the land?—Yes.

29,338. In a storm from an easterly gale it will drive the sand, will it not?—Yes; there is a double action: first, the current action, bringing the silt along the coast; and then the wave action, throwing it up upon sheltered portions of the coast.

29,339. Then the river coming down and meeting the stroke of the sea, they will meet upon neutral ground, and then a bar will be formed?—The point where the action of the sea is determined is the point where the bar is formed.

29,340. You have already said that the river scoops out a passage to the sea, and the wave of the sea drives the sand in easterly gales; then these two are conflicting powers?—Yes.

29,341. And the place where their powers are neutral will be the place where the bar will be deposited?—I do not know I could exactly say that. I conclude that the sand is thrown up by the sea, and that it is thrown up in a situation where the river has only a partial power to remove it; it is of sea origin, absolutely of sea origin, and not of river origin.

29,342. Then what is wanted, in your opinion, is more power from the land to drive a passage through?—Clearly more power to drive a passage through.

29,343. Considering the immense number of ages it has taken to deposit the sand to the south of the river on the Herd, I suppose the progress seaward would be still slower?—I do not know that it takes a long period of time. A great quantity of silt travels along the coast, especially when it is disturbed and thereby in a state of suspension. The sand has been laid down very rapidly in some cases.

29,344. We may suppose that the Herd Sand and the sand out into two fathoms water has been the consequence of a certain natural action going on for 4,000 years; you would not expect that the progress of throwing out a new headland would be very great in 100 or 400 years?—That would depend on the extent of drift upon the coast, and the amount of shelter that the sand found in that particular locality.

29,345. But that amount of drift is comparatively measured if we admit the premises by the knowledge that the Herd Sand has accumulated from time immemorial?—Yes; all parts of it have been removed, and new portions laid down again.

29,346. By what?—By being taken into the river, and sent back out of the river current, as well as by sea action.

29,347. Would not the case be that the river carries it out and the sea beats it in nearly in a circuit?—No doubt there is a circulation, but at the same time it does not follow that all the sand which goes into the river from the Herd and out again finds its way to the Herd. On the contrary, it may be carried away, and deposited in other situations.

29,348. Still you would admit that the farther the promontory went out to sea the greater time would be spent in any further accumulation along shore?—Yes.

29,349. And that if the entrance went a great distance out into deep water the process of silting up would be very slow?—I think so; so slow that it would never take place, practically speaking, so as to be injurious to the navigation.

29,350. Looking to the expense of these two new calliper piers, as laid down in Mr. Walker's plan, could not some other means be devised that would rather limit the outlay and the extent of the works?—Suppose this north pier was carried out by itself so as in some measure to overlap the other.

29,351. With a south pier?—Not going to the same length with a south pier, but so that the extension of the north pier would act as a shelter to the south pier.

29,352. And the stream travelling from the north to the south, any matter travelling would shoot across?—The north pier would be a great advantage in the manner you describe; but my own opinion is, that the south pier should be carried out quite as far as the north. I think the proper river action cannot be maintained without that; also that shortening the south pier would tend to bring the sand more into the river.

29,353. From what you have mentioned a short time ago, do not you expect that when the river gets into the train you want to put it in the deep channel will be found to be of a pretty regular width?—Yes; but to get it into train I must have the two piers carried out with a pretty regular width.

29,354. Do not you uncover the river entirely to the action of the sea by presenting the opening directly upon the sea?—I provide a stilling basin in the interior, which I think meets that objection.

29,355. Would not that position meet the heaviest wave that could come in?—Not the heaviest; the heaviest would be the north-east.

29,356. Does it not follow that any wave, say the Atlantic wave, or any other wave running in parallel lines, would run in through this opening?—Yes; but I should feel satisfied that the large extent of stilling basin provided would prevent any mischievous effect as regards the security of the space that vessels had to lie in.

29,357. The overlapping of the south pier to some extent by the north would prevent the wave coming in, would it not?—To some extent.

29,358. (*Mr. Coode.*) I think you say you consider that some inner works would be necessary to maintain the depth over the bar, but you are not prepared to say to what extent. Could you give your

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idea of the direction which they should take, and their general character?—Without pledging myself to its being my ultimate opinion, I should leave the north side as it is, and should construct works along the south side, for the purpose of training and guiding the current. Probably these might be half-tidal walls, with an open structure or platform resting upon them to assist vessels coming in, and to act as a wave trap, thus allowing the inner part of the pier basin still.

29,359. So as to encourage the production of a nearly parallel channel all the way to the mouth of the piers?—Exactly; without that I should be apprehensive that the channel would become tortuous in the pier basin.

29,360. You would do that with the view of maintaining the channel permanently in one direction, and as nearly as possible in one uniform depth?—Yes.

29,361. I gather, too, from the answers you gave to Captain Vetch, that you consider it an essential feature in any scheme for the improvement of the Tyne, that both piers should be carried out to about the same depth of water?—I think so.

29,362. The hill in the bed of the Tyne you describe as being a mass of sand, do you think it is not a nucleus of clay, or is it only a great accumulation of sand?—It is sand to a very considerable depth.

29,363. It has been tried, has it?—Yes. I may add that on the bar the deposit of sand is considerable. There have been borings on the bar to a depth of 13 or 14 feet, and still sand is found. There is an alluvial deposition westward of Shields, a thick alluvial deposition through which the river flows, but it is masked and covered by a very thick bed of sand. I calculate that above the bar level in the part of the Tyne you speak of, from Shields to Newcastle, there are about 14 million cubic yards of sand lying in the bed of the river.

29,364. Which would necessarily have to be removed in order to bring the bed of the Tyne to one uniform inclination?—Yes.

29,365. That quantity is derived from actual sections?—Yes.

29,366. Not a speculative quantity?—Not by any means. The right arm of the undertaking would be the lowering of the bar in the first instance, thus giving the river power to scour out the sand.

29,367. The character of the works within should be in the nature of training walls?—Yes.

29,368. May I ask, if your observation of the Tyne has induced you to think that groins are right in principle in attempting the improvement of such a river, I mean jetties projecting at right angles from the line of the shore?—They are not sufficient. My own opinion is, that full-tide walls trained in a parallel course are necessary.

29,369. What are ordinarily called training walls would be the treatment you would like?—Exactly.

29,370. The velocity of the tidal wave from Tynemouth to Newcastle you stated at about six miles an hour?—To Newburn, 10 miles beyond Newcastle. The first of the flood is about three miles an hour; the high-water velocity is a good deal greater, about 10 or 11. The first of the flood, which is the real test of the state of a river, is only three miles an hour.

29,371. You would improve the river so as to produce as nearly as possible an equal rate of something like 10 miles an hour over the whole bed subject to tidal flow?—Yes, or higher than this.

29,372. And that would be no unusual rate?—Not at all.

29,373. With regard to the freshets, you said that very heavy freshets occurred in easterly winds. Do the heaviest occur in easterly winds?—There is one notable instance of a very heavy freshet in the Tyne having happened with a north-east wind, called the great flood. It was a rain which extended over the whole basin of the Tyne; but with that exception, and perhaps a very few others, the great floods occur in the westerly winds.

29,374. You mean it is a rule that the heaviest floods do occur with westerly winds, and not with easterly winds?—Yes. I may add also, that besides the river floods the melting of the snow sometimes causes a heavy flood, which generally takes place with a westerly or south-westerly wind.

29,375. Can you give any statistics of the loss of life at the mouth of the Tyne? Your statement has reference simply to the loss of vessels?—No; I have prepared a statement of the loss of ships, which I have already handed in, but I have no statement as to the loss of life.

29,376. (*Chairman.*) Supposing those larger piers to be carried out, could you draw upon this chart for me what you would suppose would be the form of the sandbank outside the piers, when the depth of the entrance is reduced to 19 or 20 feet?—It would be difficult to do so, but it might extend in the manner which I have now marked upon the plan. [*The witness sketched upon the plan presented to him by the Chairman the limits to which he referred.*] I have drawn this as a sort of indication, without pretending that it would be absolutely as sketched.

29,377. My question alluded to the formation of a bank at the back of the piers?—I have no doubt it would go a great way out, but the ebb would still be powerful enough to determine a current which would keep it back. Something like what I have sketched would take place on the south side.

29,378. At the north?—The sand would be disturbed on the north side, and raised into a state of suspension. It might occasionally accumulate against the north pier, but I think it would not rest there; the south side is the sheltered one.

29,379. (*Mr. Lindsay.*) I see in your report to the Tyne Commissioners you say that, although the heaviest gales are from the north-east and east-north-east, yet the largest proportion of wrecks takes place in gales from east and by south and east-south-east?—Yes.

29,380. And I see in the return which you give that all the vessels stranded or wrecked during this year were in east and by south or east-south-east winds. There were 63 vessels, with their cargoes?—Yes.

29,381. Were these vessels which had left the coal ports—the Tyne and other coal ports—and were obliged to put back?—You are now speaking, not of the Tyne, but of the entire number of vessels wrecked at the ports within the bay.

29,382. Does this tabular statement in the report, page 2, refer to vessels wrecked in the entire bay?—Yes; that refers to the whole of the vessels lost in the bay.

29,383. Then these 63 vessels, with cargoes, are not vessels which were all lost in entering the Tyne?—No; they were vessels wrecked within the bay.

29,384. Those, I suppose, have been vessels that have come out from the coal ports and been obliged to put back?—Yes; coal laden, and obliged to come back.

29,385. With the wind at east-south-east it might so happen that even if there was a harbour at Hartlepool, that would not save many of these vessels?—It would not be reachable by these vessels.

29,386. They would, in fact, require to be south?—They would either run to the Tyne or some place further north; perhaps Leith Roads.

29,387. Is there a large trade from the Tyne?—No, not a very large trade. There is a certain amount of coals sent to Scotland; but the principal trade is to the southward.

29,388. Is there not a large trade between the Tyne and the Baltic ports?—Yes, very large. I thought you referred more particularly to Scotland. There is a very large trade with the Baltic.

29,389. I am speaking of places to the north of the Tyne. What proportion of the vessels which leave the Tyne go south-about, and what proportion go north?—The coal trade takes so many vessels that the majority go south. The coal trade principally lies in that direction. I do not recollect any state-

ment of the kind you refer to. I do not think any analysis has been made of the trade in that way, but it could be got.

29,390. I want to know what proportion of vessels loading in the Tyne go north; because a harbour south of the Tyne would be of no value to any of those vessels. I should like to know about the proportion?—I think your question, so far as it bears upon the subject of wrecks, might be partly answered by the return which I have put in. The general result of the vessels wrecked is:—Of vessels trading with the Tyne wrecked on the Herd Sand, Tynemouth rocks, and Souter Point, all close to the Tyne, 28 in ballast, 33 in cargo; total, 61. North of the Tyne, 5 in ballast, 21 in cargo; total, 26. Hartlepool and south, 4 in ballast, 8 in cargo; total, 12. Other places, 5 in ballast, 1 in cargo; total, 6. So that south of Hartlepool there are 12 vessels out of 105—between a one-eighth and a one-ninth part.

29,391. Could you furnish to the Commissioners a return showing the number of vessels loading in the Tyne which go south and the number which go north—the relative proportions of each?—For one year?

(*Mr. Lindsay.*) For three years, if you please.

29,392. (*Capt. Washington.*) You made a reference to the great flood in the Tyne?—Yes.

29,393. That was with a north-east gale?—Yes, in the year 1771.

29,394. I think that gale knocked down the old Newcastle bridge?—Yes, I believe it cleared the Tyne of nearly all the bridges.

29,395. Perhaps the recurrence of such a flood might not be the greatest misfortune that could happen to the Tyne. You spoke of the desirability of encouraging the tidal water; would you carry it so far as to stop any encroachment upon the river—encroachments by which compensation was not made in depth?—I should not consider these encroachments. I should not consider training walls for conducting the current to be an encroachment. I conceive I should gain depth, gain a useful dimension of section instead of one comparatively useless.

29,396. If I remember rightly, part of Jarrow Slake has been enclosed?—Yes.

29,397. Is it desirable that it should continue to be so?—I think so. I think it would have a very beneficial effect upon the western part of the tidal basin, the portions west of that point. The mountain of sand we have been talking of begins there.

29,398. By forcing the tide to flow further up?—Yes; it is a recess which stops the tide. There are one or two other recesses, such as Coble Dean and Wellington Gut.

29,399. I think you said the rate of the tidal wave was about 10 miles?—The tidal wave at high water is.

29,400. Are you aware what it is in the river Thames?—I think it is about 22 or 23 miles.

29,401. Twenty or 21. Do you happen to know what it is in the Humber?—I think 16 or 18.

29,402. Not exceeding 20?—Not exceeding.

29,403. In the Orwell?—No, I do not recollect.

29,404. That is 30 miles. Perhaps that is the best state we know from Harwich to Ipswich. Along the open coast of Northumberland it is 60 miles. The progress of the tidal wave may be considered a very fair test of the state of the river?—No doubt it is.

29,405. (*Mr. Coode.*) I believe you have made some observations on the discharge of the Tyne during freshets?—I have.

29,406. What is the proportionate discharge of water during freshets, as compared with the ordinary summer condition of the Tyne?—The quantity discharged in heavy floods is at the rate of about 110 or 112 millions of tons in 24 hours. The quantity discharged in the ordinary summer condition of the river is only about the 1-120th part of that. The freshet proportion is therefore about as 120 to 1. The difference is very remarkable. In large rivers, such as the Nile, it is only 5 to 1, and in the Ganges 5 to 1.

29,407. (*Chairman.*) Supposing we had these piers run out to 20 feet at low water, where will the sea break? Will it in a heavy gale of wind on shore break outside the pier heads?—The sea will come in between the pier heads to a certain extent, and expand itself upon the stilling basin inside.

29,408. But say we have only 20 feet of water outside the pier heads, shall we in that depth have a breaking sea outside the pier heads?—Not unless the sea is very heavy indeed—extremely heavy. The north-east sea will be broken by the protection of the north pier.

29,409. And therefore, except in very heavy gales of wind, there will not be a breaking sea outside the pier heads?—There will not be.

29,410. That is your explanation?—I may also remark, with regard to the depth of 19 or 20 feet water, that this is an extremely low point—dead low water at spring tide. In one hour from that in spring tides the water rises about four feet, so that in one hour from low water spring tides there will be 24 feet, and in neap tides we shall never have less than 24 feet at low water.

29,411. Do you consider five fathoms to be perfectly safe from a breaking sea under all ordinary circumstances of gales of wind?—Under all ordinary circumstances.

29,412. (*Mr. Lindsay.*) To maintain the depth of 20 feet, will it be necessary to go on improving the river up above Shields?—No, I take credit above the 20 feet for the improvements to be effected in the river.

29,413. Therefore while they are going on expending money on the construction of the piers it will be necessary to go on expending a considerable sum upon the improvement of the river?—The Commissioners must, and I believe are, quite prepared to expend a very considerable sum of money, I believe to the extent of somewhere about 200,000*l.* or 250,000*l.*, in the improvement of the river, including the removal of Newcastle old bridge; in the construction of training walls, and all other works necessary for the improvement of the river, quite irrespective of the piers or docks. In the application of their ordinary means they intend to spend that large sum on the improvement of the river.

29,414. Then to make the Tyne what we desire to see it, a harbour of refuge for the saving of life at all times of the tide, will it be necessary for the Commissioners, so as to be able to maintain the depth of the channel all the way, to go on expending so large a sum as 200,000*l.*?—No doubt it will.

29,415. They must go on with that simultaneously with the improvement of the piers?—Yes, with the view of maintaining the proper depth of the river, and increasing it.

29,416. (*Chairman.*) And therefore if the Government spend a large sum of money at the mouth of the Tyne, for the purpose of making it a harbour of refuge, it would in your opinion be fair to demand that the River Commissioners should spend a proportionate amount upon their part of the river, pari passu?—I think so.

29,417. (*Mr. Lindsay.*) Do you mean that if the Government was going to vote any money to assist in the construction of these piers you would make it a condition that the Commissioners should spend somewhere about a similar amount in improving and deepening the river?—That would be rather hard upon the Commissioners.

29,418. I should like an answer. Do you think that that would be a fair condition?—I do not know that the Commissioners should be exactly bound to do so. I think that there is a special claim upon the Government, irrespective of what may be done by the Commissioners.

29,419. If the people of the Tyne come to ask the Government for money for the purpose of making and maintaining it as a harbour of refuge, would you or

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would you not, before voting the money, make it a condition that the Tyne Commissioners should go on spending the amount necessary to maintain the depth ?—I do not see that there could be any objection to that condition. The Commissioners mean fully to carry it out. I do not know that they would object to it.

29,420. (*Chairman.*) I will put the question a little more generally. Supposing that the Government desired to make a harbour of refuge at the mouth of any river, would you consider it right and proper that the money which was to be devoted to that purpose, whether drawn from public or private sources, should be divided in proper proportions between the improvement of the river and the improvement of its mouth ?—I think that that would be a fair principle.

29,421. In order to obtain the greatest engineering effect from the money spent ?—Yes, for the double objects you mention, both being, in fact, parts of the same question.

Mr. Joseph Cowen examined.

Mr. J. Cowen.

29,422. (*Mr. Lindsay.*) You have heard the evidence which has just been given by Mr. Taylor ; you have heard him state that in his opinion it will be necessary to spend 200,000*l.* in deepening and improving the River Tyne, in order to maintain the proposed depth of channel at the end of the piers, and to render the Tyne a harbour of refuge, in the strict sense of the word ?—Yes.

29,423. Say that the Government arrived at the conclusion that something should be done to make the Tyne a harbour of refuge, and that the Government was disposed to vote a certain sum of money towards the construction of these piers which Mr. Walker has proposed, are you, on the part of the River Tyne Commissioners, prepared to say that they would spend the necessary amount of money in the improvement of the river, so as to maintain the desired depth ?—Certainly they would. They are in course of spending it now, and must, during the construction of the piers, with their present income, spend 200,000*l.* on the improvement of the river.

29,424. But would they be prepared to enter into a bargain with the Government, whereby they should be bound to spend that sum of money ?—I do not know. I am not prepared on the part of the Tyne Commissioners to say that we would enter into a bargain to do it. We have the revenue, and must spend it in the river. Over and above that, be it remembered that the people of the Tyne have already agreed to tax themselves to the extent of 400,000*l.* for the construction of the piers. The revenue of the river people is about 14,000*l.*, and is increasing. It would this year have been increased by 5,000*l.* if the Government had not prevented a matter being carried into effect. But for that interference we should this year have had 20,000*l.*, which in ten years would give 200,000*l.* that we must spend upon the river ; we cannot do anything else with it, therefore it required no bargain. We cannot apply the revenues of the river to any purpose but the improvement of the Tyne, and, therefore, we must maintain the depth so far as our revenue will enable us.

29,425. From what you state, the River Commissioners would spend about the sum named ?—No doubt of it ; from 200,000*l.* to 300,000*l.* would be spent by the River Commissioners during the time of the construction of these piers, and the principal part of that would be expended in directing the current so as to maintain the depth over the bar.

29,426. (*Mr. Coode.*) When you say that the Tyne Commissioners must spend that sum of money, are they under any positive engagement to spend it ?—Only that is the revenue of the river, and we have nothing else to do with it.

29,427. Can they devote it to any other purpose ?—Most certainly not.

29,428. They have no power to appropriate the funds in any way whatever, other than to the improvement of the river ?—Certainly not.

Tuesday, 14th December 1858.

PRESENT :

Admiral Hope (Chairman).

Sir Frederic Smith.
Captain Washington.
Captain Sulivan.
Captain Vetch.
Mr. Coode.
Mr. Evans, Secretary.

Mr. James Abernethy, Civil Engineer, re-examined.

Mr. J. Abernethy.

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29,429. (*Chairman.*) You have a statement to make, Mr. Abernethy ?—I have prepared a statement which I have here ; shall I read it ?

29,430. That will be the most desirable mode of proceeding ?—I have also prepared a model, which you will observe is made in accordance with the drawings, and shows elevations of the work in various stages of progress.

29,431. (*Capt. Vetch.*) Upon what scale is this model ?—The same scale as the drawings, 6 feet to the inch.

29,432. (*Chairman.*) You will now proceed with your statement.—This is a statement regarding a proposed mode of constructing breakwaters, and its assumed advantages as contrasted with that pursued at existing works of a similar description.

Drawings.

The relative Drawings marked Nos. 1, 2, 3, and 4, show in detail the proposed mode of construction and form of breakwaters.

Mode of Construction.

First. (Figure No. 1, Drawing No. 1.)—Piles, two in number, A A, are driven to a depth of 10 feet or thereby below the bed of the sea, the top of the piles being 5 feet above the level of low water ; these are to be connected together transversely by tie pieces (B B), four in number on each side of the piles, to which they are to be bolted by screwed bolts.

In the line of the proposed breakwater, and 10 feet from the centre of these piles, similar piles are to be driven, and connected in the same manner, the various sets of piles being connected longitudinally by inner wales, C C.

A certain continuous length of these sets of piles being driven, a mound of rubble stone or " Pierre perdu " is deposited within and around the piles, as shown by (Figure No. 2, Drawing No. 1,) the top of this mound being 15 feet below the level of low-water spring tides.

A certain continuous length of these piles and rubble mound being completed, a timber framework, D, (Figure No. 3, Drawing No. 1,) previously framed and constructed on shore, is lowered down over the top of the piles, and bolted and secured to the ends of the cross ties (B B,) similar frames being lowered over the adjacent sets of piles, and the whole connected longitudinally by wale pieces (E E, Figure 3, Drawing No. 1.)

A certain length of these frames being thus fixed in their places, balks of timber 12 in. by 6 in. and six inches apart, or panels framed together as shown by (Figure 7, Drawing No. 1,) are bolted on behind the piles up to the level of low

water (F F, Figure 3,) and the space within these panels may be then filled in, to a certain extent, with dry rubble stone packing; an additional framework (G, Figure 4,) is then constructed within and above the previous framework, the uprights of which are to be securely bolted to the cross and diagonal ties, the foot of the uprights resting on the top or head of the lower piles, which are cut off to the level of low-water mark.

A certain length of these frames being constructed, and further connected longitudinally by additional wale pieces, (H H, Figure 4, Drawing No. 1,) half balks of timber six inches apart are bolted on to the inner side of both sides of the framework, and carried up "pari passu" as the rubble filling progresses.

The rubble being tipped from wagons from the top of the framework, or filled in from barges, as circumstances may render expedient.

Lastly. The framework being completed, and its interior packed with rubble, as shewn by Figure 5, timber bearers and rails for carrying powerful hydraulic cranes (I I I., Figure 5,) are to be laid on the top of the framework with outside bearers for two roadways K K, for lines of railway to carry the stone trucks; these may be dispensed with in certain cases, the stones or masses of masonry being brought alongside the breakwater in lighters, and deposited "in situ" by the hydraulic cranes, as shewn on Drawings Nos. 2 and 3. Thus will be formed a loaded timber breakwater, possessing a continuity of structure, in addition to its weight or inertia, which renders the breaching of any of its parts by the action of the sea extremely improbable, and the timber of which it is composed, being thoroughly creosoted under pressure, which renders it, from my experience, impervious to the ravages of the worm, it may reasonably be expected to last a long period of time. The design shewn on the drawings I propose to apply to sites such as the Mumbles Roadstead in the British Channel or Hartlepool Bay, where it is assumed that the nature of the ground for foundation is of a character that renders any material subsidence of the rubble masonry at least improbable; but even supposing a subsidence did take place to such an extent as to injure the cross ties in certain cases, it would not affect the stability of the structure; the first and principal object of these ties, being to fix and secure in their places the piles (A A, Figure 1.) previous to, and during the deposition of, the rubble mound. In ground of a nature which renders subsidence probable, the rubble mound may be allowed to consolidate for a given period of time, and the details in the arrangement of the timber work, can be arranged to meet such a contingency; one mode of effecting this is shown by Figure 6, Drawing No. 1.

Rate of Progress.

The general arrangement to be observed in the construction of such a work, and its rate of progress, selecting as an example the Mumbles or Hartlepool Bay as sites, and dealing with the loaded timber breakwater as the nucleus or means of forming a permanent structure of masonry of an enduring character I should propose to be as follows:—

1st. To provide all the necessary creosoted timber, and to build for the facework large and uniform masses of masonry on shore, allowing sufficient time for these to become hard and compact before being deposited in the work. These masses of masonry to be not less than 20 tons weight, ranging to 30, or even more; and composed, in the case of the Mumbles, of the hard sandstone of the coal measures, set in best hydraulic mortar; at Hartlepool, substituting the magnesian limestone, for the foundation courses up to the level of six feet below low-water level; for the superstructure from that level, to the height of 10 feet above high water, I should construct similar masses of rubble masonry, faced with hard stone ashlar, toothed or bonded into the rubble, as shown by Figure No. 8, Drawing No. 1.

A sufficient quantity of material being thus prepared, which I presume would occupy a period of 12 months, I should proceed during the last half of this period to drive the lower piles for a continuous length of 1,500 feet or thereby, and to form the rubble mound which I estimate could be executed in a period of six months.

In the formation of this mound at the Mumbles I should use copper slag for its outer portion, beyond the toe of the facework; using the mountain limestone for the interior. The slag being heavy and angular would be less liable to disturbance, and like most vitrified substances it is very durable; moreover, its great specific gravity would tend to prevent any lateral spreading of the central mass of limestone, and cause any subsidence to be in a vertical direction.

After a portion of the mound had been deposited for a period of three months, I should proceed to form the framework, completing it at the rate of 500 feet in three months; and as soon as the first 500 feet of this work was constructed I should proceed with the face masonry at the same rate, observing, as a rule, four stages of the work "pari passu" with each other:—

1st. The masonry in progress.
2d. The timber breakwater formed.
3d. The same in progress.
4th. The formation of the rubble mound.

The whole time occupied in the construction of such a work as that proposed at the Mumbles, a total length of 6,600 feet of breakwater, would be as follows:—

1st. Preparation of material, say 12 months.
2d. Construction at the rate of 500 feet in three months, being a total period of four years and a half, or thereby. On the Drawing No. 1. I have shown an elevation, explanatory of the various stages of the work in progress.

I propose to lay the facework in alternate courses of headers and stretchers, connected together by cast-iron dowels, and cemented above low-water level with the best hydraulic mortar.

As the masonry proceeds, a certain portion of the timber only is proposed to be enclosed or absorbed within it. This is tinted green on Figure No. 6, Drawing No. 1.

Timber and Rubble Stone Structure treated as a Breakwater, &c.

In this description I have treated the loaded timber breakwater in connexion with the stone structure, but it may be used as a breakwater "per se," for a long period of time. Taken in connexion with the stone structure it affords a firm basis for setting great masses of masonry, which, from their weight and abutment on the timber framework within, cannot be breached by the action of the sea; thus enabling the work to be carried on with safety in sections of considerable length, instead of being carried on, as in the case of existing works, in progress from the end merely. The loaded timber breakwater affording, moreover, in a very short period of time, a considerable amount of shelter. Structures of such a character might be applied as an economical and effective protective work for ports possessing but limited financial resources.

The great cost generally of stone piers, and their liability to breaching by the action of the sea, more particularly during progress of construction, is well known, and has been felt by every engineer practically conversant with marine works; and I am aware that these causes have rendered, in a great measure, nugatory the means at the disposal of the authorities of various harbours on the coast of the United Kingdom, especially on the east coast of Scotland; so that, as a general rule, the works actually executed are limited in extent, and inadequate for the protection and safety of the shipping. If a mode of construction had been followed, comparatively safe and economical, in the first instance, works of greater magnitude might eventually have been carried out, from results of the additional revenue thus afforded, whereas, in many instances, the attempts at harbour improvement, to meet the demands and encourage the growth of trade, have only ended in disappointment and financial difficulty.

Comparison with present Works and Modes of Construction.

I shall now proceed to compare the proposed system of constructing breakwaters with that followed at existing works, selecting the case of the breakwater at Holyhead as an example.

For the purposes of this comparison I have furnished the accompanying Drawing, (No. 4,) showing sections of the two systems adapted to the same site, and a careful consideration of both leads me to the following conclusions:—

1st. That the proposed new method admits of more rapid completion, and is less liable to risk during progress of construction;
2d. That a considerable saving is effected in the quantity of material used, and, consequently, in cost of construction;
3d. That greater durability is insured, arising from general form and the nature or quality of the material.

With regard to the first of these.—By the present system the rate of progress is defined by the number of waggons which can be discharged from the termination of a given number of roads, and, in the case of Holyhead, the proportion between the required rubble mound and that now proposed being as 5 to 1, it is manifest that a much greater

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length of time must be required to form it; while the superstructure cannot be carried on "pari passu" with the formation of the embankment or mound, as in the latter case.

Moreover, the timber-staging at present in use is constantly liable to be carried away in storms, whereas the staging proposed being connected together as a continuous work, and loaded with a mass of rubble, is independent of its use as a breakwater, "per se" of greater strength, and more capable of resisting the action of the sea.

As regards the saving in material and cost, the estimated quantities in one lineal yard of a breakwater on the Holyhead system applied to the Mumbles site, as compared with the proposed structure, is as follows, excluding the parapet in both cases.

Holyhead.		Proposed system.	
Cubic yards, 2,472	-	Rubble stone - -	500
Cubic feet, 1,201	-	Ashlar facework -	1,118
Cubic yards, 48	-	Rubble backing in mortar - -	94
Cubic feet, 396	-	Pitching - -	219

As regards the cost of each, as I have not the means of instituting any other comparison, I have simply computed the quantities of material required in each case, applying the same scale of prices. And I find the result as follows in the case of the proposed Mumbles breakwater:—

By the Holyhead system	- £1,742,620
By the proposed system	- £895,400

I believe this is a comparison in favour of the former, because the risk and cost of such a mode of construction, on a site subject to a great rise and fall of tide, is increased by the exposure of the staging, and the long slope of the rubble mound, to the prolonged and violent action of the sea. To these must be added, the difficulty of transporting under these circumstances, to the site a vast quantity of material.

With regard to durability, I have to remark, that the system of depositing a rubble mound, up to the level of high-water mark, as a basis for a solid and vertical superstructure of masonry, has always appeared to me a costly and injudicious mode of construction in deep water, as the long slope, thus necessarily formed seaward, converts the undulating ocean wave, into the shoal water, progressive, or percussive breaker, and the consequence is, a violent disturbance on the seaward face of the rubble mass, which by the constant action of the sea, must ultimately be reduced to a mass of boulder stones, while the vertical portion is subjected to incessant percussive action. In the case of Holyhead, I am convinced, that for the preservation of the superstructure, it will ultimately be found necessary to pitch the outer slope with massive ashlar, at great expense, at least between the levels of high and low water. I consider the breakwater at Plymouth, a much more consistent example of this mode of construction, denuded as it is of any vertical superstructure.

A breakwater of the form proposed, will not be exposed in any material degree to the action of a percussive force, but merely to what may be termed the hydraulic action arising from the rise and fall of the undulating deep water wave.

In conclusion, I have to express my firm conviction, that by means of powerful staging, and machinery capable of depositing with rapidity and ease, large masses of masonry, breakwakers, with vertical face walls carried up even from the bed of the ocean, may be executed in a much shorter period of time, and at considerably less cost, than has hitherto been attained.

The practicability of meeting these requirements admits of no doubt. As regards the necessary machinery and power to deposit masses of great magnitude, my practical experience of the facilities afforded by the application of hydraulic power, in various and numerous forms and appliances by Mr. Armstrong, of Newcastle, convinces me, that as regards labour, time, or facility, a mass of twenty tons may be deposited at the same cost as a stone one-tenth part of that weight by the ordinary means in use. For sites exposed to the action of the Atlantic or ocean wave, or where it is not expedient to form a base mound of rubble stone, I have shown a mode of construction (Drawing No. 5,) bringing up the face walls from the bed of the sea in a depth of seven fathoms.

I apply what I term the vertical system to deep water breakwaters; in shoal water, and under certain circumstances, the long slope system I am aware, from experience, may be applied with advantage.

29,433. (*Chairman.*) Then you propose to deposit the rubble by tipping from the stage or by means of barges, either one or the other?—If the breakwater had been constructed a considerable distance out from the land, it might, perhaps, be the best method of carrying out the work, to deposit the rubble from barges.

29,434. In fact, it would be the only mode, would it not, because the expense of the staging under those circumstances would be so great as to render that mode in effect impracticable?—Yes, it would be the only mode; it is the mode that was adopted at the Plymouth breakwater necessarily.

29,435. But could you in any case, by means of the staging you propose to use, dispense with the use of barges?—Yes, I could; supposing the breakwater were carried out from the shore. In that case, as the framework was completed, the waggon road might be carried along the top, and the whole of the packing might be completed before the facework was commenced.

29,436. Yes; but I apprehend that the whole of the rubble mound which is deposited in the first instance must necessarily be deposited by tipping from barges?—Yes; by being tipped in from barges.

29,437. And it can only be done from barges?—Yes; it can only be tipped in from barges by this mode of construction, but it might be done otherwise, by adopting a somewhat different mode of dealing with the staging, that is, by constructing these frames and tying them together, and carrying on the deposit of rubble from the frame below.

29,438. But would that give you that portion of the rubble mound that is outside the piles?—By the aid of side waggons I think it would, tipped over outside from the side of the frame.

29,439. By the aid of side waggons you think it might be done?—Yes, I think it might.

29,440. Therefore you think that it would be possible to deposit the whole of the rubble mound by tipping from the stage?—I do.

29,441. And you propose in that way to put in the heart or core of the work?—I do.

29,442. Could you not gain a little in breadth by throwing out a temporary platform from the side to tip from?—Yes; that could also be done.

29,443. That would be practicable?—Yes, quite practicable; for the weight of the waggons which would be used for the purpose of depositing the rubble is not very great.

29,444. Have you, Mr. Abernethy, considered the subject of using iron for the piling in lieu of wood?—I have; and my objections to the use of iron for that purpose is the great cost of iron piles, and their liability—cast-iron piles especially—to be broken in the process of driving.

29,445. Therefore you consider that the greater cost which they would occasion renders iron piles unfit for your object in cases where ultimately the work is to be built in?—It does, in my opinion.

29,446. In filling up the core or rubble under your stage, do I understand that the barges would have to be brought in under the framing for that purpose?—They would get along by the side of the piles, and cast the rubble over from both sides.

29,447. From both sides?—Yes; from both sides.

29,448. But you do not contemplate the barges coming in under the staging?—I do not; and for this reason I carry the piles 5 feet above low-water mark.

29,449. Your hydraulic cranes will necessarily be made to carry a very great weight?—Yes.

29,450. How do you propose to fix them for the purpose of lowering these immense blocks of 100 tons each?—Not 100; I said 20 to 30 tons each.

29,451. Well, 20 to 30 tons each. What mode do you propose for securing your crane? Do you propose that your hydraulic crane should be a travelling crane?—It is a travelling crane; there are two modes of lifting the blocks of masonry, one being to build into them iron rods of sufficient strength with eyes,—that would be one mode; and another would be to put in small square masses of hard stone into the face of the rubble mass, and carry them down, say to half their depth. There are a variety of other modes that might be adopted according to circumstances.

29,452. But all of which would increase the expense of the work in proportion to the weight of the blocks used?—To some extent certainly, but it would be but a very trifling per-centage on the whole cost.

29,453. If the breakwater is to be faced immediately with stone, would there be any necessity for resorting to the creosoting process?—Upon the whole I think it would be advisable to do so, because certaid portions of the timber framing will be built in or absorbed within the stone breakwater when completed; and I think it would be desirable that that should be made durable; therefore I think it would be better that it should be creosoted, that it may be made the more permanent.

29,454. But if it were not creosoted, would it affect the permanency of the structure?—It would not in the least degree affect the facework, but it might cause a slight subsidence in other parts of the work.

29,455. What is the expense of creosoting timber?—Thoroughly well done, it would cost about *5d.* per cubic foot.

29,456. And what per-centage would that be on the cost of the piles?—In this case I have put down the cost of the timber piles at *3s. 6d.*, and I would add another *6d.* for creosoting,—that would be *4s.* per cubic foot; but, as I have said, the creosoting might be done for *5d.* per cubic foot.

29,457. That is one eighth?—Yes, one eighth.

29,458. I gather that it is your opinion that all breakwaters which are constructed with the long slope must ultimately, in order to ensure their permanency, be faced between high and low water?—Yes, that is my opinion; and from explanations I have heard this morning in reference to the action of the sea upon the slope, I am convinced that opinion is correct, and that unless the slope is faced, the stone will in process of time be rounded by attrition, and worn into boulders.

29,459. And, therefore, it will be necessary to pave or face the seaward slope with square ashlar?—That will, no doubt, tend to preserve the slope, but it would have one bad effect, it would give the sea greater percussive force on the vertical wall.

29,460. If there be a vertical wall to the breakwater?—Yes.

29,461. But when the facing of the entire slope is completed, shall we not be free from occasional repairs?—Yes, I think so, to some extent; but in the long slope system any subsidence in the rubble tending to disturb the facework might, by the action of a heavy sea, cause it to be broken up and moved. In Scotland we are in many cases obliged, in order to guard against this, to connect the stones with iron bars.

29,462. Therefore it is almost impossible to construct the long slope so perfect as to obviate the probability of repairs being occasionally required?—I think so.

29,463. And very heavy repairs sometimes?—Yes; sometimes heavy repairs.

29,464. You propose, I think, a new system of base building up from the bottom; have you considered that for any length of time?—I have; and I have for some time been of opinion that there would be no difficulty in dispensing with the rubble mound, commencing at once from the base by depositing large masses.

29,465. And have you considered the subject sufficiently to be enabled to give us an idea of the comparative advantages of the two systems; I mean of this system of building from the bottom as opposed to the system of the rubble mound?—I think that in certain localities, where the quality of the stone available for forming the rubble mound is of an inferior class and liable to decay, it would then be advisable to resort to the other system, and commence by building from the foundation.

29,466. But where you can procure a good class of materials, the rubble mound system is the most economic, is it not; the more especially as the fact is now practically ascertained that below the depth of 15 feet from the surface there is no disturbance from the action of the sea?—I think it advisable, on the score of economy, where a proper description of material for the purpose can be procured, to have the rubble mound; but where a suitable kind of stone cannot be obtained, I would recommend the carrying out of the vertical system from the bottom. As, for instance, in the case of Table Bay at the Cape of Good Hope, I should say it would be advisable there to adopt the vertical system entirely.

29,467. Why do you think so?—Because of the great distance you would have to transport vast quantities of material.

29,468. (*Sir F. Smith.*) Upon the whole, then, I think I understand that you are of opinion that the long slope system should be altogether abandoned as a general rule?—As a general rule I am so.

29,469. Is there any exception to that general rule?—Yes, in shallow water, where there are breakers or a strong percussive sea; in such cases I think the long slope might be used with advantage. I can give you an instance in point, showing the advantage of the long slope. The head of the pier at Aberdeen was built as a vertical wall, and it was twice thrown down by the action of the sea, because the whole mass of masonry had not sufficient weight to stand the heavy shocks of the percussive sea. The class of material used, the masses of masonry were too small. The blocks of stone themselves were too small. Hence, where you have a strong percussive sea, and cannot have any sufficient weight of masonry, the best way is to avoid its shock by forming a long slope. The vertical wall at Aberdeen, as I have said, was twice thrown down and twice built up, and then they resorted to the long slope, which has stood, I believe, for the last 25 years or more, without injury.

29,470. Then do you mean to say that if this wall had been sufficiently thick it would have been better vertical than sloped; that it wanted mass?—Yes; it wanted mass, and the foundation is somewhat insecure, being sand for a considerable depth.

29,471. And by adopting the long slope the difficulty consequent thereon is obviated?—Yes.

29,472. But is there no remedy for the evil if you have a vertical wall?—The remedy in that case would be very expensive, and also difficult to carry out.

29,473. Then you think, as a matter of economy, that the alteration at Aberdeen from the vertical to the long slope wall was judicious?—Yes, in that case.

29,474. Were you ever at Haslar, on the Gosport side of Portsmouth? Do you know the wall there?—I have not examined the works at Haslar.

29,475. Are you aware that the wall at Haslar was in 1821 a vertical wall of great massiveness, and that in successive gales of wind it was completely washed down; and that instead of being restored as a vertical wall, it was restored as a long slope wall? are you aware of that?—I am aware that it is a long slope wall now.

29,476. Yes; and the long slope is kept in repair at a very little cost. May I ask what is the depth of water in that case?—The wall is sometimes dry at low water. That is then the case of a percussive sea, and I have no doubt under those circumstances that, as at Aberdeen, the long slope wall is preferable to a vertical wall.

29,477. Then, where there is a percussive sea you think the long slope the better of the two?—I think it is the better of the two.

29,478. Do you think that the long slope might be very much diminished in its length without injury to the construction. I see here you have a long slope in the comparative wall; do you think the long slope is required here?—Yes, with the class of material used. It is simply rubble.

29,479. As I understand from you, the sea will form the slope, there being no disturbing action in the water below 15 feet from the surface line; if so, are

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we not open to have a less steep slope under the water line ?—I have shown it at 1¼ to 1.

29,480. But do you require that ?—With such material as copper slag, 1 to 1, or an angle of 45°, would be sufficient.

29,481. But your comparative estimate is, as I understand you, with the long slope ?—Yes, for the long slope.

29,482. You say that the quantity of timber used in your system of staging is not greater than would be used for tipping rubble into breakwaters constructed upon the ordinary principle ?—I think not.

29,483. Have you gone very minutely into that point ?—Not very minutely ; I have assumed a certain quantity of timber to be used, and in this way. Supposing a section to be carried out in the Holyhead form, according to this drawing. The base of the mound is marked at 520 feet. I should suppose, in order to tip the necessary quantity of material for such a mound, there would be staging 100 feet in width, and that it would be composed of piles transversely 20 feet apart, and longitudinally 30 feet apart. The piles would require to be connected by cross ties at the top and by diagonal ties below ; and seeing the great length these piles would require to be for carrying the stage 10 feet above high-water mark, and being driven 10 feet into the ground at bottom, 86 feet long, they would require to be scarfed, and I should think 4 balks would be requisite to carry the stage. I mean, if you placed them 30 feet apart longitudinally, so that there would be no economy whatever in the matter of timber. I think in that case there would be 575,080 feet of timber absorbed or buried in the work.

29,484. In what way ?—I mean the total quantity that would be absorbed in a breakwater like the Mumbles, 6,600 feet long.

29,485. In constructing a breakwater with a vertical face to the bottom, would you use the same sort of hearting as when you adopt the rubble mound construction ?—I should be inclined probably to vary it to some extent. I should adopt the rubble hearting in the usual way, but carefully packed, using large masses of masonry for the facework; but in certain sites, where the quality of the material required it, I should connect the facework by rubble walls in mortar, 10 to 15 feet apart.

29,486. In estimating your rate of progress, what have you taken as your data ? have you taken the rubble construction or the timber formation ?—I have taken the whole construction of the timber and the stone combined. I propose to prepare a large quantity of the material on shore and carry the work on in sections. There would be 500 feet of masonry in progress, 500 feet of the completed timber breakwater, and 500 feet in progress of the rubble mound beyond that again.

29,487. What is the interval between the frames ?—Ten feet from centre to centre.

29,488. Could you not place the frames more rapidly if you had no rubble to fill in ?—No doubt of it.

29,489. Consequently the rate of progress would be defined by the rubble mound ?—Yes ; the rubble mound defines the first stage of progress.

29,490. But that mode of construction would not be more rapid than any other ?—It would not ; but as the quantity is less, the time occupied would not be so great.

29,491. In the case of Swansea, it would depend upon the number of barges you employed. You might drive a great number of those piles, say extending over a length of 1,000 feet at the same time, employing a large number of lighters for the purpose ?—Yes ; it would depend entirely on the appliances.

29,492. Would you contemplate filling in the heart or rubble up to the level of the first horizontal piles, and then placing the upper framework, or would you go on filling in the rubble before you placed any portion of the second part of the framework ?—I should in all cases fill in the rubble mound to the level of 15 feet below low water before I constructed the upper framework.

29,493. What does this line on the drawing represent ?—Low-water mark.

29,494. Then should you carry the rubble up to low water before proceeding further or not ?—When the rubble mound is completed to a point 15 feet below low-water mark, seeing that the piles are driven 10 feet into the bed, the lower part of the framework will be sufficiently firm to admit of the superstructure being put on.

29,495. But if that were done the second portion, the superstructure of the second framework would be exposed to the action of the sea externally without protection ?—It would for a short period of time.

29,496. And a great mass of the timber would be exposed to the oblique stroke of the sea ?—Not more than is usually the case in respect to open pile piers, which are common on various parts of the coast.

29,497. Not more so than usual ?—No, not more so.

29,498. Would there not be in the case of Swansea, by your plan, a much larger quantity of timber exposed than in any pier you are aware of that is exposed to a similar sea ?—No ; I think not. I think in the upper part of the pier at Boulogne there is as large and as dense a mass of timber exposed.

29,499. But it is not equally exposed, I think ?—It is exposed to a very heavy percussive sea.

29,500. Have you stated in your report the rate of progress which you calculate upon ?—I have.

29,501. (*Capt. Sulivan.*) Have you made any comparison between your plan and the proposed upright wall plan, setting aside the large bases of rubble ?—I have not.

29,502. You are aware that the upright wall plan upon a small base is not a novelty ?—I am quite aware of that.

29,503. Then, to make the comparison, suppose your view, which agrees with others that have been put forward, to be right in regard to the advantage of an upright wall on a small base in deep water, would not the comparison, to enable us to judge of the relative expense, have to be made with the small base and upright wall, and not with the large base and the upright wall ?—I have in this case selected sites for comparison,—Holyhead with Swansea ; and have dealt with the plan accordingly, having reference to the circumstances of both, and I have simply made a drawing showing the upright wall system as carried out from the base.

29,504. But with regard to the saving of material, to enable us to judge of the saving in the construction of the one form of upright wall with the other, should it not be taken with the large rubble base ?—I think the comparison of the rubble base to a given height is sufficient, that is, to 12 or 15 feet above low-water mark. That is a fair comparison as against the system now carried out ; but another and a still further comparison might be made with an upright wall, if you take the other form of the upright wall on a small base. In that case I apprehend there would be but very little difference in the cost of the material as between yours and the other ?—No, there would not.

29,505. It would show the different mode of construction and the question of the superiority of the slag to a great extent, would it not, and also the supposed comparative rapidity with which the stage in your system could be carried out ?—It would show the difference in time ; and in addition, by my plan the advantage of using each of the stages as a breakwater for the time being, and also as a stage for conveying machinery of much greater weight than has hitherto been used in the construction of breakwaters, and depositing by means of the machinery larger masses of material than have been hitherto used in such works.

29,506. Then the result is, that the comparison now brought out is not the comparison of a new mode of construction as to material with an old mode of construction, but merely of a new mode of carrying

out and depositing the material, and building the enclosing walls with the ordinary mode?—Quite so. There is nothing novel in the plan of the walls themselves.

29,507. (*Capt. Vetch.*) Mr. Abernethy, have you made any comparison between the cost of your work and the cost of that adopted at Dover by Mr. Walker?—I have not.

29,508. I am presuming that he has carried the end of his breakwater now out into 7 fathoms water, and we understand that the cost of his work averages about 1,000*l.* a yard run. What would be the difference—the comparative difference—between these two plans, yours and Mr. Walker's?—Of course the cost of the Dover pier is far beyond any estimate I have made of this work; and I think the large cost of the pier may, probably, arise from the fact that it is carried on solely from the end, and that the class of material used is small, comparatively speaking, consequently a great deal of time is consumed in the construction of the work.

29,509. Well, you are aware that at Dover the building takes place entirely by means of the diving-bell under low-water mark?—I believe it does.

29,510. And that every stone is laid with the same precision under the diving-bell below water as it would be above?—Yes; and I believe the diver has as much labour in setting a small stone in that way as he would have in setting a gigantic mass of masonry.

29,511. But upon the whole, taking the pier at Dover as compared with any other breakwater pier, and supposing it was finished, which do you consider the best work being made?—I should prefer the Dover pier.

29,512. Then you would object to it chiefly on the score of expense?—Yes; the expense appears to be great. But I think when the work is finished it will be, as a breakwater, a perfect work.

29,513. You have spoken of using large blocks of stone for the under courses of an upright pier?—Yes.

29,514. Do you consider that that would tend to diminish the cost of the upright wall?—It certainly would do so, for the large blocks might be deposited as easily as blocks of a much smaller size.

29,515. And by using there large masses of masonry much time would be saved in the construction of the work, and you would be out of danger sooner?—Yes; three or four courses of blocks, such as I contemplate, would, in 5 fathoms, bring you up above low-water mark.

29,516. And if carried on barges, would they not in transport have about half their weight?—They would.

29,517. Would you look at this section of a breakwater at St. Ives, and tell me if it agrees pretty nearly with your views?—Yes; this is a breakwater of similar construction to that I propose. It shows large masses of masonry below low-water mark; but I should continue that system further, and face it with large masses of masonry up to high-water mark.

29,518. But when you get above low-water mark there is no difficulty in laying the courses?—There is not.

29,519. What do I understand to be the difference of cost between this model plan before us and that which is involved in the construction of the breakwater at Holyhead?—The comparison which I have made is made upon the supposition that I adopt the Holyhead system, and that that system is adopted in the Bristol Channel, where the rise of the tide is very great. Using that data, I estimate the cost of the Holyhead system adapted to a breakwater at Swansea at 1,742,620*l.*, and of a breakwater constructed upon the system shown on the model at 895,400*l.*; that is, for a breakwater 6,600 feet, or 2,200 yards in length.

29,520. Suppose this system had been substituted at the breakwater at Holyhead for that we now find there, that would be the comparative rate of difference in the cost between the two?—It would; for I have taken the quantities and calculated the material at the same prices in both cases.

29,521. I suppose you consider the Plymouth breakwater to have arrived at a state of repose?—No; I believe that occasionally now the facework may be liable to disturbance in very heavy gales.

19,522. I mean the outward sea face?—Yes, I should suppose so; I used to visit it very frequently while it was in process of construction.

29,523. Do you consider that the rubble work outside the Holyhead breakwater has come to a state of absolute repose?—No, I think not; I think the sea face of the sea slope will never come to a state of absolute repose until it is pitched with substantial masonry.

29,524. I think you said that many of the blocks at Holyhead, that is, of the outward face, had been converted into boulders; have you yourself observed that to be the case?—Yes; I suppose it will be the case unavoidably.

29,525. But you have not observed it as a fact?—No; I have not observed it, but it appears to me unavoidable.

29,526. But looking at the time it has been up, if it is unavoidable, as you say, would it not before this have become apparent?—I should think so; and I have no doubt, if an examination were made, that the mass of stone on the sea face will be found to be rounded.

29,527. If that should be proved to be the case, it would be a great detriment to that particular mode of construction, would it not?—It would; the stones forming the slope seaward must be disturbed and rolled about by the action of a heavy sea, and that being the case, I cannot see how they can avoid being rounded by attrition.

29,528. Can you say from your own observation that that is the case. Have you yourself observed it?—No, I have not; but I suppose it is so, and I have heard it stated that such is the case to a certain extent.

29,529. Then one of your objects, I suppose, is to prevent this change—this reduction of the rough stones into boulders?—It is.

29,530. (*Mr. Coode.*) The rate of progress, in this proposed plan of yours, would depend upon the rate at which the piles could be driven, would it not?—It would.

29,531. The first set of piles?—Yes; the first set of piles.

29,532. And these would necessarily have to be driven from barges, I think I understood you to say?—They might be driven from barges, or they might also be driven from staging for a limited period of time. Suppose a few of the piles driven and connected together by the tie pieces above and below, for a short period, above low-water mark, they might be driven from the staging; but as a general rule, I should say they would have to be driven from barges.

29,533. And at a level of 5 feet above low-water mark?—Yes.

29,534. Do you think that the Mumbles, where the tide runs at the rate of 2 or 3 knots an hour, the piles could be pitched at any other time than at slack tide?—Yes, I think so; and when we spoke of the tide running there at 2 or 3 knots an hour, it must be recollected that that is only round the Mumbles Head.

29,535. Do you think that as the work progresses, the rate of tide will diminish, or do you not think that it would carry that rate of tide with it?—I think that a wide opening being left between the Mumbles Head and the end of the breakwater near the land, there would be no fear of a very strong tide passing round the head of the breakwater.

29,536. But if the tide runs at the rate you speak of opposite the Mumbles Head, do you think that the projection of these works would reduce it?—It would not.

29,537. But you would carry at least the same rate of tide with you?—There would be no difficulty in the matter. I have often myself driven piles from barges in a stronger current.

29,538. Do you think you could pitch these piles accurately, in so great a depth of water, and with a current running at least 2 knots an hour?—I do.

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29,539. That you would not have any difficulty either in pitching or driving ?—None at all.

29,540. Could you pitch them at high water ?—No, of course not, in that case, because the top of the pile is only 5 feet above low-water mark ; therefore I could not pitch them at high water.

29,541. The top of the pile would not be bare until about half tide ?—No, not till about half tide.

29,542. Then you must necessarily pitch the pile sometime between half-ebb and half-flood ?—Just so ; but I think by using steam hammers placed in barges we might drive these piles with great rapidity.

29,543. My question had not reference to the rapidity of driving, so much as to the possibility of pitching them accurately, in deep water, with a stream running 2 or 3 knots an hour ?—In a stream running 2 or 3 knots an hour there could be no difficulty in pitching them. I have myself driven piles in a river current quite as strong.

29,544. May I ask in what depth of water ?—In 10 or 15, or 20 feet water.

29,545. Where was that ?—I have done it at Aberdeen, in the river Towey, and at Swansea ; and I have constructed a pier at Solway Firth, 1,000 feet from the shore, where the tide runs at more than 3 knots an hour, and the piles for that work I have pitched with the greatest accuracy, although they were 60 feet in length.

29,546. And what depth of water ?—The depth of water at the termination of the pier is, at low water spring tides, about 13 feet.

29,547. Then you have no case analogous to this proposed work, where the piles would be driven in a depth of 40 or 50 feet at low water ?—Not in all respects analogous ; but I should say that to drive piles of 60 feet long in a current of 3 to 4 knots, and 18 feet below low-water mark, was a more difficult thing than to drive piles in a current of 2 knots 40 or 50 feet long.

29,548. Would not these piles require to be driven with great accuracy ?—No ; supposing a little deviation took place in the driving, it would not affect the stability of the structure, because the panels behind the piles from low-water mark to the level of the top of the rubble mound, and also the framing above, can be adapted to the piles when driven. And, supposing the distance in one case to be 10 feet and in another 12, that would not at all affect the structure.

29,549. I refer to the accuracy in distance between the two piles transversely ?—The distance between the piles transversely would be regulated to a great extent by the cross ties at the head. They would form the gauge.

29,550. Could these cross ties be fixed until the piles are driven ?—They could not.

29,551. Then how could they be used as a gauge until the piles were actually down, for they would have no support ?—Yes ; we could use them as a gauge even then. After the piles had been pitched and driven, these cross pieces might be put in, and a piece fixed across each as a guide to keep them in their places ; but I cannot conceive any practical difficulty in driving piles at that angle into clay without the aid of the cross ties, and keeping them accurate as to distance. I am constantly in the habit of driving piles in deep water, and find no difficulty in keeping the distances apart from each other accurate.

29,552. Suppose there were only the variation of an inch in that part of the pile which is in the ground, would it not cause five times as much deviation in the upper part ?—No doubt it would ; and it would after all amount to this,—that we should have to adapt the framework above to the altered width.

29,553. That is what I was coming to. The upper frame could not be put together until the piles were driven and their exact gauge ascertained ?—Just so ; and I should recommend the piles to be all driven (that is the mode we pursue at Blyth), and then when the work is gauged and the exact width ascertained, it is an easy matter to construct the framework to suit the piles.

29,554. You say that this system of constructing the staging would be less liable to damage than the system pursued at Holyhead ?—Yes, I think it would.

29,555. Take this model as it stands at present. I see there is a length of about 200 feet exposed to the action of the sea ?—Yes.

29,556. Do you not think that it would be liable to breaching during a gale of wind ?—I think not. But I should state, that in making this model my chief object was to show the work in different stages of progress, without exhibiting in the model the precise way in which I would carry out the work. I might, for instance, find it advisable to expose a less amount of timber than is here shown until the rubble mound had been formed and the whole frame secured.

29,557. You consider one of the advantages of this staging is, that it is connected longitudinally and transversely ?—Yes.

29,558. Do you know that at the breakwater at Portland they find it necessary to resort to just the opposite mode of proceeding ; that is to say, they always allow the last bay outer part of the staging to be merely temporarily connected with the inner stage, in order that if a heavy gale comes on, and any pile should be moved, they may only lose the small portion outside, instead of having long lengths of the staging carried away ?—I should think it would be necessary ; in that case the staging depends entirely on itself, but in this case the base of the staging is at once secured by the rubble mound, and forms a firm base for the superstructure.

29,559. In your case you are obliged to depend upon the staging itself for a time, until you have deposited the rubble mound in it ; but in the case of the staging at Holyhead and Portland there are no horizontal timbers exposed to the action of the sea ; whereas in your plan you have a considerable mass both of horizontal and diagonal timbers necessarily exposed to the action of the sea in a gale of wind ?—In the cases both of Holyhead and Portland, seeing that the stage is dependent upon itself, it would be unadvisable to connect the timbers by horizontal ties, but in this case the rubble forming a firm basis, the staging above is able to resist the action of the sea.

29,560. Then you do not apprehend any liability to damage from the sea lifting any portion of these horizontal and diagonal timbers ?—I do not. The buoyant power of the timber there—the creosoted timber—is much less than the power required to draw these piles out of the soil.

39,561. My question had reference not so much to tearing piles out of the ground, but rather to lifting the horizontal and diagonal timbers, and the breaking of the connexion of the framework ?—They are not put on until the rubble mass is brought up, and the pressure on the timber is then much less.

29,562. You propose to cut off the heads of the piles at the level of low water spring tides ?—Yes.

29,563. That operation can only be performed at spring tides ?—Of course.

29,564. Supposing a case of bad weather during the time of spring tides, that operation must be postponed for a fortnight ?—Yes ; but that is an operation that can be done almost at any time. Supposing the top of the pile to be 5 feet above low-water mark, the framework can be put over it ; and it is only when that is on, that the pile need be cut, and that is a question of 5 minutes with a cross-cut saw.

29,565. I do not exactly understand the extent to which you adopt packing. Something was said about packing at the last examination, but I do not see any now shown on the drawing. Will you explain to what extent you adopt hand packing ?—Above low-water mark I propose to carry on the work in lengths of 500 feet each. I should tip

certain portions along that 500 feet, and place men within the framework to level the ruble mass and see that it is properly packed against the outer planking, and then carry on another layer.

29,566. Do you not apprehend that the packing would be liable to be disturbed by the action of the sea in heavy gales of wind ?—If you carry the packing at the sides a little above the level of the top of the packing the action of the sea will not materially affect it.

29,567. That is, a broadside sea ; but in the case of Swansea, would there not be a considerable fetch from the south-east, to which the end of the frame would be open ?—A south-east sea would take the end of the breakwater at an acute angle, and we have never a very heavy sea from that quarter.

29,568. Is there not a fetch of 6 or 7 miles from the south-east ?—There is a fetch from the Skerweather Sands, but I have never seen a heavy sea.

29,569. Of what materials would you propose to construct the artificial blocks ?—Of sandstone and Aberthaw lime.

29,570. What period of time would be necessary for the blocks to consolidate ?—I should say about six months.

29,571. Do you know any case where large blocks have been built with lias lime mortar in that way ?—Not for that purpose. I have seen large masses built, but not for that purpose. I may give you an instance of the use of that sort of lime. About six months ago I had occasion to put down a mooring post for a temporary purpose, and this was done by bedding the lower part in a mass of rubble 8 feet square and 6 feet thick. At the end of six months the contractor undermined the mass, and the post and the rubble tumbled down some 20 or 30 feet unbroken, and he was obliged to blow the rubble mass to pieces with gunpowder before he could remove it.

29,572. What is your estimated cost of the large rubble blocks ?—Sixteen shillings per cubic yard.

29,573. That includes the cost of building, plant, and setting ?—It includes the cost of materials and of setting. The price I pay for common rubble at Swansea is from 8*s.* to 10*s.* per cubic yard.

29,574. These blocks would have to be built in moulds, would they not ?—Not necessarily ; I should not use moulds in building them ; that is to say, a mould in the proper sense of the term.

29,575. What plan would you adopt to insure their accuracy of form ?—Building them from a level base with a common square ; it is easy to keep the sides vertical, sufficiently so for the purpose for which they are required, without building them in a mould.

29,576. Do you consider that a diver could manipulate blocks of such a size, in a tideway, as easily as blocks of a smaller size ?—I think he could. All that the diver has to do is to transmit signals. Everything can be done by the hydraulic machine ; the blocks can be moved in any direction and set with great nicety.

29,577. You think the diver would have nothing to do but to transmit the signals ?—Yes, I think so.

29,578. Have you ever constructed any work in such a tideway by means of divers ?—No, I have not ; but divers do much more difficult work. The work here at Westminster Bridge is much more difficult.

29,579. You imagine the whole work can be done by divers signalling from below ?—I think so.

29,580. What is the specific gravity of the copper slag you mentioned ?—It varies from 10 to 12 cubic feet per ton ; some is heavier still. It varies at different works.

29,581. Will you give us the rate of progress of the work according to your system,—the rate per annum at which you would construct the work ?—About 2,000 lineal feet per annum.

29,582. That would be an uniform rate ?—Yes ; that would be an uniform rate.

29,583. About 40 lineal feet per week ?—Yes.

29,584. In comparing the cost of the work at Holyhead and the cost of the work which you propose at Swansea, you take the prices according to your own estimate and not the actual cost of the work at Holyhead ?—Yes ; I had no means of ascertaining the actual cost of the work at Holyhead, and the only method I could adopt was to apply the same prices in both cases.

29,585. Will you give us the number of cubic feet of timber in your stage, per yard forward ?—I will prepare a statement.

29,586. And send it to our secretary, if you please ?—I will do so.

29,587. You said the work at Plymouth had been quite successful, and you recommended pitching in front of the rubble wall at Holyhead. Are you aware that the difficulty at Plymouth has been in retaining the pitching ?—I don't think I stated that the work had been successful, but that it afforded a good example. I am aware that the pitching has been disturbed at Plymouth. That is one reason why I think that even the Plymouth breakwater is objectionable, because the long slope is liable to disturbance. If there is the least subsidence in the rubble mass below, that will follow.

29,588. You stated, as I understood, but perhaps not erroneously, that the Plymouth breakwater was successful ?—I do not think that I exactly used that term. I say that I consider it a more consistent example than any other on the long slope system.

29,589. There is one portion of your evidence to which I am alluding, in which you spoke of the Plymouth breakwater. I was about to ask whether you are aware that they are adopting courses of masonry set on horizontal beds, to protect the foot of the pitching, and that the pitching which you recommend at Holyhead has failed at Plymouth. At Plymouth they are abandoning pitching, or rather have been compelled to set masonry on horizontal beds to protect the foot of the pitching. When you said pitching, perhaps you did not mean pitching in the ordinary sense of the word ?—I may, perhaps, use the word facing, and say facing of ashlar.

29,590. I think you estimated the piles at 4*s.* per foot, including creosoting ?—Yes ; I have taken the whole of the timber at that price throughout. That would include planking and everything else.

29,591. In reply to a question, I think you said that in the Holyhead form of stage it would be necessary to have the piles 20 feet apart transversely, and 30 feet longitudinally ?—Yes.

29,592. Are you aware that at Holyhead the piles are 30 feet apart both longitudinally and transversely ?—Yes.

29,593. Then would not that tend to reduce the cost ?—Yes. But in this case I do not think it advisable to have piles for staging more than 20 feet apart. Here you have a 30 feet rise of tide, and I think, under such circumstances, it would not be advisable to have the timbers more than 20 feet apart transversely, considering the great length of the piles, 86 feet.

29,594. Are you aware that a great portion of the piles at Portland are upwards of 80 feet in length, and have only two balks in section ?—Yes ; but at Portland you have comparatively a small rise of tide. A rise of 30 feet makes a material difference with regard to staging.

29,595. But supposing the length of the piles to be the same, how can a pile of 86 feet require four balks at Swansea, when two are sufficient at Portland ?—The rise of the tide renders it necessary.

29,596. In what respect should you require a stronger form of staging ?—Because you have a much greater height of pile out of the water, and it is exposed to the constant lashing of the sea. You have at Portland, comparatively speaking, a smaller portion of pile out of the water than at Swansea.

29,597. But with the system of upright walls there is no lashing of the sea ; the wave is not converted into a percussive wave ?—No, it is not.

29,598. Then the rise of the tide would not make

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any difference ?—No. In the one case the work is not equally exposed to the action of the sea as in the other. As soon as you get the rubble to a certain height you have the percussive sea acting on the staging.

29,599. But if the piles at Holyhead, formed of two timbers, are sufficient to resist the stroke of the percussive sea, surely piles of 86 feet, having a simple undulation to contend with, would suffice ?—The staging at Holyhead has been over and over again washed away, and many lives have been lost, and locomotive engines and waggons have been dropped into the sea. I do not think the staging sufficient at Holyhead.

29,600. May that not be owing to the want of attention in the construction ?—I think it is owing to the want of strength.

29,601. Seeing that it is of the same description at Portland, and has been successful there, may there not be some defect in the construction, or want of proper precaution on the part of the contractor to whom the stage belongs at Holyhead ?—There may ; but is not the rise of tide different at Holyhead, and is it not more exposed to gales of wind ?

29,602. But when on shore gales of wind arise, they are as heavy at one place as at another. I think you made an estimate for a breakwater at Wick 18 months ago ?—Yes ; I did.

29,603. In that case you proposed to adopt the simple rubble mound confined within timber framework ?—If I recollect right, it was a rubble mound within timber framework of a different construction from the present plan.

29,604. The timber framing went to the bottom ? —Yes ; it went to the bottom.

29,605. And the rubble was confined entirely within the framing ?—It was.

29,606. Your estimate for that work was 178,000*l.* ? —I think it was. If I recollect rightly, it was 70*l.* per foot.

29,607. I believe, when you were examined before a Committee of the House of Commons in March 1858, you proposed a different plan for the Mumbles than that now produced ?—I did. I proposed to have the rubble made to the level of low-water mark, but on reflection as to the effect of constructing the work, and seeing the destruction which had taken place at Holyhead, and taking into consideration the information which I derived from your evidence as to the effect of the sea, I thought it advisable to confine the rubble mound to the height shown in my design.

29,608. In answer to question 2037, you say, " The present mode of constructing a breakwater is " by the formation of a large rubble mound to a " depth of 12 feet or thereabouts below low-water " mark, and upon that to build a superstructure " of masonry. That mode of construction in- " volves a great expenditure of material and time, " and consequently of money." Now is not that essentially, if not identically, the same plan as the one you now produce ?—I have observed that passage in the evidence, and think I did not make myself sufficiently clear. What I meant to say was, a superstructure placed on a rubble mound 12 feet below low-water mark.

29,609. As the passage now stands, the plan therein described is identically the same as that which you now produce ?—Yes, with 15 feet instead of 12 feet.

29,610. The only difference is that you have in this case a greater quantity of the more expensive material, and a smaller quantity of the less expensive material, a greater quantity of masonry, and a less quantity of rubble ?—That is so.

29,611. Then the plan you propose is the same as that which appears here to be objected to ?—I don't know how that was reported, but I don't think that was my meaning. The rubble mound was carried higher up ; but I was under the impression that you had based your superstructure at Portland 12 feet below low-water mark, and that in that respect you differed from the mode of construction at Holyhead. But that is not the case. The section you recommended to the Committee in 1857 certainly contemplated going below low-water mark. You furnished a section, and then I observed your mound was below low-water mark.

29,612. Do you not think that a section of the kind shown with upright walls upon plan No. 3 in the Appendix to the Report of the Select Committee of the House of Commons in 1857, might be constructed from a stage similar in principle to that adopted at Holyhead ? Do you see any practical difficulty in constructing such a work from a frame similar to that at Holyhead ?—No, I see no practical difficulty, but it is not the mode I would adopt.

29,613. But there is no practical difficulty ?—No ; but I do not think it the best mode.

29,614. The section on that plan, and the section produced by you, are essentially the same ?—Yes.

29,615. As regards all their prominent features ?— Yes.

29,616. The only difference is in the mode of constructing the stage ?—Yes, that is the difference. The material used and the modus operandi of carrying out the work are the same.

29,617. The novelty consists only in the stage itself ?—In the stage, and in using large masses of masonry, and setting them by hydraulic power. The use of staging of a more powerful class, of machinery of a more powerful class, and of greater masses of masonry than have been before employed.

29,618. Has it not been proposed before to use large masses of masonry ?—The late Mr. Rendel, in his report on Hartlepool, suggested the use of large masses of rubble masonry, and in that case to build from the foundation of the sea a vertical wall. That was a great departure from the system he had adopted at Holyhead, and it would seem as if he had changed his mind.

29,619. Do you not think that he, like most judicious engineers, would vary his mode of construction according to the circumstances of the locality ?—I do not think there is such a difference between the two localities as to render it necessary to vary the plans so much.

29,620. With respect to the introduction of hydraulic machinery, is it necessary to employ such machinery, seeing that the blocks have only to be lowered, and not to be raised ?—I think it is necessary ; I think you ought to have the power of raising a block as well as of lowering it. A block might be deposited on a site which was found objectionable. It might not have a level bed, or there might be other reasons for raising it.

29,621. But would it be necessary to raise it out of the water ? Would it not be easily lifted in the water when its weight was so much reduced ?—Of course it would have to be lifted in the water. It would be submerged. It would not be necessary to raise it to any great height.

29,622. Practically the weight would not be very great ?—No, it would not.

29,623. Would the use of hydraulic machinery introduce a complication into the apparatus ?—No ; I think it exceedingly simple, and prefer it to the ordinary mode of working cranes.

29,624. You consider it more expeditious ?—Much more so.

29,625. Are you aware of the mode in which the stone is set at Portland, where a chain is used with two free ends, and the lowering of one block raises the " lewis" ready for the next ?—I am not. I have not visited Portland.

29,626. But if you were informed that that mode was adopted, should you not think it as simple and expeditious as any that could be devised ?—Probably for such masses of masonry as you use there it might be so ; but, in dealing with large masses, it is necessary to have the power of lifting them. Large masses must be brought on a truck, and raised and lowered over the side.

29,627. Still, the raising of an inch would suffice ?

—Yes, that would be sufficient. I prefer the hydraulic power on account of its great speed.

29,628. (*Chairman.*) You mentioned a pier in the Solway Firth; where is it, exactly?—It is at a place called Silloth, about 21 miles below Carlisle.

29,629. Is it exposed to any considerable action of the sea?—In westerly gales it is exposed to a considerable action of the sea.

29,630. What lift of sea would you say at a guess?—Not the North Sea wave, 10 or 12 feet in height at the extreme.

29,631. Ten or twelve feet from the crest to the trough of the sea?—Yes; not more than that.

29,632. You have heard of the wave screen?—Yes.

29,633. If there is a considerable length of pier, would it enable us to form any estimate of the probable effect of a wave screen in stopping the wave and diminishing the undulation?—To a certain extent it would; but there we have a percussive wave; and in Mr. Calver's case he deals with the deep-water undulatory wave; at Silloth we find the water on the lee side much smoother than on the weather side.

29,634. Would it be possible to institute any series of experiments there to test the amount to which the undulatory wave is reduced by passing through the pier?—It would so far as there is a percussive sea, but not an undulatory wave.

29,635. But the percussive sea is the most difficult to deal with, is it not; and if the wave screen is effectual for that, it would *à fortiori* be as good for the undulatory sea?—I think that scarcely follows. The piers at the Solway are at a slight angle to the sea, and the breaker has to pass through all the piles before getting to the lee side, and the consequence is that we have comparatively smooth water on the lee side, but there is a certain amount of undulation. In deep water, I think the effect of an open screen would be that you would have a swell on the opposite side, because it would pass through the openings.

29,636. So that the swell inside would be as high as on the outside?—It would, to some extent, be diminished. The crest would not be found so high on the lee side, but you would still have a ground swell.

29,637. You think the ground swell would be very little diminished?—Yes; I think so.

29,638. And therefore the breakwater would be of comparatively little use?—I think, as a breakwater, it would not be of much use. I think the only way in which you can break the deep-water wave is by arresting its progress, and throwing it back.

29,639. Is there any other construction that you are acquainted with that would enable us to form an idea of the probable effects of a wave screen?—There is not.

29,640. There is none that has occurred in your experience?—A good many in shallow smooth water, but not in deep water.

29,641. You know of no such work in deep water?—No; not in deep water.

29,642. Now with respect to the machinery for handling these large blocks below water, have you considered that matter in any detail?—Only to a certain extent. I have been in communication with Mr. Armstrong, of Newcastle, one of our most ingenious mechanics, and he sees no difficulty in the way.

29,643. Would you move the blocks laterally by machinery under water?—I contemplate moving them entirely from above. I think that would be a less complex plan. I am aware that there is a plan for having a supplemental cylinder below water, but I think there will be great difficulty in supplying it with the necessary water power. We work our hydraulic machines 800 or 1,000 lbs. to the square inch, and I think it is impossible to get any flexible pipe to bear anything like that pressure to begin with. I think every thing should be done from above.

29,644. Of course you have contemplated the action of frost on hydraulic machinery. Would not that cause a certain amount of delay in winter?—No; for there is a steam-engine attached to such machinery.

29,645. (*Capt. Sulivan.*) You propose to work in lengths of 500 feet?—Yes.

29,646. What do you mean by that?—I mean that I should have cranes setting the facework along that 500 feet, course after course.

29,647. That refers to finishing, not to the first construction?—I should extend the timber staging in such a way that as soon as one 500 feet was up to high water, I should be ready to go on with another 500 feet.

29,648. Do you mean us to understand that the facework is an after consideration; that the original construction was a timber framework and rubble?—No. I have always contemplated the formation of a permanent work in connexion with breakwaters; but what I have stated is, that the timber breakwater would last for a long time, provided it should not be considered desirable to proceed with stone.

29,649. Then your working of 500 feet has only reference to that which would be faced at once?—Yes.

29,650. You talk of working in layers, what depth would they be?—Probably three feet at a time, inside of the framework.

29,651. If you only worked three feet layers, would you not be a long time before you got the next set of frames in?—No; the rubble would be distributed equally over the whole space.

29,652. Do you mean to say that 500 feet of timber would be left unprotected?—I should have 500 feet in process of construction.

29,653. I think you said in answer to Mr. Coode, that your breakwater would be exposed to an acute-angle sea from the south-east, but that it would not be a heavy sea?—Not at Swansea.

29,654. Then your great exposure would be——?—West and south-west would be the heaviest exposure.

29,655. (*Capt. Vetch.*) I think you said that these breakwaters would eventually require to be cased in masonry to protect them?—As works of duration.

29,656. You mentioned the breakwater at Plymouth as a case in point?—I did.

29,657. To that it is objected that the stones did get disturbed there. I wish to ask whether you know the fact that the seaward pavement of the Plymouth breakwater has stood remarkably well, except the mere toe, where the outer stones had begun to be disturbed, and that it was found necessary to excavate the rubble beyond, and to build in three courses of upright stones, to which the remaining inclined mass of the pavement or pitching is now attached, and that, with the exception of the mere toe, that the pitching has stood remarkably well?—Yes. I think the main disturbing action of the pitching would be that of the back tow. I was on the breakwater four months ago, and minutely inspected it from one end to the other, and it was perfectly clear to me that it was the back tow that disturbed the sea slope.

29,658. Are you aware that previous to the construction of this masonry work at the toe, blocks of from 10 to 15 tons weight were thrown up upon the pitching?—Yes; so I heard.

29,659. And actually over it?—Yes; so I have repeatedly heard the fact stated. In fact the man who keeps the lighthouse mentioned several instances to me.

29,660. But in fact the toe work now prevents these great blocks from coming up?—I have no doubt it will.

29,661. (*Mr. Coode.*) At what price per ton have you estimated the rubble that has to be barged?—5*s.* a yard deposited.

29,662. Five shillings per cubic yard for that which is barged?—Yes. We have about two miles to convey it.

29,663. I think I understood you to propose to

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construct some portions of the work in isolated sections, did you not?—Necessarily there would be, one portion of the breakwater; but it is quite practicable to stage the intervals between one breakwater and the other.

29,664. In the price of 5*s.* per yard, have you allowed for lifting the material that is above the level of high water?—I have applied the price of 5*s.* to both sections. In the case of the packing above the rubble mound I have estimated it at 6*s.*, in my own case, because there is some extra labour in depositing the material within the framework.

29,665. Then, if I understand rightly, the material below the level of high water is estimated at 5*s.* per cubic yard, and that above the level of high water at 6*s.* per cubic yard?—Yes.

29,666. You have assumed that in all cases it would be necessary to adopt a masonry structure. Do you not think that there are a great many cases where a simple rough rubble mound would answer the purpose of a breakwater, if that mound is formed of stones from six tons weight down to fine chippings?—No, I think not; I think that in the case of such a mode of construction the sea slope would in the course of time become very much disturbed, and wear away; and, under any circumstances, that it is a very rude mode of constructing a breakwater, and must necessarily be expensive from the quantity of material used in it. There is another thing I should add. I think it would be a great commercial advantage in the construction of breakwaters to have a vertical wall in the internal face, particularly one connected with the mainland, so that you might use the breakwater as a wharf.

29,667. That rather touches the question of piers, and harbours of commerce; but having reference merely to the refuge question, and to the breakwater simply as such, I ask whether you think it is not possible to construct a breakwater with rough material alone, more economically than with a rough rubble base and masonry above?—I think not. I think the quantity of material that you would require would be so much increased by that mode of construction that you could not construct it at a less cost; and unless the material was of a permanent character, such as granite, greenstone, or sienite, the sea slope would in process of time become a mass of boulder stone, would wear away, and you would require to renew the rough rubble mound constantly, to keep it up to the required height, because it will become depressed in process of time.

29,668. Even supposing the sea were allowed to form its own slope, before the tipping process was stopped?—I think so.

29,669. I think you said, in your evidence before the Select Committee of the House of Commons, that by the system you propose to introduce, you would only occupy in the construction of the breakwater about one fifth of the time which is now required?—I forget the exact time I mentioned; but I think that would be almost consistent with what I have said in the report which I have presented to the Commissioners. In that I speak of $4\frac{1}{2}$ years for executing 2,200 lineal yards of breakwater. If I recollect right, the Holyhead breakwater was commenced about 1844 or 1845, and is not yet complete, nor is it of that length.

29,670. The Holyhead breakwater is somewhere about 8,000 feet long?—Of course the greater portion of that is the rough breakwater. The superstructure may be said only to have commenced, and it cannot be regarded as a completed work.

29,671. Still it answers the purpose of shelter in the meantime?—No doubt it does.

29,672. Which is all you could hope to obtain by your timber staging with rough rubble between?—Quite so.

29,673. As yet it is but an estimate that you could construct 2,000 feet per annum?—Of course it is an estimate. I have taken into consideration the facility of procuring material, and the fact that the greater part of it is previously prepared on shore. Taking 12 months to make the necessary preparations, that no delay should occur when once the works are commenced, from the small experience I have had in constructing the work at Blyth, I think if I could do 130 feet of that in the week I could do 40 feet in this.

29,674. Is the work at Blyth below the level of low-water spring tides?—It is not.

29,675. Then are the circumstances parallel?—The circumstances are so far not parallel; and of course allowance must be made for the greater difficulty of executing the work now proposed; but the means and appliances at Blyth were small in comparison with those I should apply in this case.

29,676. Your estimated progress is at the rate of 2,000 feet per annum, and you stated before the Select Committee of the House of Commons that you could construct a work about five times as fast as by the present system?—Yes.

29,677. Then by that statement you would make the present rate of progress about 400 feet per annum?—I think that is considerably beyond the progress made at Dover. I do not know whether it is beyond that made at Holyhead.

29,678. Will you be surprised if I tell you that the rate of progress made at Portland only last week, during the very short days, amounted to a rate of 1,250 feet per annum?—No, I should not; for I have no doubt you have very much improved upon Holyhead at Portland in the mode of carrying out the work.

29,679. Does not that show that the present system is capable of very rapid progress, more especially when you take into account the fact that the rate of progress at Portland is limited by the comparatively small quantity of material supplied by the convicts?—I think that at sites such as Portland or Holyhead, where you have an immense mountain of material close adjacent to the site of the breakwater, by proper means and appliances you can carry on a work with great rapidity; but in the case of a breakwater, in the open ocean, where you have not that facility, the circumstances are materially changed, and in that case I think you would not be able to construct a breakwater on the Portland system at anything like the rate you have done there. In both the cases I have mentioned you have a large mountain of material at hand, and it is only the question of the means of excavating that material and depositing it in the sea.

29,680. I think you have already stated that the rate of progress in your proposed system would depend upon the speed at which you could put in the piles?—A good deal would depend upon putting in the piles.

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29,681. (*Chairman.*) Where do you reside?—At Cologne.

29,682. Will you now proceed with any statement you may wish to make to the Commissioners on the general subject of breakwaters?—What I wish to propose to the Commissioners is twofold; first, as to the mode of building a sea wall; and, secondly, a method of treatment of rivers by which bars may be avoided, and the area of a river may be made available as anchorage.

29,683. Will you proceed with the last-named subject first? We will take the question of construction afterwards?—If an island is put before the mouth of a river it will prevent the assault of the ocean's power against the debouching stream, and when a bar is formed by the opposition of two forces, the attack that the river experiences from the ocean stream will be diverted either to the right or left of the island; and when the influence of the ocean comes in one direction, the river will take the opportunity of escaping in the

other; because the river will not run out against the power which opposes it. In answer to your first query, contained in your letter to me, and to show the reasons for alleging that the forming of island breakwaters at the mouths of tidal rivers would have the effect of preventing the formation of bars, I will read the following statement:—

Before this question is answered, it is proper to observe, that the bar which is formed by the opposition of forces is that formed by the ebb only, at the time that it is hindered in its progress outward sea wise, by the wind being against it, and producing a sea which opposes it; that is, when there is an on-shore wind of some sort.

The flood tide without the aid of the wind, *i.e.* the wind-excited sea, promotes no bar; and unless the ebb is hindered by the sea roll, it ordinarily removes the deposit made by the sea-borne drift during the hours preceding the turn of the tide. Hence it is desirable to protect the power of the ebb.

When the ocean opposes the ebb, the alluvium, with which the ebb is charged, and the detritus sea borne, are, in consequence of the eddy which takes place in the opposition of the two forces at the junction of the waters, dropped at the point of contention, and go to increase the matter already brought up under the influence of the wind-excited sea, and to consolidate it. Hence the desirableness of defending the power of the ebb, undiminished by any adverse action of the water of the sea by the interposition of an island breakwater. This is what occurs at the mouth of the river.

What takes place in and up the river, under the influence of the flood, is, a gradual deterioration and diminishing of the depth of the river by a double depositum of the detritus, which is borne along and held in suspension by the inpouring flood, until the power of sustaining is lost by the action or opposition of the stream of the river.

This is a process which I explain by saying that the river stream, which is the same as the checked ebb, sustains a running fight with the flowing flood; since it is, at each succeeding instant, and ever at a different spot, overpowered by its aggressing and irresistible adversary; the struggle is unintermitting, but the point of contention is, each spot in succession, between the river's mouth and the highest point influenced by the tide. The opposition produces eddy, and the spot where it takes place is shoaled to the extent of the amount of deposit dropped by the charged waters.

Now, if a river were a regular canal, and the bottom of it an inclined plane, and that it were possible to see the bottom of it after the action of one tide, the appearance presented would be as if a coat of distemper of mud or sand colour had been exquisitely laid on with a brush; excepting that the coat of distemper would be thickest at the mouth of the river, and would gradually taper up to nothing at the top of the tide.

Now every tidal river, as it must be subject to this action twice daily, will suffer deterioration yearly to the amount of 730 laminæ of deposit, and this will be greater or less according as the sea water is more or less charged with sand, and the fresh water with alluvium. But, more or less, during the flood, every year and day by day this reduction of depth takes place and must; and all rivers whatever are suffering under this inevitable consequence of a flood water coming in dirty and returning clean, or cleaner than it came in, by reason of the contention carried on between two forces; the eddy and the deposit being the consequence. Hence that universal complaint against river engineers for the asserted deterioration of rivers under their scientific hands and schemes is unjust, whatever the particular inefficiency or the weakness of the efforts they make to improve the navigation. For this disease, namely, the flood tide's daily damage of a tidal river, nothing is a remedy but dredging; and for the facilitating of this operation, it is very fortunate that the deposit does not take place evenly, as it would in a straight canal, especially by a tide stream unaffected by gusts of wind, but is driven about by currents and bends of the rivers, thus causing it to deposit in shoals and spits. For, these accretions are, as to the river dirt, what the scraper's process is to the scavenger's dirt, which is collected in heaps for the purpose of being more easily shoveled away, and they are, in reality, in this sense, a great advantage. Hence we may judge of the fitness of an engineer for his position as an engineer to a conservancy, when he complains that 50,000 tons of sand have been dredged away in a year from a sand in a river, and that not a bit of good has been done by it. If he stop his dredging machine, he will soon discover what good has been done, that he little knew of.

The question then being, "the use of an island breakwater to prevent the formation of bar," the answer is, "in the defence of the ebb stream from the assault of the "ocean during on-shore winds." For, if the matter which constitutes bar be brought up by the sea on the flood, it is the power of the ebb alone which operates to dislodge and dissipate it. Hence, by the interposition of an island between the river and the sea, the direct action of the sea in on-shore winds to oppose the ebb stream is prevented; and the ebb is, therefore, allowed full power to range, with best effort, through the channel formed between the shore and the island, so as that it may sweep out, in its course to the sea, all that has been previously deposited, and be aided to carry on its own contention with the ocean in an *oblique* instead of by a direct action; by the latter of which processes, viz., direct action, bad bar is created, which is what would be created at the river's mouth without the island; by the former, viz., oblique action, spit merely, which is all that would now form at the flood-tide end of the island, when the wind concurred with the direction of the ebb, and be, perhaps, wholly dissipated at the ebb-tide end of the island, when the wind was in the direction of the flood.

This is capable of illustration by a series of five double diagrams, showing the difference of the action of the roll of the sea against the ebb, when its motion is—1, directly opposed to the débouche of the river; 2, when it is oblique with the stream; 3, when it is oblique against it; 4, when it is coast-wise with the ebb; and, 5, when it is coast-wise against it.

When the expression "preventing the formation of bar" is used, there ought to be coupled with it, with reference to the defended power of the ebb by the interposition of the island between it and the sea's roll, "and the facilitating the removal of bar."

If a bar is formed only at a certain time of the tide, it very much simplifies the operation of meeting it. I believe that the bar, by the opposition of the two forces, only forms at one particular spot. That opposition is when the ebb tide is going out, and is met, not by the opposing flood, but by the sea affected, by the wind, and not by the tide. If the two forces meet each other directly, that is, when the ocean comes in directly facing the river, there is a sand formed, such as at Southwold, which is exactly right across the mouth of the river, as shown on the plan which I put in. My proposition is to raise that sand into an island, by promoting its formation; because, as nature has already shown a power of half forming an island there, I should suppose she would form a whole one if you provided her with favourable circumstances. It is evident that, when an island was raised on that sand, you would have, realised, a roadstead with two entrances; and if you could in any way realise that you would have the very great advantage of being able to get in and out with all winds.

28,684. Does that conclude what you wish to state under the first head?—No. I think that shows the effect that would be produced when the prevailing wind is in direct opposition to the outfall of water. But if the prevailing wind is in an oblique direction to the outfall of water, then the formation takes rather the form of a spit, but still it lies across the mouth of the river, and becomes equally a bar; and, in all cases, whether the entrance of the prevailing wind is oblique or direct, an island will have the effect of making still water in the river; and, by giving a double exit to the river, will prevent the position of the bar being direct, so as to lie across the mouth; it will rather form a spit at the end of the island; but, in any case, there would be no danger of any bar being formed by which ships should be prevented getting into the river, as they are by the very large bars which now exist.

If you have finished your statement on the first head, we will ask some questions on that, before we go to the next.

29,685. (*Sir F. Smith.*) When was your attention first directed towards this important subject?—When I lived at Dover in the years 1842–3, when I lived on the beach, there.

29,686. I believe that in front of the mouth of Dover Harbour there was always a considerable bar, with a wind in certain directions?—Yes.

29,687. How do you suppose that bar was formed?

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—The shingle is brought up, by the sea, raised by the wind.

29,688. By the flood tide or the wind ?—During flood tide, when acted upon by certain winds.

29,689. And what opposing force is there to cause the formation of that bar ?—There, it dropped in, round the front, where there was a place for it.

29,690. If I understand what you said a short time back, it was, that a bar was formed by the meeting of the ebb tide and the sea raised up by the wind ?—Yes.

29,691. Now there was nothing to meet that sea raised up by the wind at Dover, was there, and so cause a bar ?—When the wind sets into a basin it always makes the water inside higher than that outside. Nature is always endeavouring to recover its level, and so, at every opportunity, there would be a tendency of the water to go out.

29,692. But there is no mass of water within Dover piers to be at all equivalent to the ebb of a river such as the Tyne ?—But there is a very heavy return. If the water is always blowing into a space, it becomes higher inside than outside, and that higher water is always acting like a return rapid.

29,693. But there is no great amount of back-water ?—No, not as a quantity, but there is great power in it.

29,694. Therefore your precise theory did not, I imagine arise solely from a consideration of the state of things at Dover ?—No ; I do not suppose it did. I have not affirmed that; but I was first of all led to consider the case by its being proposed to make a great work at Dover. There they proposed to build a work out in six fathoms water, and at a great cost. I proposed a plan of building which would make it much more easy to be done, and at a much less cost. It was afterwards, in consequence of the model being made for the erection of that work, that I was led to see that the principle of building would be applicable in all places where sand is formed. I saw, amongst others, this case of Southwold, which suggested the Island theory to myself. I found subsequently that wherever there was an island that there was a good entrance and exit both ways, and no bar, and therefore I concluded that my reasoning on the Southwold case was just.

29,695. When did you first observe Southwold ?—When the Tidal Harbours Commissioners First Report was printed.

29,696. Have you seen it of late years ?—I went down once, and Lieutenant Ellis was good enough to show me over the place. He was surveyor to the port.

29,697. What interval was there between your first and last seeing it ?—I have only seen it once ; but I saw the report of the Tidal Harbours Commissioners, and read all that was written in the engineers' reports upon that subject, and went there subsequently.

29,698. That bar is made naturally; by no artificial work ?—There are piers there, and there has been a great difficulty about them. They have been first in one direction and then in another, and have been lengthened, and it has been suggested to widen and to narrow them.

29,699. I think on the chart you have put in you show the bar at some distance from the pier heads ?—Yes. That is not my chart; it is a copy of the chart which appeared in the report of the Tidal Harbours Commissioners.

29,700. You have shown the bar extending nearly half a mile along the front of the river ?—That is the Hayle Sand, I think. That has been formed at various times. The inner bar which is formed at Southwold is spit. It forms the corner of the sand, as is indicated there, I think.

29,701. Hayle Sand extends far to the north-east or north-west of the harbour's mouth, I think ?—Yes.

29,702. How do you presume that sand has been formed ?—I conclude it has been formed from time immemorial by the action of the sea-water against the out-pouring ebb in on-shore winds.

29,703. Do you know how far it extends in both directions beyond the harbour's mouth ?—I conclude that that chart is correct.

29,704. And nature, therefore, has formed a mode of access to the harbour's mouth ?—Nature has formed that bank. If it were worked up into an island it would be a defence to anything behind it.

29,705. Is it not a defence now ?—Yes ; at very low water.

29,706. You think that if that was raised to a higher level it would produce beneficial effects ?—Yes ; it would make a safe anchorage behind it.

29,707. What depth of water is there between the Hayle Sand and the harbour's mouth ?—There are soundings in feet upon the chart. I think the depth is 16 or 17 feet.

29,708. You are disposed to think that that mode of treating all tidal harbour mouths will be beneficial ?—Yes, with certain modifications ; but certainly as a general principle : whether the island should be placed more or less obliquely, would depend on the experience of the neighbourhood.

29,709. Is your object to prevent the bar at the harbour's mouth, or, to form a roadstead in which vessels might take refuge behind the island, between that and the harbour's mouth?—Both. I suppose that when the island is formed at the mouth of the river, it will so alter the conditions, that the force of the river will be sufficient to carry itself out either way, without depositing.

29,710. Are there any other situations in which you have considered that this system might be adopted with advantage ?—Smithic Sand and Yarmouth Roads. But with regard to an island at the mouth of a river, I propose it for the Tyne.

29,711. Have you, on the spot, considered that you could place an island so as to be useful to the Tyne ?—I went there, having seen the Duke of Northumberland, when he was First Lord of the Admiralty. His Grace was so good as to ask what I proposed. He saw the reasonableness of it, and said he saw at once it was just what the Tyne wanted, and that good might come, if I addressed myself to the Conservancy on the spot, which I did.

(The witness was shown a plan of the Tyne, representing the works proposed to be carried out by Mr. Walker.)

29,712. You are aware of what is intended to be done at the Tyne ?—I gather it from the chart which shows Mr. Walker's system.

29,713. It goes out to the Herd Sand on the south side, and nearly to the same depth of water on the north. Do you imagine that that would be an efficient mode of dealing with the Tyne ?—I am quite sure it would not.

29,714. What do you suppose would be the result ?—The bar would form exactly as it does now, only farther out. They may go as far they like ; they may go 100 miles, and they will still have a bar. Nature's supplies are inexhaustible, and she will keep on filling up, filling up, filling up, as at Lowestoft. There they have carried out works seaward, and it is all filling up behind the pier; and after that is done, the sand will double round and form a bar as before. Sunderland is a case in point, on the north-east coast. There they ran out piers into water they supposed to be so deep, that no bar would be formed ; but after a short time, they looked out one morning, and saw a bigger bar than ever; a yellow line right across the harbour, which they had to dredge away by a dredging machine.

29,715. You have no doubt that at the mouth of all tidal rivers a bar will be formed with any projecting piers ?—I am quite certain of it ; and I think from the evidence which Sir J. Burgoyne gave the other day, he is quite sure of it too.

29,716. Have you observed other harbours, in reference to this great problem ?—I have not observed them all ; but I have read through the whole of the

Blue Books and the Tidal Harbours Commissioners' Report, which gives this experience of them all; that however far they run out, the remedy is only quite temporary.

29,717. You know of no case where the contrary has happened?—I am not aware of any, and I do not believe that any has happened.

29,718. Supposing an island were to be formed at the Tyne, would you carry out any part of Mr. Walker's system, or leave things as they now are, and form an island?—I proposed years ago to do something, but nothing of the kind that is now proposed by Mr. Walker. I think all that is mischievous, unless the opening be now defended by an island. I should say, whatever is done let it remain, and do not spend any more money about it. The extension of the piers which has taken place might cause the necessity of placing the island farther out; but I do not know how far the works have gone out. This, which I produce, is a plan showing the original proposition I made to the Duke of Northumberland in 1852 or 1853.

29,719. If an island were formed on your principle to the seaward of the Tyne mouth, are you of opinion that the present Tyne bar would be removed by the action of the river, or only that if it were dredged away it would not be formed again?—Ebb-bar would not form again. I do not mean to say that there would be no trifling formation, but nothing to what it is now. The effect of an island would be to prevent all the mass of water at the mouth of the Tyne being affected by the violence of the ocean; and the consequence of that would be, that you would gain all that space as anchorage,—all the outer part of the Tyne which is now useless, as well as up the river. There is a small space occupied by the men-of-war which they call their mooring ground. All other vessels may go to wreck, but the men-of-war must have a mooring ground. But when an island is placed there, the river will be all available; the space from behind the break-water, up as far as Peggy's Hole, would be available as anchorage. Spit Bar only would form, at the point south of the island, when the wind is in a northerly direction.

29,720. Then you admit that there will be a bar formed somewhere?—There will be a trifling spit; but now it is an absolute hindrance. It will only form in one direction.

29,721. There is a bar now at the mouth of the river, and you propose to construct an island beyond that?—Yes; an island seaward.

29,722. And then you admit that there might be a bar formed between the northern portion of that island and the north side of the Tyne?—No; I do not admit that. I admit that there might be a small spit formed along the north end under Tynemouth Castle, but a spit of no magnitude at all compared to what is formed at present, because, at present, all the power of the ocean acts there unobstructedly, and checks the drift power of the coast stream.

29,723. Would it obstruct the passage at the north end?—No, not at all. They would get down and lie under the lee of the island, at any rate.

29,724. What would be the effect at the southern extremity of the island, because if there is any detritus coming down the river it must go somewhere?—That will form a small spit at the south end of the island.

29,725. And go on increasing the length of the island continually?—Yes; which would be rather an advantage than otherwise.

29,726. Why should you imagine it would go across the channel between the main and the island, to the island side of that channel? Why should it not remain upon the mainland side of the channel?—As the stream could not go out to the north when the sea was pouring in from the northward, it would go out the way it could, which would be southward. There would still be opposition of two powers at the south of the island, and where they met, there would be a deposit of spit, which would be deposited in the direction of the line of opposition of the forces.

29,727. And what would be the effect if, when the ebb tide was running out, bringing with it a deposit, it were met by a south-east wind?—Then it would not go south; it would run north, as it ought to do.

29,728. You think, whichever way the wind is blowing, it will force the ebb tide in the opposite direction?—Yes; it would compel the ebb tide to obey its influence.

29,729. Would that be the case? Would the influence be obeyed? Would not the tide endeavour to escape in both directions, and form a bar on that side on which it is met by the wind?—It would go in the direction in which it would receive the least opposition, and it would have the least opposition at the end of the island furthest from the wind; so that the ebb would go where it might be assisted by the wind as it went out.

29,730. You have a tide coming from the south, have you not?—But that, the ebb, does not hurt us. The river ebb and the south tide will help each other.

29,731. Still you will have some portion of tidal water running from both directions?—That would not be quite the case; the tidal water would not run in both directions.

29,732. Would not a proportion of the ebb try to escape in both directions, in the case of the Tyne?—If the wind is from the south, as the ebb is to the north, there is no opposition.

29,733. Then the whole runs out to the north?—Yes; and the material is carried away entirely. There is no deposit.

29,734. But supposing an ebb tide and a northerly wind?—That is the time mischief will occur.

29,735. Where will the mischief occur?—There will be a spit formed under Tynemouth north head, and also at the south end of the island.

29,736. Will the mischief which arises at one tide not be increased at another, and so go on accumulating?—The whole conditions of the place will be so favourable when the island is made, that there will be a constant stream of water through. You will have a much greater advantage of the stream, whatever it might be, both ways, whenever it can go out unobstructed by the weather; so that the mischief which occurs to-day may be remedied to-morrow by the natural action of the water when all the conditions of the wind are more favourable.

29,737. Suppose the wind continues for a series of days?—Then the formation will be greater; but afterwards, when the conditions become reversed, then there will be a continual wasting away of the formation. Nature will have a tendency to restore herself.

29,738. Will there be any tendency to form a similar bar on the opposite side, with a total change of conditions?—No; it can only occur on one side, and that is when the ebb is met by the opposing wind.

29,739. (*Capt. Washington.*) You were asked how long you had resided at any port having a bar harbour?—I have never resided at any port having a bar harbour, except Dover, and that is hardly in the condition of a river harbour.

29,740. Dover cannot be considered a river harbour?—No.

29,741. The bar there is due to the shingle that was washed from the east, I believe?—Yes.

29,742. You are aware that since the groin or pier has been run out the shingle has entirely ceased to travel, and it is no longer a bar?—No; I do not know that; but I do not think that alters the state of the case. There has not been time for the bay, formed by the pier, to fill up with shingle. By what is called the Admiralty Pier (the ground that lies in the bight between the Admiralty Pier and Shakspere's Cliff), must be entirely filled up with shingle before we can judge of the effect.

29,743. The portion of ground?—The portion of sea ground or foreshore which lies between the Admi-

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ralty Pier and the Shakspere's Cliff will have to be filled up entirely by shingle ; so that, so to speak, the Admiralty Pier may become another Dungeness.

29,744. Do you contemplate the possibility of that place ever being filled up with shingle ?—Yes ; I have seen as much filled up myself opposite to East Cliff.

29,745. Where is that ?—At the other end of the bay, by the Jetty.

29,746. Do you know any instance of shingle travelling below the low water of spring tides ?—No. I do not think that affects the case, because the ground will keep shoaling. The whole ground will keep shoaling, so you will alter the character of the beach. There was a remarkable instance of that, when the land-slip took place at Dover, under Abbot's Cliff. There was a projection there of 19 acres made in an instant into the sea. For a time that stood out like a promontory ; but now, the angle has been almost entirely filled up, on one side, by shingle; and so, the ground has shoaled.

29,747. It has entirely stopped the travelling of the shingle from there to the eastward ?—I believe it has, as yet.

29,748. So much so that you cannot get shingle enough at Dover to carry on the works, and are obliged to bring it from a distance ; are you aware of that ?—No.

29,749. Such is the case ?—I conclude that there will be plenty coming up in time.

29,750. You said you had a proposition for Dover differing from that carried out by the present engineer, and which could have been executed at a very much less cost ?—I will explain what that was. It was proposed to lay down a work a mile and seven eighths in length, but I never meddled with the plans which the engineer proposed. What I proposed to do was, to lay down that work upon a cheaper system of building. I did not in the least alter the plan of the engineer. I did not express any opinion against it, and I do not now. I dare say it was very good. I said it was a grand plan. I say so still.

29,751. Can you state what the construction of such a work shall be ?—At that time I printed an estimate, which is, I believe, amongst the papers that have been sent in to the Commissioners. It is accordant with a model now in existence, and which may be seen at the United Service Institution.

29,752. Referring to your papers which have been sent in to the Commissioners, I see that Table No. 4. of the estimate gives the total cost of the whole work at 411,000*l.* ?—Yes; I said 500,000*l.*, but then I had to amend that—thereabouts.

29,753. I wish you to state the sort of work which is to cost 500,000*l.* at Dover, and to be a substitute for the work now going on ?—That work would be a wooden case, filled with concrete of shingle and chalk.

29,754. Do you know of any similar work elsewhere that will stand the action of the sea ?—No ; I do not know of any similar work elsewhere, but I am certain that this would stand the action of the sea, because it would make a new foreshore. That foreshore would be of chalk, and it is found at all the adjacent places wherever there is a chalky shore that it becomes covered with a bearded sea-weed, which protects it from the action of the sea ; so I conclude, if you put chalk in Dover Bay, Nature will produce the same effect upon the chalk face there that she does on that in the neighbourhood adjacent.

29,755. Would not the timber decay ? — That would be of no consequence, seawise, because the chalk would take its place, and be defended from the action of the sea by the bearded sea-weed : the land side face could be renewed with ease from time to time.

29,756. We understand the plan to be a timber frame filled in with concrete and chalk, or both ?—Yes ; the model of which is producible, if desired.

29,757. Did you ever place a plan and estimate before a contractor, and get his opinion as to whether the work could be carried out for the price you have named ?—No. I spoke to Mr. Peto, and he admired it so much that he recommended me to speak to an engineer, to get him to propose it. He said, "We are "not engineers ; we are contractors ; but we are quite "ready to carry out that work if an engineer proposes "it to us ;" and he referred me to Mr. Cubitt. But Mr. Cubitt had a plan of his own. I do not mean to say he opposed mine on that account ; but, instead of answering my suggestions, he said, "Gentlemen "theorists were very useful men, and practical men "were very much obliged to them ;" but he gave me to understand that they were not much to be depended upon. I made him a low bow, and came away. He did not take any serious notice of the plan. But that was what Mr. Peto suggested that I should do, and he was so obliging as to give me his card, that I might introduce myself to Mr. Cubitt, as presented by him. Mr. Peto further said, "Your plan com- "mends itself to me for its extreme simplicity, and "for the entire absence of all ground fastening. You "depend altogether upon natural gravitation for your "work."

29,758. Did you propose that work should be connected from the shore, or detached ?—I did not make any alteration in the plans proposed. The Commissioners were to have two moles going out from the north and south ends of the proposed harbour, and a long island intermediately between them, with an opening at the east and another at the west.

29,759. Then you did not object to that plan ?—Not at all.

29,760. Only to the mode of construction ?—I did not object to the *mode* of construction. I only said that the manner in which I proposed to construct it was easier, for I supposed the other was impracticable, on account of the great depth of water, and that it could not be done under ten millions.

29,761. Have you not stated that you considered the works going on at Dover to be a useless expenditure of public money ?—Yes, carried on in the present manner ; because they could have been done at a much less cost. If 650,000*l.*, as has been affirmed, has been expended in the works there, which are not anything like approaching completion, and the whole could have been done for 500,000*l.*, it must be evident that that is a waste of public money.

29,762. Are not these hypotheses ? You have never carried out a work yourself ?—No.

29,763. You state you have never put your mode of construction into the hands of a contractor or engineer, to see whether it could be carried out ?—I know it can be carried out, because Colonel Jackson, who is an engineer, confirmed my view of it.

29,764. Has he carried out works himself ?—He has.

29,765. Where ? — In the River St. Lawrence. He was in the Staff Corps, and very much employed in making under-water constructions in the River St. Lawrence. I did not move in the matter at all until I had got his guarantee that the thing was practicable. He was ready to undertake it, if necessary :—not that he *desired* it at all, but he was ready, and attended with me at the Admiralty when the model was viewed by the then Lords of the Admiralty.

29,766. I think you said in the evidence, that where there was an island formed at the mouth of a river there was no bar. Will you state any cases that you are aware of in which that occurs ?—I cannot mention the cases off hand, but they are contained in the report of the Tidal Harbours Commissioners. To recur to your former question : I said the work at Dover could have been done for much less than 650,000*l.*, because at the time the work was to be commenced, Mr. Walker, or the contractor, had the command of an excavation of 18 acres of chalk and shingle conglomerated, to a depth of 40 feet, upon trams. The Duke of Wellington saw the model at my house of the work into which this mass of excavation could have been thrown. I called upon his Grace to come, at the time they were throwing it into the bay of Dover. I think Captain Washington

was aware what was being thrown into the bay, because when I was before the Commissioners, he put certain questions to me that necessitated certain answers, to the effect that the excavation was, at that time, being hoven into the bay. At that very time, some of the Commissioners had objected to Dover being selected as a harbour of refuge at all, from the tendency which there was to silting up. I think Captain Washington himself had obtained an order from the Admiralty that the throwing in of this stuff should be discontinued; and on one occasion, when I was going into Suffolk, and he to Harwich, and we met at the station, and he asked me what was going on at Dover, I told him that they were renewing the process. Afterwards, because it did not seem to be discontinued, I reported this to the Duke of Wellington. I called upon him to come to my house, before he went to a certain Harbour Sessions, to satisfy himself of what I had stated. He saw that what I said was practical; a plan greatly reducing the cost of the work, by turning all this material, which was being hoven into the bay, into the great cradle which I proposed to let down. If that had been done it would have reduced the cost from 500,000*l.* to 250,000*l.*, by taking advantage of the material which was already on the trams. Instead of that, it still continued to be hoven into the sea, and there it now is in the bay, and some day it will all have to be pulled up again by the dredging machine.

29,767. Did you ever lay your plan before the engineer for the works at Dover?—No. I might have known that there *was* an engineer, but I did not find any very great encouragement to do so. The Duke of Wellington went away from my house to the Harbour Sessions very much impressed with what he had seen. It was a great deal spoken of, and, in consequence, Sir George Back came and examined the model. After he had spent four hours in looking at it, he said, "You have not a moment to lose; "you had better go and speak to Lord Haddington "to-morrow." I did so, in consequence of his opinion, for he had been employed by the Government to give an opinion on some other cases. He had been told that this plan of mine was a copy of another man's plan, upon which he had been called upon to report; but such was the result of his investigation of my plan. If that stuff had been hoven into that large case, at the time I have alluded to, it would have saved 300,000*l.*; for, the excavation is made; it has been on the trams, and is absolutely wasted by being thrown into the sea and made to do mischief.

29,768. If you have finished your statement I should like to come to the bar harbour. Will you name any river harbour that has an island off its mouth, and has no bar?—Oban in the Hebrides is a case, where there is no bar.

29,769. There is no river at Oban, that I remember. It is an arm of the sea, with an island lying before it?—In the documents which I sent to Admiral Walcott, and which he has forwarded to the Commissioners, there is a statement of all of these cases which I have extracted from the Tidal Harbour Commissioners' Report.

29,770. Perhaps it may assist you if I enumerate the rivers without bars in the United Kingdom. They are the Thames, the Medway, the Humber, the Orwell, the Severn, the Forth, the Tay, and the Shannon. Perhaps, not strictly speaking, but, in the general acceptation of the term, these rivers have no bars at their entrances. Has any one of them got an island entrance?—I should think all of them had, if you consider under-water islands. Great shoals are islands, in a certain sense. The Thames is full of large islands, only they are not visible.

29,771. By islands we are to understand that you mean shoals as well?—I do not mean to say that. I say they can hardly be said to be rivers without islands, because these great shoals to a certain extent act the part of islands, particularly at low water; and such rivers are all, more properly, 'Arms of the Sea' than rivers. All these can hardly be called 'Rivers,' in the sense of a narrow-mouthed river. The Shannon is an arm of the sea, and the Thames and the Forth are also both arms of the sea.

29,772. Then your plan for the improvement of rivers would not apply to those?—Well, I think there *should* be a great work upon the Thames somewhere, not only from the depth of channel which may come of it, but as a refuge. The Galloper Sand, or some of those, might be worked into islands; but I do not think that any of these that you have mentioned are to be considered as rivers, in the sense in which I use the word river, when I propose to put an island before a small river.

29,773. But they are rivers and some of the principal rivers of this country; there cannot be a doubt of that. But they are not suitable for your particular purpose?—I do not know. I consider these rivers as being arms of the sea rather than rivers. The power of the sea, for instance, in the River Thames is hardly felt while you are lying behind shallow water; but, at the same time, I am quite sure that there is a great improvement to be made in the Thames by islanding it, perhaps in more places than one. It would have a great effect in improving the course of the river and the fair-ways of the river.

29,774. Will you name any river besides that at Southwold to which your plan is applicable?—I do not name any, because I say it is applicable to all. There is no river that debouches to the sea to which it would not be applicable. I do not say the Humber, because that is also an arm of the sea; but opposite to any small river where it could be laid down at all, I say it is applicable; and it could be laid down anywhere, whatever might be the foundation, whether mud or sand, in any depth. Whatever the bottom may be, you can lay down this work. That that bottom is a bad foundation, does not affect the case; it will stand equally well upon a bad foundation as upon a good one.

29,775. Do you know any instance of an island having been created or recommended to be created at the mouth of a river?—When I met you at Cologne, two years ago, you told me that there was some idea of putting an island in front of the Liffey, I think; but up to that time I do not think that I had heard of such a case. I said I was glad to hear that that the idea had at last been entertained.

29,776. In 1800 Sir Thomas Page proposed an island at the entrance of the Liffey?—I am very glad to hear it; it makes another authority in favour of laying islands in front of rivers.

29,777. I suppose if it had been thought a good thing it would have been acted upon?—It is fair to suppose so. Some time ago I proposed to make an island in the case of Wexford, *i.e.* to convert sands into an island; that was two years ago.

29,778. Could you lay before the Commissioners a plan for the improvement of Wexford Harbour by means of an island?—Yes; I have it here. That arose in this manner:—I applied to Mr. Walpole, the member for my University, to use his influence that this thing should be brought before the Government in such a way that they should take it up; and I wanted to be examined before the late committee. But owing to some informality, or the wrong time of applying, it could not be brought forward. Mr. Walpole, however, went to Sir John Pakington, and it was agreed that if I would give my ideas upon the state of Wexford they should be appended to the report. That was in the month of June or thereabouts. It was too late; I had not time to do it. But I have now sent to the Commissioners three plans referring to Wexford, and have prepared a manuscript which explains them.

29,779. Which of the three plans you have sent in represents the work you propose to carry out at Wexford?—No. 1. is what might have been done before the work was begun at all; before Wexford Harbour was touched at all.

29,780. You cannot undo what has been done?—

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If that be impossible, No. 2. represents the present state of things, according to Captain Frazer's plan; and No. 3. represents what now remains to be done, *i.e.* what it would, under the circumstances, be best to do. The manuscript which I have prepared is, in fact, a report upon it.

29,781. Can you describe that plan in any way?—Yes. No. 2. represents the river embankment according to the present state. Upon the third plan, the line of embankment on the south side of the harbour would take an S form (ʃ), instead of the curve represented, for the purpose of taking in more of the slob.

29,782. You think it is desirable to embank more of the slob inside the harbour?—Yes, because the evil is that you have too much back water, and the more you diminish that, the more you diminish the evil under which you suffer; and, seeing that you *are* embanking, it is as easy to embank in one direction as in another, and the more the ground you enclose, the more money you have to help to pay the expense of doing it.

29,783. Externally you propose to place the island breakwater somewhat in the shape of the letter S?—Yes; upon the Dogger Sands, which lay outside of Wexford Harbour.

29,784. What is the length of the work, do you know?—About a mile and a half, I think.

29,785. How do you propose to construct it?—By wooden cradles, so as to allow the sandy water to come in; the water to come in dirty, eddy, and then to go out clean. As the sand is so rapidly formed, I conclude there would be plenty of sand to rapidly form an island.

29,786. You would propose a north and south opening?—Yes.

29,787. Do you consider that the tide would keep both those openings?—Yes; I conceive the drift of water running through would keep them open, assisted by the stream. Sometimes the weather would be bad, and sometimes it would be favourable; but I suppose, that on a balance of conditions, the ultimate result would be very favourable.

29,788. If the strength of the present tide streams cannot keep the channel open, why do you suppose that it will keep open two?—The present tide stream closes up the channel. It is the tide stream which does all the mischief. The outpouring of tidal water from the lagoon *plus* the river water is so enormous, it comes out like an undersea waterfall. An extraordinary phenomenon in water engineering is that which is caused by the outpouring ebb at Wexford. That it is not an accident, nor anything dependent upon the particular locality, is evident, because the same thing occurs twice in the same river; once at Enniscorthy Bridge and once at Wexford, where holes are scoured out by the violence with which the pent-up backwater forces itself through narrow spaces: it drives through, and makes frightful pits.

29,789. Is not that the case in every harbour of the world where there is a narrow entrance, and the stream forces its way through?—That may be; but that it is not entirely local is clear from the fact that it occurs at three different places. It is a great evil, and an evil that has not been considered sufficiently, I think, by water engineers, who are always talking about the necessity of backwater. Now, as Sir John Burgoyne has said, if the effect of an excessive force of backwater is to form bars instead of removing them (and this is a most favourable instance), if that be so, then it becomes necessary here to reduce the backwater as much as possible: my plan would have that effect. The Admiralty, I believe, consented to the erection of these Lines because there *was* too much backwater; and that being the case, it would have been better still more to have reduced the evil, by making the Lines such as would, at the same time, have given more return.

29,790. You are aware that it was the Astronomer Royal who first pointed out the effect of the scouring action of the Slaney at Wexford?—Yes; I have read it in his report, and very interesting it is.

29,791. Have you formed any estimate of the cost of the breakwater which you propose to place at the entrance of Wexford Harbour?—Yes; I think it will be 150,000*l.*, but I cannot exactly say as to that. I will take the liberty of correcting that statement afterwards, if it should be necessary. It may have been less; perhaps it was.

29,792. I think you said your plan would be applicable to the Tyne?—Yes, I did.

29,793. And you went to Newcastle with the view of laying it before the River Commissioners?—Yes, I did.

29,794. Did they give any opinion upon it?—The River Commissioners, I suppose, like all River Commissioners in other places, did not know much about the matter. They had a plan prepared by their own engineer, and it was natural that they should back up their own engineer. They could not do otherwise, as the case was. If a stranger came, and proposed an alteration and a change, it was not very likely that they should take up with his suggestions, not being able to go into the matter very scientifically themselves. They backed up their own man, and, the consequence was that, I had my journey for nothing.

29,795. Had you ever been to the Tyne before?—No.

29,796. Have you ever been at Wexford?—No; but I say, as Mr. Airey said, that it is not necessary to go to a place, if you have soundings and experience of the place reported. Of course, afterwards, if any works are proposed to be done, then it might be very desirable, before everything is finally adopted, that a person should go and examine the locality. With the knowledge of Wexford, as acquired from reading, the Lines in my plans are given as a rough outline of what may be done there.

29,797. Then we are to understand that your proposal is an entire hypothesis; that it has not the support of any engineer, except Col. Jackson, whom you mentioned, and that it has never yet been tried in any place?—Well, I cannot admit all that, because there are a great many other engineers who have seen it. Col. Sykes took a great interest in it, and he had it examined by Mr. George Rennie and Captain Brandreth, whose opinions were favourable.

29,798. When I spoke of engineers, I spoke of those who had actually carried out such works?—Mr. George Rennie, I believe, has. His father was engineer of the Great Plymouth Breakwater, and the son was acting under the father.

29,799. Can you give any reason why, if engineers suppose that these low-priced works would answer the purpose, they do not adopt them, instead of erecting such costly structures?—I think, if I may be allowed to say so, that the Harbour of Refuge Commissioners made a mistake when they laid it down as a principle in their report that works only of a *permanent* character should be constructed. I have no objection to the use of the word "permanent"; but, when they said that permanent works should mean stone works, then I think they made a mistake; because there are hundreds of places that require treatment which cannot carry stone work: and, when they lay it down as an absolute rule, that, unless stone be used they will sanction nothing, they preclude themselves from the execution of many works which are much required. I think myself, that stone works, which are of a frightful cost, are very uncertain. If stone work come on a bad foundation, it is all done for; but if you have a wooden work it does not cost so much at the beginning, and you can renew it; and, it is not so likely to suffer from a bad foundation.

29,800. If you say you know of no works of the sort you recommend to be found in England, do you know whether foreign engineers have ever countenanced the idea?—No.

29,801. Are you aware that the large structures at Cherbourg,—that all that is of stone?—Yes.

29,802. That apparently shows the opinion of the French engineers?—Yes ; I think that is very likely; but I do not see that it is absolutely necessary that we should follow them, because I think, that, when wooden works can be constructed for one tenth of the amount which would be expended on stone works, that that would enable you to do many more works for the benefit of the present generation. Let the future generations look after themselves. In many places you cannot put stone work, if you would. Now, Wexford is a place that requires to be treated ; but if you lay it down as a rule, that you will have nothing but Stone Work, why then, Wexford must go to the wall.

29,803. When you mention the Harbour of Refuge Commissioners recommending permanent works of stone, are you aware that that was only as applied to Dover and Portland?—*I* did not so read the report. I am glad to hear that.

29,804. The Refuge Harbour Commissioners had nothing to do with tidal rivers. It was only Portland, Dover, and Seaford which they recommended should be done in stone?—When I came before the Commissioners, Sir Byam Martin seemed to think it was strange that after they had given a report in favour of stone works, a man should come forward and propose to erect a work of wood. He considered it was a kind of reflection upon their judgment. I had nothing to do with that. I said you are going to build a great work, which is to cost, so much. *You* say, two millions ; but *I* should say rather 10 millions. And what I said has been justified by the outlay that has taken place at Dover. There, there has been 650,000*l.* expended, for about one-tenth part of the work to be done, even *less* than that. That, too, is the most favourable portion: all the rest of the work that is to be done there, is infinitely harder than anything which has been yet attempted. Yet, this part has cost 650,000*l.*, and Col. Sykes said in the House of Commons that the whole thing would cost six millions ; but in that I think he is mistaken, for it will cost 10 millions if it be carried out in stone work ; and I say, to throw away 10 millions, to expend that sum, upon works that could be done for 500,000*l.*, is a frightful waste of money. I was prepared to show, and can show, and I maintain still, that if the work had been put down as I proposed, it would have answered all purposes, and have been finished in two years.

29,805. You would recommend the Government to expend the public money in putting down timber cases filled in with concrete as a shelter or refuge harbour in Dover Bay or elsewhere?—Yes, certainly, everywhere.

29,806. (*Capt. Sulivan.*) I suppose I may consider that the success of a work of this kind would depend upon the stream outside acting with the stream of the harbour to keep the entrance open?—I think that would be the case.

29,807. If it was perfectly still water, and there was no tide outside, the effect of such a work would be to divide the stream into two, and to have two entrances into the river instead of one, would it not?—Yes.

29,808. And consequently there would be less power in the stream to overcome any tendency in the sea to form a bar at this entrance than if there was but a single one?—That is possible.

29,809. Therefore the success of your plan, if it be carried out, would depend upon the coast stream being added to by the force of the river stream to keep each end open better than one stream at present keeps the bar open?—Will you allow me to say the sea has a tendency always to draw one way or the other, so that the conditions you propose will never take place in our seas.

29,810. That is what I want to come to. Can you tell me, when the tide turns to the north, how does the ebb tide from the river go? Can you tell me whether the turn of the tide on the coast occurs at the same time as the turn of the tide of the river stream?—Not instantaneously.

29,811. But about?—Yes, about.

29,812. Then the ebb tide would commence to run to the north about the time that the ebb stream would commence to run out of the Tyne?—Allow me to say that the ebb stream will not run out of the Tyne until the ocean makes room for it. The ocean makes room for it, and then the river stream flows into the ocean.

29,813. Exactly. Then the two streams very nearly coincide?—Yes, about.

29,814. What do you depend upon, then, to prevent a bar from forming at the end of your island, because if you have nothing of that kind to keep these ends clear, can you explain why a bar will not form by the action of the sea meeting the action of the stream at the ends, just the same as a bar is formed now at the entrance of the river?—If the ocean ebb comes from the south, as it does, and the ebb comes from the river, the two will go out together. There will be no opposition. A bar is formed by the wind blowing in from the north. That is the time the bar is formed.

29,815. Are you satisfied that southerly gales of wind bring no accumulation of sand in the south part of the River Tyne?—They may do so. I dare say they do so.

29,816. Are you aware that the sand is accumulating from the south at the back of the south pier at present?—Of course, wherever the water comes up dirty and eddies, by being obstructed, it does.

29,817. And by the action of the sea along the shore apparently the sand is heaped up now at the south end of the south pier?—Yes, and for this reason ; they made a bay for it. It cannot get on, and so it will fill in there.

29,818. How will an island in any way alter or prevent the sand coming from the south, and travelling with south-east or south gales along the shore, from accumulating at the entrance of the river and inside your island?—It will not, so long as the south side is not filled up, south of the pier which has been now run out ; but when that is close filled up, the sand will not stop at the mouth of the river on the ebb.

29,819. You stated before that the north-east wind would dam up the ebb tide, and change the current. Do you know that for a fact, that the wind would alter the tide so much as to stop the current which now runs to the north?—The wind will not alter the tide at all.

29,820. I may have misunderstood you, but I certainly did understand you to say the north-east gales,—the wind from the north and north-east,—would check the stream of the ebb tide running to the north going out, and would drive it back?—When the wind comes from the north it heaves the sea up to some height, and it meets the river. To the north it is higher, so to speak, than at the south, and therefore there is less opposition to the south, to the ebb of the river, than there is to the north. I say that when the wind is from the north, the ebb of the river will not take place through the north entrance, but through the south.

29,821. Then you consider that the wind wave travelling to the south will overcome the tidal wave travelling to the north in the North Sea?—Quite so at that spot.

29,822. Do you know that as a fact? Do you believe that the natural ebb flow of the tidal wave running to the north is actually stopped and overcome by a northerly gale?—I am certain of it, because it makes the water higher. People are very little aware of the enormous power of the wind upon the waves. Memel is often completely under water, so to speak, when the water at the other end of the Haf is quite low.

29,823. That is going into a bay or an estuary with no escape ; but can you tell me a case in which a gale along an open shore has had this effect of overcoming the tide upon this coast, because I have never known such a case. You often find the tide causing a heavy sea running against the gale, but it

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is not often that you find the tide actually overcome by a gale setting in an opposite direction in an open sea like the North Sea ?—If the gale raises the water so high as to make a hill then the sea will find its own level, and return, not against the power that raises it, but under-about.

29,824. The tendency of a gale would be to make it high where it runs in an estuary or against the land, as in Lynn Deeps; but what I want to know is, would the actual tide without, upon the open part of a coast like the east coast of Yorkshire, be overcome by a wind blowing from the north ?—I am certain of it.

29,825. But its doing so would make your plan less valuable, would it not ? If the tide would always flow north and south with the river stream it would keep the ends more clear than would be the case if the tide was dammed back by the wind, would it not ? —I cannot say. As the water comes up from the north-east it becomes higher then than the ordinary level; and, as it rises higher than the ordinary level, so it rises higher than the outgoing ebb.

29,826. Do you think that the gales along the coast can make such a difference of level in a short length like your breakwater as to have a higher wave to the north than at the south, and so turn back the current there ?—No ; but if it is only an atom it is sufficient to make its influence felt.

29,827. And would not the effect of the ebb tide being checked back be more likely to form a bar than if the natural flow of the tide from the north and south went on unchanged ?—No : the *channel* would aid the stream of the natural flow.

29,828. Is it not making your case more difficult by supposing the wind checks the action of the tide, so as to cause it to flow in a different direction ?—I am not contending that there is no difficulty in the case. It is a case of great difficulty. I am only saying these are more favourable conditions for a harbour than those which now exist ; and at the same time I answer the direct question by saying the water will be higher at the north than at the south, if only an atom, and if so then it will be felt in giving the river a tendency to make the easiest debouchment instead of the most difficult. If the sea is only one atom higher to the north than to the south, the river will go the lowest part.

29,829. Do you believe that in easterly gales along the shore there is an increased height of water in the direction in which the wind is blowing ?—On the contrary, sometimes it will be the reverse ; but in such an open sea, where there is no absolute end, it will be higher nearest to the quarter from which the wind blows than further down the coast.

29,830. I think you are mistaken in that view, and I think you are raising a difficulty against your own plan; for if the tide remain sflowing from the north to the south, and changing with the current of the river, would not that be more likely to keep the ends open than any other condition ?—I hardly understand your question.

29,831. If the coast tide changed from north to south at the same time as the river ebb and flow changed, so that you had always the tidal strength, the stream due to the coast tide and the river tide, running out to the north, would not that be the most favourable state of things which you could have for keeping the passage open ?—With a north wind it would be the most unfavourable.

29,832. Do you not believe that the tide to the south would be stronger if the ebb tide to the north is checked by the wind ?—Yes ; there would be no ebb tide to the south unless it were checked by a wind. It is not the flood tide we are speaking of, but the ebb only.

29,833. But, if the effect of the wind is to check the tide running to the north, it would have the effect of making the tide to the south stronger, would it not ? Where is your water to go to if there is no tide running to the north, while it is blowing hard with the flood tide which has accumulated ? Where is the water to go to ; ocean I mean ? If the ocean tide is dammed back by the north wind, how can this go on without filling the north sea up to the south entirely, and throwing back the whole of the ebb tide ?—It returns under-about.

29,834. Do you think that there is no reflux to the north while it is blowing from the north ?—The thing is, that it goes backward, that is, returns, under the surface of the sea.

29,835. A counter-current underneath ?—Yes, the tide goes underneath.

29,836. Can you tell then how it is that even in the heaviest weather it is a common thing, when the tide sets along the coast, for ships to make their passages with the tide, and get up against the wind. That is a common thing, continually done upon the north-east coast, and we have it in evidence that ships can even work round Flamborough Head, against the strongest gales of wind, with the tide ?—That is quite possible. Running water is a very queer thing indeed, and is capable of sustaining two or three counter-movements at the same time and place.

29,837. If that be so, would not it appear that the run of the tide upon this coast remains unchecked by northerly gales ?—The wave of the sea which comes from the north has full power to raise itself against the tide stream ; and if there were an opportunity for the stream to go to the south under-about, it would rather take that, the way that it *could* take, and go the easiest way, than run against the ocean wave.

29,838. If the tide is running to the north, if it be an ebb tide to the north, there will be a steady current through your passage inside, whichever way the wind is blowing ?—I doubt that, against the wind when sufficiently powerful to raise a sea.

29,839. There is the point. It all hinges upon that. I think that upon that point you are entirely mistaken. The tides may be checked comparatively ; but that the ebb tide should be altered and changed into a completely opposite direction by any gale, except just in the case of water being heaped up in an estuary, is a thing which I think will not be found to occur really ?—Then if what you say be true it only makes this plan better.

29,840. I think so too ; but I wanted to understand upon what evidence you ground your statement that the tide along the coast is altered by a change of the wind ?—Upon the coast of Yarmouth it is found that when the wind blows hard on shore all the manor is taken away : what is the cause of that ? the level of the water is raised, and it cannot run back against the wind, which is blowing it up ; so it is obliged to go underneath. The same would be the case here.

29,841. In that case there is no opening ; but in the case of your entrances there is an opening for the water to flow through ?—I am speaking of the power of the ocean ; not of the tide.

29,842. I think you are mistaking the power of the waves on shore altogether ?—Now that I understand what the difficulty is, I will reconsider this matter, and communicate further with the Commissioners upon it.

29,843. I do not think that is against your plan ; but perhaps it was rather a difficulty you were raising against it. But the difficulty I want you to explain is this :—What is to prevent the gradual accumulation of the sand, both from the north and the south, travelling along the shore, as it does now, still accumulating off the mouth of that river inside your breakwater, so as at last to fill up the entrance between the island and the shore, and make a double bar, as it were, at the entrance of the river ?—At what time of tide will you have that travelling sand ?

29,844. I am speaking of that travelling along the shore, which appears to be caused by the prevailing gales from either quarter, heaping up the sand, as we now see it heaped up at the back of the pier at Tyne? —When the sand is travelling from the south, the ebb of the river will also travel south.

29,845. As long as you keep these matters so that the two exactly agree ?—At other times, when it is

travelling from the south, it will be flood tide, and it will all go up the river together.

29,846. When the sand is travelling with a gale on either side, and is brought inside your island, along the shore, as it now is, towards the mouth of the Tyne, what will arise from that sand heaping up at the mouth of the river, as it appears it must do?—You have made a barrier by running out a pier, as I understand.

29,847. I am speaking of this, if your island is put here, instead of these works?—But the thing is done as it is shown upon the plan.

29,848. Yes; and it accumulates the sand?—Yes. This pier which has been run out stops it, because it has been made for it to form against outside.

29,849. You think the stream of the tide north and south would keep the channel open to a certain breadth inside the island at all times?—Yes.

29,850. And that the current of the river would be sufficient, with the tide there, to prevent any bar from forming at the end of your island?—When the current of the river concurred with the ebb there would be no bar at all, or at least a less bar than there is now. The formation that would take place would be a small spit; but no bar, so to speak, would form there at any time; it would be a spit. Under adverse circumstances the tendency to form a bar would be at the south end and at the north of the island.

29,851. That was the point which I was now coming to. At the south end of your island you would have no current to prevent the formation of a bar, except the coastal tide to the south, would you? The stream of the river would not act to overcome it in any way. It would only be the coast tide to the south that would tend to prevent the formation of a bar at your south entrance?—The flood of the ocean would help the stream. As the stream comes out, the three streams would concur: the Ocean stream, the Roads stream, and the River stream would all come out together.

29,852. If the ebb tide from the river runs to the north with the ebb coast tide?—The ebb tide of the river runs to the north.

29,853. With the ebb coast tide?—There would be no bar.

29,854. None to the north; but as the flood of the river would be running in, and you would have no river tide to help the coast tide in the south entrance, how will that coast stream alone be sufficient to prevent the formation of a bar at your southern entrance?—The flood tide as it comes in from the north will check the flowing of the river, and also, when the flood tide comes up, to turn the southern end of the breakwater running up there, you will have the two streams, which will concur and run up together, until you have high water.

29,855. You will have two powers, but you will not have more in reality than you had before?—The utmost is, what will run through the river entrance.

29,856. Then the tide which runs from the south will be much slighter than that which runs from the north?—I should think it would be exactly the same.

29,857. How will that tend to keep the south side of the river open, and prevent the formation of a bar?—First, I lay down as a general proposition that a bar is not formed by the flood tide. I deny that altogether. It is only *formed* by the ebb tide. The flood will come in at a north entrance: a minute or half a minute later it will come in at the south, and they will go to the centre, where they will join, and run up the river together.

29,858. Then upon what grounds do you suppose that the ebb tide will not split in the same way, and run out from the two entrances?—Because I say that there is always a draw in the sea, one way or the other; and whichever way the sea draws, in that direction will the river go, and the only difficulty will be, when the sea is dead or right on against the shore.

29,859. I am speaking not of the sea, but of the tide. If the coast tide to the north is strong enough to overcome the ebb of the river in a southerly direction and make it all go in a northerly direction, then surely the flood tide towards the south will be sufficient to overcome the flood at the south entrance, and if it flows in at both entrances will it not also ebb through both?—No; it will go out at the end where the water is lowest and there is least resistance.

29,860. Then in the same way at the flood would it not flow in at one end?—No, because the conditions are quite altered. It depends on the rise of the water outside.

29,861. At present where a river has three entrances formed by sandbanks, such as in the case of the Thames, or the river at Wexford, the tide ebbs and flows through all those, does it not?—At different times, with little variation.

29,862. Then if you form, as it were, a bank or island, and say that the tide will flow in at two entrances, will it not equally ebb through two entrances, and if it does so will you not be dividing the strength of the stream, and so much increase the action of the sea, which forms a bar, by weakening the force of the stream?—I wish I could, because I think people are wrong in thinking that it is all to be done with backwater. I do not think so.

29,863. Take the case of Wexford. We have had it in evidence from engineers, that, by blocking up the centre of the three channels, making an island or sandbank, the other two channels would be deepened?—I have not seen that. There is only one entrance, is there?

29,864. There are two entrances, one at each end of the bank, and a third, a shallow one, formed by the current issuing through the bank, which it is proposed to close, and make it an island, and so divide the river into two channels?—Well, I never have heard of that before. It is, however, what I recommended to be done two years since. My plan was sent in. I received for answer that it was submitted to the Harbour Board, and that I should be informed of the decision. It would seem, from Captain Sulivan's observation, that my plan was approved and acted upon, *without* informing me of it.

29,865. If the river has three entrances, and the stream forms a shallow bar off each, would you not suppose that by closing one you would carry a stronger current through the other two channels, and so deepen them?—First of all, you must allow me to doubt whether they would have a bar at each entrance, because if you keep a river open in that way, I think you will get rid of them.

29,866. But if you have a bar at each of them, and you close one of them, would you not hope that by the extra strength of the tide thus obtained the other two channels would become deeper, and further, if you close two of them out of the three, would you not have a still stronger current, and perhaps deeper water in the remaining one?—Very likely, if you throw all into one, you would have a bigger bar than ever.

29,867. If the Tyne ebbed through two openings you would not fear that its power would have less influence in keeping them clear than if it ran only through one channel?—No; I am sure the conditions would be favourably altered. I cannot suppose that a bar would be formed at both entrances. It would only form before one of them. The ebb would go in any direction that it could take. You will not find Nature running against a stone wall.

29,868. If by any means the action of the sea to heap up sand at the entrance of the Tyne is met by a less current from the river than is now the case, will you not have in this position, in all probability, a shallower bar than we now have there?—I suppose the whole conditions externally to be altered, and when that is so you will not have the bar which you expect. You cannot have it. Supposing that all the power is advancing from the stream that comes from the river, it

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will not act in opposition to the sea, but it will go in an direction that it *can* go; and when it comes towards the north it will be reinforced by the stream inside the island, and you will have a greater power through the north entrance than you ever had before.

29,869. That is supposing that the ebb only runs out from the river in one way round your island, and not by both ends. But as you conclude that the flood will come in both ways, I cannot understand why the ebb is to be confined to one only. The whole of your plan appears to me to rest upon that. If you divide the ebb into two streams you are weakening its power to keep the river clear. If you have the flood coming in at both entrances it seems to me that the ebb must go out at both?—When the ebb is coming from the south, and the river ebb comes down, the tendency of the water is to draw up north, and there will be three streams going north, instead of one: the ebb of the river, the main ebb of the tide running coastwise through the channel, and the outer stream of the ebb, from which the channel stream divided, when it entered the channel.

29,870. You think that the ebb from the south is sufficient to turn the whole ebb of that river out to the north. Why will not the same strength of the tide from the north coming round your island at the time of flood prevent the flowing of any of that flood round the south end of it?—Because the water outside is higher, and it must come in.

29,871. Well then the water will be lower at the ebb, and so it must run out both ways?—I have no objection to its going out both ways at all. When there is a quiet condition it may have that effect, but when there is a quiet condition no mischief will be done. When an unquiet condition comes, a greater height of water would be raised, which would be advantageous to the proposed alteration of the river.

29,872. You think that dividing the strength of the River Tyne through two openings instead of one will not reduce the power of each to prevent a bar from forming?—I have no doubt, if you say that the power is to be directed equally on both sides, it makes it evident there is less power than when it goes in one direction. What I meant was this, that except when the sea outside is perfectly quiet, the sea will draw in either one direction or the other; and that, in whichever direction is the drift or tendency of the sea, in that direction will the sea go, and carry with it the ebb from the river, so that there will be a coalition of power with the streams within, and then draw the water without, to assist each other.

29,873. That is supposing that the wind on this coast causes the flow of the tide along the coast always to be with the wind?—Not in the flow of the tide, but in the raising of the water.

29,874. It is the same thing. If it causes the raising of the water, and it flows along the coast, is it not the same thing as causing the tide?—Not what we should call tides.

29,875. I should like to ask you about Dover. How do you propose to make this wooden structure which you are to fill up with chalk; with piles?—By horizontal layers.

29,876. I mean the wooden structure?—By horizontal layers of wood to raise it foot by foot. There is a model of it in the United Service Museum.

29,877. I want to know whether you make the wooden structure that is to hold the chalk by piles or by box forms?—By box forms. I propose to lay on the bottom of the sea a long framework of a width suited to the height to which the work was to be erected. When that was laid at the bottom of the ocean perfectly flat,—the whole thing ought to be laid horizontally,—I should have capsized masses of concrete out of a particular box; a tumbling box. When the first layer was completely filled in, another layer of wood should be added, and upon that again another layer, and so on, filling in each with concrete, until the whole thing were completed, to a height of 70 feet from the bottom of the sea; *i.e.*, 7 fathoms soundings + 20 + 8.

29,878. You would have staging in order to tumble it in?—Yes; that is a matter of engineering. There is no difficulty about it. If I was going to lay the work on sand, I should build a frame, making it like a ship, and launch it. It was intended in the first instance at Dover to have laid a frame, and to have had divers to place the concrete in the proper places.

29,879. The tumbling boxes must be carried by vessels or stages?—Oh yes; lighters and vessels.

29,880. Have you in your calculation estimated the cost of this staging?—Yes.

29,881. (*Capt. Vetch.*) Have you a general opinion that islands at the mouths of harbours are very necessary and useful, or merely that at particular places an island at the mouth of the river will make a good harbour?—I believe both to be the case.

29,882. As a general rule?—As a general rule.

29,883. Then coming to a practical view of the subject, are you aware of any harbour in Great Britain that has that advantage of a natural island?—In the report of the Harbour of Refuge Commission several places are mentioned where there are islands. I will send in a list of them to you.

29,884. You cannot recollect them at present?—No.

29,885. But if this were so important a matter, one would think that the cases would be easily recognized and remembered?—There is one very important instance, which we all know, that I can mention, viz. the Isle of Wight.

29,886. That is a large island, of what harbour does it subserve the purpose?—Southampton Water.

29,887. Southampton Water, I think, is a sea estuary, with two little streams at its head?—Yes; but at the Needles it rushes through a very small channel.

29,888. Do you consider the Isle of Wight a case in point?—I think it is a very strong case in point.

29,889. It is a very large island, and a very small river, and the estuary lying between the river and the island is so large and extensive that it becomes effectually a firth or arm of the sea?—Yes; no doubt it does.

29,890. And Southampton Water discharges itself into this arm of the sea?—Yes.

29,891. You would not allow the Thames to be properly speaking a river, because it discharged itself into a large estuary?—If you will take away the Isle of Wight you will soon have a bar in Southampton Water.

29,892. I hope you will not try the experiment?—No; but I have no doubt that would be the result.

29,893. I have been casting my eye along the the coast of Great Britain as laid down upon the charts, and I can hardly find an instance of a river which has the benefit of an island at its mouth. Are you acquainted with the River Avon at Bristol?—Yes. I was born upon it.

29,894. There is a tide runs up and down that river strong enough to clear a channel anywhere. We have there an island, called Dumb Ball Island, on which several works are erected; tell me whether you think that that is of any great advantage to the river?—I have not considered that case; but perhaps if the island was further out it would do more good. It is now upon the low-water line.

29,895. There it is exactly at the mouth of the river?—Yes; but if you put the island further out you would have a different state of things.

29,896. Then that does not answer the purpose you have in view?—No, of course not, because I say that if you put an island at the mouth of a river it is for the purpose of getting an entrance at all times of the tide and in all states of the wind. What you must do in the case of the Avon would be to run the banks out into deep water, and then put the island off the new mouth. But the case of the Avon is a very peculiar one, and shows the enormous mischief which may be done by the rising tide. The man at

Rownhan Ferry is constantly employed sweeping away the deposit which is laid there every tide. If he did not do so, people could not use his ferry, for the mud through which they would have to walk when the tide was not at full.

29,897. That great tide ought to carry everything before it?—I do not give in to that doctrine of scours. I am a great heretic on that point.

29,898. You do not admit the doctrine that running water will scour away obstacles?—I think that bars are often rather formed by backwater than removed.

29,899. Are you acquainted with the River Wye, with two rocky islands at the mouth; a river that rises and falls more than any other in the kingdom, and has a bad entrance?—That is a peculiar case. Perhaps if you made the two islands into one that might alter the case.

29,900. Could you point out any place in Great Britain or Ireland where an island at the mouth of a river shows itself to be of great advantage?—I do not know. There is Lamlash Island.

29,901. That is not at the mouth of a river. That is off the island of Arran?—There is a good entrance there.

29,902. There is no river there. One half of the circumstances do not exist. The island is there, but there is no river. Do you know of any other place?—I will tell you to-morrow, when I have looked at the report of the Tidal Harbours Commission, which I have at home.

29,903. The Orwell at Harwich is a good navigation, and there is no island there. At the mouth of the river called the Colne, which passes Colchester, there is an island, and it is a very bad mouth, and a bar mouth. Except the Isle of Wight, I do not know of any other example which could serve as a proof of the correctness of your doctrine. Now, there is the River Mississippi, which is a large river 600 feet deep at New Orleans, and the mouth of that river is beset with islands; there is a great number of them; but it is not more than nine feet water at low water at the mouth, although up at New Orleans it is 600 feet deep. According to your theory there should be a good entrance to that river?—That Gulf of Florida is a very exceptional case. One hardly knows how it is. When you speak about tides, there is not much tide in the Mississippi.

29,904. What do you say about the Island of Anticosti in the River St. Lawrence?—I have not examined it, and cannot say anything at all of it.

29,905. But as you have had this theory of yours so long in hand, I should have expected you would have had a great many examples to bear out your doctrine. We have a number of good harbours; but I am not aware of one, except that of Southampton Water, which is an illustration of your system. The Shannon, for instance, has no island at its mouth?—That is an arm of the sea, and there are plenty of islands up the middle; that is, shoals.

29,906. (*Mr. Coode.*) You adduce the case of Southwold as favourable to your theory of the formation of island breakwaters. Are you aware, or not, whether any changes are going on there at this time?—I have not known anything of it for the last three or four years. The other day I happened to see the curate of Southwold, who came to Cologne, but he did not say that any change had taken place; but I dare say there has.

29,907. Are you at all aware in what direction that change is likely to be? Will it be in the nature of an accumulation of sand, or of a deepening of the water?—I cannot say.

29,908. Then in quoting Southwold it will be necessary to ascertain whether it is improved or not, because it is possible that the channels may be shoaling?—I dare say they are.

29,909. If so, would not that be an argument against the correctness of your theory; that is, if the channels are shoaling after the island has been formed?—No. The sea acts with great violence upon that place, because the sand is not raised up into an island. If there were smooth water within the shoal, and things were getting worse, then it would be an argument against what I have been asserting.

29,910. If that be so, is Southwold to be adduced as an argument in favour of your theory?—What I say is, that nature has formed an half island there, and if you raise that into a whole island you will get a safe and quiet anchorage behind, to which you will have access and egress; and those are two good conditions. I say, in addition to that, that the bar would not form where it forms now. It may form further out, but not in the same shape as it now forms. It will only make an increased spit at each end of the island.

29,911. You imagine that you will still be liable to a bar, even if your plan is carried out?—You will have very much improved conditions. You will never have the same bars or hindrances that you have at present.

29,912. Do I understand you that the bar which you anticipate will be a bar in the nature of a large spit, rather than of a transverse accumulation?—Yes.

29,913. You were asked some questions by Captain Sulivan as to the effect of the wind from the north meeting the ebb tide coming out of the Tyne, and in answer to those questions you stated that the effect would be to drive the ebb tide through what would be your south entrance?—Yes.

29,914. Assuming that to be so, would not the effect be to cause two currents to meet in opposition; that is to say, the ebb tide running out of the Tyne to the south, would meet the main ebb tide along the coast running to the north. This must happen if your view be correct, when you say that the effect would be that in northerly winds the ebb tide would be driven through the southerly entrance?—I will explain that. Under ordinary circumstances the returning tide runs coastwise.

29,915. By returning tide, do you mean the ebb?—Yes; under ordinary circumstances it runs coastwise.

29,916. Which way?—To the north. But when the water is very much accumulated against the east coast by a north wind, then it compels the ebb to run farther out from the coast. It does not hug the coast in the manner it does when there is no wind.

29,917. Do you mean to say that in northerly winds the ebb tide in the North Sea runs to the southward immediately along the coast?—No. I say that when the wind is very much on shore, that is from the north and north-east, the sea raises the water against the coast, and that under these circumstances the ebb will find its way parallel to the shore at some distance rather than close along it.

29,918. The effect of the north and north-east wind is to drive along the shore to the southward, meeting the ebb tide?—Yes, I say it will; and the run of the ebb tide will be forced to run parallel to the coast outside rather than go as at other times. For that reason, when the water goes out from the south entrance of the breakwater it will be drawn rather underwards and outwards, instead of remaining there to oppose the surface stream coming up from the north.

29,919. I understand your view to be, that with the wind from the north or north-east, the ebb tide out of the Tyne would be driven through the southern entrance?—Yes.

29,920. Then if that be so, with the main ebb tide running from south to north, would it not necessarily be the case that the ebb tide out of the Tyne would come directly in opposition to the ebb tide running along the coast?—No; when there is that action of the wind against the coast it raises the water, and makes it very much higher. The water at the edge of the coast is higher than the level of the sea, and returns to its level always under-about, as is proved by its sweeping away the beach or manor with it.

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29,921. That is in the case of an on-shore wind ?—Yes.

29,922. Then, assuming that the wind is directly along the shore, I ask, as you say the effect of such a wind would be to drive the ebb tide out of the Tyne to the southward, whether it would not necessarily meet the main ebb tide coming along the coast ?—It would, to a certain degree.

29,923. Meet it in opposition ?—Yes.

29,924. And would not the effect be to cause an accumulation where the two tides met ?—If it would, you would have the north entrance open; and though there would be a tendency to leave an accumulation, it would not be near so excessive as at present.

29,925. Without going into the question of the relative depth obtained in the channel by your plan and any other plan, I should like to know whether, if this method of yours were adopted, you would not have a greater liability to variation in the position of your channels, seeing that, according to your view, in some instances the ebb tide would run out through the north channel, and under other circumstances through the south channel ?—When the wind was blowing from the north a formation would take place to the south; but when the wind was blowing from the south there would be no accumulation at all, because I always premise that a bar always forms at the ebb. When the wind is from the south you would have no opposition, because the wind, the ebb coming along the coast, and the ebb from the river, would all concur in all going out together in three streams, the river ebb, the outside ebb, and the wind ebb, so to speak, or the wind current. They would all concur in going out together, and therefore there would be nothing to make a bar. At the same time, if there had been anything gathered there, before this great concurrent power of the three streams occurred, it would scour all that out. Whatever might have been deposited there by some accident or the other would be cleared out by them.

29,926. That would be your view so far as regards the north channel ?—Yes.

29,927. But as regards the south channel, would not that be liable to great fluctuations, both in position and depth, depending upon the direction of the wind ?—When the wind was blowing right on shore there might be a formation at both sides, but with any other condition of wind you will not have any other formation.

29,928. I should like as direct an answer as you could give to the question, whether with a long prevalence of northerly and north-easterly winds there would not be a tendency to an accumulation, at any rate at the south entrance ?—That is the only time an accumulation or formation would take place.

29,929. And the condition of that channel would fluctuate very greatly ; it would be dependant upon the direction of the wind ?—Yes ; I suppose it would fluctuate, but I should say not so very greatly ; but it *would* fluctuate. It would be better and worse at one time than at another ; but at no time would you have the conditions so bad as they exist at present.

29,930. The conditions as to depth might be different, but would not the conditions as to fluctuation and the variable direction of the channel be worse than under present circumstances ?—No. There is no variation now. It is *always* bad. But when this had been done it would be usually good. It might occasionally be impaired, but you would always be able to recover it. Now it is manifest that they have only six feet, or at most nine feet, over the bar.

29,931. Still, bad as the state of things may be now, they are more constant than they would be under your system ?—The north entrance would always be good.

29,932. You apprehend that in the case of the Tyne, if your system were adopted, you would always get a good entrance to the north ?—Yes.

29,933. Have you considered the depth of water which you could permanently maintain there ?—I assume that whatever depth was made, would abide, and would not alter. It might, by dredging, be increased. I maintain, whatever depth you have, you may, with the exception of places where rocks occur, realise all the way up the river. You would have smooth and still water within the whole of it, which would be made available for anchorage. At the time I first proposed it, this island could have been placed off the Tyne for 75,000*l*. Another thing is, that the ballast which is now a dreadful nuisance in the river, as they do not know what to do with it, might have been thrown into this cradle, which would have become a receptacle for it.

29,934. Do you apprehend that you could make your cradle so tight that the ballast would not wash away ?—I am certain of it.

29,935. Of what is ballast generally composed ?—Sand, shingle, or rubbish of any kind. It would go into this thing, which would be a great wooden structure, close at the back and open in the front. They might go on for centuries depositing the ballast in front, and it would keep increasing the island.

29,936. You would have no fear that the sand and finer particles would wash out and accumulate within any portion of the entrance ?—I should not care if they did ; they would only be washed out again.

29,937. You stated, I think, that you objected to backwater. Is it not a fact, that the maintenance, and even the existence of channels, is due to backwater?—I do not mean to say that I object to backwater altogether, but I think the importance of it is exaggerated, and in many instances it does absolute mischief. You may take the case of Wexford for example. Wexford would be greatly better off if they had only one tenth part of the backwater. The River Slaney is enough, without the enormous quantity that returns from the lagoon.

29,938. In what manner does the amount of backwater operate prejudicially at Wexford ?—At Wexford it makes a kind of underground waterfall, such as you see before a wear. The water goes down, and scoops out everything, and makes a little kind of circular embankment. That is what takes place at Wexford.

29,939. That is just within the Dogger Bank ?—Yes ; in fact the Dogger Bank is a portion of that kind of crater formation ; that kind of half crater.

29,940. You seem to have no doubt upon the subject of the shingle accumulating and filling up at the back of the Admiralty Pier at Dover. Have you formed any idea of the time it will occupy, assuming it to do so ?—That is impossible to say.

29,941. You have no idea ?—No. Dungeness is an example ; within the memory of man it has increased from being a little point of sand, as its name implies, the Nose of Sand, to above seven or eight miles in length.

29,942. Referring to your peculiar mode of construction, you said, I think, that Sir M. Peto decidedly approved of it ?—When I spoke to him he did.

29,943. When was that ?—In the year 1844 or 1845.

29,944. That was prior to the construction of the works at Lowestoft ?—Yes.

29,945. If he approved of that system, can you tell us why he did not adopt it at Lowestoft ?—That I cannot say. He may have been satisfied, that for his particular purpose, piles were better ; because wherever my construction is put down there is no passage of water through it; and he may have thought that at Lowestoft it is necessary to have an open work.

29,946. Could you furnish us with a section, or at any rate with a description rather more in detail than you have given in, of the mode in which you propose to construct the timber frame and the concrete ?—I can give a written account, if you choose, about half a page in length.

29,947. Something to give an idea of the process and mode of construction, and the manner in which you would proceed. I see amongst your documents a printed table containing a great many calculations as to quantities and estimates. I presume that the section or description with which you will furnish us will be applicable to these calculations, or would you prefer to send in a fresh estimate for the section which you will supply to us?—Those calculations are quite true, so far as they go, and, according to that date. But since then, things have changed. Timber, which used to be 1*s.* a foot, is now, I believe, 13*d.*, 14*d.*, 15*d.*, or 16*d.* These calculations are upon the supposition that timber is 1*s.* a foot, cubic.

29,948. Then we should have to deal with these calculations, simply substituting the present price of timber for the then price?—Yes, that is all.

29,949. In all other respects the estimate would apply to the section or description which you will furnish?—Yes; that is with respect to Dover; but in the case of a sand bank I should not prefer to have any filling in. The caisson or carcase would be loaded and kept in its place until Nature had filled it in; by which, you would save 200 per cent. upon the cost of the work nearly.

29,950. You assume that the bottom would be level on which you place your frames?—Yes.

29,951. How would you proceed in the case of a rocky bottom with a rapid fall, or great irregularities?—I do not think that in rocky places you could follow that system of sand construction. In rocky bottoms you might have to fill in. Still it would be more convenient to make it horizontal. If I had to carry out a work in such places I should first fill in the inequalities of the bottom so as to make it a tabula rasa; realise a flat, and then lay down the work upon that.

29,952. Of course the cost of that would form an element in the estimate, when such a plan had to be resorted to?—That would be extra; but at Dover there is no necessity for anticipating that case. The bottom is supposed to be quite nearly enough flat. The inequalities would have been trifling, and would have been hardly worth mentioning.

29,953. (*Chairman.*) You have a chart of the Tyne before you?—Yes.

29,954. What is the precise object of putting an island in front of the Tyne, in your view of the subject? Is it for the protection of shipping, to enable ships to run in in bad weather, or simply to improve the river?—The object is twofold. Supposing that there was no river to improve, it would be a very desirable thing to have an island there; but there is also the object of so improving the river as to give to ships, egress and access, at all times of the tide.

29,955. The primary object of all breakwaters is to supply safe harbours for shipping, is it not?—Yes.

29,956. At what distance from the mouth of the Tyne, and in what depth of water, would you place your island breakwater, in order to give the necessary safety for shipping?—That would be for the consideration of others rather than of myself. I can only give an opinion. It might be half a mile or three quarters of a mile from the mouth, or more or less; but it does not signify where it is to be placed. You can put it down equally well in deep or in shallow water; it is only a question of cost.

29,957. Of course the further out you put it the more expensive it becomes?—Yes, and the more exposed you are to the north.

29,958. To the north and south?—I do not suppose that the south is of so much consequence as the north at the Tyne.

29,959. The object would be to keep the breakwater as close to the shore as possible, consistently with furnishing sufficient refuge area for shipping?—Quite so.

29,960. Have you formed any idea at what distance from the mouth of the Tyne your breakwater would require to be placed for that purpose?—About half a mile out from Tynemouth Castle.

29,961. What depth of water does that give you?—32 feet, ranging from 25 feet to 32 at the entrance, and on the land side 28, 22, and 18.

29,962. In what water would the breakwater itself be?—In 31 feet, 32, 36; and at the south end 41 feet.

29,963. To what length on each side of the middle line of the river do you propose that the breakwater should extend?—A mile to the south, and half a mile to the north.

29,964. Are you aware that the time at which protection is required for shipping is when it is blowing hard on shore in easterly gales?—I am.

29,965. And that large numbers of vessels which would run in for shelter are so light that they make four and six points leeway? You understand what leeway is?—I have a general idea of it.

29,966. Because these are very important points; they are at the root of the matter. Perhaps you are also aware that the object is to find shelter for these vessels when the water over the bar is so low that they cannot get into the river?—Yes.

29,967. Therefore that vessels would have to anchor under your breakwater in heavy easterly gales, to find shelter?—Quite so.

29,968. Are you at all aware of the number of vessels that run into the Tyne in one tide under such circumstances?—On one occasion, when my son was there, 32 vessels, went ashore in one gale.

29,969. Are you aware of the number that run in in one tide?—No, I am not.

29,970. I think we have it in evidence that the number amounts to 50, 60, 70, and 80. Suppose these vessels came in round the ends of your breakwater, were could they possibly anchor so as to get shelter in a heavy easterly gale?—When the breakwater is once made the whole space behind it will be available as anchorage. It will deepen very considerably.

29,971. You do not understand the drift of my question. Vessels making so much leeway as those mentioned would not be able to get there. They would all be obliged to anchor in clusters near the entrances, because they could not, under sail, fetch in further. Has it ever occurred to you to consider that?—No; I was not aware of the fact.

29,972. Granting that to be the case, does not the position which you have selected entirely defeat the object of your breakwater, which is to afford shelter to ships, because they could not make use of it under the circumstances in which they most need refuge?—If you thought there was any difficulty about that there might be an entrance or two entrances lower down in the work.

29,973. How would it affect the work to make an entrance for running in just opposite the mouth of the river?—That would tend to prevent your making the river, quiet anchorage.

29,974. No; but a small entrance; how would that affect it?—Persons like yourself, who are competent to give an opinion, would have to consider that; probably it would be an improvement.

29,975. Have you formed an estimate of the quantity of sea that would come in at each end, with northerly and southerly winds, because it appears to me that with a gale from north-east or south-east, all the shelter would be destroyed?—I do not think you want shelter from the south-east. It is with a sea from the north-east that you require shelter.

29,976. With a gale from south-east a heavy sea runs on the whole of that coast, and I observe that with the wind from north-east or south-east your breakwater gives no shelter at all?—Even in that case, if a ship came in with a wind from south-east the water inside would be smoother than it is now without this work, and she would be able to get into the river very well, go up, and cast anchor in safety. She would be safe as soon as she got round the Herd Sand.

29,977. With the wind from south-east and north-

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east vessels could run in behind your breakwater perfectly well ?—Yes.

29,978. But at low water they could not get into the river, and would be obliged to anchor in the roadstead in about 26 or 30 feet, in order to be in safety, on account of the lift of the sea ?—As soon as this work was constructed the condition of the river all the way up would change. All the stuff would be dredged out, and would not re-form. They would have deep water where they now have shoals. A vast deal of space is now indicated on the chart by the sand mark. All that would be taken away, and they would have deep and smooth water up into the river.

29,979. And be able to enter the river at any time of the tide ?—Yes. The question of having an entrance in the middle of the breakwater is a matter of great consequence about which I cannot speak.

29,980. Even supposing that the river was so much improved that vessels could enter it at all times of the tide, we should have a sea running from the north and south, and the sea would still break at the entrance of the river, and render it dangerous for ships to run in. It would still be a breaking sea, which is what renders the mouth of the Tyne so dangerous for ships to run into ?—The sea would never be so violent then as it is now.

29,981. In your opinion the sea would never be so violent then as it is now ?—No.

29,982. The second head in our memorandum, Mr. Glover, was "the application of the theory "to particular instances with a view to its illus- "tration." We have had the application of the theory to Wexford and Southwold, and also to a certain extent, indeed to a very considerable extent, its application to the mouth of the Tyne. Do you wish to adduce any other instance ?—No.

29,983. I think there was something said about Wismar ?—Since I had the honour of receiving your communication, I went to Bonn, where Professor Ardt, who informed me of that case, and Professor Dahlmann, the brother of the burgomaster, reside. When I went to Professor Ardt he confirmed all that he had said. When I went to Professor Dahlmann, it seemed rather offensive to him that Wismar should be adduced as an instance of a bad harbour ; rather insulting to his country. I should have been very much taken aback by what he said as to the goodness of the harbour, had it not occurred that when I mentioned Wismar to a member of the Tyne Conservancy, he said that it was the very worst harbour in the world, that he had had a ship there three months, and she could not get out, and that they always avoid that port as much as possible. He imagined and still believes that I wanted to assimilate the Tyne to Wismar, and would not hear anything to the contrary. From that circumstance I should have gathered that Wismar was a very bad harbour, even if the fact had not been well known in Germany. I cannot obtain a chart of the harbour as it was before the Danes and Russians destroyed it, but its present condition will appear from the Admiralty charts.

29,984. We have also asked for "such natural "instances as exist or may have existed as will tend "to prove the correctness or otherwise of the island "breakwater theory." If you have anything more to say about Wismar it will come under that head ; any circumstances to detail. We have also asked for charts of the harbour, showing its state before and after the change alluded to ?—It is not possible to obtain a chart of the harbour before the change. The destruction of the harbour took place in the year 1715, and the charts of that time are not to be relied upon, even if they exist. The chart showing its present state can of course be obtained at the Admiralty.

29,985. How can we authenticate the changes which are said to have taken place ?—All you can do is to take the history of the country, viz., that at one time the harbour was used by the admiral's ship going in and out at pleasure, and that when the Danes and Russians took it, and wished to destroy it, they sunk ships between one end of the barrier and the main-land, and from that time the place has not been accessible to the same extent.

29,986. Is there such a chart amongst the papers which you have sent in ?—No, there is not.

29,987. Does it occur to you to state anything further under these three heads ?—No, not at present.

29,988. As respects construction, would you like to add anything ?—I think it is desirable that the model exhibiting the mode of construction, which is in the United Service Institution, should be seen by the Commissioners. It is too large to be brought here.

29,989. (*Mr. Coode.*) Will the description which you have promised us, apply to that model ?—It will.

29,990. (*Chairman.*) When shall we receive that description ?—To-morrow, if you please.

29,991. (*Mr. Coode.*) An examination of the model with that description will enable us fully to understand your views as to the mode of construction which should be adopted ?—Yes.

29,992. (*Chairman.*) In constructing this work, what would be the size of the boxes ?—It would be like a great ladder laid along the bottom of the sea. There would be a fore balk and a hinder balk, and these would be tied together by other balks of similar diameter, and 100, 150, or 200 feet long, according to the height of the work : the width of the base being to the height of the work as two to one. The breadth of the frame would be diminished, as you ascended, two feet each layer, which would leave an opening to the sea like steps, except that the balks would be set to the angle of inclination of the whole slope.

29,993. It would be successive layers ?—Yes.

29,994. (*Sir F. Smith.*) Do I understand that your work is not to be solid from top to bottom ? —That would depend upon circumstances. If it was to be used in a place where there was no sand formation, or that you did not choose to wait for its being filled from that source of supply, you must put it down solid ; but if you thought that Nature would do the work, or if you had the means of filling it afterwards, as in the case of the Tyne, by means of ballast, then you would make it hollow.

29,995. Hollow, in what sense ? In putting it down, what is the first operation that you perform ? —If the work is to be put down solid, it would have to be raised layer-wise ; but, if hollow, I should build it like a ship, and launch in convenient masses.

29,996. Say that you were going to erect it in the solid form at a distance of a mile from the shore, what is the process of the work ?—I should make the framework, and sink it.

29,997. Describe the framework ?—It would be a balk, say of a foot section, and of any length you please, so as to suit the convenience of sinking. If the weather was favourable, I should sink it in long pieces ; if unfavourable, in short ones.

29,998. When you talk of a balk, do you mean a single log laid down by itself ?—The framework, looked at from above, would appear like a great ladder.

29,999. In fact it would be two balks with cross pieces at certain intervals ?—Yes.

30,000. Not boxes, but merely these cross pieces acting as sides ?—Yes.

30,001. Then these boxes are a foot high ?—Yes.

30,002. And you fill them in with what ?—Concrete.

30,003. How do you pass the concrete from the surface to the bed of the ocean ?—It should be dropped in capsizing boxes.

30,004. Might not some of it be taken up and held in suspension by the water ?—I should take care that it was not let out, until the box was in the proper place.

30,005. You would let the box sink to the level of the ladder ?—Yes.

30,006. Then you would capsize it, and part of the materials would go in, and part, not ?—No ; none

would be lost; because they should be so concreted as to remain whole until they were deposited.

30,007. Then they must correspond with the spaces between the balks?—Yes; near about. The masses would be (say) four feet square, and one foot in depth. The concrete need not be as hard as mason's work. It would only be necessary that it should hold together and fill in.

30,008. Then it fills in the space between the two balks, which are a foot apart?—They may be any distance; only you must fill in between them.

30,009. Give me a dimension that we can deal with. How far apart would the cross-pieces be?—Say 40 feet.

30,010. A space 40 feet wide?—From tie to tie, 40 feet; but the length would be sometimes 100 feet.

30,011. What length will your balks be?—As an average length, 40 feet throughout.

30,012. Two timbers, 40 feet long, with cross-pieces, are laid down first?—Yes.

30,013. Is that in the sense of the width or the length of the mass?—In the sense of the width of the mass.

30,014. The length of the balks will be equal to the transverse width of the mass?—Yes. I call the transverse balks "ties," and the balks that lie up and down the length of the work "balks."

30,015. I understand, that along the outer and inner edge of your work there is a continuous line of balks?—Yes.

30,016. And that the width of the structure is represented by cross-pieces tying together these longitudinal balks?—That is right.

30,017. The balks which go from end to end are a foot square?—Yes.

30,018. What is the height of the cross-pieces?—The same.

30,019. A foot square also?—Yes: nearly square. I should make their section a trapezium.

30,020. Then you have intervals which are the whole width of the work in one direction, and how far in the other, from cross-piece to cross-piece?—40 feet.

30,021. If the width of the structure is to be 40 feet, and there is to be 40 feet between the cross-pieces, the interval which you have to fill up would be a rectangular space 40 feet square?—That is what I was afraid you misunderstood.

30,022. What will be the width of the base?—We will call it 100 feet.

30,023. If that be so, each of the compartments will be 100 feet long by 40 feet wide?—Just so.

30,024. Do you propose to frame these together before you put them down?—If the weather was favourable I should do so; if not, it would be possible to do it under water by means of a diving bell.

30,025. You propose that they should be put together by divers?—When necessary.

30,026. How should you get the timbers down?—By loading them with iron chain cable, for example.

30,027. And then frame them together when down?—Yes, when necessary.

30,028. That being the case, you next have to fill in these rectangular spaces?—Quite so.

30,029. You propose to fill them in with concrete?—Yes.

30,030. Tipped in?—Tipped in by tumbling boxes.

30,031. And then I suppose spread equally?—It would spread itself because it would be made just square.

30,032. So that a certain number of boxes shall fill each compartment?—Yes; it would look like a great chessboard, only, of course, not coloured.

30,033. We will suppose that you have completed the whole of the first layer; your next process, I apprehend, would be to put down the framework for the succeeding layer?—Just so, of less dimensions in width, but of the same length.

30,034. By that means you have the whole thing rising in steps until you come to the surface?—Yes; and upon the surface you will have a space for any purpose to which you may please to devote it.

30,035. In the event of your not adopting the solid form of construction, what other should you propose?—Then the work would be built according to the model which you will perhaps have the goodness to look at, at the United Service Institution, as the foundation for a lighthouse on a sand-bank.

30,036. Then that would be launched?—Launched, either altogether, or in parts.

30,037. Launched and sunk?—Yes.

30,038. In that case there is no filling in at all?—That would depend upon circumstances. If the work had been laid down at Dover for the purpose of being filled in with the material which Mr. Walker had at his disposal, then it would have been necessary to have made the case ship-wise, and to have launched and sunk it; and *then* to have run the rubble into it.

30,039. What steps do you take to preserve the timber from decay?—I do not care about that, because as soon as the work is solid, it may decay the next week; and it will make no difference, because all the fore part is to be chalk, which generates that weed that I have mentioned, that saves the surface from being injured by the sea. Sir Gordon Bremmer (I believe) objected to chalk being used, on the ground that it would be washed away, and gave as an instance that the land-slip at Dover had all been washed away. So far was that from being the case that not a bit of it had gone. On one side there was the great formation of shingle, and the other was covered with green weed. But the proposition was not, at any time, to put down the chalk loose, but to be defended from the wearing action of sea, in swell or current, by the means of the framework.

30,040. Has not a great portion of the cliff, blown down at Seaford, washed away?—I cannot say.

30,041. It is the same chalk, and has in a great degree washed away?—Well, at Dover it remains, or did, five years ago, at the site I have spoken of.

30,042. (*Mr. Coode.*) Do I understand that the first layer of concrete comes simply to the level of the top of the balks?—Yes.

30,043. The layers of concrete correspond in thickness with the balks?—Quite coincident.

30,044. How is that concrete brought to a level surface? Are the blocks of the same thickness as the depth of the balks?—Yes.

30,045. Then you raise your work in layers of a foot or 15 inches, as the balks may be?—Yes.

30,046. Would not these blocks of concrete require to be placed by divers?—Oh yes.

30,047. You did not contemplate that you could drop them into their places, without the aid of divers?—No.

30,048. Is that the system for which you have estimated, in the printed sheet before us?—Yes.

30,049. (*Chairman.*) Do you wish to add anything before we part with you?—No; but I should like to be present when you inspect my model at the United Service Institution.

30,050. (*Chairman.*) When shall we have your description?—To-morrow.

30,050*a*. We shall be happy to receive any statement which you may think proper to send upon the subject?—Thank you.

Friday, 14th January 1859.

PRESENT :

Sir Frederic Smith.
Mr. Lindsay.

Mr. Coode.
Mr. Evans, Secretary.

Mr. John Gibson examined.

LONDON.

Mr. J. Gibson.

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30,051. (*Sir F. Smith.*) Where do you reside ?—At Gateshead. I am superintending some works for my master, Mr. Johnson.

30,052. You are now conducting works for Mr. Johnson ?—Yes.

30,053. What is the nature of the works which you are now conducting ?—They are on the screw pile principle.

30,054. What is the precise nature of the work ? How is the screw pile principle applied ?—The nature of it is, to run a pier out into deep water to 25 or from that to 30 feet of water.

30,055. And is it a very extensive work ?—Yes, it is a very extensive work, 1,000 feet long and 40 feet wide.

30,056. What is the length of the screw piles ?—Various lengths ; we shape the pile according to the position.

30,057. They differ in length ?—Yes, they differ in length.

30,058. What is the soil in which they are fixed ?—Sand on the top and clay on the bottom.

30,059. What is the deepest pile which you put in ?—Forty-five feet into the ground.

30,060. Screw piles ?—Yes, screw piles.

30,061. Do you mean that the screw itself is that depth ?—Yes.

30,062. And what is the length of the pile which you screw into that shoe ? Am I to understand that you screw the pile into a shoe ?—No ; the pile takes the column down.

30,063. Then the whole pile is screwed into the soil ?—Yes, screwed in together.

30,064. Because there are some instances where there is a shoe, and the pile is fixed into the shoe ?—I never put in such a pile as that, and I never heard of such a pile ; we secure the screw properly to the pile before we put it into the earth, and that screw takes the pile down behind it.

30,065. Do I understand that you are now constructing such a work at Gateshead ?—Yes ; we are having a large work got up there, in which there will be nearly 8,000 tons of iron. I am not screwing the piles down at Gateshead; I am getting it up to go to Madras.

30,066. Then you are doing no work at Gateshead ?—No, not for Gateshead, it is to go to Madras, to erect a pier there.

30,067. Can you tell us any instance where you have practically carried out such a work in England ?—Yes, many instances ; the Gunfleet lighthouse and the Chapman's Head lighthouse.

30,068. Where is the Gunfleet lighthouse ?—The Gunfleet lighthouse is 15 miles from Harwich, on the face of the Gunfleet sand.

30,069. And is that in sand entirely, or in clay ?—There are two small beds of lime clay, with nine inches fall and nine feet deep.

30,070. How have you constructed that work ? What sort of piles have you used ?—The screw pile, four feet diameter the screw, the column 15 inches diameter, with the best wrought boiler plates.

30,071. What is the thickness of the boiler plates ?—Bent up to two and a half inches thick.

30,072. And 15 inches diameter ?—Outside diameter.

30,073. Do you find that thickness necessary ?—It it extraordinarily strong ; it is stronger than is necessary for the place.

30,074. It is not exposed to anything but the breach of the sea ; there is no great pressure on it ?—The sea has no effect at all on it ; I believe that it is quite capable of resisting any vessel.

30,075. How close are the piles ?—The base is somewhere about 53 feet from corner to corner, on sand.

30,076. Do you mean to say that there are 53 feet between pile and pile ?—No.

30,077. I asked what is the interval between the piles ?—I cannot possibly say ; the first bracing is about 15 feet long each brace.

30,078. Are there horizontal bearings from pile head to pile head ?—Both horizontal and diagonal.

30,079. Still the weight, I suppose, is taken on the horizontal beams ?—It has a regular bearing all over.

30,080. Is it perfectly rigid ?—It is perfectly rigid. I have sat there in a heavy gale with the plumb bob suspended 30 feet and the plumb bob has not moved.

30,081. What was the depth of water ?—When we commenced, five feet at low water.

30,082. What is the rise of tide,—12 feet ?—That is the average, or 12 feet two.

30,083. Then it would be 17 feet at high water of spring tides ?—I have had 21 feet at high water of spring tides.

30,084. Did you do the work from a staging or from barges ?—We had both a raft and staging ; the principal part of the work was done from staging.

30,085. Would it be easy to do it from barges ?—It could not be done so there, there is too much sea ; we could not have a barge ; we had to have the raft out sometimes at 10 minutes' notice.

30,086. Then you think that if the structure be exposed to a very heavy sea, it is very difficult to screw piles without staging ?—It is very difficult to make the first start, commencing out at sea, but commencing at the land it is very different ; out at sea is such a bad place to establish a beginning in the middle of the water.

30,087. Assuming that a work of that kind had to be done in the open sea, unconnected with the land, would it be a difficult operation ?—It would be difficult, but I am quite satisfied it can be done ; I did it there.

30,088. But you worked partly from a staging ?—I had the staging to fix.

30,089. Supposing you had a line of piles a mile in length to screw into the ground, what course would you adopt ?—I would adopt a steam-engine to screw them down.

30,090. But you must place the steam-engines on something ?—I would put it on the top of the finished work to travel out behind it.

30,091. But supposing it was a simple line of piles, with spaces equal to the diameter of the pile itself, such as in the model which you see before you, would you in that case be able to establish a steam-engine for work of the kind ?—If there were a great continuation of the work I should be able to establish a steam-engine to travel as it proceeded.

30,092. Would you risk it in the open sea, with the chance of a gale of wind coming on?—I would rest the engine in the open sea on the top of the screw piles. Such a structure would have to be sufficient to carry it; but I should not be afraid of the risk on such a work as that at Gunfleet sand.

30,093. But before the piles are braced there is vibration ?—The piles have to be braced. There must be space between for men to put on the bracing.

30,094. Supposing the model to represent a structure which you had to make, should you feel it safe, before the struts were placed, to run out an engine on the pile heads without the bracings ?—It could be

done more simply, so that if there was a break-up you would not have so serious a loss; an engine is only necessary for very large, enormous works. There would then be a great saving of manual labour. That is what we use the engine for. I have not really used an engine myself, but there is one in Peru, at Pisco I think, now in work, and it answers the purpose very well indeed. Wherever there are large works an engine is necessary, but I have not used an engine myself.

30,095. Do you mean by large works, works of solidity and breadth, or works of length?—As to length, it would be no matter how long the work was if your engine were secured properly. It would not pay to have an engine for small piers, that is what I mean.

30,096. Supposing it were a work a mile or a mile and a half long, of single piles at intervals, would it answer to use an engine there?—No, I would never attempt it, because there must then be a temporary stage for the engine to travel on; it could not travel on a single row of piles.

30,097. That being the case, by what process would you screw down piles 60 feet long?—To carry out a line of piles like that in the model, I should fix a frame somewhere about the point of half ebb and half flood.

30,098. At the half-tide line?—Yes; from that I should either hang or strut it up, to carry the men right along.

30,099. In the space between the stays and upright piles?—I do not know what is the supposed diameter.

30,100. The space being about 40 inches, would you have room?—No; but there is a remedy by putting the staging across at half-ebb line, and putting a cap on the top of the piles to level the pile with, to fetch it down to the level of the capstan.

30,101. Supposing you had to screw piles of that kind 10 feet into the ground, in ordinary soils, either clay or hard sand, what time would it take to screw a pile of that diameter?—I have screwed a pile at Chapman's Head or Chapman's Sand lighthouse 21 feet in 8 hours, 4 feet diameter screw at the bottom, and an 8-inch pile.

30,102. If you had two piles to screw, each 10 feet 6, you could not do that in the same time as one pile of 21 feet, because you would have to place the piles in position?—In that instance when I screwed a pile 21 feet in 8 hours, the time of pitching the piles is not calculated at all; it is reckoned from the capstan head being fixed and everything ready for screwing.

30,103. The pitching the piles takes time in rough weather?—I consider the mere screwing a pile 21 feet in 8 hours very quick work indeed.

30,104. But the pitching of the pile independent of the screwing takes time, does it not?—In a heavy sea it does. It depends greatly on the staging; if you work from a staging above the water, and are independent of the sea, the pitching a pile is not much. It depends on getting the frame fixed.

30,105. How would you pitch piles in a rough sea?—I would steady the frame.

30,106. The frame above water?—Yes.

30,107. To be a good frame it must be above water?—Yes.

30,108. Then the fixing of the stays, such as those in the model, would also be an operation which would occupy time?—I have examined this model before.

30,109. Do you think the shoe shown in it enough to hold the pile under ordinary circumstances?—I do not. I could put a pile down in half the time it would take to fix it to the shoe.

30,110. In fact you would be disposed, if I understand you rightly, to screw the raking piles at the back rather than trust to the shoe?—Yes, I feel certain that I could put a pile down easily. I cannot see how that shoe is to be got into the sand.

30,111. You would put down a pile and have a strut or screw diagonal pile—an oblique pile. Do you mean to say that the whole stay would be screwed in?—Yes, the whole stay, and fixed at the top afterwards.

30,112. That being the case, the oblique pile, which would act as a stay, would require as much screwing as the vertical pile. Would it be more difficult to screw than the vertical pile?—It would be a little more difficult in screwing, but it would go down quite as fast as the other. You would put them down as easy, but there would be more danger of breaking the capstan bars.

30,113. To make allowance for the inequality of the bottom of the sea, it would require that the screw piles should be prepared the exact length necessary?—Oh yes, though I have cut them off at the top, but not at sea.

30,114. It is an awkward thing to do that?—I could do it very fast.

30,115. I suppose, assuming that to be the process, that one pile and one screw stay would occupy you at least a day?—Oh yes.

30,116. A period of twenty-four hours?—It would occupy twenty-four hours at the least.

30,117. That would be about the rate of progress in the whole work?—In the whole work.

30,118. So that the progress would be at the rate of a pile with its interval *per diem* in the length of the work?—Yes.

30,119. (*Mr. Coode.*) You have put down screw piles at the Gunfleet sand and Chapman's Head?—Yes.

30,120. Can you name any other places?—Yes, many. I have put them down at Newport, Cardiff, and the Victoria Docks.

30,121. Those are moorings?—With shanks on the top. I have put them into the ground 15 feet.

30,122. Please to confine yourself to places where you have put down screw piles in the sea?—I have put them in at Spit Bank in the Cove of Cork.

30,123. Did you put down the piles on the Maplin sand?—No, but I have examined them since.

30,124. How many piles are there in the foundation of the Gunfleet lighthouse?—Seven.

30,125. How long were you from the commencement, until you had completed the whole seven?—We could only work in the summer season. It would not pay to carry on the work in winter. I was 48 months there altogether.

30,126. That included the completion of the light house itself?—Yes, everything connected with it, preparing the materials at Harwich.

30,127. Our object is to ascertain the result of your experience as to the time necessary for putting down screw piles under different circumstances. Be good enough to confine your answers to that particular point. With regard to the piles only;—from the time you commenced putting down the first till you completed the last, what period had elapsed?—Well, I think, as near as I can tell you, about 24 months—about half the time.

30,128. And how many piles altogether did you put down?—Seven piles of two lengths each.

30,129. Were the whole put down from a raft or after you had got a stage?—They were all put down from the stage. The raft was used to take them out. It was very substantial, and we would cut it adrift and pick it up with a steam-boat.

30,130. Are we to understand that you constructed the stage before you commenced to screw in the piles, so that the whole of the piles were put in solely from the stage?—They were finished from the stage. The stage was erected with temporary screw piles.

30,131. At Chapman's Head how many piles were there?—The same number—seven with two lengths each.

30,132. Were they put in from a stage?—They were put in from a raft. It was not so much exposed. I could clear myself of the raft.

30,133. How long were you occupied putting in the piles there?—I finished all the bracing in five months—the whole of it. I was there five months

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altogether. That is the difference between Chapman's Head and Gunfleet lighthouse.

30,134. Is there any other exposed situation where you have put down piles from a stage ?—Nothing but the Cove of Cork lighthouse.

30,135. Is that very much exposed ?—It is very much exposed when the wind is blowing into the harbour's mouth, because it stands right in the centre to guide vessels coming in.

30,136. How many piles did you put in there ?—The same number.

30,137. Were they put in from a raft or a stage ?—From a lighter.

30,138. How long were you occupied in putting them down ?—They were 17 feet each into the clay in about three weeks. It was much more simple still than Chapman's Head.

30,139. What was the diameter ?—Seven at the centre, tapering to six.

30,140. And solid ?—Yes, solid.

30,141. I think you have stated that at the Gunfleet lighthouse the piles were 15 inches in diameter, and the iron two and a half inches thick ?—Yes.

30,142. Of how many thicknesses of plates was that made up ?—Three thicknesses.

30,143. Look at that drawing, which represents a wave screen as suggested by Mr. Calver ; the piles are formed of wrought-iron boiler plates, and are from 20 to 30 inches diameter, screwed 10 feet into the ground. It is proposed to construct this screen in front of a bay, and totally unconnected with the shore, and we should like to have your opinion as to the rate at which you think you could screw down one of these piles to a depth of 10 feet, under ordinary circumstances ?—I never could put down the piles at Gunfleet so fast as I might here, because they had to be so accurately put down.

30,144. It is simply the principle shown in the model ?—At Gunfleet I had to scrape the paint off, and the piles had to go down to the 37th part of an inch, but in a single row of piles, like the model, there would be no necessity for such accuracy.

30,145. That extreme accuracy is not required in this case ?—Extreme accuracy is not required. In putting down the Gunfleet piles I had to keep them from going too fast down. I was afraid of them going too fast, and often stopped the men to get the measurements, to see that the piles were correct. I put them down 13 feet 6 at Gunfleet.

30,146. Give us an idea of the time which would be required to put down piles as in the model ?—I would put one of them down 10 feet in two hours in sand.

30,147. After you commence screwing ?—Yes.

30,148. Supposing you had to put them in six fathoms water at low water, in an open seaway, should you apprehend any loss of time in pitching the piles and getting them into their situation ?—It might be weather that you would not be able to go out.

30,149. That is what we wish to know ?—There are days and weeks when you could not go out, but I should not be afraid of the pile standing. A pile 10 feet diameter screwed in would never come out of the ground again.

30,150. That is not the question at this moment. We want to know the facility with which you could get these piles down, the time it would occupy ?—You cannot calculate more than six months in the year to work in the sea.

30,151. Then it is the result of your experience that works of this kind in the open sea can only be prosecuted during six months in the year ?—Not more, taken on the average.

30,152. Do you think it more economical to stop the works for the winter months, or would you progress just as you could ?—I would secure the works as much as I possibly could, but not exactly for the winter months. My experience proves that from March up to May is the worst of all the season round.

30,153. Would you stop the works entirely for any period of the year ?—Yes.

30,154. For how many months ?—For at least three months—February, March, and April—at any rate.

30,155. During those months you think it would be useless to attempt to accomplish anything of the sort ?—Quite useless.

30,156. Is that on the assumption that the piles are put down from a stage ?—It would be impossible to get backwards and forwards. At Gunfleet I left the stage all the winter, but it was impossible to land upon it.

30,157. It would be difficult to get the workmen to the stage without a connection with the land ?—I think it would be impossible to get men landed on it.

30,158. Then it is your opinion that nine months in the year may be calculated as reasonable working time ?—Yes.

30,159. Of those nine months what deduction should you make for lost days ?—For gales and bad weather I should say three months more. You may always calculate a broken time being three months, and that would leave only six months.

30,160. Then that comes to 26 working weeks throughout the year ?—Yes.

30,161. And in that case, assuming that the men work six days in each week, you have 156 days in the year on which to calculate, for carrying on your operations ?—Carrying on operations out at sea.

30,162. Then taking these 156 days as the working season, how many sets of piles and stays (reckoning one pile and two stays as a set) could you get down in the same day ?—This pile can be put down in two hours if it is pitched.

30,163. But taking into consideration the carrying out the piles, the pitching them, and making a temporary stage ?—What is the distance from the land ?

30,164. The distance being from one to two miles, could you complete one pile and two stays in each working day ?—No.

30,165. What should you allow to be done during the six working days of the week ?—Three columns and stays.

30,166. And you think that would be a reasonable allowance ?—That would be a very reasonable allowance. The time is taken up in running to and fro by steamb oats ; it is in carrying the material out. Supposing the pile could be put down in one hour, still you would require nearly the same time for the work.

30,167. After your long experience in such matters, you think that if you could get down three of those sets in the six days, you would have every reason to be satisfied with your progress ?—I should be quite satisfied with it.

30,168. (*Sir F. Smith.*) If you were to make an estimate to save yourself from loss, you would not calculate more than that ?—It would require the place to be looked at and examined. If it were a simple place and smooth water you might do more.

30,169. You know that Hartlepool is much exposed, that the sea breaks a great distance from the shore, and that a great sea rolls in when the wind is south-east ?—Yes.

30,170. In a position of that wind it would not be safe to make an estimate of driving more than three piles in six days ?—Three piles for six days.

30,171. You allow 26 weeks in the year and calculate three sets a week ?—Yes.

30,172. Of course you would take out more than one pile in a steamer at a time—more than one pile and the stays ?—I would take only one at a time and the braces connected with it.

30,173. You would not think it advisable to take out more than one set at a time ?—No.

30,174. And why not ?—I have been often caught going out from Harwich to Gunfleet. I have made the attempt seven times with one column, and did not get there until the seventh time.

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30,175. Did you start in unfavourable weather ?—No, but it sometimes comes on bad weather suddenly.

30,176. How far off was it ?—Fifteen miles.

30,177. It is an extreme case. Here the distance is only a mile or a mile and a half ?—With a mile or a mile and a half you might venture two piles.

30,178. Then if you had two piles and the braces connected with each, and you were able to do more than one in the course of 24 hours, you might commence the other ?—You would pitch them ; they must be finished before you leave them.

30,179. You would not attempt two at the same time ?—No, I would finish off one first.

30,180. If the length were a mile, would it be advisable to commence in the middle, and work both ways ?—In this case there would be no obstacle at all.

30,181. That might be done ?—Yes.

30,182. That would put you then in possession of twelve months' work in the year ?—Yes, by having a double set of men.

30,183. And there would be no increase of cost ?—No, not in that case.

30,184. You would just want double the amount of plant ?—Yes ; one superintendent could act on four set of men if necessary.

30,185. (*Mr. Coode.*) Assuming that the diagonal stays were screwed down, instead of being fixed in a shoe, should you not require much smoother water than if they were fixed in a vertical position ?—No. The only objection I have to screw down obliquely is the breaking of the bars. You must stop to shift the blocks, or you would break all the gear. That is the only difficulty.

30,186. (*Sir F. Smith.*) Is it not more difficult to form the guide to give the proper direction to those struts than to the vertical piles ?—When you have to put in those piles correct to the half-inch it is difficult. It requires you should work very gently and slowly to keep them to their position.

30,187. You mean the stays ?—Yes, because they are to be fixed in the manner shown in the model.

30,188. Does it occur to you to make any observation yourself ?—No. I have examined this model before, and I have no observation to make about it. I have spent some hours over it, and I cannot see how the shoes are to be got down.

30,189. (*Mr. Coode.*) You think that if the shoe could be put down in ordinary ground, it would form a sufficiently rigid resisting point to the piles, when struck by a sea ?—Yes. The weakest point is at the top of the struts, and that is where the effect of a sea would tell.

30,190. Do you think there would be any tendency in the shoe to work in the ground ?—It would work, but would set again almost momentarily.

30,191. (*Sir F. Smith.*) Do you mean in sand ?—Yes.

30,192. How would it work in clay ?—It would make a great hole.

30,193. (*Mr. Coode.*) What would be the consequence ?—The whole structure would vibrate, and the consequence would be to harden the iron in the water, and in time the piles would break off.

30,194. That is your view with regard to this particular mode of construction ?—Yes. It would be like working a bit of wire to and fro in your hand. After a certain time it breaks.

30,195. You think you could secure the stays by screwing ?—Yes, by putting in screw piles. In my opinion nothing else will do it.

30,196. Would it be braced and tied in both directions—both sea and land ?—No, that is not necessary. The back stay is sufficient. If put in with a screw it holds as much one way as the other.

30,197. What weight of screw do you think would be required to secure a pile such as is shown in the drawing ?—The screw would weigh six cwt. or seven cwt.

30,198. I am not making reference to the exact form of screw shown in the drawing, but to a screw such as would be fixed to a pile of twenty inches diameter, to be screwed ten feet into the ground ?—The weight of that would be about five cwt., as near as we can come to it.

(*Sir F. Smith.*) We are very much obliged to you for the information which you have given us.

Friday, 18th February 1859.

PRESENT :

Admiral HOPE (Chairman).

Sir FREDERIC SMITH.
Captain VETCH.

Mr. COODE.
Mr. EVANS, Secretary.

Mr. MICHAEL SCOTT re-examined.

Mr. M. Scott.

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30,199. (*Chairman.*) Be good enough to proceed, Mr. Scott, with your evidence, from that point at which you left off when last under examination ?—I described the erection of a timber and rubble breakwater upon a rubble bank, and I will now describe the mode of facing, so as to form a permanent stone structure. I propose to employ large blocks of concrete for both faces, and I conceive the advantages of using blocks of large dimensions to be, that they are less liable to be disturbed, being of great weight, and in a very few courses, probably three, the work would be brought above low water, and that these masses are cheaper than stone. Of course in handling such great weights very strong staging is required, and very powerful machinery, and I submit that I have obtained, by the plan proposed, a very strong staging, and I will now describe the machinery which I propose to employ for setting these blocks. There are two drawings handed in, Nos. 3 and 4, which represent the hydraulic machinery for setting the face. It consists first of an accumulator, patented by me in 1851, placed on a traversing frame, which frame moves on four lines of rail.

30,200. (*Sir F. Smith.*) Do you mean four rails, or four lines of rail ?—Four lines of rail.

30,201. Then you mean eight rails ?—No, four rails. I was perhaps wrong in my expression. On the fore end of this main frame there is placed a cross frame, and on this cross frame there is a crab. This crab being brought over a block conveyed on a waggon below, instead of the chain being attached direct to the block, a cylinder containing a piston is interposed between the chain and the block; the cylinder hangs from the chain, and the piston rod is

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attached to the block. A communication is made between the accumulator, which contains water under pressure, and the lower end of the cylinder by a flexible tube. A stop-cock being opened, the water passes into the cylinder, forces up the piston, and lifts the block. The men at the crab then move the crab out to the end of the frame, and by means of a break they lower the block : the divers then proceed to set it in its place, but to do this they require the power to move the block in different directions, and this is accomplished as follows :—First, suppose the block requires to be raised, the stop-cock is opened as before, and the water entering the cylinder forces up the piston and raises the block : the block may then be suspended by shutting this cock ; and suppose the block requires to be lowered, a second cock is opened, situated between the cylinder and the first-named cock, which allows the water in the cylinder to flow out ; the piston descends, and the block is lowered. To move the block laterally a small cylinder is attached to the framing above. A chain from the piston rod passes over a pulley at the opposite end of the crab, and is attached to the crab. A flexible tube from the accumulator passes down to the divers, just within the men's reach, and up again to the cylinder ; and the stop-cock in that tube being opened, the water presses upon the piston in the small cylinder, which pulls the chain, and the crab is moved to one side. For the purpose of moving the crab in the opposite direction, another and a still smaller cylinder is fixed at the other end of the frame, the piston in which is connected with the crab by means of a chain as before. This smaller cylinder is always in communication with the accumulator, and the piston in the cylinder is always acting in opposition to the piston in the cylinder previously mentioned, so that when the water is allowed to flow out of the first cylinder the piston in the second cylinder moves the crab to the opposite side. The motion forwards and backwards is accomplished by similar means, and thus the divers have the power of moving the block in every direction and in every degree without communicating above water. The great traversing frame is moved by two long cylinders of small diameter, one at each side, the piston rods of which are hooked on to chains made fast to the forward end of the work, and the water being admitted into these cylinders the frame is moved forward. When the pistons have reached the end of their stroke they are drawn out and rehooked further forward on the chains. I think this concludes the description of the machinery for facing.

I will now proceed with a description of the Round Ends of the timber breakwater. The structure end is composed of frames formed of two uprights tied together, and these frames vary in width according to the exposure ; that is, the frames on the seaward side of the round end are wider than those on the harbour side. The exterior planking is interwoven with the uprights, on the principle of basket-work, and the result is that the work, as a whole, is strong, and, being slightly elastic, vessels which might touch on entering the harbour are not so liable to injury. I do not know that I have anything further to say with respect to the Round Ends.

30,202. (*Sir F. Smith.*) What is the thickness of the planking which interlaces with the uprights ?—It varies from top to bottom. The thinnest at the top where the uprights are close, and thicker as you descend.

30,203. What is its greatest thickness ?—Six inches.

30,204. Six inches the planking, and how far apart are the uprights from each other into which it interlaces ?—I think the distance is about ten feet apart.

30,205. And do you think that you will be able to interlace at the round end six-inch planking, with uprights ten feet apart ?—We are doing so at Blyth.

30,206. How are you able to continue that in the round ? In a straight line one can understand it ?—The planks will be twenty feet long, passing in front of one upright, behind the next, and in front of the next.

30,207. Like basket-work precisely. There can be no difficulty in getting pieces to pass in in the straight. What is the diameter of the circular end ?—At Blyth it is about 45 feet.

30,208. Forty-five feet diameter ?—Yes.

30,208*a*. How much are the planks removed from the straight line in interlacing ?—I cannot answer that without referring to the model or drawing.

30,209. What pressure do you use ?—The angles are removed from the uprights, which diminishes the amount of deflection.

30,210. Give me the deflection, and what force you use to obtain that deflection. They alternate, do they not ? The planks are not wholly in the inside or the outside. They alternate, do they not ?—Yes, they alternate. There would be very little difficulty indeed.

30,211. No ; I perceive now that each plank deals with only three uprights ?—Exactly so.

30,212. (*Mr. Coode.*) Are the planks bent in any degree, or do they remain straight ?—They are bent to some extent ; not to any great extent.

30,213. Were they bent in the model which was produced ?—The model was made to a correct scale, both as to the dimensions of the work generally and the thickness of the planking, and therefore the amount of bending was shown accurately.

30,214. As far as I recollect the model, there was no necessity for bending the planking ?—They were bent, but not much.

30,215. Not enough to injure the timber ?—No.

30,216. The greatest thickness you say would be six inches. What would be the least ?—At Blyth, at the top of the rail it would be about $3\frac{1}{2}$ inches.

30,217. Have you begun the circular work at Blyth ?—No ; it has been tested to see that the thing can be done, but they have not begun it.

30,218. Was it tested on a large scale, or in a model ?—It was tested on a large scale.

30,219. What we may call the full size ?—Yes.

30,220. At what rate have you estimated these concrete blocks per cubic yard,—the cost as made without the cost of setting ?—Below low water the cost is 27*s*.

30,221. That is per cubic yard ?—Yes.

30,222. Is that the cost when set ?—Yes, set.

30,223. What is the cost of the concrete block complete on shore before it is taken out to the work ?—I can hardly say.

30,224. Do I understand you to say that the frame of the traveller is moved by hydraulic machinery or by hand ?—By hydraulic machinery.

30,225. With reference to the pressure of the water within the cylinders, have you given us the number of pounds per square inch?—The pressure might vary very considerably. It depends on the dimensions of the cylinder, but I think in the drawings it is about 700 lbs.

30,226. Per superficial inch ?—Per square inch.

30,227. Of what material do you propose to form the flexible tube ?—It is made of canvass ; a woven tube. I think that gutta-percha is used.

30,228. Have you known a flexible tube tried with that pressure ?—Oh yes. The small hose which is generally made for general purposes will bear that amount.

30,229. What is the object of passing the flexible tube down to the diver ? Is it that the cock may be placed within reach of the diver ?—Exactly.

30,230. That is your object ?—Yes, to enable the

diver to produce the motion himself, without signalling to those above.

30,231. Will the cylinder and the piston rod pass down below the water level ?—The cylinder which lifts vertically will pass down.

30,232. Do you not fear that the piston rod will be liable to corrosion in coming in contact with salt water ?—I think not, as it will be a piece of machinery in motion ; but if it is found to do so, it can be cased the same as are the pumps of marine engines.

30,233. I do not think you stated the weight of the blocks which you would propose to employ ?—The weight would vary with the dimensions, and the dimensions with the particular work ; but the machinery which I propose will be competent to deal with blocks of 30 or 40 tons.

30,234. How would you suspend those blocks,—by slings or lewises ?—By rods of wrought iron passing through them.

30,235. How would those rods be attached to the block ?—They would be passed through the block together.

30,236. And how fastened at the bottom ?—With a washer.

30,237. How would they be disengaged ?—They would not be disengaged ; I should leave them in.

30,238. How would you provide for setting the succeeding block if the first had a projecting eye left in ?—Those eyes which you see in the drawing are detached ; the rods are left in the block. The eyes represented there in the upper block are really detached.

30,239. So that you leave the upper block fair to receive the next ?—Just so.

30,240. (*Sir F. Smith.*) What amount of durability do you expect in these masses ; equal to stone nearly ? —I should say equal to many stones. I would not say they would be equal to granite of the best quality, nor equal to some other of the hard stones, but still we have instances of the great durability of such blocks.

30,241. With what stone would you compare it as being nearly as strong ?—I do not know the life of any of the better stones. I do not know that it has been ever ascertained, because it must be very great. I can hardly conceive any limit to the durability of some of the stones which we use for harbour works—for example, the Carlingnoze stone.

30,242. Is there any peculiarity in the concrete blocks which you propose—any special mixture ; or are they ordinary, such as are being used at Dover now ?—One peculiarity I was about to mention. Suppose the stone of the neighbourhood in which the work was to be erected was not of very good quality, I think the block might be faced with a superior stone by laying on their face a series of stones rudely jointed and with the ends projecting upwards, first employing cement ; then filling in with the more ordinary material. The bottom of the block would thus become the face of the block.

30,243. The external face ? — Yes, the external face; and we should have that face of a better quality.

30,244. Do you mean that you would use stone of the neighbourhood in fragments or in pieces that could be peeled off generally, or as a sort of ashlar ? —Not ashlar, but as rubble.

30,245. As rubble,—broken fragments ?—Yes, broken fragments.

30,246. And intermixing with cement ?—With cement or lime, as the case may be. Of course a great deal must depend on the locality.

30,247. Then you imagine your external surface would be of much better quality than the mass behind it ?—I think not only of better quality, but a better face, seeing that the joints would be smaller.

30,248. With equal hardness and resistance as you propose both in the external and internal portions ?—I think that, made in that way there would be no liability to fracture. I do not propose this face for the purpose of better resisting any superincumbent pressure. I assume that the whole materials of the block would be equal to that, but that you would have a better material exposed to the action of the sea.

30,249. You have, I suppose, manufactured some blocks in that form ?—I have just been trying the experiment.

30,250. You have not applied any pressure ?—I have not tested it on any large scale.

30,251. You have not tested it ; at present it is a theory, in fact ?—I do not know that it is a theory exactly, because I have said nothing of this peculiar method in describing the concrete blocks. There is a great variety of ways of making them. We know that a mass of block concrete has stood for 2,000 years exposed to the sea. I will adopt the best method. It is no part of my plan making the concrete blocks. I merely employ them in large masses on a large scale.

30,252. (*Mr. Coode.*) Following up Sir F. Smith's question,—the only reason why you employ the concrete block is to obtain a larger mass than you can get in the shape of stone ?—Certainly.

30,253. You do not contemplate that you can get stones of from 40 to 50 tons ?—No ; except at an enormous cost.

30,254. By means of concrete you will effect greater economy ?—Quite so.

30,255. Are you aware that some experiments were tried six or eight years ago in building artificial blocks with a granite face, and softer material at the back ?—I am not aware of that, but I should not expect a good result.

30,256. Why not, if in the way you have described ?—In the first place, from an ashlar face with rubble backing I should hardly expect a good result, there being such a great difference between the two materials, if there was a great superincumbent weight.

30,257. Is that your opinion, assuming that you have in the face small pitchers ?—In my process the object is to blend the two qualities into each other as gradually as possible, and I think that anything which makes a strong line of demarcation between the back and face would be disadvantageous.

30,258. Undoubtedly your object is to obtain a durable material on the face ?—Quite so.

30,259. Is that the object in the process which you have explained to us ?—Yes.

30,260. (*Chairman.*) Is there anything else, Mr. Scott ?—I was going to describe the Wave Screen. This drawing illustrates the principle of the Wave Screen. It is composed mainly of a timber grating resting on piles and inclined towards the sea, and when in action the waves will run up the slope, part of the water dropping through the transverse openings. The lower edge of the grating is not carried to the ground, but remains some feet above the surface of the ground.

30,261. (*Sir F. Smith.*) In your drawing it is marked low-water mark ?—Quite so. I said the edge does not reach the ground. The advantages which I think this Screen presents over a stone slope will be, first, that stone slopes are more generally injured at the toe, and in this case there is no toe, as the grating does not reach to the ground ; and secondly, that it permits to a considerable extent the uninterrupted flow of the tidal current through it. The water which runs up the slope, dropping through the grating, neutralizes the undulation seeking to pass underneath. As the planks are arranged, they oppose but little surface to the blow of the wave, whilst at the same time they will intercept any water returning down the slope. The peculiar form of the cross section of the planking has also the advantage of being easily secured ; and the Screen, as a whole, is cheaply erected and easily repaired or replaced. I do

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not know that there is anything further which I can say on that point.

30,262. (*Sir F. Smith.*) Have you made any experiment to ascertain what probability of success you have in this plan of yours?—Yes, I have tried it.

30,263. Where?—At Blyth.

30,264. In what depth of water?—It would be eight feet at high water, but the action of the screen was not observed then; it was when the water was four or five feet deep.

30,265. And you imagine that the great mass of the wave will not return down the inclined plane again, but pass through the planks?—I think part of the wave will return probably. I do not think it any disadvantage if it does. Of course the quantity which would return would be determined by the openings.

30,266. Have you made experiments as to what the openings ought to be?—I do not think any individual experiment would determine that for any given situation.

30,267. Except for a given situation?—Yes.

30,268. Have you made any estimate of the cost per lineal yard in any situation where there was a considerable depth of water?—It is only intended for shallow water.

30,269. You did not say so?—It is wholly inapplicable in deep water. If there were great depth of water under the toe of the screen, the undulations would pass under. It is only where the water is shallow and the wave necessarily breaks.

30,270. I asked you a question as regards the cost?—It is about 12*l.* per foot run as drawn.

30,271. There is no scale on the drawing?—It is drawn to the scale ordered by the Commissioners,—four feet to the inch.

30,272. What is the rise of water supposed to be shown on the plan?—About 15 feet.

30,273. What is the angle of inclination which you would give the screen towards the horizon?—That is not a matter subject to calculation. I think we require to be guided by experience.

30,274. By circumstances and experiment?—To a considerable extent. If the slope of the screen be very steep, it will oppose more resistance to the blow of the wave. On the other hand, if it be too flat, then the wave will be apt to overrun it.

30,275. Then you think it is quite inapplicable to deep water?—Quite inapplicable.

30,276. What is the extreme depth in which you think it would be applicable?—I am not prepared to answer that without considerable deliberation; but, at all events, at a depth where the low water would be anything like three or four fathoms I should think it would be inapplicable.

30,277. You would not go so deep as that?—No.

30,278. (*Capt. Vetch.*) Where do you propose to apply this screen?—In cases of shallow water only.

30,279. For the protection of piers?—To form a breakwater itself.

30,280. It would only be applicable in shoal water?—Only in shoal water.

30,281. How much water at low water would you place it in?—Nothing above three fathoms.

30,282. And do you think it would be applicable to depths of three fathoms?—As I have stated, it would require serious consideration before I could answer. It might be very useful in a number of smaller harbours.

30,283. What would you expect to be the action of the wave?—I suppose the wave would run up the slope. As it would run up, a considerable portion of the water would drop through; then on returning it would wholly drop through. The blow is less than on a solid stone slope.

30,284. You think that between the toe and the higher end the whole wave would be absorbed?—I do.

30,285. That it would not then come with any force on the platform?—I think not; and in case it should be found to do so, it would show that the slope ought to have been made longer.

30,286. How high would you have it above high water?—No definite point; the higher the better. That would be a question of expense.

30,287. You would not make it less than 10 feet?—I think not.

30,288. (*Mr. Coode.*) In your estimate do you contemplate that the timbers would be creosoted?—Yes, creosoted.

30,289. Have you any fears that the piles would get chafed in case of any shingle rolling upon the surface of the ground? Shingle would be disturbed in water of that depth, if there were any?—If there was any probability of that, the piles would require to be cased with iron at that point.

30,290. You have not taken that into account in forming your idea of the cost?—No; but it is a very liberal estimate, and I believe would include that.

30,291. Of what material would you form the Screen—of what kind of timber?—It would depend on the situation. On the east coast I would apply Baltic and on the west coast American.

30,292. (*Chairman.*) Is there anything else which you wish to add?—I would now propose to say some few words on the principles which have guided me in determining the best form of breakwater. I have stated that this Screen, for example, is applicable to shallow water, and that the other forms of breakwater which I described were applicable to deep water. This Screen is applicable to shallow water, because waves must necessarily break in shallow water if of any magnitude, but not in deep water. I believe that the wave will not break against a vertical face; and I think in the case of Dover we have an example of that. At Dover, partly from the absence of material, the work has been expensive, and the rate of progress is slow. I believe that it is the form only of the wave which travels rapidly in deep water; that the motion of the individual particles is small; that though the motion of each particle is small, the number moving or the bulk of water agitated is great, and that it is with the momentum of this mass of water that we have to deal. I also believe that a wave passing along a uniform channel remains of the same form and dimensions; that if the channel enlarges, the wave spreads and agitates a greater bulk, and the agitation of the particles is less; that if the channel contracts, the wave is concentrated, the bulk agitated is less, but the degree of agitation is greater, and that if the bottom rises the effect is even greater than with converging sides.

30,293. (*Sir F. Smith.*) The principles which you appear to be supporting are so well recognised, that, unless you have any particular object, the Commissioners deem it unnecessary to trouble you to go into further details?—Having stated my belief in those principles, I will not occupy the time of the Commissioners further in that matter.

30,294. (*Mr. Coode.*) Should you be an advocate for the adoption of the vertical wall under all circumstances, and in all cases, without exception?—No.

30,295. (*Chairman.*) Is there anything else, Mr. Scott?—I wish to say a few words on two very important points—the rate of progress, and the cost.

30,296. Will you proceed to do so?—I described the erection of a breakwater upon a rubble bank in my previous evidence, and I now propose to compare two breakwaters constructed under similar circumstances, the same in form and external dimensions, in materials, and in prices. I have constructed tables to show the rate of progress and the cost of these works upon the two systems. The one I call the old system, to distinguish it; and I will proceed to explain the following table in very few words:—

OLD SYSTEM.—RATE OF PROGRESS.

—	—	Amount expended each Year.	Total Amount expended.	Length
1st Year:	£	£	£	Feet.
600 ft. rubble bank, 21*l.* 12*s.* -	12,960			
600 ft. staging, 18*l.* - -	10,800			
		23,760		
2d Year:				
Interest at 4 per cent. on previous amount - - - -	950			
Repairs of staging, 6 per cent. -	648			
300 ft. wall at 69*l.* 12*s.* - -	20,880			
300 ft. staging and rubble mound	11,880			
		34,358	58,118	300
3d Year:				
Interest on previous amount -	2,325			
Repairs 600 ft. staging - -	648			
300 ft. wall - - - -	20,880			
300 ft. staging and mound - -	11,880			
		35,733	93,851	600
4th Year:				
Interest - - - -	3,754			
300 ft. mound, staging, wall, and repairs of 600 ft. staging, &c. -	33,408			
		37,162	131,013	900
5th Year:				
Interest - - - -	5,240			
300 ft. mound, staging, wall, &c. -	33,408			
		38,648	169,661	1,200
6th Year:				
Interest - - - -	6,786			
300 ft. mound, &c. - - -	33,408			
		40,194	209,855	1,500
7th Year:				
Interest - - - -	8,394			
300 ft. mound, &c. - - -	33,408			
		41,802	251,657	1,800
8th Year:				
Interest - - - -	10,066			
300 ft. mound, &c. - - -	33,408			
		43,474	295,131	2,100
9th Year:				
Interest - - - -	11,805			
300 ft. mound, &c. - - -	33,408			
		44,213	339,344	2,400
10th Year:				
Interest - - - -	13,574			
300 ft. mound, &c. - - -	33,408			
		46,982	386,326	2,700
11th Year:				
Interest - - - -	15,453			
300 ft. mound, &c. - - -	33,408			
		48,861	435,187	3,000
Three thousand feet being now complete and effective in affording protection, no interest is for the future charged upon this amount, 435,187*l.*				
12th Year:				
300 ft. mound, &c., as before -	33,408			
		33,408	468,595	3,300
13th Year:				
Interest on 33,408*l.* - -	1,336			
300 ft. mound, &c. - - -	33,408			
		34,744	503,339	3,600
14th Year:				
Interest on 68,152*l.* - -	2,726			
300 ft. mound, &c. - - -	33,408			
		36,134	539,473	3,900
15th Year:				
Interest on 104,286*l.* - -	4,171			
300 ft. mound, &c. - - -	33,408			
		37,579	577,052	4,200
16th Year:				
Interest - - - -	5,675			
300 ft. mound, &c. - - -	33,408			
		39,083	616,135	4,500
17th Year:				
Interest - - - -	7,238			
300 ft. mound, &c. - - -	33,408			
		40,646	656,781	4,800
18th Year:				
Interest - - - -	8,864			
300 ft. mound, &c. - -	33,408			
		42,272	699,053	5,100
19th Year:				
Interest - - - -	10,555			
300 ft. mound, &c. - - -	33,408			
		43,963	743,016	5,400
20th Year:				
Interest - - - -	12,313			
300 ft. mound, &c. - - -	33,408			
		45,721	788,737	5,700
21st Year:				
Interest - - - -	14,142			
300 ft. mound, &c. - - -	33,408			
		47,550	836,287	6,000
Thus twenty-one years elapse before complete protection is afforded, and the cost is 836,287*l.*				

During the first year, it will be seen by reference to the table, I suppose that 600 feet of staging will be erected, and 600 feet of rubble bank will be deposited. In the second year the expenditure consists, first, of the interest on amount already expended, because unproductive; second, of repairs of staging; third, of 300 feet of finished wall; and, fourth, of extending rubble bank 300 feet. The same amount of work will be done during each succeeding year, interest being charged until the eleventh year, by which time half of the work will be finished; and as it will afford shelter to a considerable extent, the amount expended up to that date will then be called productive, and therefore interest is no longer charged. But other ten years are necessary to complete the work, which is assumed to be 6,000 feet in length. The rate of progress remains the same, and interest is charged as during the former period. The result is, that the work constructed on this system will cost 836,287*l.*, equal to 139*l.* 7*s.* 6*d.* per foot run.

30,297. Do you consider the rate of progress which is indicated in this table as that which is most favourable to economy of construction?—I think so. The second table represents the progress and cost on my new system, and is as follows:—

NEW SYSTEM.—RATE OF PROGRESS.

—	—	Amount expended each Year.	Total Amount expended.	Length complete.
1st Year:	£		£	Feet.
3,000 ft. of staging, at 9*l.* 9*s.* -	28,350			
3,000 ft. rubble bank, at 21*l.* 12*s.* -	64,800			
		93,150		
2d Year:				
Interest at 4 per cent. on previous amount - - - -	3,726			
Repairs of staging, 6 per cent. -	1,699			
2,000 lin. ft. timber work - -	79,200			
		84,625	177,775	2,000
2½ Years:				
Interest for ½ year - - -	3,555			
Repairs of staging (1,000 ft.) -	284			
1,000 lin. ft. timber work - -	39,600			
		43,439	221,214	3,000
Three thousand feet being now complete and effective in affording protection, no interest is charged for the future on this amount, 221,214*l.*				
3 Years:				
1,500 ft. staging - - -	14,175			
1,500 ft. rubble mound - -	32,400			
		46,575	267,789	
4 Years:				
Interest on 46,575*l.* - -	1,863			
750 ft. rubble bank and staging -	23,287			
1,500 ft. timber work - -	59,400			
Repairs of staging (750 ft.) - -	567			
		85,117	352,906	4,500
5 Years:				
Interest - - - - -	5,267			
750 ft. staging and rubble bank -	23,287			
1,500 ft. timber work - -	59,400			
Repairs of staging (750 ft.) -	567			
		88,521	441,427	6,000
Thus complete protection is afforded in five years at a cost of 441,427*l.*				

But the structure has ultimately to be faced with stone, and this will cost 323,400*l.* There are three different modes by which it is proposed to meet this expenditure. The facing can be finished in four years, and four sums of 80,850*l.* are therefore required. As the timber work is assumed to begin to decay in 20 years after its erection, the work of building the stone facing will commence in 20 years, or in 15 years after the completion of the timber breakwater. In order to raise the above amount it is proposed—

First, To lay aside 12,407*l.* a year for 19 years, which at four per cent. compound interest will raise a sum sufficient to meet the instalments of 80,850*l.* each when required.

	£
19 years at 12,407*l.* each year - -	235,733
To which add - - -	441,427
This would make the total cost of the breakwater - - -	677,160
As compared with the cost on the old system - - - -	836,287

Second, To assume nothing paid for 15 years; but then such a sum would be required as, accumulated at four per cent. compound interest, would pay the instalments of 80,850*l.*

	£
This amount is - - -	305,220
To which add, as before - -	441,427
This would make the total cost of the breakwater - - -	746,647
As compared with the cost on the old system - - - -	836,287

Third, To take a sum sufficient, when accumulated at four per cent., to yield 323,400*l.*, in sums of 80,850*l.* per annum for four years, the first payment being required in 15 years.

	£
This amount is - - -	169,480
To which add, as before - -	441,427
This would make the total cost of the breakwater - - -	610,907
As compared with the cost on the old system - - - -	836,287

But even supposing it should be found that the timber began to decay in 10 years, it would be necessary then to commence the building of the stone facing in 10 years, or

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in five years after the completion of the timber breakwater. It would be necessary then to take a sum sufficient, when accumulated at four per cent., to yield 323,400*l.*, in sums of 80,850*l.* per annum for four years, the first payment being required in five years.

	£
This amount is - - -	250,868
To which add, as before - -	441,427
This would make the total cost of the breakwater - - -	692,295
As compared with the cost on the old system - - - -	836,287

Referring to the table, it will be observed that on my new system, during the first year 3,000 feet of staging and 3,000 feet of rubble bank will be deposited. In the second year the expenditure consists, first, of the interest on amount already expended, because unproductive; second, of repairs of staging; third, of 2,000 lineal feet of timber work erected and filled in. In the first half of the third year the expenditure consists, first, of interest for the half year; second, of repairs of staging; and third, of 1,000 feet of timber work erected and filled in. 3,000 feet, or half of the whole work, is now complete, and as it affords shelter, no interest is hereafter charged. In other two and a half years the timber breakwater is completed, and the result is that in five years shelter is obtained for the whole harbour at a cost of 441,427*l.*, or 73*l.* 12*s.* per foot. But the work has to be faced with stone, and this must be done before the timber decays. Timber will last 20 years. You may therefore take the benefit of the delay to allow such a sum to accumulate at interest as when required will pay for the stone facing. The sum required at 4 per cent. is 169,480*l.*, which added to the previous expenditure makes the total cost 610,907*l.*, or 101*l.* 16*s.* 8*d.* per foot, being a saving in money of 225,380*l.* In other words, the old system costs 37 per cent. more than the new, and under the old system 21 years are required to afford the same extent of shelter as is afforded by the new system in five years. I have taken the price of the facing the same in both systems, but there being little or no interruption from the current in the new system, and no danger of breaching, I think the prices may be less under the new system. As the Commissioners requested me, I have made a drawing of the staging required under the old system as compared with the new. The facing requires to be formed of heavy blocks, especially under the old system, because the open end will be exposed to the sea during the progress of the work, and this involves a very strong staging, which is obtained under the new system for less money.

For the purpose of comparison in the matter of cost, I have taken that case in the paper handed in; and in order that the comparison may be fully understood, I give the details of the quantities and prices, as follows:—

STATEMENT of the Details of the Quantities and Prices at which the preceding Tables have been calculated.

OLD SYSTEM.

Quantities in One Running Foot of the Breakwater.

	£	s.	d.	£	s.	d.
Rubble mound, 108 cubic yards, at 4*s.* - -				21	12	0
Staging:						
Timber and iron work equivalent to 103 cubic feet, at 3*s.* 6*d.* - - - -				18	0	0
**Facing:*	£	s.	d.			
Concrete blocks below low water, 20 cubic yards, at 27*s.* - -	27	0	0			
Concrete blocks above low water, 25 cubic yards, at 20*s.* - -	25	0	0			
Pitching, 36 cubic feet, at 2*s.* -	3	12	0			
Coping, 8 cubic feet, at 4*s.* -	1	12	0			
„ 8 „ at 2*s.* -	0	16	0			
Rubble filling, 58 cubic yards, at 4*s.*	11	12	0			
				69	12	0

	Feet.	in.
*The average thickness of the wall on the sea face - - - -	12	6
The average thickness of the wall on the harbour face - - - -	10	0

These thicknesses being greater than in the new system, because the walls have to bear the thrust of the newly filled rubble, whereas the facing in the new system has a backing already consolidated.

The rubble bank can be deposited rapidly. It is the superstructure which limits the rate of progress. At Alderney, where the superstructure is nearly similar, the rate of progress has been under 300 feet a year. I therefore take 300 feet a year.

The *same prices* are assumed in both cases, although the facilities for the construction of the face are much greater on the new system.

Repairs of Staging.—The necessity for this item is obvious; but it may be mentioned that at Holyhead, Portland, and Dover the staging has been repeatedly damaged. Only last season 250 feet at Holyhead, and a few years ago at Portland 330 feet, were carried away at one time.

NEW SYSTEM.

Quantities in One Running Foot of the Breakwater.

	£	s.	d.	£	s.	d.
Rubble mound, 108 cubic yards, at 4*s.* - -				21	12	0
Staging:						
Timber and iron work equivalent to 54 cubic feet, at 3*s.* 6*d.* - -				9	9	0
Intermediate frames, 152 cubic feet, at 3*s.* 6*d.* - - -	26	12	0			
Rubble hearting, 65 cubic yards, at 4*s.* - - -	13	0	0			
				39	12	0
				70	13	0
†*Facing:*						
Concrete blocks below low water, 16 cubic yards, at 27*s.* - -	21	12	0			
Concrete blocks above low water, 20 cubic yards, at 20*s.* - -	20	0	0			
Pitching, 36 cubic feet, at 2*s.* -	3	12	0			
Coping, 8 cubic feet, at 4*s.* - -	1	12	0			
„ 8 „ at 2*s.* - -	0	16	0			
Filling with concrete and cement behind blocks, 126 cubic feet, at 1*s.*	6	6	0			
				53	18	0

Total cost of facing 6,000 cubic feet, at 53*l.* 18*s.*, 323,400*l.*

† The average thickness of wall on seaface - 10 feet.
The average thickness of wall on harbour face - 8 „

To prove that 2,000 lineal feet of superstructure can easily be erected in a year, it may be observed that this is only at the rate of 12 feet per day for 167 days out of 365; and to erect in a year 3,000 lineal feet of staging, it is only required that one frame should be erected per day for 100 days. In like manner to complete 3,000 lineal feet of rubble mound in a year, only requires that 2,000 tons should be tipped per day for 250 days. And at Holyhead, where there are five lines of rails, 4,000 tons per day have been deposited.

As these tables depend very much on the question of charging interest, I wish to explain the principle upon which interest is charged on capital until the capital becomes productive, there being no other way of representing the money value of time. As an illustration, we have the case of Blyth, where Parliament enacted that no dues should be chargeable on shipping using the harbour until the completion of the breakwater, nearly a mile long. Supposing a capitalist to have advanced the money for that work, he would certainly consider that if 20 years elapsed before the work was completed, and before he received any return, instead of five years, that in the former case the work would cost him a great deal more.

It may be said that a breakwater on the Holyhead system gives shelter as soon as the rubble bank is deposited, and therefore the tables which I have given in will not apply to a work of that kind. Now, in the first place, that system is only applicable where stone is exceedingly cheap and very plentiful; but even then I have prepared a comparison without reference to this question of interest at all, in which, assuming the stone at a very low price, we get the following results: In the case of a breakwater in 60 feet

water, if constructed on the Holyhead system at the prices named, it would cost 140*l.* per foot; whereas taking the same prices, a work in the same depth of water on the new system would cost 113*l.* 15*s.*, or for a length of 6,000 feet the cost on the Holyhead system would be 840,000*l.*, and on the new system 682,500*l.*, showing a difference in favour of the new system of 157,500*l.* The following is the detailed statement from which I get that result:—

Cost of a Breakwater on Holyhead System.

Depth of water 10 fathoms; rise 21 feet.

	Price per foot run. £	s.	d.
Rubble, 626 cubic yards, at 2*s.* 9*d.* -	86	1	0
Staging, 100 cubic feet, at 3*s.* 6*d.* - -	17	10	0
Wall, 26 cubic yards, at 1*l.* - -	26	0	0
Excavation, 26 cubic yards, at 1*s.* - -	1	6	0
Cordon, coping, and plinth, 61½ cubic feet, at 2*s.* - - -	6	3	0
Pitching on slope, 90 cubic feet, at 8*d.* -	3	0	0
	140	0	0

Cost of a Breakwater on New System.

	£	s.	d.
Rubble bank, 108 cubic yards, at 2*s.* 9*d.* -	14	17	0
Staging:			
Timber and iron work equivalent to 54 cubic feet, at 3*s.* 6*d.* - - -	9	9	0
Intermediate frames, &c., 152 cubic feet, at 3*s.* 6*d.* - - - -	26	12	0
Rubble hearting, 65 cubic yards, at 2*s.* 9*d.*	8	18	9
Facing:			
Concrete blocks below low water, 16 cubic yards, at 27*s.* - - -	21	12	0
Concrete blocks above low water, 20 cubic yards, at 20*s.* - - -	20	0	0
Pitching, 36 cubic feet, at 2*s.* - -	3	12	0
Coping, 8 cubic feet, at 4*s.* - -	1	12	0
„ 8 „ at 2*s.* - -	0	16	0
Filling in behind blocks, 126 cubic feet, at 1*s.* - - - -	6	6	0
	113	14	9

As to the times in which shelter is obtained, they would be very much the same.

As works of a similar character, I take the case of Alderney, which appears by the parliamentary returns to cost 170*l.* per foot, exclusive of preliminary expenses, and of Portland, which I think has cost 150*l.* per foot, exclusive of preliminary expenses.

30,298. (*Chairman.*) With reference to the comparative cost of construction per foot, the table shows an advantage of 26*l.* on the new system over the old. How does the assumption of a depth of water of 10 fathoms affect the question? Does the consideration that a breakwater is not likely to be carried its whole length in 10 fathoms water alter the comparison? If it were in two fathoms, for example, would the advantage still be 26*l.*?—Not so much as 26*l.*, because that figure is in relation to the total cost.

30,299. And to the depth?—And to the depth. I have taken 10 fathoms,—1st, because I am dealing with a breakwater intended for great harbours; 2ndly, because that figure was adopted before, and I did not like to introduce confusion by adopting another; and, 3rd, because it is nearly the actual depth of existing great works. The 26*l.* must only be taken in relation to the magnitude of the work.

30,300. In 10 fathoms water the advantage per cent. is rather more than a fifth of the whole cost; would it be a fifth of the whole cost at lower depths?—I should think so; but, with the permission of the Commissioners, I will go into the question, and send them the result.

30,301. (*Mr. Coode.*) I see, Mr. Scott, that in your estimate of what you call the old system, you put down the rate of progress at 600 feet a year, and under the new system you put it down at 3,000 feet a year. On what have you based the relative rate of progress?—The rate of progress on the old system is based on the experience at Alderney, which is the only parallel case I can get.

30,302. Are you aware that at Holyhead the rate of progress has been 1,200 feet a year?—I acknowledge that as to Holyhead it does not apply.

30,303. I see in the table of the relative cost you put down on the new system for staging timber and timberwork 9*l.* 9*s.* per foot. In your previous evidence you gave the estimated cost at 54*l.* per yard, which would be 18*l.* per foot. The question which was put to you in your former examination was, what would be the cost of that per lineal yard, and your answer is 54*l.*?—That is the breakwater, not the staging.

30,304. You say in your former examination the cost of the timber work alone would be about 54*l.* per yard?—That is quite right. I referred to the timber work of the breakwater; that is not the staging. I distinguish between them.

30,305. By the staging you mean only the bays, which are 30 feet apart?—And what is necessary to deposit the rubble bank.

30,306. In the 9*l.* 9*s.* per foot you contemplate the bays 30 feet apart, but it does not include the intermediate timber work?—No; that is the breakwater.

30,307. Your answer of 54*l.* per yard had reference to the timber work filled in with rough stone?—Perhaps superstructure would be the better word.

30,308. Then 9*l.* 9*s.* per foot is simply for the skeleton stage, without the intermediate filling and intermediate framing?—Quite so.

30,309. You have put in a drawing of the old system of staging; from what particular work is it taken?—It is not taken from any work. I have made the best I can of it. There was no existing work to take it from, but I made the best drawing I could.

30,310. Then it is rather an assumption than a fact?—It is the best I can give. There is no example to give as a fact.

30,311. You state that Portland breakwater has cost 150*l.* per lineal foot; whence do you derive your information?—From the parliamentary returns.

30,312. For what year? I merely wish to know for what year; I do not wish to go into unnecessary details?—I think the return is dated 6th May 1858, and is made up to March 1858.

30,313. Are you aware that there is a parliamentary return of the same description made up to March 1857?—I believe there is.

30,314. Are you aware that in that return the total quantity of rubble in Portland breakwater is made to cost 634,875*l.*?—The gross estimated expenditure for rough stone work is 634,875*l.*

30,315. You will find at page 18 of the return up to March 1857, "The estimated expenditure for the "rough stone work, both in the small and great "breakwaters, calculated according to the prices at "which the same work has hitherto been executed, "is 634,875*l.*" Are you aware that that applies to the whole length of the rubble, exclusive of the heads and passages?—I am not aware of that.

30,316. Will you turn to the plan of the breakwaters at Portland, and tell me what is the total length, exclusive of the heads and passages?—It would be about 7,500 feet.

30,317. Be good enough to divide 634,875*l.* by 7,500 feet, and tell us the result per foot run?—It is between 84*l.* and 85*l.*

30,318. At what rate per annum do you assume the facing in stone to proceed?—In what work; in Portland?

30,319. In your new works?—Four years.

30,320. For what length?—6,000 feet. It is just the same rate per annum under both systems, if working at only one spot; but there is this distinction, that under the new system you can work at five or six different places at once, or a dozen if you like.

30,321. If you begin in several places at once, must not the materials be put afloat in some places?—No, I think not.

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30,322. Do you mean that the work is done entirely from the stage ?—Yes.

30,323. Is it not possible according to the old system to work at several places at once ?—It is quite impossible ; with a gap, and the sea running in, and with open ends.

30,324. Would that not be the case in the system you propose ?—Certainly not ; you would be building against an existing work ; but in the other case there is no work until you have put the facing,—the facing is the work.

30,325. Then you assume you would complete 3,000 feet of timber and rubble filling within the first year ?—Yes ; but 2,000 feet is the length which is completed of the superstructure in one year.

30,326. Then I understand you complete 3,000 feet of skeleton staging the first year, but you contemplate that at the end of the second year you would have completed 2,000 feet of timber work with the rubble filling within it ?—Quite so.

30,327. That would be, in short, a complete work of timber framing and rubble, at the rate of 1,000 feet per annum for the first two years ?—Quite so ; and then the progress, if you observe, is 1,500 feet per year after that.

30,328. I find between the end of the second year and the end of the fifth year a difference of 4,000 feet ?—Yes.

30,329. That is 4,000 feet in three years ?—Exactly.

30,330. That is not quite 1,500 feet a year ?—One year, you see, 1,500 feet is done ; but take the average, and it will come to the same thing—about 1,250 feet a year.

30,331. (*Chairman.*) Is there anything further which you wish to add ?—I wish to call attention to the statement which I have made with regard to the cost of the Portland works, for a few minutes, to show that I do not make that statement rashly. I made the statement on the basis of the parliamentary returns, and if those returns are incorrect, of necessity my statement is incorrect also. I do not wish it to be supposed that I have made a statement without reasonable grounds. If those grounds are wrong, my statement falls with the grounds on which it is based. I have been asked questions with respect to 634,875*l.* which appears in the parliamentary return of 1857 as "estimated gross expenditure for rough "stone work in small and great breakwaters, calculated "according to the prices at which the work has been "hitherto executed." I find that in the return, but that I beg to observe is an estimated amount ; and when I tried to arrive at the cost, I tried one method which gave me these results : I thought that if I could obtain the quantity of stone, and the cost of that stone, I should get some indication of the cost per foot of the work. By a return dated 16th April 1855, up to 31st March 1855, I find the expenditure, exclusive of land, stock, plant, and convict earnings, is 354,680*l.*, and the quantity of stone deposited at the same date was 1,743,437 tons. The length of staging is stated to be 3,860 feet from the shore, and I also find that a considerable part of one round head was done, and a small part of another, and I must be very near the truth, therefore, to assume that one round head was finished. These round heads are stated to cost 38,000*l.* each, so that from the expenditure of 354,680*l.* I deduct one head, 38,000*l.*, and 3,860 feet of staging, at 20*l.* per foot, 77,200*l.*, making a total of 115,200*l.*, and that amount deducted from 354,680*l.* leaves 239,480*l.* Then, dividing this amount by the number of tons deposited, I find the cost to be 2*s.* 9*d.* per ton, or 4*s.* 1½*d.* per cubic yard, exclusive of staging.

30,332. (*Mr. Coode.*) There is the cost of the staging ?—It is deducted ; 77,200*l.*

30,333. Where do you get that amount ?—At 20*l.* per foot. Further, taking the amount of stone per foot run in the work, where it is 60 feet deep, at 511 cubic yards, I find that the cost of the rubble bank alone is 105*l.* 8*s.* per foot run, exclusive of the quarrying of the stone and exclusive of the preliminary expenses. That is one of the series of proofs worked out of the parliamentary paper. My statement wholly depends on those figures. If the figures are wrong, I am wrong ; but if they are correct, I take it that I must be correct also.

30,334. Without going into any detail, have you any drawing of the stage at Portland ?—I examined the stage at Portland very minutely, and I think, from some experience, I could estimate the quantity of timber and iron within a mere trifle. I took out the quantities very carefully.

30,335. Did you take out the quantities from a drawing ?—Certainly ; from a drawing made from what I had seen as to the depth that is stated on the particular section.

30,336. Have you the particulars of the cost of the moorings, the pile shoes, and the iron work, in connection with that stage ?—It was not necessary to have them.

30,337. Would it not be necessary to form a correct estimate of the cost of the staging ?—I allow for the iron work ; I think I can give the particulars.

30,338. I do not want the particulars, only to know how you dealt with the question. You have stated and assumed a depth of water of 60 feet. Do you mean at low water ?—No, at high water. I produce the section from which the quantities were taken out. The slopes are the slopes which you stated yourself.

30,339. The depth of 60 feet is at high water ?—Yes.

30,340. (*Chairman.*) Does that conclude your evidence ?—I do not know that I have anything more to add to it.

The sitting then terminated.

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