1899.
NEW ZEALAND.

PUBLIC PETITIONS A TO L COMMITTEE.

REPORT ON THE PETITIONS, Nos. 144, OF HENRY LANE AND 54 OTHERS; 233, E. PORTER AND CO. AND 15 OTHERS; 234, A. B. DONALD AND 8 OTHERS; 280, T. AND S. MORRIN AND 70 OTHERS; AND 331, G. A. CAMPBELL AND 80 OTHERS.

Brought up on 10th October and ordered to be printed.

REPORT.

Nos. 144, Petitions of H. LANE and Others, Opua; 233, E. PORTER and Others, Auckland; 234, A. B. DONALD and Others, Auckland; 280, T. and S. MORRIN (Limited), Auckland; 331, G. A. CAMPBELL and Others, Wanganui (all similar).

PETITIONERS pray—(1) That all oil-engines (marine) under twenty-brake horse-power be allowed to run absolutely without restriction; (2) that all oil-engines of a larger power be run by men who have passed a sufficient examination on the working of oil-engines alone, irrespective of steam-power; (3) that a competent Examiner be forthwith appointed to conduct such examinations; (4) that all persons who can satisfy such Examiner that they have successfully worked and operated marine oil-engines prior to 1st June, 1899, be granted certificates of service available for use both within restricted limits and also at sea, but only for engines used as an auxiliary power in vessels fully equipped as sailing ships.

I am directed to report: That the Committee is of opinion that the evidence taken in connection with these petitions should be printed, but, as a Bill dealing with the subject-matter involved is now before the House, the Committee has no recommendation to make.

To the Hon. the Speaker and Members of the House of Representatives in Committee.

THE PETITION of the under-signed shipbuilders, shipowners, and other persons interested in the use of oil-engines for marine purposes in and about the Colony of New Zealand humbly showeth:

1. That the introduction of oil-engines for marine purposes has had a very beneficial effect in this colony, causing vessels to be built here to do work that otherwise would be done by steamers built in Scotland or in other shipbuilding yards outside this colony.

2. That the introduction of oil-engines as an auxiliary power to sailing vessels has been of such benefit to shipowners that it is now being adopted in almost every case where practicable.

3. That as a consequence the rates of freight have been reduced, and increased facilities afforded for both goods- and passenger-traffic, thereby encouraging settlement.

4. That the use of oil-engines in launches has lately been adopted to a great extent, and has been found to be of great benefit and service both for purposes of pleasure and for shipping business.

5. That the free use of such engines in launches would lighten the labour and decrease the cost of boating traffic, at the same time adding to both the safety and pleasure of boating generally.

6. Any undue restriction on the working of such aforesaid marine engines would at once check the present increasing trade both in shipbuilding and in the use of oil-engines, and would be detrimental to the colony.

Your petitioners therefore pray: (1.) That all oil-engines under 20 brake horse-power be allowed to run absolutely without restriction. (2.) That all oil-engines of a larger power be run by men who have passed a sufficient examination on the working of oil-engines alone irrespective of steam-power. (3.) That a competent Examiner be forthwith appointed to conduct such examinations. (4.) That all persons who can satisfy such Examiner or such other proper authority as may be appointed that they have successfully worked and operated marine oil-engines prior to 1st June, 1899, be granted certificates of service available for use both within restricted limits and also at sea, but only for engines used as an auxiliary power in vessels fully equipped as sailing ships.

And your petitioners, as in duty bound, will ever pray.

MINUTES OF EVIDENCE.

FRIDAY, 18TH AUGUST, 1899.—(MR. JOYCE, Chairman).

ROBERT DUNCAN, Principal Engineer Surveyor, examined.

The Chairman: I will read the following correspondence received from the Marine Department:—

SIR,— Marine Department, Wellington, 12th August, 1889.

In reply to your letter of the 29th ultimo forwarding a petition from persons interested in the use of oil-engines for marine purposes, I have the honour to inform you that, as the matter involves matters of a technical nature, I have asked the Chief Inspector of Machinery, Mr. Robert Duncan, to furnish a report, which I beg to forward to you herewith.

I agree with Mr. Duncan that there should not be freedom from survey, but up to a limit of 15 tons the obligation to carry a certificated engineer might be dispensed with in the case of vessels which do not carry passengers. I do not approve of separate examiners. The present Inspectors of Machinery should be capable of doing all that is required, and I believe they are so capable. In my opinion mechanical skill should be a necessary qualification. No doubt the obligation to carry a certificated engineer bears most heavily on sailing-vessels with auxiliary engines, but there is the same hardship in connection with vessels having auxiliary steam-power.

I have, &c.,
W. T. GLASGOW, Secretary.

The Chairman, Public Petitions Committee, A to L, House of Representatives, Wellington.

Mr. Duncan reports as follows:—

SIR,— Office of the Chief Inspector of Machinery, 3rd August, 1899.

In answer to your query *re* this petition of Lane and others as to auxiliary-powered vessels:—

Clause 1. No doubt the shipbuilding industry has been brisk in New Zealand, but all the vessels built have not been furnished with auxiliary oil-machinery. To show you this by comparison, eighty-five new vessels have been surveyed by us in New Zealand during the last three years. Of this number thirty-two have been built in the colony for auxiliary oil-power, thirty-one for steam-power, and twenty-two steam-vessels have been built out of the colony, so that all shipbuilding has been busy. Where auxiliary schooners score is in shallow draught and up to a certain size for local requirements about Auckland, where the bays are numerous, and settlement scattered. Steamers above a certain size are built in Scotland, simply because New Zealand builders could not compete, as there is no steel or iron produced here. With a wooden vessel it is different, having a plentiful supply of the very best timber suitable for shipbuilding, more especially in the Auckland Province; but necessities of trade have caused the increase of vessels, not the auxiliary aid of an oil-engine.

Clause 2. This is not true, as instance a new vessel for Whakatane trade built at Whangaroa, which was to have been driven by oil-engines, but the owners decided in favour of steam. This vessel is owned by the Northern Steamship Company, and is fitted with twin screws.

Clause 3. Where steam had the monopoly, and where auxiliary-powered vessels started to compete in trade, no doubt there would be cutting rates; but this is also found where steam-vessels only are employed, and that not at all peculiar to the trades only where auxiliary schooners are employed. Where land and means of communication are good settlement will necessarily follow.

Clause 4. Granted, but the same applies to steam-launches.

Clause 5. I do not think they would decrease the cost, as an oil-engine is about four times more expensive than a steam-engine, and no safer.

Clause 6. It does not follow, for if trade demands the increase the matter of £1 or £2 will not stop its growth.

As to the prayer of the petition:—

Clause 1. The tonnage should be the guide, not the horse-power, and the limit should be 15 tons, but not exempt from survey, and that for pleasure or fishing they be exempt from carrying certificated officers altogether.

Clause 2. Examination alone will never make a tradesman, and I consider where vessels are employed outside restricted limits that for public safety a man should have at least three years' mechanical experience at the making and repairing of engines, not necessarily steam-engines, or at work of a similar nature.

Clause 3. That there is nothing (if an examination is to take place) that an Inspector of Machinery, who at present examines engineers, cannot undertake, and I see no reason to prevent the present Examiners conducting such examination.

Clause 4. That the *Gazette* notice of the 25th May, 1899, should be the date fixed for service certificates, and the service for twelve months prior to this be enforced, and that certificates according to the trades in which the applicants have been engaged only be granted, and that service in restricted limits should not be available for certificates for deep water.

I do not think that a separate examination is necessary, as engineers with present certificates under the Shipping and Seamen's Act are quite capable of taking charge; and I think that a special certificate for this class of vessel will not ensure more trustworthy or efficient men for this special class of power.

Finally, I would point out, with reference to the alleged benefit to the colony the advent of these oil-powered vessels are claimed to have given, that the petitioners have only brought forward one phase of the question—viz., the immediate benefit to the builders of this class of vessel, entirely overlooking the fact that during the last three years there have been built thirty-two of this class of vessel, while at the same time there have been built within the colony thirty-one steam-vessels, so that if the oil-engined vessel is to supersede the steamer, this must be done at the expense of the builders of steam-vessels and other industries, as the machinery for the latter is all manufactured in the colony, and all the coal used for such vessels is supplied from the mines of our colony. The engineers who supply this machinery give employment to blacksmiths, fitters, turners, pattern-makers, moulders, boiler-makers, coppersmiths, plumbers, and apprentices; and with regard to the latter, the importations of this oil-machinery at the expense of the manufacturers of the machinery would necessarily militate against the advancement of the young fellows of the colony at present apprenticed, and would limit the number of apprentices required in the future. To make this thoroughly clear, it must be pointed out that the whole of the oil-engines, and even their duplicate parts, are imported from America and the Old Country, and give no employment to any of the skilled workmen named. It might be said that the revenue derived on the oil should be a factor in considering the benefit to the colony, but here again there is no benefit, as the steam-vessels will use an equal amount to that used by the oil-vessels, as they must constantly use oil on steam-vessels for their engines.

ROBERT DUNCAN, Principal Engineer Surveyor.

The Secretary, Marine Department, Wellington.

1. *The Chairman.*] You say, Mr. Duncan, that a steam-vessel would use as much oil as an oil-engine vessel. Take the steamer "Wakatu," for instance. Would she use as much oil as the "Huia?"—That is perhaps a little overdrawn.

2. *Mr. Crowther.*] What did you overdraw it for?—It is according to the horse-power. You cannot gauge the exact quantities of oil you might use. Some steam-vessels require double as much as others. I have been on vessels that require 2½ gallons per day for lubricating purposes, while some require 5 gallons per day, and the engines required it all, and you cannot explain it.

3. *The Chairman.*] You know the "Huia" schooner, which trades between Lyttelton and Kaipara. Can you say how much that vessel uses per hour when running all her engines?—Perhaps half a pint for every brake horse-power per hour.

4. What is her brake power?—Perhaps forty.

5. That would be 20 pints, or 2½ gallons?—Yes. It all depends upon the size of the machinery, and how the engine works also; also upon the class of oil used. Some oil is better than others, and some oil is not of the same quality every shipment.

6. You say all these oil-engines are imported from America?—Nearly all; the majority. Up to quite recently they were. I do not think you will find half a dozen vessels in New Zealand with auxiliary oil-engines that were not imported.

7. Where do those come from that are not imported from America?—They are built in Auckland.

8. Then, there is a factory for the manufacture of oil-engines in Auckland?—Yes; I think it was in use for perhaps a year or eighteen months, and then stopped, but I think it re-started again. It was not working in Auckland in February last, so far as I know. I visited Mr. Henderson, the late manager, and took great interest in the shop, and saw all parts of the machinery. I always visit these shops wherever I am to see what they are doing.

9. Was it because there was no work being done in the factory that you omitted to mention it in your report?—That is partly the reason. I thought they had stopped the manufacture. I knew it was the only shop that did make them in New Zealand.

10. It was given in evidence yesterday that oil-engines were being manufactured there, and we could not understand why you had omitted to mention it in your report?—Yes.

11. You were going to give a further explanation for not putting it in your report?—Mr. Henderson mentioned to me that he would probably start another shop, in a letter last week to me, for gas- and oil-machinery, and from that I understood, seeing that he had left his old shop, and as he told me, over a year ago, that possibly the shop stopped altogether, I thought it might not go on again.

12. *Mr. Houston.*] Are you a certificated engineer yourself?—Yes.

13. Have you seen any oil-engines working?—Yes.

14. Have you been on board a vessel when an oil-engine was working?—Yes.

15. You saw it working?—Yes.

16. Do you understand how to work these oil-engines?—Yes, I do.

17. Did you try to start that engine you saw on board that vessel?—No.

18. Do you know the name of the vessel?—The "Aotea."

19. Have you been on any other vessel which had an oil-engine on board?—Yes, one of Bluck's launches in Auckland Harbour. It was amongst the earlier productions of the Century Motor Power Company, who manufactured gas- and oil-engines in Auckland.

20. *Mr. Crowther.*] Do you say they had manufactured gas-engines in Auckland?—Yes. The same company that I said had stopped.

21. *Mr. Houston.*] Was any one with you when you went on board the vessel in Auckland?—Yes, the captain.

22. What is his name?—I do not remember his name.

23. When was it?—I could not tell you.

24. *The Chairman.*] Was it a month, a year, or two years ago?—Perhaps eighteen months ago.

25. *Mr. Houston.*] Was the Minister of Marine with you?—No.

26. Were you not in Auckland with the Minister of Marine eighteen months ago?—I was there at the time, but I did not see him.

27. Can you assure the Committee positively that you were not on board one of those vessels with the Minister of Marine?—Quite sure. He was there when I was in Auckland, but I did not see him personally.

28. You say in this report, in reference to clause 2 of the petition, which says "That the introduction of oil-engines as an auxiliary power to sailing-vessels has been of such benefit to shipowners that it is now being adopted in almost every case where practicable," that this is not true?—In this case I referred to a new ketch built by Mr. Brown for the Northern Steamship Company. This was supposed to be fitted with oil-machinery, but they got the advice of expert people about Auckland and decided that in the interests of their trade they would not fit the oil-engine on board. They fitted a twin-screw steam-power engine on board. The name of the vessel is the "Waimana." [Telegram read.]

29. *The Chairman.*] You telegraphed, then, for the name of the vessel?—Yes.

30. What did you say in the telegram?—I asked for the name of the twin-screw vessel for Whakatane trade. It was being built at Whangaroa in February last, and it has not been surveyed yet. They decided, after getting expert evidence in Auckland, to put in steam machinery.

31. *Mr. Houston.*] What was the expert evidence?—They got the evidence of our enginemen, and took the results of our engineers and their own engineers. They have had an oil-engine at the Thames. They fixed one oil-engine in and took it out again. It was imported from England. They chucked this engine out because it caused so much trouble. It jibbed on almost every occasion, and then they put another engine in.

32. *The Chairman.*] Is it still in the boat?—Yes.

33. *Mr. Houston.*] What proof can you bring to support that statement?—The superintending engineer of the company.

34. Was it the drivers of any of these oil-engines that the Northern Steamship Company got to report? Was it not others, and you call that expert evidence?—I am quite unbiassed in this matter, and I wish to answer as squarely and fairly as I can. The Northern Steamship Company got the information from the experts of the oil-engine agents as well as from the best steam men they could get in Auckland. I gave no detrimental evidence against them. A light-draught vessel is wanted for the Whakatane trade—a vessel that will carry cattle and other cargo, and be of considerable beam. An oil-engine of low draught might stick them up, because the oil might not gravitate down to the engine when wanted.

35. Do you know what a scow is?—I do.

36. Is she of light draught?—Sometimes.

37. Could an ordinary scow go into the Whakatane?—I do not say they could or could not; but I am giving you the information the Northern Steamship Company got, and they decided to get steam. Mr. McDonald, the managing man of the Union Company here, who takes charge of the company's repairs, and who is a naval architect and shipwright, tells me they imported an oil-engine launch recently with the "Mokoia." I asked him for information about it, because the "Hinemoa" was thinking about getting one, and he said, "You put your foot down and do not have an oil-engine for the "Hinemoa." He said, "The oil-launch brought out by the 'Mokoia' sticks us up at all times, and is a regular humbug—she is not at all reliable."

38. You said it was expert knowledge obtained by the Northern Steamship Company that caused them to alter their opinion about putting an oil-engine in this vessel?—Yes.

39. Was the principal expert knowledge they obtained got from their own engineers?—No; they are too far advanced for that. They want as good knowledge as any company.

40. Do you know the chief inspector of the Northern Steamship Company?—Yes; I know the two of them—both Mr. Coutts and Mr. Gow.

41. Was that the principal evidence they obtained?—No; they went all round. They did not ask me. I had nothing to do with it.

42. Are you not aware that the engineers employed on board steamers and driving steam-engines are entirely opposed to the use of these oil-engines?—Not at all. It would not be to their interest.

43. Do you think that certificated engineers employed on steamers are capable of driving an oil-engine?—I do.

44. Have they ever tried it?—That is no objection.

45. Are you not aware that these oil-engine vessels are obliged to carry a certificated engineer?—Yes; that was the law on the 5th January.

46. Are you aware that some of these engineers have been placed on board these vessels?—Yes.

47. Are you aware that some of them were not capable of working them?—I believe that some of them did not get a fair trial.

48. Do you know a schooner called the "Medora"?—Yes.

49. Are you aware that she has an oil-engine on board?—Yes.

50. Was she obliged to carry a certificated engineer?—I expect she did. The regulations require it.

51. Are you aware whether that certificated engineer employed on the "Medora" was capable of driving the engine or not?—I do not know any engineer of any standing who would have gone on board the "Medora."

52. Why?—Because the owners of the vessel advertised that they would give so many pounds to any certificated engineer who could drive the engine, and it was said that they would do something to the machinery that would prevent him starting the engine. That is what I heard.

53. I ask you whether they were obliged and did get a certificated engineer?—I believe he was, but he was an indifferent man, and he never got a show.

54. *Mr. Crowther.*] How was it he got a certificate, then, if he was an indifferent man?—A certificate does not make an engineer any more than a certificate makes a doctor.

55. *Mr. Houston.*] Are you aware whether that certificated engineer ever drove that engine or not?—I could not tell you: I have no personal knowledge nor official knowledge. I may say that I wrote up to my surveyors at Auckland and asked them how they were getting on with these oil-engines, and they said there was no trouble, and they were getting on all right.

56. Are you not aware that in point of fact this man never drove this engine; could not start it, and could not stop it?—I am not aware of it.

57. Are you not aware that the owners of the same schooner, the "Medora," put an advertisement in the newspaper asking for a certificated engineer?—I believe so.

58. Are you aware that any applied for the position?—I could not say. I got a copy of the paper sent down to me.

59. Are you aware that seven certificated engineers applied for the position?—I am not aware.

60. And that seven went on board?—I am not aware.

61. And you are not aware that not one of the seven could start the engine?—I do not know that. I might say that they have the same trouble on steam-vessels sometimes. The "Anglian," some two years ago, could not be kept going more than half speed one trip between Sydney and Auckland. There was some crack found in her machinery between steam- and exhaust-port of low-pressure engine, and they could only get half speed out of her. That baffled all the experts in Auckland and the three certificated engineers on board, and took three days to rectify. It does not show that because a man cannot start an engine he is not qualified as an engineer. Troubles arise in all camps, even among the best men.

62. According to that, the fact of a certificated engineer being on board one of these vessels

having an oil-auxiliary is no guarantee that the thing is right?—From the mechanical education certificated engineers have, they have a better chance of finding out defects and running and maintaining the efficiency of an engine.

63. I ask you, Is the fact of a certificated engineer being on board, such as the regulations impose, any guarantee of the safety of the vessel?—Yes, certainly.

64. And yet he may not be able to start or stop the engine?—Nor were any of the present drivers able to start these oil-engines at first. You wind up a clock, and it goes; but if anything goes wrong you have to get an expert to put it right.

65. Do you want a certificated engineer to drive clocks?—No.

66. You say the "necessities of trade have involved the increase of vessels, not the auxiliary aid of an oil-engine"?—I have no doubt it has.

67. How do you arrive at that conclusion?—By the increase of settlement in Auckland.

68. What has caused this increase of settlement?—The policy of the present Government.

69. How do you know there has been an increase of settlement in the North of Auckland?—I read the statistics and reports.

70. That is only book-knowledge?—We get the experience of others in books.

71. You maintain that it is not the assistance oil-engines have given to vessels that has increased it?—I have no doubt they have, to a certain extent.

72. Have you been North of Auckland?—Yes.

73. How far?—Mangonui.

74. Have you been in Awanui?—No.

75. Have you been in Hohoura?—No.

76. In Parengarenga?—No.

77. In clause 2 of your report you say, in reference to clause 2 of the petition, "This is not true, as instance a new vessel for Whakatane trade, built at Whangaroa, which was to be driven by oil-engines, but the owners decided in favour of steam." I dare say you have heard the expression made use of that an exception only proves the rule?—If it had been such a good thing they would have put the oil-engines in their vessel.

78. Do you know of any other instance, either with the Northern Steamship Company or any other company, where oil-engines were put in and taken out again?—No; but the Wanganui vessel was not a success.

79. *The Chairman.*] What is her name?—The "Thistle."

80. *Mr. Houston.*] You say, "Where steam had the monopoly and where auxiliary-powered vessels started to compete in trade, no doubt there would be cutting rates, but this is also found where steam-vessels only are employed." Are you aware that the Northern Steamship Company has made an objection to the use of these oil-engines in sailing-vessels?—No.

81. Well, are you not aware that vessels which use these oil-engines, and which were formerly sailers, can now go up rivers, estuaries, and small bays that steamers could not go into?—No, I do not think so.

82. You cannot get steamers to go up these small rivers?—It is not a matter of the shallowness of the vessel; it is a matter of construction of the vessel. I have explained Thornycroft's stern for light draft, as used in Anderson's Bay ferry-boat, Dunedin, going twelve knots and drawing 1ft. 6in.

83. Are you aware that vessels are now going to places which were formerly not visited by steamers?—I do not know.

84. Why did you make this statement: "Where steam had the monopoly, and where auxiliary-powered vessels started to compete in trade, no doubt there would be cutting rates, but this is also found where steam-vessels only are employed, and that is not at all peculiar to the trades only where auxiliary schooners are employed. Where land and means of communication are good, settlement will necessarily follow." The latter part of that statement is evidently gratuitous, because it has nothing to do with either steam or oil. Are you not aware that it depends upon the means of getting into bays and harbours how settlement in the back-country progresses?—I have no doubt it does, but there must be some inducement to settle. If the land is good, and settlement offers inducements to the public to invest their money and energy, of course they will go there, and they will soon petition the Government for communication, and if there is anything in a good grumble, it will stick.

85. Clause 4 of the petition says, "That the use of the oil-engines in launches has lately been adopted to a great extent, and has been found of great service and benefit, both for purposes of pleasure and for shipping business." You admit that, but you say the same applies to steam-launches. You should have confined your remarks to these oil-engines?—We have to consider both.

86. In answer to Clause 5 of the petition, you say, "I do not think they would decrease the cost, as an oil-engine is about four times more expensive as a steam-engine, and no safer." I ask you to give a straightforward answer to that—whether you consider that statement correct, that an oil-engine costs four times as much as a steam-engine?—It depends upon the size. Above fifty-horse power it would perhaps be four times, but up to fifty, perhaps only twice.

87. *Mr. Crowther.*] Can you quote the price of a fifty-horse-power engine?—I have not got the figures here. About £500.

88. *The Chairman.*] Do you know the "Huia" schooner?—Yes.

89. What power has she?—About forty-five or fifty.

90. What would be the cost of a forty-five-horse-power steam-engine?—Perhaps £100 to £150 for the engine itself, without the boiler.

91. We want the estimate with the boiler; the machinery to drive the vessel?—About £250 for everything.

92. *Mr. Houston.*] Suppose you have this oil-engine that costs £500, and a steam-engine complete that costs £150 or £200, which takes up the most room?—Of course, the steam machinery.

93. Then, if a vessel whose chief motor-power is sails gets an oil-engine, the space saved will more than counterbalance the cost of steam-machinery?—I am not prepared to say that.

94. *The Chairman.*] But there would be the cargo-space?—Yes, it would.

95. *Mr. Houston.*] As to the inspection: you are aware that the Government have an Inspector of Machinery in Auckland?—They have two.

96. What are their names?—Blackwood and Jobson.

97. Mr. Jobson examines all the machinery north of Auckland?—Not all.

98. Has he ever examined machinery at Whangaroa?—Yes.

99. Has he ever examined the oil-launches?—Yes, I believe so.

100. Have you ever heard of a launch called the "Midge"?—I do not remember.

101. Has the Inspector ever inspected that?—He has inspected one or two launches there.

102. What do you mean by launch?—An open boat with an engine in it.

103. Of any particular size?—No.

104. A dingy would be called a launch then?—Yes.

105. Are you aware whether Mr. Jobson examined a small boat called the "Midge"?—I could not tell you from memory.

106. You do not know the size of the boat?—If she has been surveyed, we have the size in our books.

107. In examining an engine like that, would he take the machinery to pieces?—He would.

108. And it is his duty to put it together again?—Certainly not.

109. Do you mean to say an Inspector can take an engine to pieces and leave it without putting it together again?—The "Mararoa" takes a whole week for survey and employs fifty men per day for the purpose.

110. Then an Inspector can take the machinery to pieces and leave it lying about?—He does not take anything to pieces. He can stand by and order every part to be cleaned for examination. He must see everything to satisfy himself.

111. You would not think it was incapacity on the part of an Inspector if he took one of the engines to pieces and could not put it together again?—It is not our duty to do anything of that sort.

112. *The Chairman.*] He does not take anything to pieces?—No; he looks on while it is being done. The Act specially provides for that.

113. *Mr Houston.*] Do you know anything about the cost of examining a small oil-engine?—No; but where there is not a mechanical man employed in taking down machinery, it adds to the expense. Where you have not got a competent mechanical man as engineer, it costs six times more; because he does not mark all the parts carefully, and a competent man would.

114. What would be the cost of inspecting the machinery of a boat 14 ft. 6 in. long, and 4 ft. 6 in. beam?—If a vessel like that stopped to-day, and an engineer could not take it to pieces and put it together again by the next morning, he would not be fit to be there.

115. What would you think would be a proper amount for an Inspector to charge for inspecting a boat of that size?—It is defined by law. It is £1 10s. for one survey.

116. No matter what size of engine?—It depends upon the tonnage; it has nothing to do with the horse-power.

117. What would be the cost of inspecting a boat 14 ft. 6 in. long, and 4 ft. 6 in. beam?—It would be by tonnage.

118. What would be its tonnage?—It might be 4 or 5 tons.

119. Anybody that would allow much more than 500 cwt. in that boat should be prosecuted. What would be the tonnage of a boat 14 ft. 6 in. over all in length and 4 ft. 6 in. beam: you say she could carry 4 or 5 tons?—I suppose she could.

120. *The Chairman.*] Can you work it out?—What is the depth of her?

121. *Mr. Houston.*] About 2 ft. 6 in.—That is very shallow for the engine; there would be no draught at all. [Witness here figured it out.] Four tons.

122. You know what is called a watermen's boat: is there any watermen's boat at the wharf here that would carry 4 tons?—I do not think there is for a single man. It depends upon how many men she is built for. Some would be twice the size of others.

123. I mean an ordinary watermen's boat at the wharf?—No.

124. There are no watermen's boats larger than those?—Yes there are, plenty of them.

125. Clause 2 of the prayer in the petition says, "That all oil-engines of a larger power be run by men who have passed a sufficient examination on the working of oil-engines alone, irrespective of steam-power." You say, "Examination alone will never make a tradesman." Would experience make a tradesman?—Experience neither comes by years nor by examination; it depends upon servitude greatly.

126. Would experience make a tradesman?—The manipulating of tools would make a tradesman.

127. Supposing a person had been engaged driving an oil-engine for eighteen months or two years, would you not consider him qualified to drive it?—The law allows that, but he must get his experience somewhere. That seems to me to be a very fair law for service.

128. You say here that examination alone will never make a tradesman, and you go on to say, "and I consider where vessels are employed outside restricted limits, that, for public safety, a man should have at least three years' mechanical experience at the making and repairing of engines, not necessarily steam-engines, or at work of a similar nature." Then, any person engaged in a mechanical shop where there were oil-engines made and repaired would be qualified after

three years?—That would be a very good experience if an examination was instituted. A third engineer on a vessel legally qualified to carry passengers must have served five years for a steam-vessel.

129. *The Chairman.*] If a man were at work in a shop, engine-constructing and repairing for three years, could he not take charge of the engine in a vessel like the "Huia"?—Yes, if not less than three years' shop-service after examination.

130. *Mr. Houston.*] Then, with regard to vessels inside restricted limits, what qualification do you consider necessary for driving an oil-engine?—I have not sufficiently thought of that. That requires careful consideration. Some of our river-limits are very extensive.

131. Clause 3 of the prayer of the petition says: "That a competent Examiner be forthwith appointed to conduct such examinations." You say "That there is nothing (if an examination is to take place) that an Inspector of Machinery, who at present examines engineers, cannot undertake, and I see no reason to prevent the present Examiners conducting such examination." Do you consider the present engineers conducting these examinations for steam-engines are capable of examining men for certificates for driving oil-engines?—Yes, I should think so.

132. Do you consider that an Examiner who examines persons for certificates as engineers on board of vessels is capable himself of being an engineer and driving the machinery on board a vessel?—Yes.

133. You consider that he ought to be?—Yes.

134. Do you mean to tell me that the Examiners we have at present for examining engineers understand this oil-engine question?—I do.

135. Are you aware that an advertisement appeared in Auckland from Messrs. Briskie, owners of the "Medora," offering £10 to any certificated engineer, first, second, or third, to go down and start the oil-engine on the "Medora," and work it down the harbour?—No, I am not aware of any advertisement, but I know there was money offered.

136. Then you are aware that there was not a single engineer who accepted that offer?—I do not know that.

137. As a matter of fact, no engineer accepted the offer?—I do not think any engineer would go down on the offer of that sort. He would treat it with scorn.

138. *The Chairman.*] Why?—He would treat it as beneath his notice.

139. Why would it be beneath his notice?—Because it was a challenge from the master of a sailing-vessel, *re* machinery.

140. Do you want to amplify that?—Here is a man, the owner of a sailing-vessel, advertises for engineers to go down and start an engine: do you mean to say that any engineer of note would go down at the beck and call of any one to start an engine?

141. Suppose an oil-engine was in a vessel here, and the captain said he would give £10 to any engineer to start the engine: do you think any young man would refuse to accept the offer?—The only reason in this case was that it was considered to be downright cheek. The men stood on their dignity.

142. *Mr Houston.*] How do you know they stood on their dignity?—I heard so. Mr. Blackwood offered on one occasion to take up a wager, but the master backed down by saying, "I did not mean you, but the other man," and it did not appear in the papers. There should be no animosity like that in the matter of trade.

143. *The Chairman.*] It is not a question as between oil-engines and steam-engines. We want you to help the Committee to come to some definite conclusion with regard to this petition. When we got your report yesterday we did not feel at all satisfied. Of course, you have given many explanations this morning which may be considered so far satisfactory, but in all questions and answers we want you to assist the Committee. If there is any injustice done to the owners of the oil-engines, we desire that there shall be some rectification.—Yes.

144. *Mr. Houston.*] Are you aware whether the present Examiners for certificates for driving steam-engines have had any experience with oil-engines?—They would have.

145. Have they now?—Yes.

146. How did they get it?—At the surveys, and at the building of these engines at Auckland, and on board these vessels. They have seen all the different parts put together, and know the principle on which these engines work.

147. You said, in part of your report, that all these engines were imported from America?—I qualified that in the beginning. I have made up from time to time a synopsis of the different features of the engines, gathered from the best sources, for the benefit of the different surveyors, and, I must say, most of the engineering men I have applied to have been very kind in giving the information. I have embodied these remarks in a paper. I say it is for the owners themselves to get practical men if they want to get the best results out of the machinery.

148. Are you aware of any vessel where the oil-engine is the sole motor-power?—Yes, there are several launches in Auckland Harbour.

149. As regards these vessels spoken of in the petition as going into the bays and estuaries and up winding rivers, are you aware whether in those vessels the oil-engine is used solely?—No.

150. Then they have sails as a motor-power?—For the simple reason that it is too expensive all the time. It is three times as expensive as coal.

151. Take a vessel running from Auckland to, say, Mangonui, 180 miles: how long do you think the oil-engine is in use during the trip?—Perhaps till it gets clear of Tiritiri and clear of the heads at Mangonui; five hours on a single trip and five hours on the return.

152. Then, it would require a certificated engineer to be on board such a vessel as that for a five hours' run?—They might make four trips a week. A smart vessel, with a big power, might do that. That was the first pretext given against carrying engineers, because the engine did so little work; but when the permit to run on since was introduced, then, the moment they started

to load, the time was counted as proof of service in order to get the permit. The time they give is considerably more when it suits the purpose of the present owners. If the time is properly taken when running, none of these men are entitled to this permit—not legally.

153. Do you mean to say that a man in charge of an oil-engine, if he got a certificate for twelve months' service, that would be only current for the actual number of hours he was driving?—If you go by your remarks, experience makes a man. He has been allowed to pass, and I have no doubt he is qualified enough.

154. Say that a vessel is going from Auckland to Mangonui, and that its engine is worked five hours, do you think it would be a fair remuneration for a certificated engineer if he was only paid for five hours?—That is a question between master and servant. If you employ a cabman, and want to go to the wharf, say, from here, and you keep him waiting two hours, you do not pay him for the run, but for the time occupied.

155. In the latter part of clause 4 of your report you say, "I do not think that a separate examination is necessary, as engineers with present certificates under the Shipping and Seamen's Act are quite capable of taking charge, and I think that a special certificate for this class of vessel will not ensure more trustworthy or efficient men for this special class of power." Are you not aware that on certain vessels propelled by oil-engines, to meet the requirements of the regulations, certificated engineers were taken on board, who could not work these engines?—I have no doubt there were some who could not work them, but my surveyors in Auckland say there was no difficulty in the matter so far as they knew. I know there was one man who was a gaol-bird, and a low-down dog, who was employed.

156. Was he a certificated engineer?—Yes, he was ————. He was one of them so employed. That was not the man who went on board the "Medora." Morally, he was not a man that should be taken as a proof of what engineers could do.

157. *Mr. Houston.*] Moral qualification is one of the qualifications for an engineer?—Yes; but when you bait me about these men, I say you should not refer to a man who has lost his brains by drink.

158. Are you not aware that the owner of the "Medora" put an advertisement in the paper requiring a certificated engineer to work his engine?—I am aware of some advertisement. I know myself that an advertisement—perhaps more than one—went into the papers bearing on that.

159. And are you not aware that, in answer to that advertisement, seven men applied for the position, and could not start the engine?—I am not aware of that. I know of engineers who have been in vessels with oil-engines and have had no trouble. The "Thistle" is 105 indicated horse-power, and the largest oil-engined vessel in Australasia, and they have had no trouble. It is not a financial success, and if she had steam she would be a greater success.

160. Is the fact of the great opposition to use of oil-engines on board vessels as an auxiliary propelling-power not due altogether to the opposition raised by the engineers of this colony who are engaged in driving steam-engines?—No. I will qualify that by saying it is a matter of pounds, shillings, and pence. There is nothing else in it.

161. Then, the engineers of our steamers are not opposed to oil-engines?—Not at all.

162. Of course, you are answering for the whole body of men who are employed driving steam-engines?—No; I am answering as one of the servants of the Government—as a servant of yours.

163. How do you arrive at that as the opinion of the engineers of the colony?—Simply because if you pay a man properly you get qualified men to go on board, but I know that several owners—Messrs. J. W. Briskie and others—think it is a great hardship to pay an engineer when they can only keep him going a few hours. They want handy men who can be got to pull a rope and so on. It is not a matter of mechanical men, but a matter of pounds, shillings, and pence on the par tof the owners.

164. You say, "Finally, I would point out with reference to the alleged benefit to the colony the advent of these oil-powered vessels are claimed to have given that the petitioners have only brought forward one phase of the question." You say it is a question of pounds, shillings, and pence as regards the owners. These petitioners claim that it has been a benefit to the settlers in the different rivers and estuaries gained by the advent of these oil-engines?—I admit that.

165. And now you say it is simply a question of pounds, shillings, and pence, so far as the owners are concerned, who do not wish to be obliged to employ certificated engineers?—I think so. If you approach the men, I dare say you could come to some amicable arrangement.

166. Are you not aware that a certificated engineer belonging to the union would not do anything but attend to the engine?—That is what he is paid for.

167. And he would be employed for five hours and do nothing else. You know that the oil-engine is not the motor-power—the sails are the motor-power?—They would use the engine when it became necessary in a calm. The engineer would be there to take charge of the machinery, and would start and stop when wanted by the master. It is the same with a steam-vessel.

168. One of the reasons you give for objecting to these oil-engines is that if they were in general use it would prevent the employment of men engaged in building steam-engines and throw a great number of young men out of employment. Are you not aware that those engaged in building vessels in order that they may be fitted up with auxiliary oil-engines also employ a large number of men?—Yes, a few.

169. Do you know Messrs. Lane and Brown?—Yes, I expect you have every name of their employés in the petition.

170. Do you know how many men they employ?—Perhaps fifty.

171. Indirectly they employ a great many men in the timber-trade?—The timber would come down in any case.

172. How would it come down?—In scows, or something else.

173. Are you not aware that Lane and Brown cut their own timber?—I am not aware of it. They find it cheaper, I suppose.

174. Are you aware that Lane and Brown have built a number of vessels fitted up with oil-engines?—Yes.

175. Are you aware that they have had to refuse orders for vessels on account of the restrictions put on by the Government in regard to oil-engines?—I could not say. I know nothing about that. They may.

176. Do you not think it would be an injustice to a firm of that kind, who employ so many hands?—If trade demands a commodity nothing in the world will stop it.

177. Do you mean to say that restrictions placed on the production of gum or anything else would not affect the output?—A skilled man would get £12 a month and an ordinary driver £6 a month. Do you mean to say that £72 a year would harm a vessel? The difference in pay given to an engineer and to a driver would not increase the pay one penny on freight carried in vessels carrying 100 tons employed in the Auckland–Wanganui trade.

178. It would have an effect upon it?—Very small.

179. It is a fact that a great number of orders placed with Messrs. Lane and Brown, of Auckland, have had to be withdrawn?—The number of steam-vessels built in Auckland are almost as numerous as those with oil-machinery, so that trade has been busy all round; and last year machinery for shore and marine purposes was very much increased.

180. There has never been anything like it for some three years?—No.

181. *The Chairman.*] You have been ten years in the Government service?—Yes.

182. *Mr. Houston.*] Do you think none of that prosperity can be attributed to the oil-engines enabling vessels to go into places where they had never been before?—I cannot tell that, but I think it is a mistake to put all the trade down to that.

183. Do you not think it would injure the settlers to restrict the use of these oil-engines when the rates of freight can be brought down to a reasonable sum by their use?—Take the rate to Mangonui: what difference would it make to the tonnage if the cost to the vessel was increased by £72 a year?

184. You do not seem to realise the difference between the motor power of sails and steam. In a vessel driven by steam I admit it would not make a great difference, but in a vessel whose motor power is entirely sails it must make a great difference. The "Medora" used to go up a winding river perhaps thirty or forty miles, so that her sails were of no use to her whatever. The result now is that she can go into the river, her sails are pulled down, and the oil-engine is made use of to take her up to the wharf. That is the advantage the owners give to the settlers in enabling them to have their freights carried at a very much lower price than before. They can go from Auckland to Awanui, going up the river in about three hours with the tide.—That may be so.

185. *Mr. Carson.*] Are you entirely prejudiced against the oil-engines?—Not at all.

186. The tenor of your report was entirely against them, and showed that they should not be introduced because they were against the interest of labour?—Shipbuilding has increased since these came into force. The petition says that the shipbuilding industry was never so busy as it is now, and I simply drew a comparison to show that shipbuilding in steam-vessels was equally busy as shipbuilding for auxiliary power, the number built out of the colony, and the nnmber built in the colony and surveyed by us. I merely wanted to give the facts from our own books.

187. I gathered from your report that oil-engines were not introduced because they were imported from America?—Not at all.

188. And I understand you made no reference to those built in the colony?—I only got word about the factory from Mr. Henderson last week.

189. I suppose it has nothing to do with you if people like to introduce oil-engines?—No, I never interfered with the trade.

190. Is a certificated engineer who has never seen an oil-engine competent to drive one?—The Board of Trade allows a man to go aboard a ship as an engineer who has been employed at works of a similar nature, although he may never have seen a steam-engine built; and I say that if such a body as the English Board of Trade would allow that, surely a mechanical engineer is a proper person to take charge of these engines.

191. Then your argument is, that a mechanical engineer can take charge of an oil-engine although he has not seen it before?—Certainly.

192. Is it not a fact that a person may be asked to take charge without knowing anything about it, and do nothing?—No; the law demands it.

193. And then they keep another man to look after the engine?—No, they do not require to do so.

194. I mean that under the present arrangement they have to employ two men instead of one?—No; the law only compels them to employ an engineer.

195. The law would not compel them to employ two men?—No, that is their own look-out. They are not compelled to employ two.

196. Is is not a fact that some of these engines have been taken charge of satisfactorily by persons who have only been trained on launches?—It is just like a woman taking charge of a sewing-machine in the country. She gets the threads in and works the machine, but something goes wrong and she has to go to a doctor—a mechanical engineer. There is a difference between driving and taking charge of an engine. On a steam-ship the best driver of a winch is the winchman; but when it comes to a point and it jibs and won't work, he has to go for the engineer. Give me a winchman for driving a winch-engine, but if in an isolated position you will never make a man a mechanical man by examination. A driver is not an engineer—that is the point. A man

probably has natural ability; he is a gifted mechanic, with ideas and and notions, but his education may not have been in the way of the maintenance and running of an engine successfully. A driver will shove a lever over and give it a drop of oil, and away the engine goes, but if it goes ten revolutions more or less, he will not bother; but an engineer is not satisfied with that: he knows every point and every click, which is music to him as to an educated woman who knows every note on a piano. It is to the interest of an owner to employ competent men, and if a practical man should not be immediately conversant with the engine, and cannot drive it so satisfactorily as perhaps a man who has been doing it for two years, he should not be barred. Take the engineers of the "Wakatu" and the "Stormbird": they are both capable men, but if placed on board the "Monowai," having so much different gear on board than they have been accustomed to, they would feel strange at first. They have hydraulic gear and electric gear on board to look after, and the engineer must be conversant with them. There are two sets of engines, perhaps triple expansion engines, and in the case of the "Monowai," an engine for driving the dynamos for the electric light. Vessels like that have hydraulic and freezing machinery, and all this machinery is in charge of the same man, a mechanical engineer, and each machine is a speciality.

197. *The Chairman.*] How long have you been a certificated engineer?—Since 1882. I passed as second engineer in 1882, and as chief engineer in 1883. I have numerous other certificates from the Science and Art Department, South Kensington, and from Liverpool School of Science.

198. Are you an electrical engineer?—No. I know a little about it.

199. Have you been in large steamers?—Yes, in the British India Company's Royal Mail service on their home-trades through the Red Sea, and I was in their fast mail-service between Calcutta and Singapore for two years.

200. You said just now that this question was a matter of pounds, shillings, and pence?—Yes.

201. Do you know the Kaipara Heads?—No, I have not been there.

202. Do you know the distance up the river to Helensville?—No. It must be about sixty miles. It is a big estuary.

203. Should there be a certificated engineer on board the "Huia," 350 tons, and if not, what experience should a man have to be in charge of an oil-engine?—Would she carry passengers?

The Chairman: No.

Witness: A third-class certificated engineer would meet the law, or a man with a permit who had been running an engine for twelve months prior to the 31st May, 1899, running in deep water, or had passed an examination after service for three years in a shop.

204. *The Chairman.*] So that any one who had experience in a shop for three years, and with an examination would be qualified to take charge of one of these boats?—Yes, he should not have less than three years' shop service.

205. I have spoken of the "Huia," which has been trading from Lyttelton to Kaipara?—Yes.

206. Do you know whether she has made some rapid trips?—I have not heard specially, but I have seen it mentioned in the papers. I know she has done some very good work.

207. The captain has told me that on several occasions, when getting into a calm and using the engine, and then getting a fair wind, the owners have earned a lot of money.—If they are doing well they should not grudge the extra £5 a month to keep the machinery working well up to the standard.

208. A vessel of that tonnage getting to the Kaipara Heads might be detained a week or more before getting up the river without the aid of this auxiliary power?—They might make an agreement with the tug-boat people to reduce the rates to a nominal tonnage.

209. But if there was only one tug she could make any demand she pleased?—If so, she could cross the bar with her own sails.

210. *Mr. Carson.*] I think you said that the "Thistle," belonging to the Wanganui Freezing Company, is a failure?—For going long distances; not for the trade for which she was built. For going to Westport it does not pay.

211. Then you mean that it would be better if she had not an oil-engine?—It would be more economical for the company for a long trip.

212. *Mr. Lethbridge.*] You say as much oil is used for steam machinery as in oil-engines?—They use a great quantity. It amounts to a lot of oil.

213. You say that for lubricating the steam machinery it would cost as much?—No, not so much. My report was written hurriedly. I got the requisition for my report on one morning, and wrote it out the next evening. I had no idea that it was coming before this Committee in the way it has.

214. *Mr. Carson.*] Are you aware that the chairman of the company which owns the "Thistle" is one of the petitioners?—I could not say.

215. It is hardly likely he would petition in this matter if he thought the oil-engine was not a success?—I think it would cost more than coal. It would cost roughly from £15 or £20 a day for oil, and it would only use about 4 or 5 tons of coal for same power for steam.

216. *Mr. Crowther.*] Is she schooner-rigged?—Yes, a sort of a scow. I understand now she is ninety-horse power, but I heard she was 105.

217. *Mr. Carson.*] It is all a matter of experience with regard to working these engines, and any man of experience would be capable of working one. Your contention is that he could run it all right, but that if serious difficulty arose he could not repair it?—Yes. The Northern Steamship Company carry an extra engineer not required by law, but it is cheaper to do so, as it saves repairs.

218. That is for the purpose of safety?—Yes. I know that in the matter of survey it may seem excessive, but if a non-practical man were to get ready for survey, the machinery would take him twice as long, and he would put the machinery together in an indifferent fashion. A man trained to the work for a number of years would make sure of every point as he went along.

219. I think you say that any practical man with three years' shop experience would be competent?—Yes; after examination. Nearly all the men engaged in the sale or manufacture of these oil-engines that I have seen are in favour of practical engineers being in charge. They say they get better results from them.

220. *Mr. Crowther.*] Has it come to your knowledge that even Mr. Henderson has not been allowed to drive an oil-engine?—No. Mr. Henderson has a private launch, and has not applied for permission.

221. Has not permission been denied him?—No.

222. I heard from him lately, and he told me that he had got a launch but he was not allowed to make use of it?—He is not allowed to make use of it, except for pleasure, after application through the Secretary of Marine and the approval of the Minister of Marine.

223. *Mr. Symes.*] You say that all machinery is more or less complicated. An ordinary individual could fix up a hydraulic ram without having a certificated engineer to work it?—Certainly; as long as his fall was all right.

224. What would be about the cost of fixing up a sailing-vessel with an oil-engine as a means of propelling it?—It would depend upon the power of the engine. For an ordinary vessel, I suppose it would cost £150.

225. What would be the cost of fixing an ordinary steam-engine for the same class of vessel?—Perhaps £60 more than that. These are only rough estimates.

226. Take it by power?—Well, perhaps a third more.

227. Do you not consider that it has been of great advantage to the settlers, living in places where it would be difficult to get ordinary steamers to go, to have these sailing-vessels fitted up with oil-engines?—Yes; but there is no place using oil-engines where steam-vessels could not go.

228. Is it not a fact that steam-vessels are the most expensive vessels you can have?—I do not think so.

229. Do you think there is any great amount of danger in the use of oil-engines?—You have as high a pressure in oil-engines as you have in the highest-pressed steam-vessels in New Zealand. The highest pressure is 200 lb. in the "Upolo," and you have an initial pressure of 180 lb. to 200 lb. and over in an oil-engine.

230. Are they just as dangerous, or more dangerous than the ordinary steam-vessels?—I do not recollect any vessel being stuck up with a steam-boiler in New Zealand. If you hear of a vessel being detained, it is always on account of the shaft breaking, or through a defect in the machinery. The boilers have to be so carefully made, that there is no accident likely to occur to a boiler.

231. Does the department insist on having a certificated engineer to drive an ordinary threshing-machine?—No.

232. Do you not think there is just as much danger in working the engine of an ordinary threshing-machine by an uncertificated man as in working an oil-engine on one of these boats?—I understand the Government are bringing in regulations to meet that matter now. I do not think so, because if there is any danger in connection with a threshing-machine, the men can run away, as they are on *terra firma*, but on board a ship, when on a lee-shore, or going up a river, if the engine jibs, the vessel is wrecked.

233. *The Chairman.*] What accident could happen to an oil-engine that would endanger life or cause shipwreck?—There was an accident at Waitara recently, where a vessel went ashore. The cylinder might burst up.

234. Would there be a danger to lives if there was an accident to the cylinder?—If it burst, it might blow a man's head off.

235. *Mr. Lethbridge.*] Having a competent man on board, he would not stop that?—He might from his knowledge prevent that.

236. *Mr. Symes.*] Was that vessel carrying a certificated engineer at the time?—Yes, a man with a third-class engineer's certificate.

237. An accident somewhat similar could have happened with an ordinary engine, and the breaking of a shaft or the propeller?—Defects will arise in any way, but a competent engineer can look out for them and prevent them before they go too far. An engineer is never understood properly. He goes down into dark holes, and does work which is never heard of, and engineers generally do not get half the credit they deserve for what they do.

WEDNESDAY, 23RD AUGUST, 1899.

ROBERT DUNCAN, Chief Inspector of Machinery, further examined.

1. *Mr. Lawry.*] I suppose, Mr. Duncan, you are accustomed to see reports in the newspapers of deputations that wait upon the Minister in reference to marine matters?—Sometimes I see them.

2. Do you remember reading a report of a deputation waiting on the Minister in Auckland in reference to these oil-engines?—No, I cannot say I do.

3. You do not remember that the Minister replied to the effect that he would recommend regulations to be issued by the department to provide for what is really contained in this petition—viz., "That a competent Examiner be forthwith appointed to conduct such examinations"?—No, I do not recollect that.

4. I understood you to say that the engineers were not hostile to the use of oil-engines?—No, they are not hostile.

5. Are you aware whether or not the engineers are opposed to these oil-engines being driven by men who have not certificates as marine engineers?—Yes, they are naturally opposed to that; but the owners of steam-vessels are equally opposed to that.

6. Are you not aware that there were two deputations which waited on the Minister in Auckland?—I could not say.

7. *The Chairman.*] Why are the engineers and the owners of steam-ships opposed to men who have not certificates having charge of these oil-engines?—I suppose it is human nature. It is a branch of engineering which has always been run by engineers heretofore, and where the owners of steam-vessels have to carry higher-paid men than the owners of auxiliary-driven vessels it is natural, I suppose, that they should resent it.

8. *Mr. Lawry.*] I suppose the Committee has to understand that with the engineers, as with the shipowners, it resolves itself into a question of pounds, shillings, and pence?—No; it is a matter of principle.

9. The question of payment does not enter into the matter at all: it is purely a question of principle?—The question of payment has nothing to do with the engineers; that has to do with the owners.

10. Why are the engineers opposed to these other men driving the engines?—Because they are not qualified engineers according to law.

11. When they received their certificates as marine engineers the question of running oil-engines was never contemplated?—The Shipping Acts are altered from time to time to suit the circumstances as they appear, and the Imperial Act of Great Britain was altered in 1894 to suit the altered condition of things. The American Act has been altered repeatedly, and New Zealand will have to follow. It is only within the last few years that oil-engines have been used.

12. In your evidence before, you said there had been a specified number of boats made to be propelled by oil-engines?—I said specifically that the number of boats surveyed by us appeared in our books.

13. Does that include schooners?—It included all that were running legally.

14. The number you mentioned included those boats supplied with oil-engines?—Yes; in New Zealand. I said there had been so many vessels surveyed by us in New Zealand and built to carry oil-engines, and that if there were any vessels outside our books they were running illegally.

15. For instance, that boat running between Auckland and Gisborne would be included in your list?—Yes. I have a list of the boats here. [Produced.]

16. *Mr. Crowther.*] Does that show where and when built?—The port where owned, the name of owner, and the maker of the engine. Of the thirty-two vessels in the colony, only three of the oil-engines were made here. All the other machinery which has been surveyed and appears on our books was imported.

17. When you made the statement contained in your report that all the oil-engines and fittings were imported from America, you had forgotten the existence of the factory in Auckland?—No; it was stopped for some time, and I understood it was not working when I was in Auckland last.

18. Have you heard any remarks made as to the quality and efficiency of the machines made in Auckland as against the imported ones?—Yes; I think they are a very good article indeed. I have no fault to find with them.

19. Then your contention that all the machinery and fittings were imported from America is very largely discounted?—There are thirty-two in our books. If there are any running outside of our books they are running illegally. There are only three running which have engines made in the colony.

20. You would not object to the colony being able, in the near future, to make all the oil-engines required for the trade?—I wish they could.

21. Do you not think there would be as many mechanics employed as in making steam-engines?—There might, but I hardly think so, as no boilers are used.

22. It is not a question of economy as between oil and steam?—No. I will take a fifty-brake horse-power engine. Benzine equals 1s. 3d. per gallon; naphtha, 2s. 10d. per gallon. Add these two together and divide by two, and you find the average price of the oil is 2s. per gallon. A fifty-brake horse-power engine will use $\frac{3}{4}$ pint of this oil per brake horse-power per hour. That equals $4\frac{3}{4}$ gallons per hour the oil-engine would use. At 2s. per gallon that equals 9s. 6d. per hour, and in a day of twenty-four hours the cost would be £11 4s. Now, for a modern steam-engine of fifty-horse-power I produce the indicated horse-power cards of the steamer "Onda," belonging to the British Steam Navigation Company, a vessel which was in Wellington recently. The average consumption of this vessel was 1·6 lb. of coal per indicated horse-power per hour; but for rough calculation we will say she used 2 lb. of coal per indicated horse-power per hour. I take these cards because she is not a locally-owned vessel, and therefore there can be no bias. Take a vessel with the same consumption of fifty horse-power: 50 multiplied by 2 = 100 (that is the amount consumed per hour), multiplied by 24 is the amount consumed per day, and dividing by 2,240 lb. in a ton equals 1·1 tons of coal per day. With regard to the prices of coal, they vary, but take the price at: Bay of Islands (steam coal), 10s.; Auckland, 15s.; Wellington, £1; Westport, 10s. Say the average at the very highest is £1 per ton for steam coal in any part of New Zealand, and the cost will be £1 2s. for a fifty-horse-power engine per day, as against £11 4s. for oil-engines; and yet one gentleman said it was too costly to run steam-vessels.

23. *The Chairman.*] Will you add the cost of the first, second, and third engineers and the stokers?—They do not require to carry them. They only require to carry one engineer and no stoker, say in restricted limits for small power of fifty horses. An engineer gets £16 per month, and these other men only £6.

24. *Mr. Crowther.*] Does the engineer do all the stoking?—Yes, for these limits.

25. *Mr. Lawry.*] What do you mean when you say that a big steamer uses as much oil as one propelled by an oil-engine?—Because the oil-engine is only worked two or three hours when going in and out of a harbour.

26. Then you do not credit a ship with the cost of oil used in connection with steam?—No, I

left that out. I go by the fuel used in both cases. The cost is excessive in the case of an oil-engine as compared with a steam-vessel. It is all a matter of expense, and both vessels use oil for lubrication.

27. Do you not think a mechanic who understands the niceties of construction and has practical knowledge of an oil-engine would be capable of driving one just as well as a certificated engineer?—He would still be a driver. He would not be able to look after the up-keep of the machinery for want of the practical knowledge which is obtained in a shop.

28. But suppose they take an engineer out of a shop?—Yes, he could do it.

29. Does that not do away with any objection you have to the prayer of the petition?—I have answered that by saying that three years' shop-experience should qualify, with an examination.

30. Supposing he has the shop-experience, what is your objection?—I have no objection whatever.

31. Then you have no objection to regulations being framed to give what is asked for in the petition?—The petition does not say anything about shop matters.

32. But you can make that alteration?—Exactly. There was a matter mentioned by Mr. Houston in reference to river restrictions at the last meeting. I have thought over that since, and will give you the decision the department has arrived at, with Mr. Glasgow's consent.

33. Supposing the department decides to give effect to clause 2 in the prayer of the petition, how long would it take to frame the regulations and bring them into practical effect?—About the beginning of the year. About the river-limits, I would like to have them defined the same as for a river-steamer engineer, with the reference to the boiler left out. Twelve months' service in a shop where he was employed about machinery on shore should qualify, with the addition of an examination. That, in my opinion, would be sufficient.

34. Do you not think your department might have come to a decision about this matter before this, instead of giving all these people the trouble of coming here?—I am not in a position to say that. That is a matter for the head of the department.

Mr. Glasgow: My impression is that what the department has been asked to do is to recognise service on board a ship only, without examination, or even with examination; but shop-service has never been mentioned before. I think shop-service has always been put forward by the department as being necessary for obtaining a permit. When this matter first came up it was represented to the department that anybody could go on board one of these oil-vessels and learn how to start and stop an engine, but it was pointed out that that was not sufficient to satisfy the requirements for the safety of the ship where passengers were concerned. Then it was stated that even an engineer who had a certificate could not start these engines, and that was considered to be very anomalous—that anybody could go on board and start one of these engines and yet a certificated engineer could not. I do not think the department has ever departed from the principle that mechanical knowledge is a necessary qualification. I noticed in this petition there was no reference to shop-service, and I thought that was intentional, so that licenses could be granted to men who had merely an experience through being in charge of oil-engines.

35. *The Chairman* (to Mr. Glasgow).] I gather that there has only been a slight difference of opinion as to the qualifications of persons to take charge of the engines. You thought they should have mechanical knowledge, and that was not put forward by the applicants?—It was decided by the department to give permits to those who had been up to that time twelve months in charge of an engine. No stipulation was made as to shop-service. It was only to meet the case of men who had been in charge of engines, and it was thought it might be a hardship for these to be thrown out of employment.

36. Your view was that the man should have some mechanical knowledge?—Yes. I wrote a minute for the information of the Minister as early as June, 1898, which will be the view I took of the matter then: "The principle which lies at the root of this matter seems to me to be this: Should the department take the position that in the interests of the safety of passengers and crew it is essential that there should be a man on board these vessels who has practical experience of machinery, or is it sufficient that there should be a man, not necessarily a mechanic, but so far acquainted with the mode of operation of these engines as to be able to start and stop them? If the latter view is adopted it will be necessary to amend section 3 of the Act of 1894 so as to exclude these vessels from operation of the law relating to certificated engineers. This course is, however, one demanding very serious consideration. Although at present confined to engines of small horse-power, the system is no doubt capable of great expansion, and in the course of time comparatively large passenger-vessels will be propelled by these engines. It cannot, I think, be argued that it should be left to the discretion of the owners of such vessels as to whether or not there should be a man on board having proper qualifications from experience of machinery to manage engines and keep them in order. I take it, therefore, that the idea of altering the law so as to exclude these vessels may be dismissed. The next question to be considered is whether or not the law should be amended so as to provide for a special certificate for drivers of oil-engines. The question would, however, still remain whether any experience in a shop or foundry where engines are manufactured is to be required as a qualification for examination for such certificates. Is a man who knows how to start or stop an oil-engine, and perhaps knows something of its structure theoretically, but who is not a practical mechanic, and has never handled tools in a foundry or machine-factory, to be entitled to a certificate? It appears to me to be obvious that if mechanical experience is a necessary qualification in the case of a marine steam-engine, it is as necessary for the driver of a marine oil-engine. In fact, I do not think the opposite view could be sustained for a moment in the case of passenger-vessels, propelled solely by oil-engines. The whole difficulty has arisen in connection with sailing-vessels having auxiliary oil-engines, the owners of which object to carry a certificated engineer on account of the extra pay involved.

37. *Mr. Crowther* (to Mr. Glasgow).] You see that that memorandum is founded mainly on the last portion of it—"propelled solely." They are not propelled solely; they are in no way dependent?—I admit that in the case of auxiliary-vessels there is a certain amount of hardship involved.

38. *Mr. Lawry* (to Mr. Duncan).] You heard that minute read by Mr. Glasgow?—Yes.

39. Have you seen that before?—No.

40. Do you notice that it says that the owners object to carry a certificated engineer on account of the extra pay?—Yes.

41. Did you tell the Committee the other day that there was a great deal of difference in the pay received by an engineer of a sea-going boat and a man who runs a steamer up a river?—No, I did not make any comparison. I made a comparison between the pay on oil-vessels and those driven by steam.

42. I understood you to say they could get men to go up rivers for £6 a month?—No. I said that on oil-vessels they got about £6, while a mechanical engineer wanted about £12 or £14 a month; and then I went on to show that the difference in wages would not amount to 1d. per ton extra on cargo carried to meet the additional cost of carrying an engineer.

43. Do you suppose that if a man passed the most rigid examination he would not get as much for driving an oil-engine as he would for driving a steamer?—I would rather not answer that question. I do not want to interfere with trade in any way. If a man likes to have an oil-vessel for pleasure it has nothing to do with me. It is purely a matter as between the owner and the engineer as to wages.

44. Then is the Committee to understand that you did not institute a comparison between the cost and wages or anything else?—Yes; I did answer that.

45. *The Chairman.*] I stated that the opinion of the Committee, after reading your report, was this: That you were a partisan of the engineers employed on steam-vessels. Of course you inferred that you drew a little on your imagination, and that if you had known it was coming before this Committee you would have been more guarded. You backed down a little?—I might have qualified my remarks a little if I had known I was coming before the Committee. I received this telegram from Mr. Blackwood, engineer surveyor at Auckland, in reply to my query: "Please find out the prices of oils used by gasoline-vessels in Auckland." (Telegram read): "Benzine from 9d. to 1s. 3d., naphtha 2s. 10d. per gallon. Benzine is used for Union engines, and naphtha for Hercules engines."

Mr. Lane: That is absolutely untrue. Benzine is used for Hercules engines as well as the others. There is no naphtha used except for the little launches.

46. *The Chairman.*] The owners may be using naphtha without your knowledge?—There are only four vessels in my list using naphtha, and if more are running they are doing so illegally.

47. *Mr. Lawry.*] Have you known of any serious accident to occur in consequence of a non-certificated engineer being employed to drive these oil-engines?—Mr. Glasgow sees all the reports relating to accidents, and he would be able to speak on that point. I do not know from memory, except that there have been one or two fires on board. The "Hercules" has been ashore at Hokitika, but I do not know whether it was through the engine breaking down. The "Mavis" and "Oban" have been on shore, and probably others.

48. Could you name the vessels that took fire?—The "Aotea" and "Medora."

49. Do you know what the cause was?—I could not say.

50. Do you know whether it was through the engine?—I believe it was, but could not say for certain.

51. Can you give the cause of the "Oban" coming to grief?—If that is the vessel that went ashore at Waitara, it was through a sea being shipped and the water going into the engine-room. It got into the air-pipes, and, instead of drawing air, she draw water into the vapouriter. The engine was stopped, and she was quite helpless.

52. Would not the same thing happen to a steam-vessel if the fires were put out?—That is to be taken for granted.

53. She carried a certificated engineer?—Yes, by law.

54. If anything did go wrong while a non-certificated engineer was on board who could not work the engine, do you think they would give themselves away, or the master, under the present circumstances?—When they got the vessel on shore or alongside the wharf they would simply go on their way rejoicing, and no one would be any the wiser.

55. Coming back to the question of examinations: Supposing a man had been driving an oil-engine for three years, and under examination could give you the most minute outline of its component parts, could take the engine to pieces and put it together again, and could give you a practical demonstration of this, do you not think that would be sufficient service?—No, a mechanic must understand the proper handling of tools.

56. But supposing he could smash the most delicate part of the machinery and mend it again?—Men of that sort would as soon take a hammer and chisel to break off nuts, and a tradesman would not.

57. Supposing the owners had men in their employ who could do what I have indicated, would you not let them drive an oil-engine?—No, not without shop-service. They can get a service qualification now without an examination if they have been driving for a year before May, 1899.

58. You would only make that prospective?—Yes, make it from the 1st January next.

59. You said you did not interfere with trade: do you not suppose that the owners of oil-engines know what suits them best?—Of course.

60. Do you not suppose that if they could run their boats with steam more economically they would use steam instead of oil?—It is a matter of a man going into business: one uses two windows to his shop and another one. One man goes in for oil and another for steam. We could not interfere with trade of that sort. It is all a matter of opinion.

61. *Mr. McLean.*] You said something about America in your evidence: what is the difference in the practice in America and Great Britain on this point?—In Great Britain the law affecting auxiliary-powered vessels is that they must come under the same regulations as steam-vessels, with such modifications as may from time to time be deemed necessary as diffiulties crop up.

62. Practically in the same way as the department proposes here?—Exactly the same way, as circumstances arise.

Mr. Glasgow: As a matter of fact only passenger-boats carrying twelve persons are surveyed: all the others are outside the law.

Witness: That is the law in Great Britain and New South Wales.

63. *The Chairman.*] What about America?—They have altered the law materially from time to time, and I believe the Marine Board or Board of Trade people were very sorry they did not interfere with this class of trade before they did. The law now is that if a man can show his qualification by examination he is allowed to go through.

64. *Mr. McLean.*] In what sense qualified?—By examination.

65. What sort of examination?—I do not know. I have not seen the regulations. I have seen a copy of the Act. I believe it was amended last year.

66. What is the nature of the examination a man would have to go through before he would be considered competent to take charge of a vessel?—I have not got that.

67. *The Chairman.*] You might give the Committee an idea of what you think it should be?—I would rather not.

68. Why?—It is not within my province at present.

69. But a general idea?—Well, the oil-engine and machinery, and the manipulation of parts requiring repairs.

70. And the shop-experience?—Yes, three years' shop-experience.

71. *Mr. McLean.*] What is the danger connected with oil-engines?—You have a high initial pressure to start with, perhaps ranging from 180 and over; you have pumps to look after, an electrical battery and dynamo, valves of emission and exhaust, and other points to look after. There is danger by explosion, and if on a lee shore the vessel would go ashore if there was a breakdown in the machinery.

72. Of course, with an auxiliary sailing-vessel it is rather an advantage than otherwise?—Well, the "Mavis" went ashore and could not get off again, and the "Oban" broke down on a lee shore and went ashore at Waitara. But there is as much danger in that respect with a vessel run by steam. You have the same difficulty in both cases, I admit.

73. *The Chairman.*] Of course, you know the auxiliary engine will only be used in fine weather?—If they can find oil in Taranaki or Orepuki, and the price is reduced to 1d. a gallon, they will use these engines all the time. It is only a matter of expense so far.

Mr. Glasgow.] I have here an extract from the laws governing steamboat inspection in the United States of America. Section 4426 (1898): "The hull and boilers of every ferry-boat, canal-boat, yacht, or other small craft of like character propelled by steam shall be inspected under the provisions of this title. Such other provisions of law for the better security of life as may be applicable to such vessels shall, by the regulations of the Board of Supervising Inspectors, also be required to be complied with before a certificate of inspection shall be granted; and no such vessel shall be navigated without a licensed engineer and a licensed pilot. Provided, that in open steam-launches of ten tons burden and under, one person, if duly qualified, may serve in the double capacity of pilot and engineer. All vessels of above fifteen tons burden carrying freight or passengers for hire, propelled by gas, fluid, naphtha, or electric motors, shall be and are hereby made subject to all the provisions of section forty-four hundred and twenty-six of the revised statutes of the United States, relating to the inspection of hulls and boilers and requiring engineers and pilots."

74. *The Chairman* (to Mr. Glasgow).] You exclude vessels under 15 tons?—Not under the present law, but it is contemplated to do that. Not from survey.

75. *Mr. Crowther* (to Mr. Glasgow).] That is on the presumption that they are propelled solely by these engines. That is different. Our struggle is for auxiliary power, not for the sole power. Your provision is for sole power?—That is so.

THOMAS MAJOR LANE, examined.

76. *The Chairman.*] You are senior partner of the firm of Lane and Brown, shipbuilders at Whangaroa?—Yes.

77. You reside in Auckland?—No, at Whangaroa.

78. You are a shipbuilder?—Yes.

79. Carrying on business how many years?—Since 1870.

80. What is the total number of vessels you have built?—Sixty-five, nearly all sailing-vessels.

81. With register tonnage ranging from?—From 12 tons to 320.

82. How many of the sixty-five have auxiliary power?—I should think about eight or ten.

83. And the engines in these eight or ten, were they constructed in Auckland, America, or England?—Two of them are Priestman's engines, constructed in England—the "Aotea" and "Moana." The "Medora," "Thistle," and "Greyhound" have Union engines from San Francisco. The "Hercules," the "Toroa," and the "Brothers" have Hercules engines, also constructed in San Francisco, and we have built small launches with Sintz and Wolverine engines from New York. The launch engines are of a different type altogether.

84. Have you any engines in vessels that you have built here that were constructed in New Zealand or any of the colonies?—No; we could not get them big enough in New Zealand. They are now making them up to twenty-five-horse power in Auckland, but only recently.

85. You have no New Zealand-made engines in any of your vessels?—We had a winch made in Auckland. It is on a punt used in connection with our works.

86. Do you own, or partly own, any of the vessels which you have built?—We own the "Moana."

87. Trading where?—In the intercolonial trade, across to Newcastle.

88. What is her tonnage?—96 tons register.

89. What power?—Eighteen horse-power, I am sorry to say.

90. Is it too much?—No; a great deal too little. Some one has to do the experimenting.

91. Is she a schooner?—Yes, a topsail schooner.

92. How many hands does she carry?—Eight, all told.

93. Is one set apart to drive the engine?—I think there are only seven now. One of the men drives the engine, and we do not get him for £6 a month. There are no such wages paid for driving engines.

94. What do the seamen get?—The intercolonial wages just now are £4 a month. We pay him £8, but I am sorry to say he is not able to do the work.

95. Why not?—He does not understand the engine. The Priestman is a very complicated engine.

96. How long has he been in the vessel?—About two years, I think.

97. How long has the vessel been running?—About four years, but she had not engines in her when she was built. We put them in afterwards.

98. How long have the engines been in?—A little over two years.

99. Has this man been in charge the whole time?—No, there was another man in charge at first. Stevenson, I think, his name was.

100. Was he a certificated engineer?—No, but he was competent to do the work.

101. How long was he there?—About six months.

102. What wages did you pay him?—The same as the present man.

103. Then, the man who is in charge now has been in charge eighteen months?—Yes.

104. And he does not understand the engine?—No, and never will; but he generally has one engine going like a lame duck. I consider they have saved the vessel when going over the bar through having one engine going.

105. What wages do you pay the mate of that vessel?—Some £8.

106. When the engine is not working does the driver do duty as a seaman and take his watch?—I suppose he does.

107. You know the prayer of the petition: What do you think the Committee should recommend?—I think they should recommend what is asked for, seeing that I drew up the petition.

108. You have heard the suggestions by the Chief Inspector of Machinery, as well as Mr. Glasgow, the Under-Secretary: Do you see any objection to them—that is to say, new regulations to come into force as from December next giving certificates to all drivers who are now in charge, and that in future all drivers should have certificates upon showing a knowledge of the engine and with shop-experience in the handling of tools? Do you see any objection to those proposals?—No, so long as the regulations do not apply to vessels of small tonnage.

109. Will you state the tonnage you think the regulations should apply to?—It is not so much the tonnage of the vessels as the size of the engines. In a vessel of small power you have no benefit with it.

110. What do you consider small?—Anything under twenty-horse power.

111. Would not the same danger arise with a vessel of twenty tons as with a larger one?—I have never heard of an oil-engine blowing up.

112. You have heard the Inspector say that there is as much danger of explosion in an oil-engine as in an ordinary steam-engine?—I did not understand him to say so. Certainly, so far as the engine is concerned it is the same, but an engine does not explode—it is the boiler, and we have no boiler, with an oil-engine.

113. The impression I have gathered is that there is the same amount of danger with oil-engines as with ordinary steam-engines, under certain conditions?—So far as I am aware, there is no danger. The only possible danger would be in the event of fire through the oil being stowed below, and that is arranged for by the department, which compels us to stow it below.

114. You say the only restriction should be as to the power in granting certificates to drivers?—Yes. We would not put small power into vessels now.

115. What power has the "Huia"?—Sixty, I think.

116. In the other vessels you have the power ranges from eight up to what?—Up to fifty. We have sold the "Toroa." She belonged to us until recently, and ran six months without a hitch.

117. About what speed was she?—Seven miles in smooth water.

118. *Mr. Crowther.*] How many hours would she run under sail, and how many under the power of the engine?—I am sure I could not say. I did not travel in the boat.

119. Still, you can gauge it in some sense by the consumption of oil?—We had nothing to do with that. Subritzky, who chartered the boat, will give you some particulars on the subject.

120. Supposing two vessels start from the same point and run to the same point, one under steam and the other under oil—say, of forty-horse power—can you give the Committee an approximate idea of the relative cost of that journey?—I have had no experience at all of steam in large vessels. I have a steam-launch, but I do not know the cost of running steam-vessels.

121. When you say that smaller vessels use too much expensive oil, what size do you designate as smaller vessels?—It is not so much the size. Any will run on benzine: I do not know any that will not. But naphtha is much easier vaporized on a cold morning, and with small launches they run better if they use naphtha; and some of the larger vessels, such as the "Toroa," have a little naphtha-tank for starting purposes.

122. Are you aware whether gas-engines are, or ever have been, built in Auckland?—Yes; there are two gas-engines in Campbell and Ehrenfried's, in Auckland, built by the Century Motor Company.

123. Is it not your opinion, essentially, that prior to a man being placed in charge of one of these engines—say, of forty-horse power—that he should have three years' shop-experience?—I would not say three years, but he should certainly have some reasonable mechanical knowledge. Some men will learn as much in one year as others in three. I think it is quite as much in the interest of the owners as any one else that we should have qualified men to go to sea. Our trouble is that we have to take unqualified men who have certificates, and have in addition to put men on board to operate the engines who have not certificates.

124. Do you think the cost of auxiliary power is four times greater than that of steam-engine?—I have had no experience.

125. Do you think the present Board of Examiners are competent to examine engineers or drivers of oil-engines?—I am sure they know very little about oil-engines, and are entirely incompetent to have anything to do with them at present. They are men who are thoroughly well up in their own work, and well able to do it.

126. Do you think it is necessary to set up other Examiners?—Yes.

127. *Mr. McLean.*] Why do you think the Examiners are incompetent to examine engineers so far as these oil-engines are concerned?—Because they have no knowledge of the engine, or only a very trifling knowledge, which they have picked up incidentally.

128. Do you not think that with their mechanical knowledge they could acquire this special knowledge?—Undoubtedly they could. It is only a very stupid error to suppose that a mechanic will not learn as easily as a man with no mechanical skill at all, but he requires to learn it. He cannot know without.

129. *The Chairman.*] If our present Examiners are not competent to examine candidates, who in the colony would you set up as Examiners?—I would appoint a competent Examiner.

130. Where would you get him?—Here he is. [Witness here indicated Mr. Henderson.]

131. *Mr. Duncan.*] What objection have you to the oil-tank being kept in the engine-room?—In case of fire you have no means of getting it away, whereas if you place it on deck, where it could be properly protected, you could take it right away if there was any danger.

132. *The Chairman.*] Do you know that the oil on the "Huia" was stored on deck?—I did not know that it was.

133. *Mr. Duncan.*] Are you not aware that fires occurred on oil-vessels where the oil was actually boiling?—I have heard so, but I was not there.

134. Does that not upset your objection to the tank being in the engine-room—that the oil was actually boiling and did not explode?—It is a very fortunate circumstance there was no leakage.

135. *The Chairman.*] Do you admit that the oil was boiling?—I do not know—it might be a fact; but the tanks did not give way. I know that as an absolute fact.

136. *Mr. Duncan.*] You infer, I suppose, that when the "Toroa" ran accurately for six months and broke down immediately on the first trip after she left your hands, that it was the fault of the engineer that she broke down?—I do not infer anything of the sort. There is the bare fact that she did run for six months under a man who had not a certificate, and then a man with a certificate took charge of her and she broke down.

137. Do you not think that the defect might have arisen through a fault in the material where the breakdown occurred?—I do not think it from the inquiry I have made on the subject.

138. In winter naphtha would be more largely used than benzine?—Only for starting purposes.

139. In cold climates they would use naphtha?—Only for starting.

140. What should be the qualification of an Examiner?—I should imagine he should know all about the construction of the engine, how to build and how to run it, and that he should ascertain if the men he was examining could practically run the engine.

141. Do you know anything about the construction of a steam-engine?—A little.

142. *The Chairman.*] To what extent?—We use engines in our mills, and have done so for a good many years, and I have a river certificate myself for steam.

143. *Mr. Duncan.*] With auxiliary oil-engines you have pumps, valves, piston-rods, admission- and exhaust-valves, the same as in a steam-engine, and you have a shaft-and-propeller reversing-gear?—Yes.

144. The only difference in the machinery is the dynamo?—But there is this difference, the power that operates it. The one is operated by gas that has to be manufactured as you go on. That is exploded by an electric spark. In very many instances the trouble is that with a battery there is some short circuit; and then again, when you start the engine, if the mixture is not right she will not work. All these things are quite different from steam, and a speck of dirt will stop an oil-engine.

145. Is it not liquid fuel?—Yes.

146. Naphtha and benzine?—Yes.

147. They must both be reduced to a gas or vaporized before they can be applied as power?—Yes.

148. Then where is the difference?—You have other things to consider.

149. Where have the present men who have permits gained their experience? Where did the first man who drove an auxiliary-powered vessel get his experience?—He simply got it on board the vessel. The first engine was a Priestman, which was put in the "Aotea."

150. Could he drive as well in the beginning as afterwards?—No, he made numerous mistakes.

151. *The Chairman.*] You say that marine engineers cannot drive these oil-engines?—Of course they can when they know how, but they have to learn how.

152. *Mr. Houston.*] Do you consider, as a shipbuilder, and one engaged in the industry for many years, that if any severe restrictions are placed on oil-engines they will, to a great extent, cripple the industry you are engaged in?—They certainly would.

153. At the present time most of your vessels are built for oil-engines?—We have built four this year for oil-engines.

154. Have you any orders on hand?—There are two just now, and two have been put off.

155. Do you think the restrictions would have the effect of crippling your industry as a shipbuilder?—I am quite sure of it.

156. How many hands do you employ?—Sixty just now.

157. Do you consider that the advent of the auxiliary oil-engines has been a great benefit to the settlers in the extreme north?—Very great benefit indeed.

158. Do you consider it has an advantage over the ordinary sailing-vessels that visited parts in the north where steamers could not go?—Undoubtedly. It has given them a steady run.

159. And do you consider the advent of the auxiliary engines on sailing-vessels has been the means of increasing settlement and making some of those settlements more prosperous than they were some years ago?—Well, it would appear so. It is difficult to say, because there are so many causes.

160. I mean, has not this been an auxiliary to the advancement of the settlements?—I can say there had been a large increase in trade since they came in.

161. *Mr. Carson.*] Do I understand you to say you think the time-service should not be opposed, because one man might learn more about oil-engines in one year than another man in three years?—Yes.

162. Following that up, do you think there should be a practical examination?—Yes. A man should prove that he has skill to use the tools, and engineering skill, before he is allowed to take charge.

163. In other words, you think it is not necessary that he should serve three years in a shop?—I think a man should know enough not to use a cold-chisel instead of a wrench.

164. *Mr. McLean.*] Do you know of any accidents that have happened to any of these oil-engines?—None, except with the fires. Nothing causing danger to life and limb.

165. No driving ashore or engines blowing up, or anything of that sort?—No.

166. *Mr. Glasgow.*] You said that the fifteen-horse power engine in the "Moana" was not sufficient?—Eighteen-horse power. The "Toroa" has fifty.

167. That would drive her at the rate of seven knots at hour?—No; seven miles an hour.

168. Does not that go beyond the idea of an auxiliary power?—That is only under favourable circumstances, in smooth waters.

169. But the tendency is to put larger engines into sailing-vessels?—Yes, as large as you can get them, but you are restricted inside by the room they occupy.

169A. You said they should be in charge of a man with some sort of a permit or certificate?—Yes. I certainly desire a certificate to be issued, so that when we pay a man we shall have some guarantee that he can do the work.

THURSDAY, 24TH AUGUST, 1899.

STATEMENT by Mr. T. M. LANE.

There are several points touched by Mr. Duncan to which I should like to call attention:—

(1.) "Injury to steamers by cutting freights." This is no more than the ordinary operation of the law of the survival of the fittest, and will soon adjust itself by the ruin of the oil-engine boats if they are, as stated, so very much more costly than steamers. In the meantime the public get the benefit of cheap freights.

(2.) "Vessels now running without inspection." The fact that numbers of boats fitted with oil-engines are now running without inspection proves that the present Inspectors are either unable to overtake the work or they realise that the inspection is unreasonable in the case of boats of small tonnage.

(3.) "Survey of auxiliary vessels." Under existing arrangements auxiliary vessels, whilst fully equipped as sailing ships, are surveyed as steamships and required to pay the same fees as steamers of the same tonnage, although they have not probably an eighth of the power, and not a third of the work for the Inspectors, as there is no boiler in the case of oil-engines. Moreover, they are required to carry their boats under davits and provide other equipment which is a hindrance to the efficient working of small sailing-vessels. Then, again, the Inspector demands that he shall sight the bottom, though he may have little or no knowledge of the construction of wooden ships. In the case of the "Aotea," now under inspection at Auckland, the Inspectors required that the shaft should be drawn for inspection, and to do this, the engine has been lifted clear out of the way, at great expense, notwithstanding the fact that when we applied to the Inspector before the engine was put in, we were told that there were no regulations applying to these engines, and that the authorities did not recognise them in any way.

(4.) "Tonnage-limit to free use." I am informed by Mr. Leitz, of Dunedin, who represents the Sintz Engine Company, that naphtha is delivered into the tanks on board the boats on the Eastern States of America at 5 cents a gallon; therefore it is reasonable to infer that most of the vessels will have full-power engines, and not be fully equipped as sailing-vessels, and the 15-tons limit would probably mean about 40 horse-power.

(5.) With reference to the question of wages paid to drivers of oil-engines, I may say that £8 is only paid on vessels of small power. The "Brothers," forty-horse power, pays £12, and the owners of the "Toroa" wired me in Auckland offering £15 for a competent man.

(6.) I contend that auxiliary vessels, whether oil or steam is used, should be subject to regulations suitable to that class of ship, and not be required to conform to the laws made for full-power ships, because the auxiliaries are fully equipped, apart from their engines altogether.

FRANK HENDERSON, Mechanical Engineer, Auckland, examined.

170. *The Chairman.*] How long have you been in Auckland?—About four years.

171. And you came from?—England.

172. Did you serve your time in England as a mechanical engineer?—Yes, at William Collyer's, Manchester.

173. How long were you working there?—First I was an apprentice.

174. How many years were you an apprentice?—Five.

175. Did you work there afterwards?—Yes, for about two years afterwards.

176. And then you came on to New Zealand?—I was in England for some time practising as a consulting engineer, and made a particular study of gas- and oil-engines.

177. Did you carry on business on your own account or as an assistant to a firm?—On my own account.

178. For how many years?—Practically up to the time I left England.

179. What number of years were you at Home after leaving the firm?—About ten or eleven years.

180. Practising as a consulting engineer?—Yes.

181. Then you came to New Zealand?—On account of my health.

182. Did you take up your abode in Auckland?—First in the Waikato, where I took up a farm; but, having regained my health, I went on to Auckland. My wife and I both have private means, and it did not matter what we did. I have no business at the present time.

183. Have you been connected with any of the factories in Auckland?—Yes, with the Century Motor Power and Traction Company. I had a five years' engagement, but owing to a difference between the syndicate and the promoters concerned the business was determined.

184. How long ago?—July, 1898.

185. And you made an agreement for five years?—Yes.

186. Had you been employed in the construction of any machinery as consulting engineer in Auckland?—No, that was the first.

187. For how long did you act as mechanical engineer?—As near as I can say, about fifteen months.

188. During those fifteen months what was done in the factory?—We designed a ten-horse power marine engine, a four-horse power double-cylinder engine, a three-horse power marine engine, a fifteen-horse power gas-engine, a six-horse power gas- and oil-engine, a one-horse power marine engine. I think that is about all.

189. Did you also build all those engines you have spoken of?—We constructed them all from my designs.

190. And are they all now in use?—Yes. We built three of the ten-horse power marine type which were put out in my time, but they were only just finished when I cancelled my engagement.

191. Then it follows that you are conversant with the marine engine as well as the oil- and gas-engines?—Yes. I have designed every class of gas- and oil-engine.

192. Have the marine engines you turned out worked satisfactorily?—Yes. I may say very satisfactorily.

193. And the gas-engines?—Yes, they have been working ever since they were put in. There have been no complaints.

194. And the oil-engines?—They have done the same.

195. Have you not designed any marine steam-engines?—No, all oil- and gas-engines. While I do know something of steam-engines, yet I made a special study of gas- and oil-engines; and not only by reading, but by actual practice. I have an experimental shop, and always have had, for conducting experiments for my own special benefit and knowledge. That is in Auckland at the present time. I use it for my own amusement. I have three engines which are in constant use, all built by myself.

196. Have you ever constructed any steam-engines?—No.

197. Although you know all the mechanical parts and the principle on which they work?—Yes.

198. After leaving the company which you were employed by in Auckland, have you done anything since for the last nine months?—No, except conduct experiments.

199. In connection with the oil-engines?—Yes, entirely, and electrical machines.

200. Have you fitted up any vessels with the engines you have constructed?—Yes.

201. And put them in the vessels?—Yes.

202. Personally superintended the work?—Yes. I can give you the names of the ships. There is the "Norseman," Mr. Bluck's launch.

203. Is that a naphtha boat?—Naphtha or benzine. There is the "Lemuria," my own launch, and the "Speedwell," a trading boat.

204. What is the tonnage—the burden?—I suppose, about six tons.

205. Have you put engines into any of the trading schooners?—No.

206. Not in what we call sea-going vessels?—No. The trouble was that we had a very small plant, which was totally unsuitable for the class of work we were endeavouring to put out. For the same reason we did not get the two orders for engines for the Northern Steamship Company, for the "Waiomana."

207. A vessel of what size?—About 100 tons. We were asked by the Northern Steam-ship Company to give a quotation for two engines of thirty-five horse-power, and they gave us the specifica-

tion right through. We had to consider the question, and it was found to be impossible with the plant we had to construct those engines. One of the directors and myself went down to see Messrs. Ransom and Gow, the manager and superintendent of the Northern Steam-ship Company, and pointed out that we could not build the engines owing to the size wanted. They were perfectly satisfied with the work that we could do. I had also information from Captain Anderson, a neighbour of mine, who said that if we could have built the engines we should have got the order, but it was purely because we had not got the plant to do the work that we did not get it. Mr. Gow is very favourably disposed towards our engines.

208. Coming to the drivers, in your experience what training do you think a man should have in order to drive an oil-engine?—Preferably, a man should have shop-experience of some years—very preferably, because it is better to have the engine in the hands of a man who knows how to build it and put it together. Otherwise, it is simply a matter of showing the man how to work it, and a certain amount of experience.

209. How should that be estimated?—Probably it might be estimated by examination.

210. Who should conduct that examination? Should it be, say, Mr. Glasgow, the Under-Secretary of the Marine Department, or any of the present Inspectors?—Of course, I do not know what Mr. Glasgow's qualifications are as a mechanical man.

211. We will assume that Mr. Glasgow has not any more knowledge of mechanics than myself or probably some other member of the Committee?—In that case it must necessarily fall to some one who has a knowledge of mechanics.

212. From your knowledge, have the Marine Inspectors, such as Mr. Duncan and his assistants, the necessary knowledge?—From all mechanical points I should say, yes, decidedly. Mr. Duncan knows I have no animosity towards him. The whole crux of the difficulty is in the manipulation of the oil-engine, which is so totally different to the running of a steam-engine that, unless one has had very considerable experience in the running of it, it is very difficult. There is a difficulty, even with a thoroughly-qualified man, in dealing with it.

213. We have got down probably to the crux of the whole thing—namely, whether the present Examiners or some other Examiners should be appointed?—I have no hesitation in saying that if I could have a few minutes' chat with Mr. Duncan he would be quite able to deal with the question. No matter how excellent a man may be, unless he has had experience with oil-engines, a little tuition would be necessary. It is not that I have any feeling towards Mr. Duncan, because, as far as I am personally concerned, nothing would give me greater pleasure than to assist him or any one the Government chose to appoint, either in formulating the examination or giving information, providing it was not used against myself. At the present time I have been made the managing director and engineer of a small company, established for the purpose of building gas- and oil-engines in Auckland, and we have sent Home for the tools for this special work. That is why I made the remark that I would give every information so long as it was not used against myself.

214. Did you design or assist in building any of this class of engine in the Old Country?—Yes.

215. So that, in addition to your theoretical knowledge before you came to New Zealand, you had practical experience?—Yes. For the last fifteen years I have been constantly building engines and also for experimental purposes of my own.

216. Coming back to the drivers, you say you think they should have some shop-experience?—I say very preferably so. I do not think it is absolutely necessary, because you can very often find men who are quite as handy in taking up a pair of brasses, or looking after a pump, without having had this experience, but I say very preferably the man who has served in a shop is better. We find that some men who have five years in a shop are not worth so much as some who have only had a year's experience.

217. Supposing you were an Examiner, and you found a driver who had had some knowledge of tools and shop-experience, do you think he would require to have a special knowledge of these engines before you would give him charge of a sea-going vessel having an oil-engine on board?—He would have to satisfy me that he could run the engine satisfactorily, and further than that, for examination purposes parts of the engine should be purposely made wrong, so that you could say to him, "Tell me what is wrong with the engine at once." There are many trivial matters about an engine, and if he could put these things right, you would know that he would not be likely to be stuck up with anything of a trivial nature at sea. So far as an explosion is concerned, that is almost impossible. We have no boiler, and the oil-engine and gas-engine are practically one and the same thing. I believe there are four hundred gas-engines in Auckland, and any one can run them without any examination at all, if he has got into the run of things. With small-power engines it is not necessary there should be any restriction, but with the larger vessels it is only right there should be an examination, but I think the examination should be made in accordance with the laws governing these matters. There is a natural law which governs these engines that cannot be departed from. There is the law which governs the explosive power of gas, which must be mixed with a certain quantity of air. If you take a charge of four parts to one of gas, the mixture is practically explosive, but with two parts to one it will not explode at all. It is not like steam, you cannot get above a certain pressure. There is a definite range in the explosive power of gas up to which you can work your engine. The best mixture is about ten parts of air to one of gas; so you see there is a natural law which you cannot get away from, and which practically disposes of the idea of explosion. That is a very strong point in the favour of oil-engines generally. I had the pleasure of showing Mr. Hall-Jones, the Minister of Marine, that by giving the engine too much gas it simply stopped. If you take too little gas the engine also stops, and that is a natural safety-valve which makes these engines particularly safe.

218. You heard the answer Mr. Duncan gave in reference to the danger by explosion on

board these oil-boats: is there the same danger with oil-engines as with an ordinary steam-engine with a boiler?—Absolutely not.

219. Could there be any explosion?—It is very improbable. Supposing you had the oil-tank leaking, that would be the same as if you let your gas on in a room.

220. That would have nothing to do with the engine?—Nothing; so far as the engine goes, it is entirely different.

221. That would be negligence?—Entirely so.

222. You say there is a company or syndicate in existence in Auckland to construct engines on a large scale?—We, Frank Henderson and Co. (Limited), cannot manufacture on a large scale, because it is a question of capital at present.

223. But you have it in contemplation?—Quite so.

224. And then you will be able to compete with America?—Yes; both as regards price and workmanship.

225. *Mr. Lawry.*] I was going to put a lot of questions myself, Mr. Chairman, but you have anticipated them, and put them in so much nicer than I could.

226. *Mr. Symes* (to witness).] Can these vessels be fitted up cheaper with oil-engines than with ordinary steam-engines?—For small power I think the oil-engine would be the cheaper.

227. *Mr. Lawry.*] Do you think it necessary for a qualified marine engineer to be employed to drive one of these oil-engines?—No.

228. With regard to the new boat the Northern Steamship Company built, would they be quite satisfied to have taken one of the oil-engines if you could have got sufficient power to drive her?—Yes, that is one of the things Captain Anderson told me.

229. And he is one of the directors?—Yes.

230. Was that the boat in which they afterwards put a steam-engine?—Yes.

231. And if you had been in possession of the necessary machinery to build an engine of sufficient power, it is very probable that she would have been driven by an oil-engine?—Most probably. I was satisfied myself from the private information I had that it was absolutely certain we should have got the order.

232. In your remarks with regard to the Examiners, you did not wish to pass any reflection on the Marine Department?—That was furthest from my mind.

233. What you meant was that the examinations should not be conducted in a perfunctory manner, but that a man should be a thoroughly practical engineer so far as the oil-engines are concerned?—Yes.

234. Before giving the certificate, you would have to be perfectly satisfied that the man was qualified to do the work?—Yes.

235. Do we understand you to say that the test would be to throw some parts of the oil-engine out of gear?—I would not remove, but would displace some of them.

236. And it would be an important matter with you to see that the man could put them together again?—Yes, within a certain time.

237. Could a thoroughly competent marine engineer, unacquainted with an oil-engine, do that?—No, not unless he had made a study of the oil-engine.

238. Then the two branches are separate and distinct?—Yes, beyond the ordinary question of cylinders and so on. There are other technicalities which a man who has only studied a steam-engine cannot understand. He must have had a particular experience in these things. I have had an instance where the chief engineers of very large steam-ships were completely nonplussed until they had had some practical illustration given to them. When they grasp the theoretical part of the question they become as proficient as anybody else.

239. I think you have made it quite clear to the Committee that oil-engines are infinitely less dangerous than steam-engines?—That is so.

240. Do you think it is necessary for a man to serve three years in shop-work?—I say it is very preferable to have a man who has served some time in a shop, but not for these little pleasure-boats going round the harbour. For engines above twenty-horse power it would be better.

241. Three years' probation seems a very long time: could there be some preliminary examination? If a boy or a man had been two years in a workshop, and said he was qualified to pass an examination, do you think there would be anything wrong in allowing him to pass a preliminary instead of a final examination?—I do not think there would be any harm in that.

242. All you would require is competency?—That is it.

243. Would you like all examinations to be competitive, supposing there were five applicants to fill three situations?—That all depends upon the law of supply and demand.

244. *Mr. McLean.*] You said there were some hundreds of engines working in Auckland?—Gas-engines for stationary purposes. I pointed out that these marine-engines and gas-engines, as far as the engines themselves are concerned, are exactly the same. There is the same cycle, the same ignition, the same explosion, and the same exhaust.

245. And in handling them, one is practically the same as the other?—Yes.

246. If there is no examination needed in the one case, what necessity is there for an examination in the other?—Of course, I cannot see that.

247. *The Chairman.*] If an accident occurred to a gas-engine in Auckland, or in any place on shore, mechanics would be called in to repair the broken pieces, but a man inexperienced with tools would not be able to do it?—If a man broke his crank-shaft at sea, the repairs could not very well be carried out.

248. But for minor repairs, if a man understood the use of tools he could use them?—Yes.

249. *Mr. McLean.*] Which class of engines is most likely to go wrong—a marine oil-engine or a steam-engine, giving equally good handling in each case?—One is practically the same as the other.

250. How many years have they been in existence for marine purposes?—About fifteen years. It was further back than that when the first engine was made; but they have been in general operation about fifteen years. Priestman started them.

251. *Mr. Lawry.*] In his report Mr. Duncan stated that the engines were mostly very costly, in consequence of having to import them from America. I would like you to make it quite clear that, if you had the proper appliances here, you could make these oil-engines to compete against America and the world?—I did so when I was with the Century Motor-power and Traction Company, and the tools we had were totally inadequate for turning out the work rapidly and well.

252. If you had the appliances in New Zealand you could compete against the world?—I have no hesitation in saying Yes.

253. *Mr. Duncan.*] About that vessel built for the Whakatane trade by the Northern Steamship Company: what power did they want?—They asked for two 35-horse-power engines with twin screws.

254. You say the biggest marine engine you built in your shop was of fifteen-horse power, and some one has told us that they are building twenty-five-horse-power engines at present. How do they manage that with the plant they have now?—The fifteen-horse-power engine built for Mr. Chamberlain would give them over eighteen-horse power by enlarging the cylinders, and with the same stroke these engines could be made to give twenty-five-horse power; but, seeing that I have nothing whatever to do with the business, I am not prepared to say how they are going to do it.

255. You say you have had seven years' experience in Collier's shop in Manchester?—Yes.

256. What class of work did they generally turn out?—They are principally toolmakers, but made engines for their own use.

257. You were for ten years a consulting engineer for gas- and oil-engines?—Yes.

258. With any special maker?—Wells Brothers, of Nottingham.

259. And you had two years' experience with the Century Motor Company, of Auckland?—Yes.

260. Have you ever been at sea?—Not as an engineer.

261. Do you not think an Examiner of Certificates should have sea-going experience?—Preferably, I should say, Yes; but there is a considerable difference in the two classes of engines.

262. There are many things that might go wrong outside the working of an engine that could be referred to by an Examiner if he had been at sea?—That would necessarily follow.

263. The propeller-shaft, heated bearings, and various parts that may go wrong, and, if a landsman were an Examiner, his experience would be very small as compared with an Examiner of sea-going experience?—I say preferably he should have sea-going experience, but it does not necessarily follow that he should have been in a big ship at sea.

264. You say you are conversant with both steam- and oil-engines, and the principles which govern both?—Yes; but I do not profess to be a steam-engine engineer. I profess to be a gas- and oil-engine engineer.

265. Both have cylinders?—Yes.

266. Both have pistons?—Yes.

267. Both have connecting-rods?—Yes.

268. Both have emission- and exhaust-valves?—Yes.

269. Both have reversing gear for driving the engine ahead and astern?—Yes.

270. Both have crank- and propeller-shafts, and both have sea-cocks and pumps?—Yes. You put all that down; but you also have a boiler, which I have not. You also have steam-cocks, which I have not. There is a boiler in the one case and not in the other.

271. Have you ever read recently of an explosion to a boiler that disabled the vessel in New Zealand?—No.

272. In my experience ranging over fifteen years, and ten years as Surveyor, I have not known of a boiler sticking up the vessel at sea.—That may be so.

273. So that a boiler is a very safe article on board a ship in good hands?—I say these boilers in New Zealand are in good hands, and are watched very closely, but the general question is not affected by that, because we know there are boiler-explosions all over the world.

274. I was only drawing the comparison to show that these things were mutual in both classes of engines?—Yes, so far as the engine itself goes, but when it comes to a question of supervision, you have a boiler which requires infinitely more attention than my engine.

275. The Board of Trade Surveyors have only to do with the safety of passengers' lives at sea, and I have never known of an accident to a marine boiler in New Zealand in the last ten years.—I do not doubt that at all.

276. Are you aware that in some vessels running in New Zealand at the present time, they have electricity fitted throughout for lighting-purposes and for driving fans?—Yes.

277. And for other purposes—cleaning boots, and so on?—Yes.

278. How is that electricity generated?—By a dynamo.

279. Who is in charge of that machinery?—The mechanical engineer.

280. Are you aware that Examiners, who are also Surveyors, have to examine and survey all this machinery?—I was not aware of it. I should like to point out that the man who is required to take charge of an electrical plant, such as that on board the "Rotoiti,"—and a very good plant, too—has totally different duties to those required in the manipulation of a dynamo for sparking an oil-engine. An amateur or boy could look after a dynamo to spark an oil-engine, but he would be totally unfit to take charge of the "Rotoiti" plant. In our case ten volts and two amperes is quite as much as is required, and any boy in a mechanic's workshop with ordinary intelligence will build you a dynamo to do that.

281. I was asked if I knew anything about electricity, and I want to point out to you and the Committee the fallacy of thinking that we are not capable of becoming Examiners of drivers for

oil-engines.—Do not question me as to your ability. My explanation was perfectly clear, as given to the Chairman some little time ago. (See 213.)

282. There is nothing very special about a Sampson battery?—No; but that is not in use except for certain purposes. There are a good many other batteries coming into operation.

283. What would you think should be the knowledge an Examiner should have for examining marine engineers to take charge of auxiliary-powered vessels?—In the first place, he should be a thorough mechanical engineer, and in the second place he should have every knowledge with regard to the repairs and alterations required for engines that are in use; and then he should have a thorough knowledge of all the little technicalities and difficulties that arise in running an engine, and a thorough theoretical knowledge of the gas- or oil-engine.

284. *The Chairman.*] There are two things the Committee and the House will require to know: firstly, are the present Inspectors in Auckland capable of examining candidates to drive these oil-engines; secondly, what experience should the driver have?

285. *Mr Duncan.*] Mr. Henderson has already said that he is a practical engineer, and that Examiners should have sea-experience, preferably. Well, both these qualifications are possessed by the present Examiners. Then he also says they should have shop-experience?—Preferably so.

286. What limit would you put on the shop-experience?—The lowest experience, I think, should be two years.

287. As the vessels increase in power do you not think the men should have more than two years' shop-experience—say for 200-horse-power?—It will be some little time before 200-horse-power engines will be used.

288. Is it not a fact that the firm Mr. Lane represents build engines up to 200-horse power? Their catalogue says 200-horse power?—I think they do, but I have not seen one.

289. Do you think a boy in the first year, or, say, the second year, would be able to take charge of a 200-horse-power engine?—We do not have 200-horse-power engines.

290. Do you think three years would be a small enough limit for a man who has to run a passenger-carrying vessel?—If you are going to have 200-horse-power engines, and to carry passengers, I say you should certainly have a man with three years' experience; but there must be some difference between those and the little boats.

291. *The Chairman.*] The primary point is the Examiner: Are the Inspectors in Auckland capable of examining candidates?—They are quite capable of examining applicants, providing they have some little further experience conveyed to them with regard to the technicalities of an oil-engine.

292. You put in the word "providing"?—It would be difficult for me to say whether they knew all the technical points. If I said to them, "Start my engine and run me up Pine Island and back again," I should very soon know.

293. You are aware that the Examiners appointed by the Board of Trade have sea-going experience, and also in America?—Yes, I do not doubt that at all.

294. If I enumerate eight or ten little things that might stop an engine, you could tell the Committee then pretty well all that might go wrong: suppose the supply of oil was choked in the pipe, would it stop the engine?—Yes, if it was choked. If it was only partially choked you could still run the engine.

295. The valves in an oil-engine are similar to those in a steam-engine, and if what you call electrodes did not fire off at the exact time, that might stop the engine?—No, firing late would not stop the engine.

296. Would too little or too much air stop the engine?—Yes.

297. Would a weak battery or too small a spark stop the engine?—Are we to suppose that the engine is supplied with a dynamo? If so, if you had a loose connection, probably, it is possible you might be able to start, and may not. It is a question of degree.

298. Assume that the cylinder was hot and the water-jacket was not properly supplied, would that stop the engine working?—Not for some considerable time. It depends upon how it was placed. Some engines are built without water-jackets.

299. Would pre-ignition stop the engine?—It might or might not. It is not often that happens. No properly-designed engine will preignite.

300. You say that by an adjustment of the electrodes or firing-gear, that would not stop an engine?—If she was firing late it would not stop her, but it will take off the power.

301. Would excessive lubricating-oil stop an engine?—Not unless you filled the cylinder.

302. Will a deposit of carbon stop it?—It depends upon the class of electrode.

303. There are many other points, but these are the principal which would stop an engine. These are not minor points but points that might crop up at any time?—I think some are very doubtful. You are asking me whether these things would stop an engine, and these could only occur through the total incompetency of the man looking after the engine. To get an excessive amount of lubricating-oil in the cylinder you would have to get an oil-can and pour the oil in at the top. You cannot get it through otherwise.

304. Do you think an ordinary driver without mechanical experience could adjust all these electrodes and the other details I have mentioned?—Yes; I have seen that done.

305. *Mr. McLean.*] Are you aware that some of the certificated engineers were not capable of working these engines?—I know of two very distinct instances personally.

306. Engineers of steamers?—Yes. I know of two distinct cases in which the men held the highest certificates, and in both cases they were totally nonplussed.

307. And the chief or second engineers holding sea-going certificates?—Yes. Until they had gained the information which is necessary for men to run these oil-engines, they were just at sea.

308. Were these two engineers at the time on sea-going vessels?—One was, and the other was appointed to take charge of an oil-engine.

309. *Mr. Duncan.*] Where did these first drivers get their experience?—I think I was one of the first drivers in New Zealand.

310. We will leave you out of the question.—They gained their experience by having the engine to work, and by finding out the difficulties they had to contend with. The point is this, if a man has to run an oil-engine he must know all these various technicalities, and then he can do it.

311. Do you know that the Marine Department allows an engineer to go on board, and that the owners will accept this man's services with a certificate?

312. If you took a man out of one of the very small boats in Auckland, and put him on board the "Monowai," he would be nonplussed for a long time, and yet the Board of Trade, although he cannot start the freezer or hydraulic plant and similar machinery, allows him to go on board as an engineer. Do you not think there is as much gear connected with freezing-machinery as there is with an oil-engine? The same applies to a triple-expansion or compound engine driving dynamos; there is as much complication with that machinery as there is about an oil-engine?—Oh, yes.

313. And quite as much gear in an hydraulic plant for steering and hoisting as in an oil-engine?—Yes.

314. And yet they would take a man out of a small vessel in Auckland, and the owner would allow him to go on board a large vessel to work this machinery?—I do not know as to that.

315. *The Chairman.*] Is it possible that an engineer who is able to go on board the "Monowai" and be certificated by the Marine Department would be incapable of examining drivers for oil-engines?—Yes, he could not do it. For instance, take any ordinary chief off the steamers, providing that he had not made a study of an oil-engine, I would put him on my launch, and he would not be able to work it; but it would take him a very little time to do it if I was there to tell him what to do, and to give him the theoretical information. He would then be able to do it in a jiffy.

316. *Mr. Duncan.*] In twenty-four hours?—Yes. But if I was not there to give him some tuition he would not be able to do it.

317. Do you know that the man who drove the "Mavis" had no experience, and could drive it all right?—I do not know of it.

318. Did you teach the man who drives that vessel?—No, but I presume he had tuition.

319. *The Chairman.*] Do you know the "Medora"?—Yes.

320. Do you know whether an advertisement was put in some of the Auckland papers for a certificated engineer?—Yes.

321. Do you know whether there were any applications sent in?—I believe none—that is to say, the advertisement I believe you refer to was in regard to the starting of the engine in a limited time.

322. Are you aware whether any engineers applied for the position of engineer on that boat?—I believe they did, but it is only what I have heard. It did not interest me particularly at all. In fact, it is an outside question that does not concern me very much, beyond that I would like to see the matter settled with regard to the small boats, and for a suitable examination for the others.

323. Will you explain what you mean by small boats?—Boats carrying engines up to twenty-horse power. I am strongly of opinion that those boats should be exempt.

324. Would that be irrespective of whether they were within river-limits or sea-going vessels? Of course, within river-limits they could get shore assistance.—I think it would be necessary to qualify shore-limits to a certain size, and say that it was not necessary on a twenty-horse-power boat to carry a certificated man.

325. You agree with Mr. Lane that a man should have some technical knowledge?—Precisely. I am in no way averse to engineers.

326. *Mr. Carson.*] What would you consider a satisfactory examination?—In the first place, a man should show that he is capable of using tools, and should, preferably, have had a certain amount of shop-experience. He should be able to satisfy the Examiner by a written examination and a verbal examination as well, and be able practically to illustrate his capability of doing the work if anything went wrong.

327. Would you specify any period of shop-experience, or specify that he should demonstrate his knowledge?—I think, in some cases for the smaller boats, two years' shop-experience would be any amount.

328. That is for the work he would have to do?—Yes; but I think there would be a difficulty in finding men in the shops to do the work. I doubt if any young fellow who has opportunities would go for £8 a month.

329. I understand that an engineer would qualify himself quicker than anybody else?—That is a foregone conclusion. For locomotive-driving a man who comes from the plough is best, for the simple reason that his work is very difficult to do, and he has to have a great deal of pluck to do it. If a man knows all the little technicalities of an engine he drives it very carefully, as he wonders if the tires, &c., are all right. An educated man is generally the worst driver, because he knows too much. As a rule the locomotive superintendent engineers in the Old Country express the opinion that the best driver is the man who comes from the plough-shafts; so that it does not follow that the best qualified man here would make the best driver.

330. *Mr. Lethbridge.*] I take it that if it is a sea-going vessel, you want a mechanical man; but for an ordinary launch you consider there is no necessity?—No, up to twenty-horse power. When you get larger powers the owners will look after their own interests—it is so entirely opposed to self-interest that a boy should be put in charge of engines which are worth £600 or £800 apiece.

331. *Mr. Lane* (to Mr. Duncan).] What do you mean by stopping an engine?—I meant in the general way that I put it.

Mr. Henderson: You want to go very much further into details on a question of this kind.

ALFRED HARRIS, examined.

332. *The Chairman.*] What are you?—Owner of the "Toroa."

333. Where do you reside?—In Wanganui.

334. How long have you owned the vessel?—About two months now.

335. Are you a mariner or mechanic?—I am not a full-fledged engineer, but have been connected with all kinds of machinery about thirty years.

336. At Home?—Home and here. I have not been running marine engines, but could run a dozen machines that a marine engineer could not run.

337. Where were you employed at Home?—I was working for my father in Somersetshire.

338. On what kinds of machinery?—All kinds. On a steam ploughing plant.

339. Your father was a manufacturer of them?—No; he used to own them.

340. You have driven that class of machinery at Home?—Yes.

341. How long have you been in New Zealand?—Twenty-three years now.

342. Have you been engaged in work in machinery since you have been here?—Yes, in flax-mills. I have had charge of five flax-mills for Messrs. Johnston and Co. and my own. I have worked eleven steam-engines. I was the charterer of the first oil-engine, the "Moana." I chartered her when she first had the engine put in.

343. How long is that ago?—Three years. Seven years before that I had a Priestman oil-engine. We had a difficulty in working that, and I found that mechanical appliances of oil-engines were quite different from steam.

344. Three years ago you chartered this "Moana" from Mr. Lane?—Yes.

345. Had it an oil-engine?—Yes.

346. Did you go with the vessel?—No, the Marine Department stepped in and put a difficulty in the way of our working it.

347. Did you get over that difficulty?—Yes, by throwing up the charter of the boat.

348. How long did you hold the charter?—We had the vessel four months.

349. Did you use the engine during that four months?—Yes, as well as we were able to.

350. Who drove it?—The man is in Greymouth now.

351. Who is he?—A seaman, but not a certificated man.

352. Did he drive the engine?—Yes, better than any other man that worked her.

353. Did any other man try to drive her?—No, not in my time, because when we had the difficulty with the department we threw up the sponge.

354. Do you know her speed?—About four knots. It was only about eighteen-horse power in a vessel about 100 tons. Eighteen-horse oil-power in an oil-engine is only about one-fifth of steam high pressure.

355. Did you have any accident during the time you had the contract?—No, I did not know she was a Priestman until we got her down. She is very much more complicated than the other makers.

356. What experience have you had with oil-engines?—I have been watching them carefully by studying and manipulating different makers. I consulted the late Chief Inspector of Machinery, Mr. Mowat, shortly before he died, as I wished to have some motor power, and I asked him if he could advise me.

357. What did you do as the result of your seeing him?—I waited for developments, and got the "Gerty," steamer.

358. Then what did you do?—I went to Auckland and saw the oil-engines that were working there, and found them working like a piece of clockwork, and not refusing duty. There was a man there who had charge of the "Toroa" for about six months, and I questioned him quietly, and he said there was never a hitch.

359. How long have you had the "Toroa"?—Two months.

360. Have you been on board when she has been at sea, or only when she gets into the harbour?—When she gets into the harbour. I went round with her to see how she acted in Auckland Harbour.

361. What speed had she?—About seven or eight miles.

362. How long were you on board?—Just in the afternoon.

363. Who drove her?—A. Subritzsky. I applied to the department to allow me to put a man on board who was experienced in oil-engines. I presented two—one who had had nineteen months' charge of oil-engines, and the other only nine months. The man with the nineteen months' experience I found, in going to Auckland to get the proper qualification or references from the original owners, that they refused to give these references. Some of these owners were n a fix themselves. Donald and Edenborough wanted a man to go down to the Islands, and the department would not give him the license. Then I advertised for a marine-certificated man with an experience in oil-engines.

364. Did you get any applications?—Yes.

365. How many.—Some five.

366. Did you accept one of the five?—Yes; but when I put a question to each of the five they all replied that they had never driven oil-engines.

367. You selected one?—Yes. I employed him because he had high-class references, and a varied experience of machinery.

368. How long did he remain on the vessel?—We sent him to Kaipara, and he promised to take a man with him that was not a certificated engineer, to show him how to work the engine,

and, at the last moment, Donald and Edenborough took this man. The man I selected went to Kaipara and took charge of the vessel. Then I wired to Mr. Lane, and, as a result, he sent his son down from Whangaroa to show the certificated engineer (Lisle) how to start the engines.

369. Was it a condition-precedent to his taking charge that some one should tell him how to work the engine?—Yes. He said, "I must have my full £14 a month, because I am a Union man"; and, as a contra, he agreed to take this man Spry for a month.

370. The Auckland firm wanted to take Spry down to the Island?—Yes.

371. And you went to Lane and told him the difficulty, and he sent his son down?—Yes, and he was a week with him.

372. After that, did the vessel leave Kaipara?—Yes.

373. Where was she bound for from Kaipara?—Wellington.

374. Do you know how long she was on the passage?—About four days.

375. Did she arrive in Wellington?—Yes.

376. Where did you go from here?—To Greymouth.

377. With the same engineer on board?—Yes. When he came here the engine was broken down. He did not wire me, but I found the engine was broken down. He had broken the reversing-gear in trying to reverse her. I maintain he broke the engine from inexperience.

378. Did you question the engineer yourself?—Yes.

379. What did you ask him?—I asked him how he did it, and he said he did not know.

380. Who repaired it?—It was repaired at Luke's foundry.

381. How long was it away?—About three weeks, but he could not work her then. I instructed him to warm up the engine, and he could only get the engine to work but once in three days at the wharf. Mr. McGregor went on board to see if the engine would work, and put the question to the engineer, "Are these engines perfect?" and he replied, "Yes, as perfect as when it was made, as far as I know," and Mr. McGregor said, "Why can't you start them?" and he said, "I do not know." He thought the parts made by Luke's people were not made accurately, but they were made as well as they could make them here with the appliances they had. He suggested to me and the captain that the ship should proceed to sea as a sailer, and be put before the wind to drag the propeller, and the propeller would drive the engine, and so assist him to start her by making her own compressions. When they went to sea they put the ship before the wind for three hours, but he could not start the engine then. Then she arrived at Greymouth, and the boat was off Greymouth with her engines not having been used since leaving Wellington. He said she had broken down, which was an untruth. I got a wire to that effect, but the engines were as when she left here. She was towed into Greymouth.

383. Did you go to Greymouth?—No.

384. What happened there?—I wired down and discharged the engineer. She is running to-day with her engines useless for the want of a driver.

385. The engines have not been used since?—No. She is lying at Wanganui to-day because there is not an engineer to drive the engines procurable.

386. Have you at any time got what the department call incompetent competent to see if the engines will go?—Yes.

387. And will they go?—Yes.

388. You say you know all about its construction: have you tried it yourself?—No, but when I go back I will.

389. She went to Kaipara?—Yes.

390. Was she sailed from Greymouth to Wanganui?—Yes, under sail, but she was towed into Wanganui.

391. Was she towed out of Wanganui?—No, she is lying in Wanganui now.

392. Have these engines been used at sea since they were put on board here after the repairs, and, if so, were they driven by some person whom the department would call an incompetent man?—No.

393. Is it not possible that there might be something wrong in the parts through them being put together in an improper way?—I am prepared to challenge any one on that point. This man could not start them.

394. Could not Mr. Duncan start them?—I do not think so. It may seem absurd that marine engineers fail to work oil-engines, but there are many adjustments in the working of oil-engines, and the atmosphere has to be taken into consideration as to the proportion of hot and cold air. As a matter of fact, different engines have a different proportion of air, and the makers of the engine do not put on a gauge as regards the adjustments.

395. You say that Mr. Duncan could not work it?—I do not think so.

396. Could Mr. Henderson?—I do not know, but it sounds as if he could. In each case where vessels have got into a disaster, they have been in charge of a certificated marine engineer. I think there is no doubt that, if they were to make themselves acquainted with the oil-engines they would naturally command employment by the owners, but they seem to enter upon the position with a prejudice on oil-engines. Two of the members of the Institute have told me that they would not take charge of oil-engines without further experience, and that the position has brought contempt on them as members. The manipulation of an oil-engine is totally different from that of steam.

397. Are there any other points you wish to refer to?—With regard to the present position, the secretary of the Marine Institute informed me that he had a hand in drafting the conditions, and we have to thank him for having to employ certificated men. A man should be qualified if he is competent without being twelve months in charge of oil-engines.

398. You do not know how many permits have been issued to men to drive?—I cannot say. We have advertised and offered tempting wages, but it is not enough for your marine engineer. Men get £10 a month, and I have offered £15.

399. Is that in addition to their food?—Yes; and they are only asked to work when the engines are going. They are not grafting all the time.

400. *Mr. Duncan.*] About the "Toroa"—what carried away and disabled the machinery?—The reversing-gear for going astern. It did not carry away for going ahead.

401. What is it made of?—Cast steel; the centre and outer planet and small pinions of gun-metal.

402. Were you satisfied that they made a good job of the repairs?—Yes, except that they were not accurately cut.

403. There is no machinery for cutting teeth, as far as I know, in Wellington?—I think not. I wired all over the colony to get it, and I have had to cable to America.

404. Did you not apply to the Marine Department for leave to go out as a sailing vessel, because the reversing-gear was not quite finished and you wanted to get away?—No, we claimed to have the ship cleared because we were not dependent on the engines for motive-power, but there was an objection lodged.

405. Was the application granted?—I do not know. We waited from Saturday to the Tuesday, and were going from one to the other in the department. The ultimate result was that we had a letter sent on board to proceed to sea.

406. *Mr. Duncan.*] Was not the machinery under repair up to the night of your going to sea?—Absolutely not. The machinery was repaired, and we were there three days trying to get her to work.

407. Have you not told us already that you did not think she had been properly repaired?—I do not think so. Mr. McGregor will confirm me in the fact that the marine engineer in charge answered in reply to him that the engines were as perfect as the day they were made.

408. Have you not told us already this morning that you were conversant with the working of oil-engines?

409. And you also told the Committee that when you went back to Wanganui you would try them?—Yes.

410. Why did you not try them before?—When I attempted to, the engineer threw down the tools. I knew what touchy men they are in these matters, and I walked on deck.

411. Where is the engineer of the "Thistle"?—I suppose he is in charge at Wanganui.

Mr. Duncan: I may say I was at Westport and went on board this vessel. I never saw her before. I had a talk with the engineer and said, "Just start these engines," and he started them in a jiffy. He started the winch, and did it splendidly. Yet this witness says he was discharged because he was incompetent.—I did not say so.

412. *The Chairman.*] Give us the reason why he has been discharged.—I do not know the reason. I understand they, the freezing company, are reducing the staff, and do not intend to send him to sea. For all the work required they can put the second engineer of the works in charge.

413. *Mr. McLean.*] I understood you to say he was not competent at the start?—That is what I said.

414. *Mr. Hall-Jones.*] They are simply going to use the boat for carrying off frozen mutton, and so on?—Yes.

415. *Mr. Houston.*] When this engineer on the "Toroa" was at Kaipara, did Mr. Lane send his son over?—Yes.

416. Was Mr. Lane's son a certificated engineer?—No; not that I know of.

417. Was he able to work her when he got on board?—Yes.

418. Then the certificated engineer could not work the engines?—No.

419. And you have discharged him?—Yes.

420. Why?—What was the use of keeping the man when he broke the engines and could not work them?

421. You consider that although he was a certificated engineer he was incapable of driving an oil-engine?—Well, he proved so twice.

422. *Mr. Carson.*] I suppose that because the department compels you to carry a certificated engineer you are stopped altogether?—Yes; we lose her services.

423. If you could get a practical man, you would get one immediately?—All we want is a man competent to drive the engines, and if the department can put a man there I am willing to pay full wages; but I do object to carry a man who breaks our machinery and jeopardises our property.

Mr. Duncan: The cause was the breaking of the tooth. If a tooth breaks it is like a wheel in a clock—the clock breaks down thoroughly. These teeth cannot be made in New Zealand. It was not because the man on board was incompetent.—There was no flaw visible in the breakage; it was through unskilful manipulation.

424. *The Chairman* (to Mr. Henderson).] Do you concur in what Mr. Duncan says about these teeth?—Mr. Duncan says they cannot be got in the colony, but cast teeth can, and will do the work practically as well if machine cut, although the reversing-gear may be broken down, it makes no difference to the engine driving ahead. She can use her propeller.

425. *Mr. Duncan* (to witness).] Why not get a qualified man in the vessel to run her now?—Because the certificated men available have proved incompetent. I was asked two or three points about the engine. There are two or three things the same in the Hercules engine as in the Union engines, but there are conditions that do not apply. As regards the question as to why we do not take the present engineer from the "Thistle," the point is this: The "Toroa" has to make her own compression; in the "Thistle" they have self-starters.

426. And, therefore, that engineer is not competent?—I do not say that, but I should certainly want some proof of his experience. The vessel is more powerful, and she is a self-starter.

427. *Mr. McLean.*] Did you say marine engineers were incompetent without experience of oilers?—They acknowledge that.

428. How do you know that?—I judge it from the six boats that have run with them in charge, and by confessions from individual members of the institute.

429. What are the names of the boats?—The "Toroa," with two different engineers; the "Huia," in which a man was carried as mate who formerly worked the engines, and his first experience was that he had to manipulate the engines with the engineer on board.

430. Where did you hear that?—From the owners. Then there is the "Waiapu," and the "Hercules" and "Oban."

431. All these had certificated engineers?—Yes.

432. *Mr. Duncan.*] You would not be surprised to hear that I have got a telegram from the surveyors in Auckland that all these are going smoothly?—I should be surprised, and am advised the engineers are often stuck.

THURSDAY, 31ST AUGUST, 1899.

HERBERT SUBRITZKY, examined.

1. *The Chairman.*] What are you?—Master of the "Greyhound."

2. Is she a schooner?—An auxiliary-powered schooner.

3. An oil-engined vessel?—Yes.

4. What is her registered tonnage?—Eighty-three.

5. What is the power of her oil-engine?—Fifty-horse power.

6. How long have you been master of the vessel?—Since she was built—about two months. I was master of the "Medora."

7. How long were you in command of her?—About two years and six months. She has an oil-engine. Then I was master of the "Toroa" schooner since I had the "Medora." She has an oil-engine of fifty-horse power on board.

8. When did you first have command of these vessels?—It would be more than five or six years.

9. Do you know anything about the practical management of oil-engines?—I can work them.

10. Have you worked them?—Yes.

11. Where?—On those boats.

12. You have gone down into the engine-room to satisfy yourself that you could work them, and have started them?—Yes, with my brothers. It is my brothers who have been engineers of the vessels I have commanded, and naturally it was my interest to look into them as well as theirs.

13. Has the engine ever broken down on any of these vessels when you happened to be on board?—No, not to stop us.

14. What oil did you use?—At first naphtha, but we use benzine now.

15. Wholly?—Yes, it is the cheapest.

16. Can you say what the cost is per hour?—Yes, the oil-engine of fifty-horse power cost us about 4s. 6d. per hour.

17. What vessel is that?—The "Greyhound."

18. The one you now command?—Yes.

19. At what speed does the vessel go?—In calm weather about eight miles an hour. When at sea it is of course different.

20. Which vessel was it that went down to Greymouth?—The "Toroa."

21. Did you command that vessel?—Yes. We took her from the stocks for six months, while this last new one was being built.

22. Has the "Toroa" the same engine on board that she had when you commanded her?—Yes. It is what they call a Hercules engine.

23. Had either you or your brother any difficulty in working that engine?—My brothers had no difficulty.

24. Did the engine stick you up at all when you were in command of the boat?—No, not for any length of time.

25. She did stick you up?—Some little pin might have gone wrong, but it was nothing to speak of, and the engine could be set going again in a few minutes.

26. Have you heard that they could not start the engine all the way from here to Greymouth?—Yes.

27. They have not been started yet, as far as we know?—Yes, but my brothers could start it at short notice.

28. Do you know of your own knowledge the cause of the engine not being worked?—I could go pretty close to it. They do not feed the engine right in the first place. That is the main trouble. They do not regulate the oil and the air properly, or the electric spark, or set the vaporiser right. These are the main things to attend to in working oil-engines.

29. *Mr. Crowther.*] There are several of these fifty-horse-power engines now?—Yes.

30. And you say you and your brothers can work them?—Yes, my brothers more so than I. I was master of the boat and they drove the engines.

31. You have had no trouble with them?—No.

32. How many hours a day on an average did you work the engine?—We might go for several days and not work them; but if we take the round trip it would not amount to an hour a day. That is from Auckland to Auckland. They are meant for river and harbour work. They are very seldom worked at sea.

33. They are not worked on an average for more than an hour a day?—Yes, taking the boat

in and out, not for more than an hour or an hour and a half per day. We have used them not more than an hour per day so far.

34. All that that fifty-horse-power engine has cost you for auxiliary power is 4s. 6d. per day?—Yes, that is at that driving.

35. You are quite sure?—Yes, from an hour to an hour and a half. We have used it on an average only an hour a day. We know from the amount of oil we take away with us. I would not put it exactly at 4s. 6d. per day. It might be a fraction more or less, but that is what we put it down at.

36. *Mr. Symes.*] I understand you to say that nothing has ever happened to the engine, since you have been in the boat, but what could have been fixed up by the man in charge?—That is quite right.

37. Do you consider that these auxiliary-power oil-engines have been of great benefit to the settlers in different parts where it would be almost impossible for an ordinary sailing-boat to go, and where nothing but a steamer could get in?—Yes. In our district, since the oil-engines have come into use, the land taken up has increased in area over 25 per cent., and the population has increased over 40 per cent. These oil-engined vessels are able to go up and down rivers where a steamer could not go on account of their greater draught and the enormous freights. The oil-engines take up such a little space. These are sailing vessels, and we depend on the sails at sea, not the engines. The Awanui River is some twenty miles long, and for some eight miles you can jump ashore on either side. It is impossible to get a sailing-vessel or a steamer up there large enough to carry freight direct to Auckland without charging a big price.

38. Supposing you were at any time at sea and got on a lee shore, would the engines be of any assistance to you?—Yes; these vessels lie close to the wind in a gale, and the engines would enable you to work off. You can lie within two points and a half. It was only the engines in the "Greyhound" that saved us going on the rocks at Russell when a gale was on. With the aid of the engines we slewed round and got shelter. The oil-engines also saved the schooners "Aotea" and "Medora," and also the schooner "Waiapu," from going ashore in the breakers down there.

39. Do you know anything about the prices of oil?—We get benzine at 1s. 2½d. and naphtha at 2s. 6d. I think it is cheaper now. We have not used naphtha lately, for about two years.

40. *Mr. Crowther.*] You have not used naphtha for two years?—Not for our engines.

41. *Mr. Symes.*] In your opinion, is it necessary to have a certificated marine engineer on board those vessels to work the oil-engine?—No. The knowledge the engineer requires is to be able to take one of these oil-engines to pieces and put it together again. Part of the machinery should be taken away, and the candidate should be able to tell what is wrong, and be able to put the parts together again, and show that he can really do the work.

42. *The Chairman.*] You are speaking of the inspection now, or examination?—Yes, providing there is to be an inspection and examination for these oil-engines.

43. *Mr. Symes.*] Do you consider it necessary to carry an ordinary marine engineer on these boats?—No. Any one of my crew can work the engine.

44. Supposing any portion of the engine was broken at sea—do you carry duplicate parts?—No, not of the engine. It is nearly all cast.

45. Do you carry duplicates of the pins and odds and ends?—We do not carry all but we carry sufficient, so that if anything does go wrong it can be repaired. If anything serious went wrong it would have to be repaired ashore.

46. Is there any danger to life through anything blowing up?—No. I will give £50 to any man who can go and deliberately blow up any portion of our engine, and so will other firms. The makers of the engine offer 5,000 dollars to any one who can do that. It is impossible to blow them up.

47. You say it can be stopped and started almost instantaneously?—Within ten seconds.

48. In less than a minute?—Yes. I would give my engineers five minutes to dress themselves, oil down, and start the engine at full speed. I said if they could not do it they were no good. They are my brothers, and they can do it at any time.

49. *Mr. Crowther.*] I suppose it is only ignition by light, like that of a gas-engine?—Yes; as soon as the spark catches it it is off. The engine is always ready.

50. *Mr. Symes.*] I suppose that is why it is of so much benefit when on a lee shore?—It is a life-saving apparatus whichever way you like to take it. These oil-engined boats are the best-equipped vessels on the coast.

51. *The Chairman.*] Did you go up the rivers before the oil-engines were introduced?—Not with these sized vessels.

52. You had been up before?—Yes, for seventeen years, with the "Medora," thirty-three tons.

53. And you had to pull the boat for twenty miles?—No, for about nine miles; the other eleven we could work up, but only at times.

54. Speaking of the drivers—the men who work the engines: your brother, you say, is an expert driver on the "Greyhound"?—Yes.

55. Is he a mechanic?—Yes; he was the first one to try an engine on his boat. I have two other brothers besides.

56. *Mr. Crowther.*] Was he a mechanic prior to the introduction of the oil-engines? Did he serve any time?—No.

57. *The Chairman.*] Supposing you were lying at the Auckland Wharf and wanted to take your boat up the Awanui River, and wanted a man to drive the oil-engine, and you knew nothing at all about it, what qualification do you think that man should have by way of experience or knowledge entitling him to get a certificate?—He should have sufficient knowledge to take the engine to pieces and to put it together again. Then the examiner should take some part of the

machinery away, and the engineer should be able to tell what was wrong. He should also be taught how to regulate the oil-taps.

58. Should he also have some knowledge of tools?—Yes, a small knowledge of them would not be out of the way.

59. It is not absolutely necessary?—No, because if any parts of the engine break they have to go to a lathe to be made, as they are mostly cast.

60. Speaking for yourself, do you think you have sufficient knowledge to be an Examiner?—Not myself. I have not had the experience of my brother. He has a thorough knowledge of the matter. I have no hesitation in saying that he could pass the candidates, and I also know two others in Auckland that could pass them.

61. *Mr. Lawry.*] Do you know that the owner of the auxiliary boat at Wanganui could not start the engine?—Yes.

62. Have you heard why?—I do not know why, but I have an idea.

63. Were you asked to go and see if you could start the engine?—I received a telegram from Mr. Houston asking me to come down that way.

64. And were you unable to do so?—Yes. I do not say I could go and take an engine to pieces the same as my brothers, but I will guarantee that I could bring one of my brothers down who could take it all to pieces and put everything together again.

65. And your brother is not a marine engineer?—No.

66. Did you ever know of a fire on board one of these oil-engine vessels?—Yes.

67. Do you know what caused the fire?—It was not proved what the cause of the fire was on the "Medora," but on the "Aotea" it was caused through some cotton-waste.

68. Was there an explosion?—No.

69. Did the fire come in contact with the oil-tank?—Yes; the oil-tank on the "Medora." My brother was running her at the time, but the oil-tank was not the scene of the fire. The fire started at the back of the oil-tank, and when the fire was put out the solder ran off the tank. There were about twenty or thirty gallons of benzine in the tank at the time.

70. That would strengthen your opinion that there is no danger of combustion, even under a very hot fire?—The running of the solder proves that it must have been very hot. The danger in benzine or naphtha is in opening the tanks.

71. Do you think it is necessary for what we call a driver to serve three years in a workshop before being certificated to drive an oil-engine?—No. Any young chap could learn how to do it in three days if he had a head at all.

72. *The Chairman.*] You say you are not competent to be an Examiner?—I am speaking from experience. In one or two days, my sailors, after seeing the engine worked, can go and work it themselves.

73. *Mr. Lawry.*] Do you think there is any more difficulty in driving an oil-engine at sea than a gas-engine on shore?—No, they are about the same.

74. So far as you are concerned you would have no objection to men applying for the position of driver being subjected to the most rigid examination with regard to the oil-engine?—No.

75. And you do not think it would take a man three years to qualify himself to pass such an examination?—No. I have thought this matter out thoroughly, because we have been in charge of these engines so long.

76. You think the testimony you are giving here would be corroborated entirely by your brother, who has had greater experience than yourself?—Yes.

77. Are you satisfied that the use of these engines as an auxiliary power to sailing-vessels has been greatly to the interests of the settlers?—Yes, of great benefit.

78. *Mr. Duncan.*] You are aware that permits have been issued to men who have been running these engines for a year?—Yes.

79. You said in your evidence that your engine had been working on an average one hour per day?—Yes.

80. Taking the 365 days at one hour per day, that is equal to 16 days?—Yes.

81. Do you think it is honest that a man should have a permit for running an engine sixteen days?—As far as the oil-engine is concerned, yes.

82. Take an engine with 100-horse power, running between here and Australia, do you think a man should have a permit after having worked that engine for sixteen days during a year?—Yes, I do.

83. Do you use naphtha?—Benzine only.

84. Are you aware that evidence has been given here in connection with the "Toroa's" Hercules engine that they always used naphtha for starting?—Yes, they were supposed to use naphtha. My brother did at one time. He said he had to use naphtha.

85. The builder of the vessel said in evidence that naphtha was used on the "Toroa" for starting?—They used naphtha when they first took her off the stocks to go round the harbour, and they gave it up, benzine being cheaper. They certainly use benzine.

86. Do you know that a mechanic can make a pin round with a hammer, chisel, and file, equal to that of a lathe?—Yes.

87. Then, why did you say that everything had to be taken to a lathe if it broke?—I was talking about the main parts of the machinery.

88. Is not a pin the main part of the machinery if it breaks and stops the efficiency?—No, my idea is that it does not take a man long to make a pin.

89. *Mr. Crowther.*] And a pin made by a lathe is a very much better pin than that made by a hammer and a chisel?—Yes.

90. *Mr. Duncan.*] I am speaking of an emergency.—But in an emergency it does not take a man long to make a pin.

91. Do you think a man from the plough could make a pin in three days?—If used to it he could.

92. Do you think a man, having a permit for working an engine for sixteen days in one year, could tell if his propeller was loose in the shaft?—Yes.

93. Could you tell?—Yes.

94. How?—By the vessel not going ahead.

95. Could any of your men test the efficiency of an engine and say whether it was doing good or bad work?—Yes, at once.

96. How would they do so?—I could not tell you.

97. *Mr. Houston.*] From your evidence Mr. Duncan has shown that a man would only have sixteen days' experience in a year in driving an oil-engine on your vessel?—Yes.

98. Would he not be on board from the beginning to the end of the year?—Yes.

99. And be called upon at a moment's notice to work the engine?—Yes.

100. Would you not expect him to be ready at a moment's notice?—Yes.

101. In reality, his only having a practical experience of sixteen days in the year would not render him unqualified to take charge of the engine?—Not at any moment.

102. How does he fill in the balance of his time?—He was an able seaman on board.

103. *The Chairman.*] So that when not driving the engine he would be taking his watch?—Yes, the same as the others.

104. *Mr. Houston.*] You consider that the motive-power on all these vessels is the sail?—Yes, except in river work and in going to and from the wharves. Outside that you cannot depend upon the engine. But if the sails should be blown away, with a little judgment you can get into a port and get assistance. If the engine breaks down the vessel is a sailer.

105. Do you think the protection of life and property is as great as on a steamer?—Yes, if properly equipped. You never hear of a sailing-vessel with auxiliary oil-engine going ashore through the breaking down of her machinery.

106. With regard to the oil-tank, where was the tank placed on board the "Medora"?—In the engine-room, right alongside the engine. That is the main or only thing that we all object to. We want to have that tank out of the engine-room, because if there is any danger at all it can only come from the tank. We wish to have the oil-tank to be placed away from the engine altogether, but the regulations will not allow it to be done.

107. Where do you think is the safest place to have it?—Anywhere aft or out of the engine-room. Then there is no danger of explosion, even if the tank does leak.

108. *The Chairman.*] Have you been on board the "Huia?"—Not since the engines have been at work.

109. *Mr. Houston.*] You consider there is no danger of explosion in the engine of one of these vessels?—No, it is impossible if the oil-tank is out of the engine-room.

110. I would like you to give us your experience, as master of a vessel, of the certificated engineers you have been obliged to carry?—When these regulations first came out in January last, we had to take marine engineers. I took one to start with, but at the same time I had to have my brothers there to work the engine. He was with us about two months.

111. What did you ask the engineer to do?—He told us he could not work the engine; but we had to carry him, and my brothers had to work the engine in place of him.

112. Where did you sail from?—Awanui and way ports.

113. For how long would that be?—About six weeks.

114. While on board did he do anything in the way of driving the engine?—He tried to.

115. He could not drive it?—No, without being shown. When the engine was started, he could sit down below.

116. *Mr. Crowther.*] Did he do any other work on deck?—No.

117. *The Chairman.*] What did you give him per month?—£10.

118. Then you discharged him and got another engineer?—Yes.

119. How long was he on board?—About two months.

120. How much did he get a month?—The same amount.

121. What work did he do in connection with the engine?—Nothing. He was shown how to start it and managed to do so, and was left in charge; but by some mistake he let the water off, and the cylinder got red-hot and some part of the engine was cracked, and we had to send to America for the duplicate part. When he got to Auckland he left without any orders. Then we had a third engineer.

122. How long was the third engineer on board?—He was on the "Toroa" for about two months or a little over. The two engineers I have spoken of were on board with my brothers. The third could not work the engine.

123. How much did he get a month?—£10.

124. What did he do?—Walked the deck. He said he never had so much reading in his life before. Just before coming down I sent down to the department for a permit, but the answer came too late, so I got a first-class engineer—a man fifty-six years of age; but he came to me and said, "I am a first-class English certificated engineer, but I cannot drive your oil-engine. I have got to learn yet."

125. *Mr. Duncan.*] What is his name?—The names of all of them are at the Customs.

126. *The Chairman.*] Whom did you employ then?—My brother had to go away as skipper, and had to start the engine himself, and then the engine went wrong. The first-class engineer was supposed to drive it.

127. The skipper went down to start her?—Yes. There were two engineers on board—a first- and third-class engineer. They have cost us enough and have done no work.

JOSEPH HARE, examined.

128. *The Chairman*:] Are you a mechanic?—No.
129. Where is your residence?—At Whangaroa.
130. Are you a farmer?—A storekeeper.
131. Have you any vessels?—Yes, several. We own the "Hercules," at Hokitika now.
132. Trading there?—Yes.
133. Are you interested in any other vessel?—I have a share in the "Aotea," and I have also a launch with oil-engine.
134. How long have you been an owner of vessels?—With Captain Skinner I was interested in the first oil-engine in the colony.
135. How long is that ago?—Four or five years.
136. What is the registered tonnage of the "Aotea"?—Ninety tons.
137. And her horse-power?—Fifteen.
138. Have you had any difficulty with the drivers of the "Aotea"—Only since the driver left who was originally employed before we were forced to take an engineer.
139. How long is that ago?—Between six and nine months.
140. Then for two or three years you employed the first man and had no difficulty in the driving of the engine?—No, he and the captain drove her successfully.
141. You had no reports as to the engine being stuck up at any time?—No. It is a peculiar engine of English make, and the only difficulty is that in starting her she required about twenty minutes to get up steam, but when once started it worked quite successfully.
142. That man left the "Aotea" about nine months ago?—He was forced off her.
143. The department's regulations required you to carry a certificated engineer?—Yes.
144. Did you employ a certificated engineer?—Yes.
145. How long did he remain with you?—I think the captain has tried two or three since then, and he has had to drive the engine himself.
146. Then, the engineer you first employed could not drive the engine?—The marine engineer could not drive her.
147. You are certain of that?—Positive. The captain wrote to me, giving all the particulars. He said he had to drive her night and day.
148. How long did he remain as engineer of the vessel?—He might have been two months—probably a trip.
149. And from the information supplied to you the captain did the work, and not the engineer?—I know that is so. I spoke to the captain, and received a letter from him telling me that he had to drive her.
150. You obtained that information from the captain?—Yes.
151. Did you get another certificated engineer after he left?—Yes.
152. How long did the second one remain?—I have not got the dates.
153. Did he remain any time?—I could not say. I know the captain has had two or three altogether.
154. After the second one left did you get a third, and is that third one on board?—I cannot tell. I know he is an old man now. Mr. Subritzky had him on board.
155. Is the present one a certificated engineer?—I believe so. Captain Skinner told me he got his knowledge from Mr. Subritzky.
156. Can you give us any further information about that boat or any other boat?—With regard to the "Hercules," we had a young man driving her until we were forced to take a marine engineer.
157. How long was he driving her?—A year and a half.
158. Did any difficulties arise during the time he was driving her?—I had letters from the charter party saying the engine was working beautifully and she was doing her work well.
159. And nine months ago he had to retire through the departmental order?—Yes.
160. Whom did you put in his place?—A marine engineer. The charter party then wrote to say that, as they had to pay £15 a month, the vessel would not pay to run, and that I would have to devise some plan by which the price could be reduced.
161. Was that charter party annulled through this?—No.
162. Did any further difficulty arise?—During the time this man had charge the vessel went ashore at Waikura, Jackson's Bay, West Coast; but I do not know that it was through his fault. The department informed me that it was the captain who made a mistake in taking the signals.
163. Have you any further information to give us about that vessel or any other?—I have been repeatedly cautioned to carry an engineer on my own launch by the department in Wellington.
164. What size is the launch?—25 ft. long.
165. Do you carry passengers?—I have taken friends of mine out, but have never charged.
166. What distance would you go with the launch?—All round the harbour, down to the heads, and up rivers.
167. From twenty to forty miles?—Yes.
168. What is the power of the engine?—Four-horse power.
169. Beyond the reminder to carry an engineer you have not carried one?—No.
170. Who were in charge?—My sons.
171. Are they engineers?—No. My son Oliver has got a permit to drive an oil-engine since.
172. Have your sons a knowledge of tools, or any experience of a workshop?—Only what they have picked up. They are smart boys.
173. Is your home situated far from the sea up the river?—It opens into the harbour about six miles up the river.

174. Before these oil-engines were put into these sailing-vessels, were you visited by steamers or only by sailing-vessels?—There were some little steamers. I suppose the "Clansman" has been trading up there for the last fifteen or twenty years.

175. Is she still running?—Yes.

176. Have you had vessels running for you all the time?—Only for about three years, when the oil-engines were introduced.

177. Since the oil-engines have been used in sailing-vessels, trade has increased to what extent?—There is considerably more trade, and freights have been reduced from £1 per ton to 10s.

178. How many vessels go there a week or a month?—There are three oil-vessels which trade to the harbour, and I think they make fortnightly trips. They come in once a week.

179. There are three vessels making a trip each every fortnight?—Yes.

180. Before the advent of the oil-engines, did these vessels visit your place?—The "Medora" did occasionally—about once a month. In addition to the advantages we get in the way of trade we get an occasional mail.

181. The exports from your place consist of timber?—Timber and gum principally.

182. Have you increased the population of the land in your district by means of the increased trade?—Yes; settlers are coming in from other parts, and further north there are more. We had a steamer before, and were not so badly off as others.

183. I suppose you have roads from your place extending far away?—We have tracks.

184. And the produce is brought to your place?—Yes; gum is packed on horses.

185. By means of the vessels coming so regularly the produce is taken away?—Yes, it is an advantage to the settlers.

186. Of course, owing to your interest in so many vessels, you know that the advantage is considerable when vessels can go straight from the sea and up a river without much time being taken up in doing so?—It is of as much advantage to the settlers, because the goods are better handled and the freights are reduced.

187. Do you think a driver should have some knowledge of tools and instruction in the management of an oil-engine before he is allowed to be put in charge and go away to sea?—I think, if he had a knowledge of tools, it would be an advantage to him; but, so far as my experience goes, there is nothing breakable in an oil-engine unless it is that a small spring might occasionally snap. These things are kept in duplicate, and no matter how skilled a man might be in tools he could not make these things himself on board.

188. Do you drive a launch?—Yes.

189. You have heard the evidence given by Captain Subritzky?—Yes.

190. As to admitting certain parts of air and oil, and so on?—Yes. There are different kinds of engines.

191. Is the engine in your launch more modern?—It is more modern. The oil and air are in the same chamber, and they are mixed in a perfect manner before being taken into the cylinder.

192. So that a boy of fifteen with very little experience would be able to drive your engine?—Yes. If you have a boy large enough to give a wheel a turn it cannot help making its own gas, and the cylinders must go.

193. What size is the wheel?—On a four-horse-power engine it is about 16 in. in diameter.

194. And would not require much strength to revolve it?—No.

195. *Mr. Crowther.*] You say you have been driving launches?—I have been driving my own.

196. I understand that you drove the Premier and the Governor when they were up there?—Yes.

197. *The Chairman.*] Were you driving at the time?—No, my son was driving; I was steering.

198. Without a permit?—Yes. He had no permit.

199. *Mr. Crowther.*] And there were two or three other launches there?—Yes.

200. How many passengers had you that day?—About eighty in the four boats.

201. And none of the drivers had permits?—No.

202. *Mr. Crowther.*] And did the Premier and the Governor express themselves highly pleased with the trip?—The Governor expressed himself very highly pleased indeed.

203. *The Chairman.*] What of—the engine or of the driver?—The engine, as to how it worked.

205. *Mr. Crowther.*] The Governor took special interest in the engine?—Yes, and so did the Premier.

206. They expressed their satisfaction?—Yes.

207. *The Chairman.*] Were they at all nervous?—Not at all. They enjoyed it immensely.

208. *Mr. Lawry.*] You are quite satisfied that when the engine was driven by a non-certificated engineer, it worked with the greatest satisfaction?—I have never had one moment's trouble or difficulty since I had my engine in my boat. It has never refused duty, and has been as perfect as a steam-engine.

209. You had no trouble when it was driven by what the department would call an amateur?—None whatever.

210. And the trouble commenced when you got a professional?—Exactly.

211. Are you prepared to say that the engineer should have had no marine experience?—I would prefer a man who had not had experience of steam, because he is more likely to make a mistake through not having studied the mechanism of an oil-engine, whereas another man would make a study of it.

212. In other words, you would prefer practical knowledge to the technical knowledge possessed by a marine engineer?—I am hardly able to answer that question. A marine engineer

has got his own scientific knowledge of steam, and no doubt he is an expert, but not in an oil-engine.

213. Then, the technical knowledge gained by a marine engineer of a steam-engine would not be applicable to an oil-engine?—No; the scientific knowledge he had of making parts would be there if anything was broken, but there is no part of an oil-engine likely to break except perhaps a small spring.

214. You were speaking of having a small launch?—Yes.

215. Could you from a commercial point of view continue to work the launch if you had to pay a certificated engineer?—No; she could never go from her moorings.

216. She would be practically useless?—Entirely useless. I would have to pull the boat with my oars, as I used to do.

217. You have never heard any serious complaints from the steamship companies in consequence of your competition with them?—No.

218. I suppose it has not diminished to any appreciable extent the amount of goods carried by the Northern Steamship Company?—I do not think there is any apparent depreciation in our harbour. There might be further north.

219. Does it affect the freights by bringing them down?—Yes, but of increasing the trade.

220. *Mr. Symes.*] I understood you to say you imported the first oil-engine to the colony?—Yes.

221. Was that the one you sent home again?—No, that is on board the "Aotea." We imported a Hercules engine from people in San Francisco. That was not perfectly made, and we had to send it Home.

222. What was the power of the engine in the "Hercules"?—Twenty-five.

223. Is the "Hercules" a schooner?—Yes.

224. You heard Captain Subritzky say these engines could be started almost instantaneously?—Yes.

225. Yet you said it took you twenty minutes?—That was on the "Aotea," on the engine of English make, not a Sintz up to date.

226. You also told us that the captain was forced to take a marine engineer on board, and that the captain had to work the engine night and day?—Yes.

227. Can you explain how it is possible for the captain to work his own engine?—His mate would assist him in his duties.

228. You say that you had to pay £16 a month by taking a marine engineer, so that any excess in the charter party was originated by the oil-engine?—They were paying £8 a month.

229. And that was increased by £8?—Yes.

230. What did the driver of the "Hercules" do when he was not driving the engine?—He worked just the same as the other men.

231. Did the marine engineer do the same?—No.

232. He did not do anything?—No.

233. You have also said that settlement had increased since the advent of auxiliary power to these schooners?—That is so.

234. Do you not think it was a case of supply and demand?—No. I think settlement would increase very much more rapidly if we had good roads.

235. Do you not think that settlement would have increased whether there had been oil-engines used or not?—Not so much in the North, because they could not get their produce away if they had not had the advantages in carrying it.

236. Do you use naphtha or benzine in your boats?—Benzine and naphtha.

237. Do you know the prices of those two articles?—Yes.

238. What is about the price of benzine?—1s. per gallon.

239. And naphtha?—2s. 6d., I guess, or 2s. 8d.

240. I suppose what you want to convey to the Committee is that, through the schooners being of lighter draught, and the oil-engines taking less space than steam-engines, they are able to take bigger cargoes and run at cheaper freights than the steamers?—Yes; it is not the cost so much of running the boats.

241. Do you know the difference in price of an oil-engine and an ordinary steam-engine?—I do not know the price of a steam-engine.

242. Which would you think was the cheaper?—I think the oil-engine would be cheaper.

243. You do not know of your own knowledge?—No.

244. *Mr. R. McKenzie.*] How far do you run your launch?—In the harbour.

245. Where is your place?—Whangaroa.

246. How do the mails get there?—By steamers.

247. And you say that the freight has been reduced from £1 to 10s.—Yes.

248. Do you know whether there is a clause in the mail-contract with regard to freights?—There is no mail-contract.

249. Do you consider that oil-engines are liable to explode?—No.

250. They cannot possibly explode?—There is nothing to explode. The only thing is that, the same as with a steam-engine, if the driver did not put water round the water-jacket he might explode his water-jacket. That would apply equally to a steam- or any other engine.

251. That does apply to an oil-engine?—Yes.

252. *The Chairman.*] Would injury result to the man at hand if the explosion took place?—The driver might suffer.

253. *Mr. McKenzie.*] It could not kill or injure the passengers, or injure the vessel?—No.

254. Are those oil-engines inspected by the Government officers?—Yes, but should not be, as they know nothing about them.

256. Do you know any reason why they should be inspected?—No.
257. Do you think it necessary?—No, not a bit.
258. Did you tell us you were capable of driving one of those engines which were in the vessels when the Governor and the Premier were driven round?—Yes, perfectly.
259. Do you consider that oil-engines ought to be inspected?—Not by a marine engineer.
260. Do you consider a marine engineer is less capable?—I do, for the reason I have given, that his scientific knowledge of steam directs his mind only in that direction.
261. And you think he is less capable than any other man you could pick up?—I have proved that in my own boat. I have had a certificated engineer dozens of times, trying to instruct him to drive my steam-launch, and he cannot do it now.
262. Do you go out to sea with this engine?—I just confine myself to harbour-work.
263. Some go out to sea?—Yes.
264. And in the event of anything happening, such as the boat being dismasted and the engine breaking down?—That would be a pretty bad case.
265. Do you admit it to be a possible case?—It might be.
266. And do you think that a man who did not know anything about an engine would be able to fit it up?—He has nothing to fix up, supposing it is broken.
267. But every steamer carries nuts and bolts?—Yes, but does not carry a new shaft.
268. The engineers might be able to repair it, the same as they did on the "Perthshire"?—They do not carry connecting-rods.
269. Do you think a qualified engineer would be of more use?—I said he would be more useful in the way of making or mending.
270. How long would it take a practical, ordinary, intelligent man or lad to work one of those oil-engines?—It just depends. An ordinary, intelligent lad, with no preconceived notions of steam, might learn in a week. My experience is that marine engineers have their minds biassed in the direction of steam.
271. I want to know how long an ordinary, intelligent man or lad would require to learn how to start and run an engine?—Any of my children are capable of doing anything with an oil-engine.
272. How long would it take an ordinary intelligent man or lad to start and run one?—I do not really know how long it would take. One man might learn in a week, and another not in three weeks.
273. Do you think the fact of a man being a mechanic makes him less capable?—No. I do not.
274. Is it a fact that a mechanic would more easily pick up anything in connection with mechanics than a man who is not a mechanic?—If you refer to constructing anything, he would be more capable of mending a broken part of a machine; but I do not think he would be more capable of working an oil-engine.
275. I ask you whether, in your opinion, a mechanic would pick up more about a machine in less time than a man who is not a mechanic?—I do not think he would unless he understood the science of an oil-engine.
276. *Mr. Lawry.*] You do not object to the drivers being subjected to the most rigid examination?—Not in the science of driving oil-engines.
277. *Mr. McKenzie.*] Do you think Parliament should pass a measure to provide for another grade of engineering, and give a certificate for this particular class of man?—I think there should be another grade entirely independent of marine engineers, but be careful who is appointed examiner.

HENRY LANE, examined.

278. *The Chairman.*] Where is your home?—Bay of Islands.
279. Are you partner with your brother, who gave evidence here the other day?—No; I was.
280. How long have you been living at the Bay of Islands?—Twenty-six years.
281. Are you a shipbuilder?—I served my time to it.
282. Have you built any vessels which have oil-engines?—No.
283. Are you a farmer now?—No, a saw-miller.
284. Do you own any vessels or have you any interest in them?—Not oil-engined vessels.
285. What information can you give us about oil-engines?—The information I can give you is on behalf of the fishing industry. There are two factories, employing a large number of men in tinning fish up there, and the fishing-boats have to go thirty or forty miles away to bring in the fish.
286. What is the size of the boats?—About 8 ft. beam and 25 ft. long.
287. Decked?—Half-decked.
288. How many men do they carry?—Two men in a boat.
289. Are there any with oil-engines?—No. They all want them, but are frightened of the restrictions.
290. Do you know anything about oil-engines?—Yes; I have started and stopped them, and know the theory.
291. Where?—Wanganui, at my brother's place.
292. Which vessels—the launches?—Yes. I have been on oil-engined vessels, and know how they are constructed and worked.
293. Is there any difficulty in an ordinary intelligent person driving one?—I can only tell by myself. I have an engineer's certificate for steam. I went on board and could start the engine in five minutes the first time I had anything to do with it by just looking over the works. I got hold of the batteries and started working them straight off the reel.
294. Then it was in consequence of your knowledge as a mechanic that you were able to grasp the whole thing?—I could see the whole thing much quicker.

295. Would the ordinary fisherman, who is not a mechanic, be able to grasp the thing?—A great many would. I think the whole thing is so very simple that there is no great difficulty about it. Many of the fishermen are smart people.

296. As an engineer do you think there is any danger of explosion in an oil-engine?—No. The danger lies in the connection between the engine and the oil-tanks. People knocking about the boat might cause a leak in the tank, and, as it is an explosive oil, if lights were carelessly knocking about a fire might be caused. But that could be remedied by the tank being kept well away from the engine, up in the bow, and the oil led to the engine by pipes. Then, another dangerous thing is the way that oil-waste is allowed to lie about. It should either be put away or thrown into the water.

297. Have you seen any accident through what you have mentioned?—I have seen fires take place—not to do any damage—through this waste.

298. Where?—On shore.

299. How many fishing-boats are there in the Bay of Islands?—Between fifty and sixty,

300. Do they go out every night?—When the weather is suitable. They go even as far as Mangonui to Awanui—sixty-odd miles.

301. What fish do they catch?—Mullet; they only do that in the winter time when the fish will keep. They cannot do it in the summer time, because it will not keep, but they are talking of getting ice now.

302. *Mr. Crowther.*] If they had oil-engines they would be able to land the fish very much quicker than if they were dependent on sails?—Yes. In the islands they get a load of fish, and by the time they get it to the factory it is not fit to be used.

303. What is the average quantity of fish brought in?—It varies very much.

304. *The Chairman.*] Are they set nets?—Yes.

305. *Mr. Duncan.*] Fishing-vessels are exempt by the Act. The Minister can exempt them, if application is made.—Just as I left, the owner of one of the factories asked me to see what could be done. These boats do other work besides, such as carrying a bit of cargo. They frequently come up to my mill and take a bit of timber, or they carry a bag of flour for the settlers.

JOHN ST. CLAIR, examined.

306. *The Chairman.*] What are you?—A solicitor, and also a farmer.

307. Where do you reside?—Chiefly in Auckland. I have also a home in the Waikato, on my farm.

308. What information can you give the Committee?—We have suffered very severely through the restrictions on oil-engines. We have a man who runs a little boat with an oil-engine, and we are all likely to suffer through these restrictions. I own a three-horse power engine in a launch called the "Monitor." I also have a 25 ft. boat, with 6 ft. beam, but the engine is out of her now.

309. In what way do the regulations interfere with you?—Owing to Mr. Wade, who runs the "Awaroa," and carries our freight, having to get a certificated engineer: his boat was stopped, I believe. He had to get an engineer until he could come down to get examined, and it disorganized the whole trade for some time because he could not run his oil-engine. He trades in the interests of the settlers in the Whangape district, and takes up wool and other produce. Last spring the settlers were unable to get their wool out on account of the boat being stopped. We had to bring it down in canoes.

310. Had that man been driving the oil-engine long before he was stopped?—Yes, a couple of years, I think.

311. Was he ordered not to drive the engine any more?—I heard so, but I know personally that he took fright and took the engine out of his boat. It was on account of no fault in the engine. He laid the boat up because he was afraid of being fined. That was the reason given to the settlers. As regards the running of the engine in Auckland in my own steam-launch, I may say that I, myself, drive the engine. I could put the engine in the boat, with the aid of a mechanic to bend a few pipes, if I had the tools.

312. Is it possible for the engineer to say that he did the work and you looked on?—No. I can work a lathe. The engine is so simple that it does not require a skilled man to work her.

313. What is the maker?—The Monitor Vapour and Power Company, who make the Monitor and Mogul engines. The man we employ simply follows out the instructions, and the engine has gone ever since. She has stuck us up occasionally, but that is because we did not understand her. Once we got to understand the engine it gave us no trouble. We have blown up a teaspoonful of benzine by way of experiment to see what would be the effect. The little launch, with the one-and-a-half-horse power engine, has been driven by a little girl, who is nine years old. She has started the engine and driven it in Auckland Harbour. I am prepared to let her do it with the larger boat of three-horse power. I would not trust her with a horse and buggy, unless the horse was quiet.

314. *Mr. Lawry.*] I think you were an old settler in the Waikato before you became a solicitor?—Yes; I was farming eight or nine years.

315. And you are thoroughly acquainted with the settlers on the Waikato River?—Yes.

316. Would the general use of the oil-engine in the Waikato River be a benefit to the settlers?—I took a launch up there last season, and I was promised several orders provided there was no restriction about carrying a certificated engineer.

317. Then, the regulations make it obligatory for these boats to carry a certificated engineer?—Yes, if the boat is to carry passengers, and they are frightened to take an oil-engine for fear of being interfered with.

318. You know Mr. Wade?—Yes, he has been working in different positions on steamers for the last twenty years.

319. Do you remember introducing Mr. Wade to me in Auckland some little time ago?—I cannot say I do.

320. Do you remember him coming down to Auckland and complaining very bitterly about having been obliged to take his engine out?—Yes.

321. I think it was at your request that I communicated to the department on the matter?—I cannot remember that for certain. I know there are a great many complaints, and I know he came to Auckland and complained very bitterly.

322. Are you interested in the manufacture of oil-engines?—Yes, with the Monitor Company.

323. Is your company at work now?—They are not engaged manufacturing in New Zealand, but they are making them in America. The agents here are simply indent agents—they do not stock here.

324. Will your company construct or simply put them up here?—They may construct later on. They have altered and improved their patent.

325. You do not think from your experience that it is absolutely necessary to have a certificated engineer on these boats?—If the instructions are read over carefully, an average person of common sense can manage the engine.

326. *Mr. Symes.*] I understood you to say that the settlers had suffered very severely?—Yes, Lake Whangape is a stormy lake, and it is very severe work to bring goods over.

327. What did the settlers do before the advent of the oil-engine?—They used open boats.

328. Would it decrease the cost of freight if you had oil-engines—I myself have paid £1 10s. a ton for bringing goods out, and now it is under 10s., delivered at the railway-station. With my own launch I could bring it out for very much less.

329. Do you know anything about gas-engines?—Yes; we also use a stationary engine for gas.

330. If working in town would you be compelled to have a certificated engineer to drive them?—No, and our engine is simply a marine gas-engine.

331. You would not require a certificated engineer for it if it were stationary?—No.

LUDOVIC BLACKWOOD, examined.

332. *The Chairman.*] You are a Government Inspector of Machinery?—Yes.

333. How long have you been in the service as such?—I have been in the service sixteen years altogether; as Inspector, a little over fourteen years.

334. Have you been engaged in such duties in different parts of the colony?—Yes.

335. What have been your duties?—Inspector of Machinery and Engineer's Surveyor.

336. What machinery do you inspect?—All land machinery.

337. Gas-engines?—I have inspected a lot of gas-engines; saw-mill machinery, steam-boilers, engines, and oil-engines.

338. Marine engines on board ships?—Yes.

339. You say you have examined oil-engines. Where?—In the Auckland District principally.

340. What vessels have you inspected where there were oil-engines on board?—I have inspected the "Huia," "Aotea," "Waiapu," "Brothers," "Torea," "Sunbeam," "Mona," "Beryl," and several others.

341. Starting with the "Huia," have you inspected her more than once?—Twice.

342. When did you make your first inspection?—When she was ready for survey. That would be in about 1897.

343. Where were her oil-tanks?—On deck, I think. On the first of the oil-ships they were on deck, or right forward. Some people advocate them being put right forward, and the department think they should be right above the engine.

344. In the case of the "Hercules" they were above the engine?—Yes.

345. Are the tanks down below in some of the vessels?—Not now. They are all above the engines in the home-trade vessels.

346. You say that in all the home-trade vessels the tanks are on deck?—Yes. I have not surveyed the "Medora."

347. In the vessels you have surveyed are the oil-tanks on deck or above the engines?—In the engine-room.

348. Which is the best place?—Above the engine, so that the oil can gravitate down into the machinery.

349. Is there any danger to life or to the vessel while the tanks are in the engine-room?—I do not think so. I have seen no danger from it.

350. Do you know the construction of the oil-engine?—Yes.

351. And therefore every part of it?—Yes.

352. Can you start any oil-engine that you have inspected?—Yes, I think I could.

353. Have you any doubt about it?—I think it is a very easy matter; just about as easy as swallowing a glass of good whisky, or falling off a log.

354. Have you been consulted by the owners of any of these ships about the incompetency of marine engineers to start these engines?—No; not on one occasion.

355. Not on any occasion?—No. Captain McKenzie was in charge of the "Huia," and he told me he was perfectly satisfied with the third-class certificated man he had. This man had never been at sea, but he held a third-class certificate.

356. When did he tell you that?—About six months ago. He put up a room in the vessel so as to retain this man. He did not wish to lose him, so he gave him a room of his own, as he wanted to keep him if possible.

357. Have you inspected any vessel where the driver was not a certificated engineer?—Yes, the "Toroa" and another.

358. In examining those vessels, how did those men compare with those who had certificates?—The man in charge of the "Greyhound" is a mechanical man, and I might say that mechanical genius is like that of poets and statesmen. Some do not require to be made—they are born; and I think that man was a born tradesman and very clever.

359. As you say you are thoroughly conversant with the construction and working of oil-engines, do you think the driver of such should be a certificated engineer, or a man having mechanical knowledge and experience?—A man with mechanical knowledge seems to get on very well with the oil-engine, with experience.

360. Would he be as competent as a marine engineer?—The men I have come in contact with—I think there are perhaps a dozen and a half—with the exception of the man in the "Toroa," have all been third-class or river certificated men. They had steam certificates and there seemed to be no trouble at all. Steam experience seems to suit them thoroughly well.

361. Take the "Greyhound": was he a certificated man?—He was a mechanical man, but held no certificate. But, as I said before, he is a genius—a very clever man with tools. I dare say he could true-up a piece of iron and file it as accurately as a lathe could do it, but it would take a long time.

362. As the result of your experience, do you think these drivers of oil-engines should have some knowledge of tools, as well as experience in driving, before they are permitted to have charge of an engine?—I do not think a driver wants much experience in driving, because it is very simple; but he should have some experience of tools, and be able to do little repairs.

363. What experience?—He should be able to use the hammer, chisel, and file, and these steamers should always have a good kit of tools for these men.

364. *Mr. Symes.*] You say you have been sixteen years in Government employ, and fourteen years as an Inspector of Machinery?—Yes.

365. You have had experience both of oil-engines on these boats and gas-engines on shore?—Yes.

366. Is there any difference between the two?—The mechanism is very much the same. They both have pistons, and are very nearly related.

367. There is as much danger with one as the other?—With the engine I should say there is.

368. Danger to what?—Danger to life and property with the engines.

369. As a matter of fact, is there much danger with either, if any?—Not under a competent man; very little danger.

370. I would like to know what you call a competent man?—A competent man is a man who should thoroughly understand his business. Of course, all engineers are not competent in their profession; they may degenerate as years go on.

371. You heard a man here, in evidence, say that his child, nine years of age, could start and work one of these oil-engines?—Yes.

372. You would think he would have more concern about his own child than a hired man?—Yes.

373. He said he would allow her to drive an oil-engine before he would allow her to drive a buggy with a pair of restive horses?—Yes, I should say so. I would prefer an oil-engine to frightened horses.

374. How long do you think it would take a man of ordinary intellect to learn to start and stop an oil-engine?—In a quarter of an hour an ordinary man could understand it all. If shown about twice how to turn on the air and oil, and to use the battery all right, you would be able to do it yourself.

375. What are oil-taps?—It is the supply, just like turning on the steam in a steam-valve. There is just one oil-tap and the air-tap.

376. Would it be absolutely necessary for the broken parts of one of these engines to go to a workshop?—With a novice on board it would. With a mechanical man having the tools on board it would not.

377. Supposing he had the tools on board, of course, he could make pins, bolts, and nuts, if he had a set of dies?—He could do a lot. It depends greatly on the art of the man.

378. Did you have to carry material on board as an engineer?—You can very often find that on modern ships you can make rods up to 3 in. diameter. A practical man who can handle his tools can do wonders on board ship.

379. We had it in evidence this morning that a marine engineer—third-class, I think—had been six weeks on board one of these vessels, and had not been able to work the engine; he rubbed his hands with cotton-waste, and looked very wise?—It was a second-class engineer.

380. Can you give us any reason why he should be six weeks on board, and yet not be able to work one of these engines?—I can give no reason. He simply did not want to work it. There is nothing to work; but if there is a flaw or defect, an engineer can notice it in time. If an engineer wants to do anything he does not do it at sea; he does it in port. All work that is done at sea is caused through accidents. An experienced man can see defects and prevent accidents. While the engine is going he can read his book.

381. The man spoken of was absolutely incompetent, although he held a certificate?—Well, he simply did not want to work the engine.

382. Do you not think it is a great hardship to people that they should be compelled to hire a man like that at so much per month?—They are not compelled to take that man.

383. But how are they to know? They have certificates issued by the department, and in this case it was a second-class certificate held by a wooden man?—They should not have had him without inquiry. The "Aotea" had a man with a first-class marine certificate who was quite

incompetent to start and stop the engines, so a man said this morning. I understand that this man served in Her Majesty's navy, and retired on his pension. If he served in Her Majesty's navy for twenty years I do not think he was incompetent.

384. You said that gas- and steam-engines are twins?—I said that gas and steam were twin sisters.

385. And there is as much danger with one as with the other?—Yes.

386. And yet the one can be worked on shore, and a man and his premises may be blown up, but at sea you will not let them be blown up?—No. He gets drowned as well as blown up.

387. We have heard that fishermen are permitted to work these oil-engines themselves?—Yes.

388. Do you not think a fisherman's life is just as valuable as another man's life?—Yes.

389. Does it not strike you as peculiar that two, three, four, or six fishermen can go out and run the risk of being blown up, but directly they get a ton of flour on board there is danger?—Yes; but I do not think that affects the case at all.

390. You have inspected the oil-engines on these boats?—I have inspected about a dozen and a half.

391. Have you inspected the "Oban"?—No.

392. She went on the bar at Waitara?—Yes.

393. Have you ever heard the reason?—No; but her oil-tank is forward, and that might have caused her to strike on the bar.

394. Why would that cause her to strike on the bar?—Because the supply of oil in the pipe is very small, and the gravitation would be interfered with when she was not down at the stern. Another thing is that if she shipped water she might take it into her cylinders, and that would stop her.

395. Do you think that having a marine engineer on board would prevent any of those things occurring?—I think so. A practical man—I would not say a marine engineer—would find out defects quicker than any novice would.

396. You do not know whether there was a marine engineer on board?—No, I have no idea, I know the "Oban" was laid up, and had very little success. She was practically useless, and they were going to take out her engines. The Mokau Coal Company chartered the vessel. The engines were sealed up and they could not use her.

397. She had, as a matter of fact, at the time she got wrecked, a marine engineer on board?—Yes, that may be.

398. *Mr. Lawry.*] Do the Committee understand you to say that the position of a vessel under certain circumstances would prevent the oil flowing by gravitation—by depression in the bow?—Yes.

399. Would it not be possible to place the tanks somewhere where that would not occur?—They could utilise the mast for a tank.

400. Do you think there is any danger of combustion or explosion by the tank being placed in close proximity to the engine?—No, I do not think so.

401. Do you think that under all the circumstances the best place for the tank is in the engine-room?—Yes; immediately above the engine. I have found out since that the "Oban" was in the sea-way, with her bow dipping and ascending, and therefore could not get a regular supply of oil.

402. Have you heard of any case where an explosion has taken place?—I heard of one in Sydney, but not in New Zealand.

403. I understood you to tell the Committee that there was just as much danger of explosion whether it was a steam- or oil-engine that was used?—Yes, with the engine.

404. Do you think that with ordinary care there is very little danger of explosion in either case?—Very little.

405. Have you during your experience as an Inspector heard any complaints from owners of steamers propelled by oil-engines as an auxiliary power as to the incompetence of men they have employed who were not marine engineers?—No, I have heard no complaints about them.

406. Officially have you heard any complaints through the compulsory employment of men who were certificated engineers?—Yes.

407. How do you account for the satisfaction in the one case and dissatisfaction in the other?—I cannot account for it, because all the people I have come in contact with seemed to be perfectly satisfied and made no complaints.

408. Will you explain to the Committee the reason why an engineer refuses to drive an oil-engine when he is on board?—I cannot explain that.

409. Have you any evidence to support the statement that a certificated engineer would refuse to learn how to drive an oil-engine?—No.

410. Have you any knowledge as to whether the marine engineers as a whole are hostile to the proposal to have experienced men to drive oil-engines who are not certificated marine engineers?—I do not think they have any hostile feeling towards it.

411. Have you heard of a deputation which waited upon the Minister of Marine in Auckland, protesting on behalf of the marine engineers, against the employment of non-certificated men?—I remember that.

412. Would you not suppose they were hostile to the employment of non-certificated men, when they formed that deputation?—They must have been, or they would not have done so.

413. You take that as *primâ facie* evidence that they were?—Yes.

414. Are you aware that on the same day there was a large deputation of men interested in oil-engines as an auxiliary power which waited on the Minister and asked that men who were not marine engineers be allowed to drive these engines, subject to examination?—Yes.

415. Have you any recollection of the reply of the Minister?—No, I saw the account of a deputation waiting on the Minister in the newspapers. I think Mr. Lawry introduced both deputations.

416. You do not remember that the Minister, by inference, at any rate, promised the later deputation that he would endeavour to frame a regulation, or enactment, if necessary, to give effect to their demand—that was, to have men driving these oil-engines who had subjected themselves to examination and proved their qualification?—Yes. I thought it was *vice versâ*; that the deputation of the shipowners was first, and that of the engineers came last. All my replies on this matter refer to what I saw in the newspapers.

417. *The Chairman.*] There is nothing official?—No.

418. *Mr. Lawry.*] As a departmental officer you would have no official objection to any regulation or enactment which would provide for the employment of uncertificated marine engineers if they possessed the necessary qualification for driving these oil-engines?—Not the least.

419. *Mr. McKenzie.*] There is a piston to these oil-engines?—Yes.

420. Is there a block on it?—The piston is usually called a "piston-block."

421. I suppose there are rings?—Yes.

422. Do you suppose a man not used to the work, and had to file it down, would be likely to fit a ring on as well as a practical mechanic?—No, he could not do it; he would not know how to start.

423. We were told this morning that a girl nine years of age could start and work one of these engines. Do you think so?—Yes.

424. Do you think such a young lady could, if shown how, be able to start or stop the "Gothic"?—Yes, if the engineer in charge opened out the valves, she could do it. It would be easier than an oil-engine.

425. Do you think the risk would be about equal?—Yes; there would be no risk to life and property in stopping and starting an engine.

426. We were told she went out in one of these launches?—Yes.

427. Suppose she went out in the "Gothic"?—I would not like to let her take charge of the "Gothic."

428. But you say she could start the "Gothic"?—I have not the slightest doubt that a seven- or nine-year-old girl could start the "Gothic," or any Atlantic liner.

429. Do you think it would be better to have a person with practical knowledge?—It would be much better for the owners. These oil-machines are all new, and only came into use a few years ago. They will naturally decay and go to pieces, and the owners will have to employ a doctor. It would be in the interests of the owners to have practical men.

430. Say there is a grade provided for this class of work, do you think it is necessary that the time served should be the same as for marine-engines and boilers?—Not necessarily. Less practical experience with the tools would do, I dare say.

431. Can you give the Committee what you consider to be a reasonable mechanical qualification for a man to drive?—Perhaps two and a half or three years' apprenticeship. A clever lad would, if he had any taste at all for the work, make a very good mechanic in that time.

432. And you are of opinion that there is just as much risk with these oil-engines as with steam-engines?—Yes; if they break down there is the same danger to life and limb.

433. Is there any pressure in an oil-engine?—Yes, practically the same as steam. The firing point of oil is 266, and in steam 160 pressure is just about the same.

434. *Mr. Houston.*] You said that one of these certificated engineers had been on board of one of these vessels and did no work, and you said he did not want to: will you explain?—You cannot make a horse drink if you take him to the water.

435. Was it on account of his not having the necessary qualification?—I do not know.

436. Do not you think he was disgracing his profession if he went on board and took the owner's money without doing anything for it?—Yes; I think it was very low down. If a man does not do something equivalent to his wages, he is no good at all. I do not know the man, and do not know the circumstances.

437. Are you aware that the owner of an auxiliary oil-engine advertised for a certificated engineer?—Yes, I believe he did.

438. And got several applications?—I am not aware of that.

439. Are you aware that several certificated engineers went on board and were unable to start the engine?—I am not aware of it.

440. Are you aware that an advertisement was put into an Auckland newspaper offering the sum of £10 to any certificated engineer who would come and start one of these engines?—I think it was £15. I read the challenge.

441. Are you aware whether any engineers answered that challenge?—I do not know. I do not know that I was in Auckland at the time.

442. *Mr. McKenzie.*] If you had accepted the offer, could you have started it?—Yes.

443. *Mr. Houston.*] You are not aware whether the challenge was accepted or not?—I have no idea.

444. Do you think that if capable, they would have done it?—I think I would. I would have scooped up that £15.

445. Do you consider it would have been derogatory to the profession for any certificated engineer to take up that challenge?—I do not see that it would.

446. *The Chairman.*] At any rate, you would have done it?—Yes, and considered I would have earned the money very very easily.

447. Would you have known, from your professional standing in Auckland, whether that challenge was accepted or not?—No, I would have nothing to do with it; I would take no notice of it.

448. *Mr. Subritzky.*] You were the Inspector of the "Toroa" when she first came to Auckland? Could you find any fault with the working of her engine with no certificated engineer in charge?—No.

449. And yet the engine comes to Wellington and clews all the engineers up. Can you tell me why that is so?—She was a little older then, and had been knocked about by non-professional men; or novices had been in charge and had disarranged the machinery.

450. You were on board the "Greyhound" when out on her trial trip, with Mr. Jobson?—We had a special trial.

451. Could a marine engineer, no matter of what standing, have worked the engine better?—No.

452. Yet there was no marine engineer on board.—Just so.

453. How is it, then, that the engines are represented to be so hard to work that you must have a first-class mechanic to work them?—They are not hard to work—I never said they were; but I think I said the man in charge of the "Greyhound" and "Toroa"—they are one and the same man as far as I can understand—went about his duties like a professional man. He was a born mechanic.

454. Have you heard from Mr. Jobson that there was anything wrong with regard to the engine of the "Medora"?—No.

455. Are you aware that each time he inspected that engine there were two different engineers working it—brothers?—I did not know.

456. They took it to pieces for his inspection?—Yes. I suppose the family is endowed with mechanical knowledge.

457. And you say you could have started the engine on the "Toroa"?—Yes. I have started engines that had never made a revolution before.

458. The following advertisement was inserted by me in the *New Zealand Herald* on the 18th March, 1899: "Notice,—Wanted, any first- or second-class marine engineer to come on board schooner 'Toroa' and work the oil-engine for one hour; quarter of an hour given to start the engine. Must be responsible for any damage to ship or machinery. I will give £10 to any one who can comply with the above. I have a man who can start the engine in five minutes, and work the same for twenty-four hours. This is open to any first- or second-class marine engineer from 8 a.m, till 12 noon to-day (Saturday), 18th March.—H. SUBRITZKY, schooner 'Toroa.'—18th March, 1899." This was when I was driven into a corner and could not get any man to drive the engine.—I do not remember seeing that advertisement.

459. *The Chairman.*] Would you have accepted that challenge if you had been in Auckland and had seen it?—I do not think it would have been proper for me to have done so, as I was an Inspector; but if I had been an engineer there I would have done so.

460. Could you go on board the "Toroa" and start her?—Yes.

461. If the owners of these vessels say they are prepared to give £100 to any institution if any marine engineer can go on board and blow up an oil-engine in the ordinary way of working it; what do you say to that?—I do not suppose they could blow it up. It could not be done, so far as my knowledge goes.

462. *Mr. Crowther.*] Then, how comes it that you put so much stress on the pressure that these engines are carrying as compared with steam-engines?—I am not putting any great stress on it. I say they are just about the same. I know that oil vapour is just the same as steam vapour.

463. And you spoke of piston-rings: there are grooves for them to fit in?—Yes.

464. And you could not get the piston to work unless they were in these grooves?—Yes.

465. And you cannot put them in wrong: you could not get the piston to work if not in its place?—No.

466. *Mr. Hare.*] Do you know the schooner "Brothers"?—Yes.

467. Have you been on board her?—Yes.

468. And seen her engines?—Yes.

469. What do you think of them?—I think they are a fine piece of machinery.

470. Is it well kept?—Yes.

471. Seems to be working satisfactorily?—Perfectly.

472. Are you aware who drives it?—I am aware. I remember the lad. A smart lad he was.

473. Are you aware whether he had had any experience as an engineer?—No experience except what he has gained in Whangaroa.

474. And you thought that engine was entirely satisfactory and was doing its work as well as a steam-engine?—Yes. The only defect was that the thrust-bearing was a little turned, but that was not due to the lad. I examined it. It was there when the engine came to New Zealand. It was a frivolous thing.

475. With regard to the oil-pipe on the "Oban," do you think if the oil-tank was fixed on the deck there would be sufficient gravitation?—Not in the seaway. You know there is a very small supply-pipe—about $\frac{3}{16}$ in. in diameter. Perhaps you know that a fly can stop an engine?

476. How would you stop an oil-engine?—I would put a fly in the pipe and stop the supply of oil.

477. *Mr. McKenzie.*] Suppose that lad, who you say was looking after the oil-engine so satisfactorily, had one or two rings to fit?—There may be three.

478. Suppose they were just as they were cast, without having been fitted; do you think that lad could fit them in?—No; it would be foreign to him. I think that would be beyond Mr. Hare, jun., although a smart lad.

479. Suppose this lad did put one of these rings on and it broke, what effect would it

have on the cylinder?—Very likely score the cylinder. The explosion would pass down through the grooves and impair the efficiency of the engine. It would have to come out and be repaired.

480. You saw the advertisement that was in the Auckland newspaper; is it possible to fix an engine so that no engineer could work it for an hour?—I suppose it is.

481. So that there is nothing in this advertisement at all?—They might be able to do something to the engine which would prevent it working.

482. It might be so fixed that the engineer would have to take it all to pieces?—Yes; they could have done something with it.

483. So that the £10 was perfectly safe?—Yes.

484. Supposing you tried, could you take that engine to pieces in an hour?—No. I should like to get two hours.

485. What pressure would an oil-engine get a certificate for?—We do not restrict the pressure. The mean pressure is about 180. You can regulate the pressure.

486. Suppose that engine was in work, and anything went wrong, and the pressure could not be relieved; could it be increased so as to burst the cylinder?—It would stop it.

487. Have you surveyed the Monitor or Mogul engines?—No.

488. *Mr. Monk.*] You said there was just as much danger with an oil-engine cylinder as with a steam-engine; will you explain to me what constitutes the danger?—The pressure in the oil-engine is 180 lb. to the square inch, and the pressure in a steam-cylinder is practically the same. It is a question of study to hold on those two covers.

489. Is that what constitutes the danger in a steam-engine; is it merely the pressure on the cylinder-head?—There is no danger to the cylinder from explosion; it is the boiler. If an oil-engine generates water it will blow the head off, as it did in the case of the "Mokau." If the water gets into the end of the piston it will knock the cover off.

490. What was the momentum?—The momentum was in the fly-wheel. Water is non-elastic, and therefore it will knock it off. While the air is there free from water it will not knock it off. There are very few cases of the cylinder-head being knocked out of a steam-engine. I have never, in all my experience, seen a cylinder-end knocked out by water.

491. *Mr. Duncan.*] Is there not a valve at the back to prevent that accident happening?—Yes; a relief-valve.

492. Have you known any accident to a boiler in your experience in New Zealand?—Yes; sometimes there are slight accidents with all boilers.

493. But the boiler is a very safe factor in your experience in New Zealand?—Yes.

494. *Mr. Crowther.*] What happens when the tubes begin to leak?—That is when the trouble comes.

495. *Mr. Duncan.*] Would there not be the same danger, if there was leakage, if the oil-tank were in the bow of the vessel as if placed in the engine-room?—Yes. I think if it is placed under decks forward it might be more dangerous there.

496. And the gases might not escape?—No.

497. The supply-pipe between the tank and the engine would be led along the lower and upper part of the hold, and if the hold were filled with cargo when anything went wrong they would not be able to do anything until the cargo was displaced?—No.

498. You know the "Beryl"?—Yes. The driver drives his own launch. It is used for fishing and little excursions. It was built in Auckland by the Century Motor Company. The owner has had very bad luck with it, and would be very glad to get quit of it. He would sell it at less than half price. He was a novice at it.

499. Take the "Sunbeam"?—I remember the "Sunbeam"; she is a launch. She is run by the owners—novices—but not successfully. The last time I saw her she was in the hands of the doctor, getting some rings put in. She has a Union oil-engine.

500. Do you know anything about the "Mona"?—Yes. Mr. Smith, of Kaipara, is the owner; Union engine. The "Mona" was not successful. The man who owned her at first returned her and bought a steam-launch. Mr. Smith, at Kaipara, has given it to a first-class man who holds a certificate, and he keeps it in repair for him. Mr. Smith gets it when he wants it.

501. Take the "Nellie Brown"?—She is a Kaipara boat.

502. Is she successful?—She is an open launch, running up a creek. The man who runs her owns her. She is a Union boat. Her power is two and a half or three horse. The owner gets on very well with her, but he told me that if he had got a little mechanical knowledge he would have got on very much better.

503. Take the boat called the "Coy," at Tauranga?—She is a launch. The owner runs her himself. He has been stuck up once or twice, and gets a second engineer if he wants some one to do repairs. At the last survey I pointed out several defects which might lead to ducking or drowning when he takes out his wife and children. He might be knocked on the beach in bad weather.

504. Take the "Dolphin": does she work well?—Yes. She was taken from the Kaipara to Hokianga. While at the Kaipara there was a novice who owned her. He sold her, and a third-class man was put on board, and he took her to Hokianga. I have heard that the men who took her over were novices and took the engines out of her. After the novice took her up they had very bad weather and could not manage her afterwards.

505. Take the "Tawhera," at Gisborne?—She is driven by a river engineer, and goes into the roadsteads for cargo from the large steamers. At first they had a lot of trouble with her, but now manage her well.

506. Take the "Pareora"?—She is on the Kaipara. Previous to going there she was with the Waiuku Steam Navigation Company, and tendered the "Weka." She was a complete failure,

and is owned by an entire novice. She was practically useless. She was sent back to the owners and lay on their hands. The man who took the "Dolphin" to Kaipara has run her about three thousand miles without a hitch. She is about three or four horse-power.

507. Take the "Tairua"?—Meinburg owns and runs her. He has a third-class certificate and has no trouble with her.

508. What about the "Queen of Beauty"?—She is at Auckland, and is a private yacht. She has not done much running and is managed by the agent of the Union engines in Auckland. The man has a river certificate, I believe, and has no trouble.

509. Take the "Norseman"?—She is another private yacht. Mr. Bluck was owner, and ran her very successfully. He is a mechanical man, and built or partly superintended the building of the yacht. She has a Century Motor Company's engine, and their engines are as good as the Union's. The workmanship is very good.

510. There is a private yacht owned by Mr. Henderson?—Yes. He has had a lot of experience in oil- and gas-engines.

511. What about the "Thistle"?—They had some trouble with her at first. She is a twin-screw boat of ninety-five-horse power. She gave a little trouble at first, but has been very successful for a long time. She is run by a third-class engineer—a practical man.

512. Tell us something about the "Waiapu"?—She is a home-trade boat, run by Captain Martin. I surveyed her recently. Captain Martin was compelled to take a certificated man on board. He was his own engineer up to then, and seemed to manage the boat very successfully. He must have three or four years' experience. When the law came into force providing for a certificated engineer to be carried, he got one, but somehow or other he was very antagonistic to the young man. He would not allow him even a chance to start her, but put him in the galley to cook for the crew. I told the captain that I knew the lad, and that he knew more about machinery than he knew about cooking. I saw the lad also, and told him he ought to think himself a very lucky man to get £10 a month for taking lessons in cookery. He was learning another profession.

513. There was another little boat called the "Worksworth"?—Yes, Captain Standen. His boy acts as engineer, and I think they have done fairly well. The last time I saw Captain Standen he was complaining very much about the expense of keeping her up.

514. In the case of the "Hercules," there is a practical engineer running her, and in that of the "Brothers," the young fellow is a born engineer?—Yes, but not certificated.

515. *Mr. Symes.*] You have said that the "Waiapu" was running several years successfully before the owner was compelled to take a marine engineer?—Yes.

516. Just as successfully as she has been running since?—The marine engineer was put into the galley; he did not take charge of the machinery. The captain said he could not give him a discharge as an engineer, and I said, "You could not give him a discharge as a cook."

517. Has she been running as successfully since?—There is no engineer on board.

518. Is he not compelled to take an engineer?—No, he has got a permit; and, as he employs a captain, he takes charge of the machinery.

519. Do they generally pay cooks £10 a month?—No, that is what the boy laughed at.

520. Does this boat carry passengers?—No; cargo.

521. Do you know at whose instance this law was first introduced compelling vessels with oil-engines to carry marine engineers?—I have no idea.

522. How long has it been brought into force?—This is the first year, I think.

523. I think you said you did not know whether the engineers were antagonistic to oil-engines or not?—They evidently showed some feeling when they formed a deputation to the Minister about it.

524. Could any marine engineer go straight away and work one of these engines?—Perhaps he could not start one, but he could work it. He could take charge of the engine, although he could not start it.

525. *The Chairman.*] Supposing some one started one, could an engineer stop it?—Yes.

526. *Mr. Symes.*] No matter how highly certificated these engineers may be, they cannot, without experience, work these oil-engines. That is your evidence?—Without trial.

527. Do you think it fair that the owner of a vessel should be compelled to pay a man to work an engine when he cannot do it?—The oil works it. If they are not able to start and stop the engine they are of no use. Where you would find one or two who could not start the engine you would find a dozen that could.

528. Do you not think there should be some provision made that, when an owner has hired one of these men, he should be competent to manage the engine?—Yes.

529. And he cannot do that without some experience?—He should have a trial.

530. Do you think it right that the owner should pay for teaching that man?—No, the men should make themselves qualified, and not make fools of themselves before going on board. I should be sorry to go on board and not be able to start an engine.

531. You have heard of failures?—Yes.

532. Is it not a fact that you have heard of more failures than successes?—No, I have not. Those I have quoted—there must be about a dozen—I think are all pretty successful but two; and there must be men who can handle tools.

533. You have told us there was a great deal of trouble about fitting rings, and that a man must be competent to do it?—There is no trouble, but a man must be competent to do it.

534. Have you ever seen a reaper and binder, or a hydraulic ram?—Yes.

534A. There is a good deal to go out of order in those machines?—Yes.

535. Yet it is possible for a man with an ordinary intellect to repair them?—Yes.

536. It is not necessary for him to be an engineer?—No.

537. Experience should be one of the main tests, beyond the ordinary use of tools?—Yes.

538. And you think that should be provided at the engineer's own cost, and not at the cost of the owner of the oil-engine or the boat?—Yes; it is only for a little while.

539. *Mr. R. McKenzie.*] Do you consider that knowledge of oil-engines should be included in the marine engineer's examination before he gets a certificate?—They might add that to it.

540. Are there any books available in the colony where a certificated engineer, as well as any one else, can get the information?—Yes.

541. If you gave him this catalogue [Monitor Vapour Engine and Power Company's] for a few hours, an engineer could be as capable as any man?—Yes, if the parts are marked. If he likes to digest that he could work the engine.

542. What is the most important part about oil-engine machinery, and constitutes the very essence of knowledge about an oil-engine?—The piston perfect, tight, and close-fitting in the cylinder, free from any grooves or blow-holes, or defects in either piston or cylinder.

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