

SESS. II.—1897.  
NEW ZEALAND.

GOLDFIELDS AND MINES COMMITTEE

(REPORT OF, ON THE CYANIDE PROCESS GOLD-EXTRACTION BILL).

*Brought up 14th December, 1897.*

REPORT.

THE Goldfields and Mines Committee, to which was referred the Cyanide Process Gold-extraction Bill, has the honour to report that, having duly considered the same, it is recommended that the Bill be allowed to proceed, subject to the amendments shown in a copy of the Bill attached hereto. 14th December, 1897. W. J. M. LARNACH, Chairman.

MINUTES OF EVIDENCE.

23RD NOVEMBER, 1897. (HON. W. J. M. LARNACH, C.M.G., Chairman.)

Dr. BLACK examined.

1. *The Chairman.*] You are the Professor of Chemistry of the Otago University?—Yes.
  2. The Cyanide Process Bill is being considered by this Committee. You have some explanation, I believe, to make in connection with it?—I would rather like to be asked the question where it has been used for the last four or five years, and the ores it is suited for.
  3. Whom do you represent?—I do not represent any one.
  4. Who has brought you here?—The Minister of Mines has brought me. I am in Wellington in connection with the explosion case at Brunner, and, being here, some one suggested that my evidence would be useful in deciding this case. I do not appear for any one at all.
- Hon. A. J. Cadman:* I may say that the firm of solicitors acting for the company, Messrs. Stout, Findlay, and Sim—Sir Robert Stout spoke to me about Dr. Black being in town and would like to give his evidence, and it is on that understanding that Dr. Black is here. Dr. Findlay has questions prepared, to extract the evidence from Dr. Black, which questions I have seen.

Mr. H. HOWARD GREENWAY examined.

5. *The Chairman.*] I believe, Mr. Greenway, you represent the cyanide proprietary, and that you have some explanation to give in reference to the process now before the Committee?—Yes.
6. Mr. Greenway seems to be the principal in this colony who represents the Cassel Company. Are you not?—Yes.
7. *Dr. Findlay.*] You are the attorney in the colony for the Cassel Company?—Yes.
8. The patent was taken out, I believe, in February of 1888 in this colony, and it was first tried in the North Island. Had the company any difficulty in getting the process employed?—Yes, a great deal of difficulty. We sent a representative in 1889, and he did his best to introduce the process, but could not persuade people to take it up. They looked upon it as ridiculous that the cyanide could do the work. Then the company had to take an interest in the Crown Mines Company on the condition that the company would use the process.
9. It was not until what year that it began to be used commercially apart from the Crown?—In 1894.
10. At that time had there been any return from the royalties?—The first return came in the year ending 1894.
11. Between 1888 and 1894 the company had obtained no money from royalties?—Up to 1893, during the year ending 9th July, £472.

12. Up to that time had you spent any money?—Yes; a good many thousands.

13. It seems to have taken about four years to start here. Will you tell the Committee what mines it is used in?—Waihi, Waitekauri, New Zealand Crown Mines, Talisman, Try Fluke, Kapai Vermont, Great Mercury, Te Aroha, and some others in the North Island.

14. What places in the South?—Premier Mine, at Macetown, and the Tipperary Mine, owned by the New Zealand and Westralia Explorers Company, and also companies using it behind our backs at other places—for instance, at the Big River tailings.

15. At any other places as well?—Yes.

16. Can you give me an estimate of the amount of gold saved?—Over three-quarters of a million.

17. Upon a steady increase since 1894?—Yes.

18. Can you give the figures since 1894?—For the year ending June, 1894, there was recovered by the cyanide process £61,537 worth; in the year ending June, 1895, £159,320; for the year ending June, 1896, £195,547; and for the year ending 30th June last, £257,320; and since that during a period of four months, up to the end of October, a little over a £100,000—that is for the four months.

19. That totals something over £300,000 a year?—Yes. A total of £773,721 has been recovered by the process since the end of 1893.

20. What royalty has the company been charging?—7½ per cent. on all the bullion recovered by the process.

21. These sums have not actually been obtained, but charged?—We have not been paid since litigation started.

22. Do you know whether the patent has been validated in the United States?—Yes; we had an action in connection with the Mercury Company there, and they were mulcted in damages to the extent of 20,000 dollars.

23. What about the Australian Colonies?—It was the same there.

24. Is the company carrying on its business in Canada?—Yes.

25. Obtaining royalties?—Yes.

26. In India?—Yes.

27. In Chili?—Yes.

28. In the Straits Settlements?—Yes.

29. Has the company lost its patent rights where any other law prevails?—No.

30. Was it not lost at the Rand, where the German law prevails?—Yes.

31. Any other place where English law rules?—No.

32. Have you an intimate knowledge of the goldfields of the North Island?—Yes.

33. Do you know if there would be a wider field open to the process if the royalties were reduced?—Yes.

34. Could you give some illustrations?—Of course there are a large number of reefs in every goldfield which are of a low grade, of about £2 a ton—about the same value as the Waihi-Silverton—and the cost of treatment to them is something like £1 15s. or £1 16s., so that only getting £1 19s. or £2 would leave them 2s. or 3s. per ton profit. A 7½ per cent. royalty in a case like that would not add to their profit.

35. If the royalty were reduced these lower-grade ores could be treated, and the tailings?—It would apply to the tailings as well.

36. How many localities in the North Island where these low-grade ores occur?—Nearly every goldfield in the North Island.

37. *Hon. A. J. Cadman.*] You charge 7½ per cent. on the total bullion that is recovered by the company?—Yes; by the company using the process.

38. Do you consider it fair to charge 7½ per cent. on the whole return from the mine when probably by the ordinary process the mine would produce £1 a ton, and by introducing Cassel's process it extracts £1 10s. a ton? Do you think it fair to charge the whole of the royalty?—The companies who are able to treat their ores thus economically treat them by amalgamation first, and only use cyanide for the tailings. They are then only charged the royalty on the amount recovered by the cyanide. They are not charged on the bullion recovered by the prior amalgamation.

39. I understand, then, you do not charge on the full returns from the mine?—Only when they use cyanide, and cyanide only. In many of the mines up North they crush dry, because, by amalgamation they not only can get next to nothing out of the ore but lose a lot in the run-away, and the tailings are not so easily handled; so they crush their ore dry, and then use the cyanide. The whole of the bullion is then recovered by the cyanide. Then it is a matter whether the cyanide should be used in that way or the other.

40. Say a mine with the ordinary stampers and berdans get a ton, out of which they get £20, and instead of using the stampers they use the cyanide and so get £30, they would then only pay royalty on the £10 additional they got from the cyanide?—The Try Fluke Company crush dry and then treat their tailings quite apart, as a separate thing, and then they only pay the royalty on the bullion recovered from the tailings.

41. Are they all in the same boat?—No. We will take the Crown, Waihi, and Waitekauri: they prefer to crush their ore dry, and to use the cyanide for the whole of it. They do not have any preliminary work. They take it practically from the battery, and so the whole of the bullion is recovered by the cyanide. They run the residue from the tailings over mercury plates, and then they recover a little of the very gross gold which the cyanide has not time to extract. With both extractions they remove all their bullion.

42. *Mr. Lang.*] You explain to the Committee as an argument for the colony taking up this patent that they could make a reduction in the rates of royalties. Would it not pay the company to reduce the rate of royalty?—It may, but it should surely be argued from the company point of view. We have to recover great expenses, first of all in exploiting the process, and secondly in the

Courts. We have been badgered in one country and another. Then, when you first try to introduce the process it is very difficult to get anybody to take it up. You have to start on the mines that are in a better position than others to use it. We have had to gradually work it up. If we had started with a low royalty when we only had the few companies we at first had, we would have had no revenue. The life of the patent is very short, and we have to make hay while the sun shines.

43. *Dr. Findlay*: The life of the patent is four and a half years, with a right of applying to the Governor for an extension, and it is in his discretion to give a further extension of the time or not. The Governor may refer it to the Court, but he need not do so—will inquire whether the patentees have had a fair harvest from their patent, or whether their right is to extend. It is optional with the Governor, but we can only rely on four and a half years.

*Mr. Carnecross*: On the discretion of the Court?

44. *Dr. Findlay*: Yes, on the discretion of the Court; but the Governor refers it to the Court in his discretion. If the Governor refuses we have no remedy. I cannot find a case in English practice where the Governor has refused. It is a constitutional rule that it should be referred.

Dr. BLACK examined.

45. *Dr. Findlay*.] Do you know anything about the nature of this process, Dr. Black?—Yes.

46. Was it a real discovery?—Yes; it was a real discovery. A discovery in this sense: It was known fifty years ago that cyanide would dissolve gold. After a labour of years two Glasgow men discovered it. I agree with Mr. Park that the discovery of the fact that a dilute solution of potassium will dissolve gold must rank amongst the most remarkable discoveries of this century, a widespread application of this fact marking an epoch in the history of gold-extraction. It is certainly most important for this colony.

47. Do you know any application of it prior to the patent?—No.

48. You were consulted by the directors?—The man who brought it to the colony consulted me. He explained to me his process, and wanted me to experiment for him, and I was then convinced that it would come to no good. I would not spend the money. I believed it would not succeed, because I knew that those who had dissolved gold long ago had great difficulty with it.

49. Do you know that a chemist was sent to New Zealand in 1890 named McConnell, and that he endeavoured to promote the use of the process throughout the colony?—Yes.

50. Do you know from your own knowledge that what Mr. Greenway has said is a fact: that until 1893 it was not used here?—I believe that is a fact.

51. Do you know if the process was used on the Waihi tailings?—Yes.

52. Do you know what the facts were?—There were some 27,000 tons of tailings there which were not capable of being treated successfully by any process. McConnell, or the representative of the cyanide people, got these tailings and applied the cyanide process to them, and I am told that they recovered something like thirty thousand pounds' worth of gold—a little over £1 a ton.

53. That was in the end of 1893?—Yes. That was the first I heard of the success of the process. That marks the beginning of its success in the colony.

54. You have heard the names of the mines Mr. Greenway has said it was used in?—Yes.

55. Do you know the names of the mines in the South Island, and their output?—Yes.

56. Do you know what the total output of the colony is per annum?—About a million pounds sterling in value.

57. We have been told previously that £320,000 is about a third of the total output?—Yes.

*Dr. Findlay*: The figures are from an official report.

*Mr. Greenway*: That would be the average. £80,000 in the last three months.

59. *Dr. Findlay*.] You have an intimate knowledge of the goldfields of the colony?—Yes.

60. Can you see any further fields for the employment of cyanide?—Yes. The whole of the ores on the eastern coast, starting at Ohui, for a length of seventy or eighty miles down that coast, and for a breadth of fifteen miles, no other process will treat the gold there except cyanide.

61. Supposing the process were free, can you say that its use would be extended?—Sure to be.

62. Upon a rough average, what is the value of these tailings and ores?—You cannot state it roughly. They vary from 5s. up to pounds. You cannot form an average.

63. Would 2½ dwt. or 3 dwt. in tailings pay if the process were free?—Yes, they might.

64. At 10s. or 12s. a ton?—Yes, for tailings already crushed.

65. There are, then, very wide fields up the North Island if it were free or cheaper?—Yes, certainly.

66. Do you know if the present royalty is a bar?—Naturally it is. It is a bar to a certain extent. Take the case of a man obtaining two pounds' worth of gold a ton. On the assumption that it takes £1 17s. to mine the ore, and to extract the gold by the cyanide process, there is only 3s. margin left. The royalty on this amount is over 3s., and there is, therefore, nothing left. Had there been no royalty there would have been that margin, which in a large mine would be thousands a year profit. It would be a profitable concern then.

67. Do you know any tailings in the North Island which, if the process were free, could be treated?—I do not know any in the North Island. There may be at the Thames—I do not know. There are mines, however, in the Ohui district not now working, but which would be working if the process were cheapened. All the mines down at Karangahake, and probably some about Waiorongomai—no doubt there are mines there ready to begin if there was no royalty. Also in the Whangamata district. Two mines in the Whangamata district are erecting cyanide plants, and will work by the process on a large scale.

68. Is there any field for it in the South Island?—There are lots of tailings there, at which very likely it would be profitable.

69. Do you know any at the Big River?—Yes.

70. Globe?—Yes.

71. Francis Drake?—Yes; and also a large quantity of tailings.
73. Barewood?—Yes.
74. Preservation Inlet?—Yes.
75. Cromwell?—Yes. Big tailings there.
76. Rough Ridge?—Old Man Range, &c.
77. Could any of these be treated?—Yes; and there are lodes there which the process might encourage.
78. You think there is a field in the South Island?—No doubt of it.
79. It has been suggested that if a company is working a poor ore, and has the prospect of being able to treat the tailings with cyanide with a cheap royalty, it would be induced to treat these low-grade ores?—Yes; it would be a great accessory to every other process.
81. There is a process called the "Permanganate process"?—Yes; it is a French invention.
82. Do you know anything about it?—Yes.
83. Can you tell me if that process is likely to conflict with the cyanide process?—No; they occupy different fields altogether. With the permanganate roasting is always necessary, but in the case of the cyanide there is no such thing necessary.
84. Would that roasting keep the permanganate out of the field?—No.
85. Will the cyanide extract as much gold from the same ore treated with permanganate?—I could not answer that. Different kinds of ore give different results.
86. The chief objection you see is the cost of fuel in roasting?—Yes; there is the cost of roasting to be considered always. If the cyanide is suitable they would never dream of using the permanganate, and there would be no competition between them. The two of them together would be a very good thing for the goldfields of the colony.
87. Have you heard of the process called "Siemens-Halske"?—Yes.
88. Do you know if it has been used in the colony?—No; it may have been used.
89. It was registered here?—Yes, subsequently to the cyanide. They use cyanide.
90. What is the difference?—There is no difference in the solvent. The solvent is the same in the two cases. The essential fact is the solvent cyanide is common to both.
91. Assuming that the cyanide patent is valid, the Siemens-Halske must withdraw the cyanide?—Yes. The only additional factor is that they precipitate by a different method, that is by electricity. The only difference is the electricity.
92. Assuming the cyanide patent stands, that is the only part they can use?—Yes.
93. It has not been used commercially in the colony?—I do not think so.
94. *Hon. A. J. Cadman.*] I will ask a question or two which may appear hostile to my own Bill, but I want the Committee to see both sides of the question. You named certain districts in the North Island which you said this process would suit, and then later on I understood you to say that 2 dwt. or 3 dwt. extracted would pay?—That is, the tailings. The tailings being already ground and ready for the process right away would have no further expense upon them. For unmined ore of that value it would never do. It would not at all pay.
95. You are aware that, in the North, silver largely predominates in the ore. When you say 2 dwt. or 3 dwt. do you mean 2 dwt. or 3 dwt. of bullion?—No. Of pure gold value. Ten or twelve shillings' worth of bullion.
96. You mentioned certain districts in the North which you gave as samples of where the process could be applied. What proportion of the goldfields have you named?—I have not named very many yet. The best of the eastern side, from Cape Colville down to Te Puke, is all suitable for this process; over an area of 120 miles in length by 10 or 12 miles in breadth, down to Te Puke.
97. Are you satisfied that the mines there can treat this process?—The Coromandel and Thames mines are utterly unsuited for it. There might have been some previous treatment by which it would have been rendered suitable, but I am not aware of it.
98. You mentioned the Waiorongomai district. Do you know of any claim which could use the process?—No. I do not know about the tailings there, whether by a previous roasting of the tailings they destroyed some of the objectionable stuff.
99. *Mr. Lang.*] In that case the permanganate process would be as well?—Yes. The copper of the Waiorongomai would be an objection to the cyanide process.
100. *Mr. J. Allen.*] I think you said that there were ores varying in value from 5s. a ton to £1 a ton that could be treated by cyanide?—No; I did not say that. I was asked what was the value of the ores in that country; what was the average value. I would not give the average value, but said that there are reefs there containing from 5s. to pounds value per ton, and that I did not think anything under 30s. would pay to work by any process.
101. *Dr. Black:* the Bill makes provision that, "On and from the expiration of one month after the passing of this Act it shall not be lawful for any person to directly or indirectly use or employ, for the purpose of extracting gold or silver from ore or other compounds,—(1) The said patent rights or any of them, or (2) In the absence of the said patent rights, or in so far as they or any of them may cease to exist or may not extend, any process wherein cyanide of potassium, or any compound of cyanogen in any form, combination, or strength whatsoever, is employed as a solvent, unless he is the holder of the license under this Act." Is not that going beyond the patent rights of the Company? Is it not possible that some combination of cyanogen could yet be discovered which would not infringe this patent, but would infringe the above clause, and be useful as a gold-extraction process?—There may be a combination of cyanogen capable of dissolving gold. It may well be. Such as the chloride or bromide of cyanogen.
102. *Mr. J. Allen (to Mr. Greenway).*] You appear with *Dr. Findlay*, and with your witness, *Dr. Black*, on behalf of this Bill?—Yes. On behalf of the agreement.
103. You told us that there were several companies using the cyanide now who pay no royalty?—Yes.
104. Why is that?—Because we have had our hands full with our litigation with the Govern-

ment, and it was no use entering into other actions for the same purpose. The Government started to take action for revocation, and we have been defending the action. It would have been inadvisable to take action for infringement when this action was at issue.

105. You told us that you charged a royalty of 7½ per cent. on the total bullion won by the process. My calculation makes that out about £56,000?—I said that was the arrangement we made; but you can quite understand that during the last two and a half years that litigation has been going on we cannot come to terms, so have not made our arrangements on that account.

106. I understood you to say that there were several people paying no royalty?—Yes. Our rights have been disputed by the Government, but now that we have got the amendment put through we will proceed.

107. You say your rights were validated by the Courts in the United States? Was that the highest Court?—No.

108. I suppose at the Court of the State?—Yes; no appeal was taken.

109. Is the amendment of the patent all that you require?—That validates it, as it brings it on a level with the Court of Appeal judgment in England.

*Dr. Findlay*: There had been an appeal in England, but there was a defect in the specification, which was corrected in the amendment, and the patent in England is now perfect. We are moving in New Zealand now to have the same formal amendment made in its place.

110. *Mr. J. Allen*.] Is the patent absolutely perfect in England?—Yes.

111. The life of the patent is four years and a half?—Yes.

112. And you have no absolute right at the expiration of that time to get from the Government a continuation (to *Dr. Findlay*)?

*Dr. Findlay*: The Government, I understand, would give us leave to apply to the Supreme Court, and the Supreme Court would weigh the merits of the case, and if they thought we had not sufficient time to recover the money they would allow us an extended time.

113. *Mr. J. Allen* (to *Mr. Greenway*).] In this memorandum of agreement there are four mines exempted?—They have another arrangement. They paid us a lump sum instead of paying us a royalty.

114. Do these constitute the chief mines?—They are among the chief mines. The Waihi Union has not a plant up yet, although they have the right to use the process.

115. Is the cyanide used for the extraction of silver?—Yes. It is part of the patent.

116. *Mr. R. McKenzie*.] You say that the patent is perfect in England?—Yes.

*Dr. Findlay*: The Court of Appeal decided there was a defect, and on that ground they would not enter up judgment in favour of the company. The appeal failed in view of the perfect patent. Of course it is a question of law. There is no question that the patent is perfect in England.

117. *Mr. R. McKenzie*.] You also state that your amendment was granted in the colony about three years ago?—Yes.

118. Will you give the names of the mines you are receiving royalties from, except those in the Bill, and the amounts you receive?—The ones in the bill pay a lump sum, but we have not got our royalty during the last two and a half years, because the other companies have refused to come to terms while the present action with the Government pends.

119. You mention that since you got your amendment your patent is perfect. Have you taken any steps to enforce it?—We were waiting on this agreement with the Government.

*Dr. Findlay*: The amendment was perfected about three weeks before the agreement was signed.

120. *Mr. R. McKenzie*.] Was not your patent upset in Victoria or New South Wales?—No.

*Dr. Findlay*: You see the agreement prevents us receiving royalties. Mr. Justice Edwards's judgment was only given a few weeks before that agreement was signed. In view of the agreement we desisted.

121. *Mr. R. McKenzie*.] *Dr. Black* says the patent can be used in Reefton?—It is being used just now in the Big River tailings, and I believe they are getting 80 per cent. of the gold out just now. It is being used for extracting the gold and not for experimenting at all. They have bought the tailings and are working them out rapidly.

122. Any other place at Reefton?—The Cumberland and the Drake and Globe people have tailings there suitable for the same process, but I do not know whether the bargain is settled yet. I think the same people are taking it up.

123. Is it a modern invention?—The knowledge of the fact that cyanide dissolves gold is about seventy or eighty years old, but it is a discovery that a dilute solution of it can dissolve gold on a large scale in the ores.

124. Is it a very expensive process?—No, it is a very cheap process.

125. *Mr. Fraser* (to *Mr. Greenway*).] What amount of arrears should your company recover for patent rights?—Outside the companies mentioned in the agreement there was, up to the end of August, due to us nearly £5,000 for arrears.

126. That is, moneys owing to you which you now claim you could recover?—Yes.

127. *Mr. R. McKenzie*.] The Bill prevents the possible working of another process. It prevents the Siemens people using the process. As a matter of fact, passing in its present form makes that patent useless in the colony so far as the cyanide is concerned?—Yes.

128. This Bill takes away the patent rights altogether. The two patents cannot stand together. Will not the chief clause take away their rights without their having any option?—Yes.

129. The fact of the patent being registered gives them the right till then?—It does give them the right, but their patent is always attackable.

130. *Mr. Carmichael*.] I understand, *Mr. Greenway*, that for the last two years you have been engaged in litigation?—Yes.

131. And during that time you have not been able to collect your royalties?—No.

132. And for the last two years they have accumulated?—Yes. They have accumulated from the infringers. The Crown, Waihi, and Waitekauri paid a lump sum and finished with it. There is nothing due from them.

133. Outside of these people are there any people honestly paying a royalty?—Yes. Two in the South Island.

134. *Mr. Mills.*] Do I understand, Mr. Greenway, that the company reserves all their rights against those who have not made arrangements with them?—In the agreement, yes. Up to a certain date which was mentioned, these royalties are of course ours. Defalcations have taken place before that date.

135. You can allow no right to the £5,000?—No. The company reserve their rights to receive the £5,000.

136. *Mr. McGowan.*] Mr. Greenway: how many other companies out of the number you have named using the cyanide in the North Island are in the same position as the Vermont, saving a portion of their gold in the ordinary way, and then paying their percentage on the gold saved by the cyanide process?—The Try Fluke, the Great Mercury—that is all in the north.

137. And yet you have been drawing a royalty from the total product of gold from other companies?—Yes; except during the last two years or so.

138. These are the only two mines in this position?—Yes.

139. Are there not a great number of other mines who might be in the same position if they were in a position to come to terms with your company now?—Yes. I believe there are a number of mines who could treat their tailings. Some of the Thames, but they are of a very low grade. The amalgamation process takes such a large percentage out of the ore. I had some samples sent to me, and found them to contain about 2 dwts. or 2½ dwts. None of the Thames mines use cyanide.

140. In the agreement made with these four companies, is there anything in the agreement that binds other companies in the same district to treat with them for the use of the process?—No.

141. Is the agreement simply and absolutely with the company?—Yes.

142. You are free of that old agreement with the Crown?—Yes; that is right. It is simply with the four companies.

143. *Mr. Herries.*] You said, Mr. Greenway, that about three-quarters of a million of bullion is regained by the process?—Yes.

143A. What proportion would come from the Waihi Mine?—I could not answer. On an average they get about eleven or twelve thousand a month, perhaps one hundred and fifty or one hundred and sixty thousand.

*Professor Black:* I do not know whether the Siemen-Halske process is a cheaper process. Both sides claim to have the better process. The common part is the solvent, cyanide of potassium. The potassium has nothing to do with it; it is the cyanide of potassium. The cyanide of sodium would do just as well. There must be a combination of the cyanogen. It must be a cyanide of some metal, not cyanogen itself.

144. *Mr. Herries.*] I understand, Mr. Greenway, that the average of £10,000 per month is the total of four mines. That royalty would amount to £9,000 a year?—Yes.

145. *Mr. J. Allen.*] Do you expect an increase?—Yes. Several plants are going up now. One at Whangamata, Komata Reefs, New Zealand Jubilee, Royal Standard, and Waitekauri.

146. Is the £9,000 a year you have now likely to increase?—Yes.

147. If that is so, and you are expecting this large royalty from your patent, and having told the Committee that your patent is perfect, why do you now want to sell your rights to the Government for £15,000?—That is a thing decided by the directors of the company. To take it Home to the House of Lords would mean a big sum.

148. Is it the fear of litigation?—It is not the fear of the ultimate result of litigation. We are in this position: we have to find an enormous amount of money to carry on the litigation with, and this appears to us to be a compromise, which we will accept. It is a question of finance, pure and simple.

*Dr. Findlay:* It will take over two years to get Home, and we have spent many thousands of pounds in litigation. Our revenue is stopped pending the litigation.

149. *Mr. J. Allen.*] Did you state before that all your rights are reserved, and that as soon as your patent is fully established you can recover these arrears of royalty?

*Hon. A. J. Cadman:* The rights are preserved if they establish their patent.

*Dr. Findlay:* That is in this colony, but it is proposed to take it to appeal.

150. *The Chairman.*] What is the amount of royalties you receive from the four companies named in the Bill?—We do not receive any royalties: they pay a lump sum. I have no objection, but I do not know whether I am right in divulging the business of these companies. There were some shares and some cash, and the value I received at the time was about £20,000 for three. For the Crown Mines we received shares, but no cash.

151. That sum would be besides the £15,000 if the Bill became law?—Yes.

152. *Dr. Fitchett.*] Is there any connection between the sale to the Government and the agreement with these four companies? Are they related in any way? Was the arrangement with the companies made in contemplation of the sale to the Government?

*Dr. Findlay:* No; it was made two years and a half ago. It has no connection with the Bill at all.

153. *Dr. Fitchett.*] Is it the fact that the cyanide company really lost the case in the English Court of Appeal?—If you read the judgment it is not so.

*Dr. Fitchett:* What was the precise result of the appeal?

154. *Dr. Findlay.*] The action came before Justice Romer on the ground that there was no novelty, no merit, in the invention. That was taken to appeal, and it was granted that there

was novelty and merit, and Romer was upset; but as the claim did not mention the words "dilute solution" sufficiently clear, judgment was given on that technical point.

155. *Dr. Fitchett.*] Did you commence an independent action to amend, or was the application part of the original proceedings?—The appeal was in favour of the company. It was the one result.

156. Was the result by virtue of a subsequent action?—As part of the case.

157. *Dr. Findlay.*] The application was made at the time for permission to take it in Chambers. As a matter of law the application must be made to the Judge who heard the case.

158. *Dr. Fitchett.*] I should like the point to be made clear to the Committee?—Application was made at the conclusion of the case for leave to apply to the Comptroller to amend, in view of the fact that the Judges thought the patent was a good one, and that the Chief Judge said, "We regret that this formal defect makes against the company." The following is the judgment:—

But still there remains the question as to what is the true reading of the specification with claim No. 1 in it. Sir Richard Webster argued that claim No. 1, with the words at the end "substantially as hereinbefore described," limited that claim to the quantity of cyanide of potassium to be used in the solution to be applied to the ore in the same way as claim 2 did, and he argued that claim 2 was inserted as being only applicable to the richer ores mentioned in the specification, and that in neither claim was the use of *any* solution of cyanide of potassium at large, claimed. We cannot read the specification in this way. We would if we could; but we cannot do so. It appears to us that claims 1 and 2 are independent claims having application to the whole specification, the first making claim for the use of any cyanide of potassium in solution irrespective of amount substantially as therein described, and the second making claim for the use of a dilute solution containing a specified quantity of cyanide of potassium substantially as therein described. It appears to us impossible to discard either the one or the other, or to hold that both mean the same thing, or that claim 1 applies to one part of the specification and claim 2 to another; for this, in our judgment, is not the true construction of the specification as framed. If the first claim had been disclaimed or omitted, we should not have been faced with the difficulty we are, but as it is in the specification we are unable to read it as the plaintiffs desire to do; and for this reason, and for this alone, we must, with reluctance, give judgment for the defendants and dismiss this appeal with costs.

*Mr. Moulton:* Your Lordships have found for the plaintiffs on the great bulk of the issues. The costs of the issues that you have found in favour of the plaintiffs, will, I presume, be the plaintiffs'.

*Lord Justice A. L. Smith:* You ought to have all the costs about infringement.

*Dr. Findlay:* Technically we have a perfect patent.

159. *Dr. Fitchett.*] Was the application contested?—Yes.

160. And by the same counsel?—Yes.

161. And you say the effect of the amendment is to perfect the patent?—Yes.

FRIDAY, 26TH NOVEMBER, 1897.

DR. FINDLAY examined.

1. *The Chairman.*] Do you desire to supplement anything you have already said in reference to the patent rights of this process?—Yes. I felt what I said last was rather fragmentary, and to some members a little unintelligible. As I have had the litigation before me for the last few years I can place the facts before the Committee as fairly as any one. I do not propose to give any legal opinion, but only the position in which the company is declared to be by the English Court of Appeal. There seems to be a doubt in the minds of one or two members as to what was the real point decided in England, that, of course, being the basis of the company's legal position here. The patent was filed in England in 1888, but on the 19th October, 1887, the MacArthur-Forrest people had filed their provisional specification, and on the 16th July, 1888, the complete specification was filed. In 1893 C. M. Pielsticker and T. G. Bowick erected a cyanide plant in England for the treatment of ores by cyanide; and on the 28th July, 1893, something over five years after the patent was registered, an action was brought by the Cassel Company against these people for infringement. It seemed quite clear last day that the exact nature of that proceeding was not understood by the Committee. I have here a certified copy of the pleadings in the action. The statement of claim of the plaintiffs was that, as the Cassel Company claim that they are the registered proprietors of this patent, the defendants are infringing the process of cyanide in solution for the treating of ores. I propose to show you shortly what was really at issue in the action. The claim sets out that the defendants had infringed the Cassel Company's patent, and the reply made was, first, that the invention was not subject-matter for a patent at all, the specification was not sufficient, the alleged invention was no invention capable of supporting the patent, that the invention was not new, that the invention had not novelty—in other words, the validity of the patent was brought at issue. The whole of the literature known to the world was in vogue for the purpose of upsetting this patent, even William Skey's articles in the "Transactions of the New Zealand Institute" were brought in evidence, and the whole of the information known to chemical science was in vogue to show the patent was invalid. The case passed through the Divisional Court and on to the Court of Appeal, before Lord Justice Smith, Lord Halsbury, and Lord Justice Lindley. It was argued there by all the strongest patent lawyers in the world, the case occupying thirteen days. There was not a chemist of great eminence who was not called to give evidence. A few of these were Lord Kelvin, Professor Austen, Professor Crookes. In fact, the whole knowledge of chemical science was invoked to show whether or not this was a real invention and a meritorious patent. Now, it is impossible to understand the decision in England unless one knows the technical ruling in the Patent Courts. After a man has discovered some new thing he has got to frame a specification embodying his alleged discovery. Now, it is difficult to frame a specification that will stand the test of the ingenuity of the greatest lawyers in England to find a hole in it. It is just as difficult to draw a circle without the aid of a compass. This difficulty, it will be seen, created a great hardship amongst many of the most meritorious patents that were upset on technical grounds, and fifty years ago a rule was introduced permitting the meritorious patentee to amend the difficulty in his specification. That law is the law in England now. It simply means that you may amend your specification if you really only remove the technical objection; you must not extend it, but remove the technical objection by application to the Registrar. Shortly put, supposing a

patentee brings an action for infringement against the Pielsticker Company, and the company defend it, saying that the patent is invalid and the specification informal, the Court before whom the case comes will say, "Your specifications are defective; it is true you have a meritorious patent, but as your specification is defective we cannot give you judgment; all we can do is to permit you to amend your specification by making an application to the Comptroller-General of Patents." In this case there are what are called in patent law two claims. There were two claims by the MacArthur-Forrest people in their specification: one claim was a claim to use cyanide of potassium in solution irrespective of the amount of cyanide employed for the purpose of extracting gold from ores. The second was a claim to use a dilute solution containing a specified quantity of cyanide. Both those claims are in the MacArthur-Forrest specification. The Court of Appeal held that if the first claim had been eliminated the MacArthur-Forrest specification was invulnerable, and that they would have succeeded against the Pielsticker Company. The Court of Appeal said, practically, "There are actually three sides in your specification; you ask too much. You cannot, by a technical ruling, improve your specification, but as we find you have a good process—you have invention, utility, and novelty, all the essence of a good patent—we will give you liberty to appeal to the Comptroller-General to amend your patent." It will be shown by a reference to the judgment what the Judges thought of the merit of this patent of the Cassel Company. You will remember, gentlemen, what was put in issue by the pleadings—no novelty, no invention, and no utility. The Court of Appeal said, through the Lord Justice, in delivering judgment, "The defendants deny the infringement, and also asserted that the plaintiffs' patent was invalid—firstly, by reason that the discovery as claimed contained neither novelty nor invention; and, secondly, by reason of prior anticipation. A further point was raised, which is that if the specification is to be read as the plaintiffs read it the defendants contend that there is such disconformity between the complete and the provisional specification as to be fatal to the plaintiffs' claim. The defendants do not deny the utility of the plaintiffs' invention, but they dispute the great commercial importance claimed for it by Sir Richard Webster for the plaintiffs. As regards the infringement, the defendants, during the first five days of the trial, strenuously insisted that their patent, which was said to be an infringement of the plaintiffs' patent, was for the extracting of gold from its ore by means of the conjoint current of electricity and cyanide of potassium, and was therefore no infringement of the plaintiffs' patent, the electricity which they used being a material part of their invention. When, however, their witness, Mr. Harland, was being cross-examined, and they were challenged to refer to independent experiment and trial whether their electricity as used was not in reality a myth, they refused to do so, and admitted that they were infringers of the plaintiffs' patent, and thus this point became disposed of." The Pielsticker people there admitted that if the patent of the Cassel Company could be supported they were infringers, and liable to the result of infringement. The Judge proceeds: "It was also, in our judgment, proved that prior to the plaintiffs' patent it was not known that cyanide of potassium would act as a solvent so as to extract gold from its ore. We leave out silver, for it has nothing to do with the case. The way in which gold had theretofore been extracted from the ore in which it was contained had been by subjecting the ore which had been crushed, and which contained the gold, to a process which is called the amalgamation process, and then, by again subjecting that ore to a second process called the chlorination process, further gold was thereby obtained. These two processes, however, left a residuum of gold in what are termed the tailings, and this residuum could not by any known process at the date of the plaintiffs' patent be commercially obtained, and it went to waste with the tailings and was lost. That a large amount of gold which otherwise would have gone to waste has been recovered by means of the plaintiffs' patent (in conjunction with another patent which they took out prior to the filing of their complete specification herein, when applied, at any rate, to the tailings of South African ore) has been established, and, indeed, there is no evidence to the contrary. The objects which the plaintiffs had in view, and which they attain by their two patents, was by the first to extract the gold from the crushed ore by getting the gold to a state of solution by means of the application of a solution of cyanide of potassium, and then by their second, which was for an improvement in precipitation of gold by zinc, which was then well known, to extract the gold theretofore brought into a solution out of it." The difficulty was to get the gold out and leave the baser metals. "That the plaintiffs solved this problem appears to us upon the undisputed facts of this case established, for it is proved that by their application of a very dilute solution containing an extremely small quantity of cyanide of potassium to the tailings of South African ore they have profitably extracted gold therefrom in a commercially pure state, even though the ore contains only such extremely small quantities as two to three pennyweights of gold in a ton weight of ore. Professor Austen, of the Mint, stated that in the year 1893 some 500,000 oz. of gold were produced by the cyanide process, and came to this country, a large proportion of which, but for the plaintiffs' process, would have been wasted and unproduced, and this represents a very large sum in pounds sterling." Then, gentlemen, he proceeds to analyse all the applications, and all the alleged knowledge that existed prior to the patent of the Cassel Company, and meets each one, showing where it does not support the contention, and finally winds up by an examination of Dixon's paper. "We now come to Dixon's paper, which was read before the Royal Society of New South Wales in August, 1877. It was a paper as to the method of extracting gold, silver, and other metals from pyrites. It first deals with that which was, and is, common knowledge—namely, that precipitated gold is soluble in cyanide of potassium if exposed to the air, and, after alluding to Ræ's American patent and other matters, he makes this most significant statement. He says: 'There being, therefore, no method by which the precious metals could be removed and the baser metals left, it remained to fall back on one of the first principles of metallurgy—namely, to remove the baser metals at the earliest stage if possible, and leave the precious metals as a residue.' Now, this is exactly what the plaintiffs, by their invention, have shown should not be done, for they remove the precious metals by their invention at the earliest stage and leave the

baser metals as a residue; and yet the defendants' witness, Mr. Vautin, as also Mr. Mactear, cite Dixon's paper as possibly the best publication they have to show what they want to establish as regards prior general knowledge. In our opinion, this paper of Dixon is cogent evidence in favour of the plaintiffs, and equally so against the defendants." This shows that the Court found that the patent had the merit of novelty and utility. Says the Judge: "Novelty and utility being established, it goes some way, at any rate, towards carrying invention. To see if there was invention, we turn to Mr. MacArthur's evidence (it is the first time we have alluded to it, simply because it is a party to the cause, though it is most important upon many parts of the case), where he describes the researches he made before he hit upon that for which he was seeking. Professor Dewar points to the fact that in nature the conditions are so complex that the question could only be solved by experiment and trial; and Lord Kelvin gave evidence to the like effect. Mr. Mactear, called by the defendants, under cross-examination as to the properties of cyanide of potassium, said: 'Cyanide-of-potassium solution is of such a peculiar nature that I do not think any chemist in the present day knows its composition or knows the reactions taking place within it, and the knowledge of it is purely experimental,' which is entirely in accordance with the plaintiffs' evidence upon this point. We would point out that the invention consists not merely in discovering that cyanide of potassium can be used to extract gold from its ore, but in showing the public the best practical method of doing it by leaving the baser metals behind, which had never occurred to any one before. We cannot doubt that, upon the evidence given in his case, of which we have only given typical extracts, if the plaintiffs' specification is to be read as contended for by them, there is ample novelty and meritorious invention in the discovery." I think I have previously mentioned the troubles which had beset Mr. MacArthur, and I think the whole thing may be summarised in the words of the Judge: "In our judgment, the plaintiffs' invention as claimed by his second claim has novelty, invention, and utility; it has not been anticipated, and it has been infringed." It may be asked, if the Court found all these things in favour of the plaintiffs, why it is that they were defeated; the reason is found in the fact that a technical defect saved the defendants in this action for infringement. The reasons are explained in quite a few lines: "But there still remains the questions as to what is the true reading of the specification with Claim No. 1 in it. Sir Richard Webster argued that Claim No. 1, with the words at the end 'substantially as hereinbefore described,' limited that claim to the quantity of cyanide of potassium to be used in the solution to be applied to the ore in the same way as Claim 2 did, and he argued that Claim 2 was only inserted as being applicable to the richer ores mentioned in the specification, and that in neither claim was the use of any solution of cyanide of potassium at large claimed. We cannot read the specification in this way. We would if we could, but we cannot do so. It appears to us that Claims 1 and 2 are independent claims, having application to the whole specification, the first making claim for the use of any cyanide of potassium in solution irrespective of amount substantially as therein described, and the second making claim for the use of a dilute solution containing a specified quantity of cyanide of potassium substantially as therein described. It appears to be impossible to discard either the one or the other, or to hold that both mean the same thing, or that Claim 1 applies to one part of the specification and Claim 2 to another; for this, in our judgment, is not the true construction of the specification as framed. If the first claim had been disclaimed or omitted, we should not have been faced with the difficulty we are; but, as it is in the specification, we are unable to read it as the plaintiffs desire to do; and for this reason, and for this alone, we must, with reluctance, give judgment for the defendants and dismiss this appeal with costs." Well, that was the position in England. Leave was given to the company to apply to amend. This then went to the Comptroller-General, and after a strong contest he granted the amendment on the                    day of                    1895. On the 1st February, 1888, we filed our specification in New Zealand. After we obtained our amendment in England we immediately applied to amend in this colony, and thirty days after our application the Government intervened, and prevented a grant of the amendment in the usual course by filing a petition for the revocation of the patent. We applied to the Chief Justice, and he suspended the petition until we had applied to the Registrar for leave to amend. The Registrar refused us leave to amend, and an appeal was then made to Mr. Justice Edwards. The case was really fought over again, as the whole matter was at issue. Mr. Justice Edwards reserved judgment, and then found us entitled to our amendment. If Mr. Justice Edwards's opinion stands, we are in exactly the same position as in England. It is two years last May since this litigation began in New Zealand, and the costs of the company have been £3,000, and the costs of the Government not much less. And then we have only got to the amendment; the petition for revocation is still unheard. If the Government are going to appeal against Mr. Justice Edwards's decision, that appeal cannot be heard till April next. If they succeed they have still got to go on with the petition for revocation, which would have to be heard in the Supreme Court, and could not be heard before next June. In that case it would be finished at the end of the year. The appeal from that action to the Court of Appeal would not be heard till April, 1898. Then, the appeal would have to go Home to the Privy Council, and it is known that the average time to get a decision of the Privy Council in England is from eighteen months to two years. The result would be we would get our final judgment in 1901, and by that time probably £15,000 would have been spent in costs. As Mr. Allen puts it to Mr. Greenway, it is plain till this is settled we cannot expect to obtain our royalties, because infringers will take shelter behind the Government. If we maintain our present legal position against the Government it would be fully four years before we could assert our rights. We have had to find money for the appeal, and if the Government are going to allow this litigation to go on, it will cost the Government as much as they are going to pay for the patent now. It is a matter for the Law Officers of the Crown to say whether the legal position I take up is correct. We have got our legal position absolutely established in England, and in New Zealand it is the same if Mr. Justice Edwards's judgment stands.

*The Chairman:* I think the Committee understands Dr. Findlay's opinion. It is very explicit.

2. *Mr Herries.*] I would ask if the litigation at Home is quite conclusive, in case the Pielsticker Company appealed?—Yes. The patent has been perfected, and the Pielsticker people have desisted from their infringement. It is the same in America, where our patent is perfect.

Mr. FRANK WALDEGRAVE, Registrar of Patents, examined.

3. *The Chairman.*] Would you give a list of the patent rights which have been taken out in New Zealand which this Bill may affect?—I ought to explain that, some little time ago, Mr. Cadman asked me to give him certain information with regard to patents taken out in New Zealand in which cyanide was an ingredient. I had a rough search made in the indices of the office, and the list I have here does not pretend to be in any way a complete list of letters patent in which cyanide is an ingredient. I will hand this list in. [List handed in.]

4. I think we should have a complete list?—It would take some little time, because every specification would have to be examined.

5. I think it is the wish of the Committee that a complete list should be furnished as quickly as possible?—I will furnish such a list; perhaps I ought to show all the patents which have been granted subsequent to the Cassel Company's patent, because if the Cassel Company's patent is held to be valid, they must necessarily be subject to that patent; nobody else could use cyanide without the leave of the company. Whatever rights there may be under those letters patent must be subject, of course, to the preceding valid patent.

6. *Mr. McGowan.*] Does that mean that between the time of the application to amend and subsequently, if a fresh patent is granted, that patent would not be affected?—That would be a question, of course, for the Courts to decide.

7. *Mr. Herries.*] It would only date from the amendment?—From the original patent; the amendment would date back if the amendment is made.

8. *Mr. McGowan.*] If the patent is granted subsequent to the application for amendment or even subsequent to the first issue would that patent be null if the amendment is allowed?—Yes, I think so. I do not think they could use cyanide of potassium without the leave of the company. But, of course, you will understand that this question of infringement can only be settled by the Courts. Any opinion I express is only my own opinion.

9. *Mr. Herries.*] Has the amendment been registered?—No; the appeal is still pending. The amendment has not been made yet.

10. *The Chairman.*] But the amendment has been allowed?—Yes, by the Supreme Court; but an appeal is pending, and, therefore, the amendment has not been made in the Register of the Patent-office.

11. *Mr. Duncan.*] According to Dr. Findlay it will be four years before that is decided?—There are two distinct and separate questions involved. There is first of all the question of the amendment of the patent, and then there is the question of the revocation of the patent. I think Dr. Findlay was talking of the revocation of the patent having to go to the Privy Council, not the question of amendment.

Mr. WILSON, Inspecting Engineer of Mines, examined.

12. *Hon. Mr. Cadman.*] Will you tell the Committee the number of claims using the cyanide, number of stamps in the batteries, number of tons put through annually, new plants being erected which intend to use the cyanide, so as to give the Committee some idea of what the companies will pay on the royalty in order to recoup this £15,000 (and costs) which the colony will pay for these patent rights?—The figures I will give are taken from the annual report of the Inspecting Engineer of Mines. I will give in as short a way as possible the results from the cyanide process ending on 31st March last.

13. *The Chairman.*] You will state the number of companies using it and the result?—Yes. During the past year, that is 1897, the Kapai-Vermont, Mariposa, Monowai, Tararua, Talisman, Waihi-Vermont: about six companies outside of the Waihi, Waitekauri, Union, and Crown, the four companies mentioned in the Bill. The Great Mercury did not work last year. I may say in round numbers that about 110 stamps were employed by the mines mentioned in crushing quartz during that period.

14. *Mr. R. McKenzie.*] Constantly?—No, but as a basis you may take it as constantly. I have allowed for that in the average. That is the average number, though they were not all working constantly. From 100 to 110 stamps were used.

15. *Mr. Duncan.*] Would they be working all night?—Most of them would be working twenty-four hours a day. Some would not. The value of the gold obtained by the cyanide process from the mines using the 110 stamps would amount, in round numbers, to £26,500. This does not include the four mines mentioned in the Bill. I anticipate a large increase in the use of the cyanide process in the near future.

16. *Mr. O'Regan.*] Do you think it will come into use on the West Coast—in the Reefton district?—So far as I can learn they are at present using it. The value includes silver and everything—the bullion value. The batteries that are at present erected and are being erected in the Hauraki district will number seven, outside the six companies I have already mentioned, and the number of stamps that these companies have already erected, or are in process of erection, and which I anticipate will be erected shortly is two hundred, the greater number in the Ohinemuri district. I may say that in that district the quartz is very suitable for treatment by the cyanide process, and I have no doubt that they will all more or less adopt the process in the Ohinemuri district. In addition to these two hundred stamps in the Ohinemuri district, there will be seventy to eighty stamps erected in the Coromandel and Thames districts which may partly use the cyanide. It will not be in such general use there as in the Ohinemuri district.

17. *Hon. Mr. Larnach.*] What is the total increase?—If 110 stamps has given about £26,000 to £27,000, I am expecting more than double that amount when the mills get to work.

18. *Mr. R. McKenzie.*] Will it not depend on the order of working?—It will depend upon many things. I will assume that the stamps that produced £26,000 last year will produce something like the same—that is, the 100 to 110. I have thus got 200 and a moiety of the eighty to deal with. Then, for the next year I will get £26,000 from the last year's total, and, as I have twice as many stamps as were employed the previous year, I will get twice as much.

19. *Hon. Mr. Larnach.*] After all, that depends on the nature of the ore?—It depends upon everything; it is problematical. I have a wide margin within the mark. The stamps erected will do all that in time.

20. *Mr. R. McKenzie.*] They may be idle next year, or for several years afterwards?—It is easy to assume, but from my knowledge of the mining work I do not think it is likely. I think we will get a great addition to our yields from those sources. I do not know anything further I can state. I am merely giving an estimate of what the future probable yields will be. I do not say the £52,000 will come next year. I do not know the royalty yet; I have not gone into that.

21. What is your estimated increase?—My future yields will be £88,000 per annum: £26,000, the same as last year, and £52,000 from more than double the number of new stamps. If I had 110 stamps employed last year, then in the near future I will have 240 in addition, which will make 350 stamps.

22. Taking your own very sanguine estimate, supposing you had three hundred stamps at work you would get £78,000 a year, supposing everything turned out as you expect?—Yes.

23. *Hon. Mr. Larnach.*] Will you give us the names of the new plants where they are going up?—Ohinemuri, White Stock, Waitekauri Extended (forty stamps), in the same district, all but completed; the Komata Reefs (twenty stamps) are erected, and, I believe, are at work; the Talisman (twenty stamps), stamps erected and at work; twenty-stamp mill at Luck-at-Last (Whangamata); and I was informed that another company, called the Royal Standard, at Wharekuraupunga, are about to erect forty stamps. In the Thames district we have Broken Hills, East Coast, Tairua (twenty stamps). I mentioned before that some mills are being erected at the Thames, at which the cyanide will be used for concentrates and tailings, and I would leave them out of my calculation.

24. From your knowledge of these claims, do you think they would be on a par as gold-producers with the others which produce £26,000?—I think they would be on a par. I have every reason to believe it from the nature of the quartz.

25. *Mr. R. McKenzie.*] You say these seven companies have their works under construction. You say the batteries were under construction—that is, they have not started to crush?—I believe the Komata Reefs have started, the Talisman have started, and the Woodstock have started.

26. Some put up very small batteries?—Yes; twenty head.

27. They are batteries put up to test the ground. They are not what you would consider batteries put up permanently?—I think they would be put up with a view to add to them.

28. They are really put up for testing the ground?—We may call it that. A twenty-stamp mill is only put up to test; still, at the same time, I think it may return a large amount of work. I may say the Komata Reefs have another foundation laid for twenty, and the Talisman have other foundations, and their new mill is working on another principle, which may be equal to ten stamps. The Luck-at-Last have not erected, the Broken Hill have not erected, and the Royal Standard have not erected, but all the rest are erected.

29. Seventy or eighty stamps which may use cyanide are not worth taking into consideration?—I have not thought much of them.

30. *Mr. O'Regan.*] From your knowledge of the quartz at the Big River tailings, do you think they will be as amenable to the treatment of cyanide as the northern quartz, because I understand there is some quartz which cannot be treated by the cyanide process?—I do not think the cyanide process would be suitable for the most of the quartz on the West Coast. It is different to the quartz in the North, which contains very fine gold.

31. *Mr. R. McKenzie.*] Do you think the cyanide will be used on the Preservation Inlet quartz?—I cannot tell.

32. Is it used in Otago?—I believe it is used in the Premier and Tipperary on concentrates. I believe it is now being used treating tailings and concentrates, but not to a very great extent.

33. Do you think it is probable that it will be used on the quartz in Otago?—That would be very hard for me to say. There is no doubt that when they find it suitable they will have no hesitation in applying it. The gold is generally coarse in Otago, and it is only the tailings they would treat with the cyanide.

34. That is equivalent to saying that it is not likely to be used in Otago?—I would not like to say, from my knowledge; but the gold is of a coarse description.

35. *Hon. Mr. Larnach.*] Have you seen the Nenthorn Mine?—I have seen some of the quartz.

36. *Mr. Herries.*] Do you think a reduction of the royalty will make more mines use the process in the future?—I have no doubt it will. It is a commercial transaction. The big royalty charged by the Cassel Company was prohibitive.

37. Do you think that prevented people from using it?—Yes.

TUESDAY, 7TH DECEMBER, 1897.

CHRISTIAN DENCKER, examined.

1. *The Chairman.*] You represent a gold-extracting process, I understand, in connection with which cyanide of potassium with electric agency is used?—Yes.

2. Will you explain the process to the Committee?—The Siemens-Halske process is a cyanide process. It uses cyanide of potassium or any other composition of cyanide in order to bring the

gold in solution out of the tailings, slimes, &c., and precipitates the gold out of the cyanide solution by means of an electrical current. That is, in short, the Siemens-Halske process.

3. The process, I think, is generally known as the electrolysis process, is it not?—Yes, but generally the Siemens-Halske. The difference of this process in comparison with the other cyanide patents is that by means of the electrical current we can precipitate the gold out of a very weak cyanide solution, weaker than the cyanide solution used by the MacArthur-Forrest patent and others, and by making use of a very weak cyanide solution we work more economically. This process was introduced in South Africa on the goldfields in the year 1892 and has been adopted there, if I am right, by a dozen mines at Johannesburg. Further, the process works in New South Wales, in the Gibraltar Mine, in Victoria, in the Mount Hepburn Mine, and in some places in Siberia, as far as I know. That is all I have to say about the process.

4. Would you kindly state your profession?—I am a mining engineer, and I am attorney of the General Exploration Company, mining in this colony.

5. How long have you been connected with this process?—About three years.

6. You have been connected with it before you came to this colony?—Yes; in South Africa and Australia.

7. For long?—About a year and a half.

8. Do you also understand chemistry?—Yes. This process has been purchased by the General Exploration Company, and therefore I represent that process (the Siemens-Halske process) in this colony.

9. *Dr. Fitchett.*] In reference to the appeal case in England, was your company or your patent represented by the defendants in that case?—No; Mr. Pielsticker, my predecessor in office of my company, brought the action.

10. Was it the same patent in principle?—Yes; nearly the same. It is an electrical patent too.

11. Have you any observation to make on the following portion of the judgment. In giving judgment the Court said as follows: "As regards infringement, the defendants, during the first five days of the trial, strenuously insisted that their patent, which was said to be an infringement of the patent of the plaintiffs, was for extracting the gold from its ore by the conjoint current of electricity and cyanide of potassium, and was therefore no infringement of the patent of the plaintiffs, the electricity which they used being a material part of their invention"?—That was not our patent. That was the patent of Mr. Pielsticker.

12. The electricity which they use is practically part of their invention, but when their evidence was being cross-examined and they were challenged to prove that the way their electricity as used was not, in reality, a new method, they refused to do so, and admitted that they were infringers of the patent of the Cassel Company?—Mr. Pielsticker brought the gold in solution by cyanide, but at the same time he brought the electrical current through the cyanide solution to dissolve the gold. He brought, therefore, the gold into solution not exactly in the same way as the Cassel Company does, and after he precipitates the gold by means of the electrical current. The first part of the Siemens-Halske patent is exactly the same as the Cassel Company and most of the other cyanide patents, but in the second part we differ. This patent of Mr. Pielsticker is a private one, and differs from ours.

13. Your patent is not the same?—It is similar, but different.

14. Do you claim your patent is a good patent?—Yes, we do.

15. I know it is validly granted, but do you claim its validity as a patent? Could you sustain an action for infringement?—Yes; with exactly the same right as the Cassel Company. The first point we have got the patent for is the making use of the cyanide. The Cassel Company have got the patent for that too. If this point of the patent can be upheld at all, our patent is as good as that of the Cassel Company. Apart from this, we claim the patent for the use of electricity.

16. I understand your position to be this: You do not claim your patent for cyanide has any validity nor the Cassel Company's patent has any validity. You uphold cyanide cannot be patented?—Yes.

17. And therefore your patent has no validity?—No, as far as the first point of it is concerned.

18. *Dr. Findlay.*] As a matter of fact your patent does claim exclusive use of cyanide. Then you admit that claim is invalid?—Yes.

19. Since when have you admitted the claim is invalid?—We never have admitted it. We never attached any importance to it.

20. Still you seriously claim it in your specification?—We have made it a claim as others have, but we have never tried to enforce it,

21. You admitted the exclusive use of cyanide is invalid?—Yes.

22. And you allege, so far as the Cassel Company's claim is concerned, it is also invalid?—Yes.

23. The essential difference is this: the Cassel Company precipitate the gold in solution by fine threads of zinc, you precipitate it by electricity?—Yes.

24. The words of your claim are—you have given up the first part—"for separation of various metals by electrolysis." That is the only part of the patent you rely on?—Yes.

25. The conflict arises through the second part of the two methods?—Yes.

26. Would you be content if the Bill we are here dealing with merely provided for the purchase of the Cassel Company's patent rights without any more?—We do not oppose that. But we do not want to pay any royalty as far as cyanide is concerned.

27. Suppose the Bill went no further than to provide for the purchase of the Cassel Company's patent rights?—If we were not excluded.

28. Supposing you were excluded, would you object if it provided for the purchase of the Cassel Company's patent rights?—Yes.

29. Apart from the Bill you could not use your process, if the Cassel Company's patent is valid, without the leave of the Cassel Company?—That is what we contest

30. The assumption is that the patent is valid. If the Cassel Company's patent is valid you could not use your patent without the consent of the Cassel Company?—Certainly not.

31. If the patent be valid this Bill will not affect you?—It could not affect us in that case.

32. If the patent be valid then your position would practically be the same. There would be no further bar offered to you by the Bill. Your main objection is to the patent itself?—Yes.

33. Your essential objection is to the patent itself?—Yes.

34. There is a clause in the Bill which says: "In the absence of the said patent rights, or in so far as they or any of them may cease to exist or may not extend, any process wherein cyanide of potassium, or any compound of cyanogen in any form, combination, or strength whatsoever, is employed as a solvent." First, it provides that no person shall use the patent rights or any of them. Then it provides that in the absence of the said patent-rights, &c. My point is this: The only solutions of cyanide which are of any value commercially in extracting gold from ores are the weak solutions?—Yes.

35. There is nothing in the point that the Bill carries it as far as strong solutions. The Bill really carries the principle no further?—No.

36. If the patent rights are given the Bill carries it no further?—Yes. The question is that the Government Bill excludes every other cyanide patent in the colony.

37. What I want to say is that there is nothing in the Bill outside the patent rights that you object to. Your objection is that the Bill validates or seems to validate a patent which you say is invalid?—Yes.

38. Is not that purely a question of law?—It may be finally.

39. The Courts must be the judge in a matter of that kind?—I could show that this patent must be invalid, and can be made invalid if properly assailed. The patent is a very weak one.

40. You admit that the ultimate test then must be the Courts? Now, do you know that in the Court of Appeal in England judgment was given by Lord Justice Smith on the 9th April, 1895?—Yes.

41. Do you know that Mr. Pielsticker was one of the defendants in that case?—Yes.

42. Is Mr. Pielsticker connected with the company you are associated with?—Yes, he was.

43. Your principal?—No.

44. He was your predecessor here?—Here.

45. Do you know whether this patent (the Siemens-Halske) was referred to at all in the action brought against Mr. Pielsticker in England?—The Siemens-Halske supported the action, as far as I know.

46. Was the Siemens-Halske patent brought before the Court of Appeal?—Not at all. The Siemens-Halske had no direct interest whatever in this action against Mr. Pielsticker. It was simply a private concern of Mr. Pielsticker.

47. Do you know if the Siemens-Halske process was referred to in the evidence?—No, it was not. It was patented long before the Siemens-Halske patent was obtained.

48. When was it patented in New Zealand?—It was patented some four or five months after the Cassel Company. Our patent was obtained in England in 1897.

49. Do you suggest that your patent was patented before that?—I am not certain about the date.

50. Consequently it could not brought before the Court of Appeal?—No.

51. I suppose you familiarised yourself with the evidence before the Court of Appeal in England?—I am not very well up in the details of it.

52. Do you know that it lasted thirteen days?—Yes.

53. Do you know that the Court of Appeal had heard many specialists, and that the judgment contains this paragraph: "In our judgment the plaintiff's invention as claimed by his second claim has novelty, invention, and utility: it has not been anticipated, and it has been infringed." Will you express an opinion about that verdict?—That is about the dilute solution. I know that the Cassel Company brought an action against Mr. Pielsticker. They did not think at all about their claim of a dilute solution in the beginning; they only thought of their claim to make use of cyanide generally. Then, when they could not uphold this, they went over to their second claim about the dilute solution. The lawsuit went on for a very long time. The whole object of Mr. Pielsticker was to promote a company, and as the lawsuit was going on the promoters went back. And when it had gone so far that the Cassel Company had lost their first claim of cyanide altogether, and went over to their second claim, Mr. Pielsticker had no interest to contest it seriously. That has never been properly assailed, but it has been assailed in South Africa.

54. Where Dutch law prevails?—No, not Dutch law; Transvaal law.

55. You have to face the Judges having so found in England?—It never has been assailed. There was nobody there to attack the claim. Mr. Pielsticker abandoned it; there was no one there to oppose it, and it went through unopposed. I was in South Africa at the time that it was known that the use of cyanide altogether could not be upheld by the Cassel Company, but the Judges hinted that the dilute solution perhaps could be. The Cassel Company afterwards brought in their amendment. In Johannesburg the Chamber of Mines decided that this question of dilute solution should be tested. They then went into experiments to discover what the real facts about this dilute solution were. Well, it was known for a very long time that cyanide solution altogether can dissolve gold, that cyanide solution can be and will be destroyed by many refractory ores, that dilute solution also will dissolve, or that dilute solution also will be destroyed by refractory ores, of course in comparison with the respective quantities, and that nothing was especially preferential to dilute solution in the question of dissolving gold, or in dissolving baser metals. That has been asserted in Johannesburg. The question at that time arose: What is dilute solution? Some expert in England has expressed his opinion to the effect that the dilute solution is everything below 0.4 per cent. That may be the opinion of the expert, but every one can have an opinion of his own about this. The maximum was said to be 0.4 per cent., all under this should be dilute solution;

but, as a matter of fact, the Cassel Company cannot precipitate gold properly or economically out of a dilute solution under 0·1 per cent., whereas with the Siemens-Halske process we precipitate gold out of a solution of 0·005 per cent., out of a solution so dilute that the Cassel Company has never precipitated and cannot precipitate, simply because the chemical action of the zinc ceases in such a dilute solution. It was, therefore, made out in Africa that it was impossible for the Cassel Company to claim the use of a dilute solution which they cannot use by their own process, and that was put forth and has been proved. The Chamber of Mines can furnish all the details. It has been established by very extensive operations and experiments. Therefore, I say this dilute solution cannot stand from two different points of view. There is no discovery, and consequently the Cassel Company claims something that cannot be patented at all; further, the Cassel Company claims something that she cannot use herself as far as a dilute solution under 0·1 per cent. is concerned. The Chamber of Mines at Johannesburg considered it a very weak claim and rejected it.

56. Do you know whether there is an appeal to any Court from the decision in Johannesburg?—Yes, certainly; an appeal to the Supreme Court of Pretoria, under Transvaal Government.

57. Can you name a single country governed by English law where the Cassel Company have lost it?—In England.

58. Will you tell me when?—In 1895, in the Pielsticker case. They lost their cyanide patent generally, and as nobody has seriously assailed their claim to make use of a dilute solution, they got their amendment through.

59. You are familiar with the details of the litigation in England, and you say the amendment was not assailed?—Yes, I say that.

60. Do you know Mr. Moulton?—No.

61. He was your principal counsel before the Comptroller, when judgment was reserved.—I claim a dilute solution was not assailed.

62. You say a claim for a dilute solution was not assailed?—Yes, that is so.

63. Do you know whether a claim for dilute solution was heard before the Comptroller, where counsel represented Mr. Pielsticker?—I am not intimately acquainted with the London lawsuit. I was in Johannesburg.

64. Would you be surprised to learn that the Comptroller-General reserved judgment, and that the thing had been contested for several days; on the question of amendment, that is. The amendment was applied for in the same way as before Mr. Justice Edwards. Do you know, as a matter of fact, that it was contested in that way?—No.

65. Would it surprise you?—No. I am not surprised at all about that, because, as the lawsuit went on, Mr. Pielsticker lost his object of promoting his company, and consequently all spirit.

66. I thought you said the thing was allowed to slide through?—Yes.

67. Do you not know it was contested by the ablest patent lawyers in England?—No. It is not so much a lawyer question; it is far more a technical question.

68. I think you said the matter was allowed to slide through?—Yes.

69. Do you know that Mr. Pielsticker and his colleagues employed one of the best counsel to contest it?—I am not very well up in this lawsuit.

70. Do you know that the Court of Appeal expressly found that the dilute solution was what we were entitled to in the patent, and that no chemist in the world had known that before?—I do not know, and I deny absolutely that that is a fact.

71. You differ from the finding of the Court of Appeal?—Yes.

72. Do you state that up to the time of the Court of Appeal case the defendants had not fought their case as vigorously as they might?—As I said before, I am not familiar with the lawsuit in London. It is completely a technical question, and you must not listen to what the lawyers say. The case was quite different in Johannesburg. The Chamber of Mines went into facts and proved by actual experiments. Mr. Pielsticker had not the money to do that.

73. Mr. Pielsticker spent £22,000 in England?—Yes.

74. You are not aware that the suit in 1895 was contested by the best lawyers in England?—No.

75. You pointed out to Dr. Fitchett that the patent Mr. Pielsticker now claims bears some similarity to the Court of Appeal case. You know that the Court of Appeal said then that Mr. Pielsticker's patent was invalid?—The cyanide patent is invalid and every clear cyanide patent is invalid too. We do not claim it.

76. Your patent began in New Zealand in June, 1888. Can you tell me how much gold you produced here?—None at all. It has not been introduced here.

77. The Cassel Company have produced seven hundred and seventy-three thousand pounds worth, but you have not produced any?—Yes.

78. Is there any future before it in this colony?—We should use it perhaps.

79. Is there any use for cyanide in the South Island?—Certainly.

80. If cyanide were free it would be a great boon for the South Island?—Yes.

81. You think therefore it would be well if the patent were upset, or that the Government should charge no royalty?—Yes. The Siemens-Halske have not come out to this colony to draw royalties. We are not a purely metallurgical company. We have had to purchase the patent, and we have worked the patent in South Africa, and it works economically and better than the MacArthur process. We want to have the free use of the cyanide here, and the Government stands in the way of it, if it purchases the MacArthur patent and excludes all other cyanide patents.

82. You are aware the Cassel Company are obtaining royalties from a considerable number of mines?—Yes.

83. Has it never occurred to you to share some of that royalty?—Yes; but how could we? It would have been a very small business. We have asked 3 per cent. in South Africa, and here we

- would have asked 3 per cent. Then we would have certainly got into a lawsuit with the MacArthur-Forrest people, and it would never have paid us at 3 per cent. to fight a big lawsuit. We have mines ourselves, and we have an interest to preserve our rights for ourselves.
84. So, if you had got the Government to litigate at their expense it would have served you very well?—Yes.
85. You want to get the Cassel Company's patent upset?—Yes, if the Government makes it valid it will exclude all other patents.
86. That all depends, does it not, on the validity of the patent?—Yes.
87. At best your method is one of precipitating gold?—Yes.
88. Do you know anything of a book published by Mr. Park, of Auckland?—Yes.
89. That book says your patent is a rival of the MacArthur-Forrest patent zinc patent?—No, it is quite another thing, though to a certain degree it is a rival.
90. You do not agree that yours is a rival of the MacArthur-Forrest zinc patent?—The difference is this: one is a zinc process and the other is an electrolysis. We are superior to the MacArthur patent because we can make use of a much more dilute solution and work more economically.
91. So long as the Company are entitled to use any solution there is a difficulty?—Yes.
92. Do you know what the cost of your process is per ton?—It depends on the country.
93. Do you know Mr. Izaller's book?—No. In South Africa ore treated by cyanide by the Siemens-Halske process used  $\frac{1}{4}$  lb. of cyanide of potassium to treat the ton. The Cassel Company used 1 lb. or 2 lb.
94. Do you know that in New Zealand the most successful results have been obtained with 0.01 of KCN, extracting all the gold with a solution of one-hundredth part of 1 per cent?—You cannot do it.
95. Do you know whether a solution of 0.01 per cent. has not performed the best results in the Upper Thames?—No. You cannot get the gold out of it by zinc.
96. Do you know that by an assay afterwards no trace of gold was found?—Perhaps there was nothing in it before. I have made experiments, and the Chamber of Mines at Johannesburg has made experiments, and it has been found to be impossible to precipitate properly and economically out of cyanide by means of zinc under 0.1 per cent. At the Waihi and Woodstock the strength of solution used is very much above that.
97. Do you know the average cost per ton is 2s. per ton?—It depends absolutely on local circumstances. The question is, how much cyanide of potassium is used to the ton of ore to be treated. If I spend much money in charging and discharging my tanks, that has nothing to do with the cyanide at all.
98. What is your cost in New Zealand?—We have never worked it in New Zealand.
99. What is the cost of the two processes?—A difference of 6d. to 1s. per ton.
100. Can you say why the Waihi and others have not asked your permission to use your patent?—We have not tried in time to bring our process to them.
101. Would you have let them have it?—Perhaps. The Waihi have bought the rights of the Cassel Company, and they knew they could not get our patent for nothing.
102. Your process is described in Mr. Park's book?—Certainly.
103. The whole thing turns upon whether the Cassel Company's cyanide patent is valid. You have said it is not; the Court of Appeal says it is?—I am convinced that the claim of the Cassel Company about their dilute solution can never stand if properly assailed, and the full evidence proving this can be got from the Chamber of Mines, Johannesburg, which has worked for months and months preparing evidence against it by very renowned chemists. It cannot stand, and will be upset if properly assailed. Therefore we are quite right if we try to oppose the Bill. We should not pay royalty at all. If the Government pass the Bill we must pay it, and then our hands are tied.
104. You do not ask the Government to continue litigation?—The Government can do as it likes. That has nothing to do with it. We will defend our rights as soon as we come into collision. We wish to be left alone, and not forced to pay royalty.
105. *Mr. J. Allen.*] Dr. Findlay asked you whether your process was an improvement on the Cassel process as regards the precipitation, and I think you said yes?—It is an improvement, and quite a different thing. It works better, and therefore it is an improvement. It is quite another idea. The Cassel Company precipitate by zinc, and we do it by means of an electrical current.
106. Do you not contend that your process is an entirely different one from the Cassel's, so far as the solution of the gold is concerned? You say the dilute solution is an undefined one, and the patent right does not define what the dilute solution is. Your dilute solution is a different one to the one used by the Cassel Company?—Yes. Ours is a weaker one.
107. And you go further, and say that the Cassel Company could not use your weak solution?—No.
108. Your patent is a more dilute solution than the Cassel Company's?—Yes.
109. And the utilisation of a different method of precipitation?—Yes.
110. You claim that your dilute solution is 0.005 of cyanide. You can use as weak a solution as that?—We can. The electrical current takes out everything.
111. Is your average solution 0.01?—Yes. Anything from 0.01 to 0.005.
112. You say the only solution the Cassel Company can use and precipitate by the zinc is 0.4 to 0.1 solution?—Yes, but I do not believe they can use 0.1 at all. It is a strong solution everywhere above 0.1.
113. Pielsticker did not contest when the amendment was given?—Pielsticker did not contest the dilute-solution patent, because he had no reason to do so.
114. And you say that the question of the weak solution has been tested in Africa?—Yes, and very fully tested.

115. And it was decided against the Cassel Company?—They have no rights whatever in Johannesburg.

116. In this Bill, does clause 8 go further than a weak solution of cyanide of potassium?—Yes; that excludes us and every other person who does not hold a license under this Act.

117. Does clause 8 include any solution of cyanide of potassium?—Yes.

118. It does not cover only the Cassel patent, but every other patent?—It covers the use of cyanide altogether.

119. It goes further than that, and covers any solution of cyanogen at all?—Yes.

120. Outside of cyanide of potassium?—Yes.

121. So anybody inventing a patent to include cyanogen would not be able to use it?—No.

122. Does not this Bill prevent anybody contesting any patent included in clause 8?—Yes; that is the trouble. It prevents everybody.

123. Therefore it prevents anybody from contesting Cassel's patent or any sort of cyanogen whatever?—Yes.

124. It would prevent you contesting it?—Yes.

125. And you would therefore lose your method of precipitation?—Yes.

126. Then this Bill would make the patent valid whether it was valid or not before?—Yes; I should think so.

*Dr. Fitchett*: According to the subsection, the royalty is taken whether the patent exists or not. It practically amounts to what Mr. Allen says. Under the Bill you need not rely upon a patent at all.

127. *Mr. J. Allen.*] You mention that the patent for the use of a dilute solution is invalid?—I am sure of it: that is, if properly assailed.

128. *Mr. R. McKenzie.*] You say your patent is used in New South Wales and Victoria?—Yes.

129. Have the MacArthur-Forrest people interfered with you there?—No.

130. You do not pay any royalty?—No.

131. There has never been an attempt on their part to prevent you from using it?—Not as far as I know.

132. *Mr. Guinness.*] You represent the General Exploration Company. Where is the head office of the company?—In Berlin.

133. Do your operations extend to the South African goldfields?—Our people hold mines there, but not our company proper.

134. You are in operation on the West Coast?—Yes, and in Australia, Canada, and in British Guiana.

135. How long have you been established on the West Coast?—One and a half years.

136. What amount of capital have you laid out in developing mines?—The company has spent here about £80,000 in cash, including wages and plants.

137. And you came here with the patent rights for the process known as the Siemens-Halske?—They hold a third of our shares, and the Siemens-Halske are therefore interested as permanent shareholders in my company.

138. Has it cost the company any considerable sum of money to purchase, with bonus, the rights of the Siemens-Halske Company?—I do not know: it was long before I came here.

139. You do not know what it has cost?—No.

140. *Mr. Herries.*] How many claims have you?—Five.

141. Are they all quartz workings?—No; all alluvial.

142. Have you tried if the cyanide would extract the gold?—We are sure of it. The process works at Johannesburg in a hundred mines.

143. If this Bill is passed you would have to pay a royalty?—Yes. If the Government makes it law we would have to pay a royalty, and that is what I want to prevent.

144. *Mr. O'Regan.*] You say Mr. Pielsticker did not contest the case when the amendment was given?—No, as far as I know.

145. What was the reason?—When first the cyanide process came out it gave enormous inducements. The Cassel Company made a very good business in Johannesburg, and 40 per cent. of the whole of the gold is there extracted by cyanide. The present monthly output is 200,000 oz. The MacArthur-Forrest Company asked a royalty of 10 per cent.; that would now mean £32,000 per month. That created great excitement, and several people brought new improvements in cyaniding to the front. Mr. Pielsticker was one of them. He was forming a company to work his patent in over-sea countries, and he erected a plant in London for experimenting. Then the Cassel Company stepped in and said he had no right to work cyanide, because they held exclusively this patent. Then the lawsuit went on, and it took a very long time, and was very expensive. The original underwriters of Pielsticker's company soon got sick of it, and concluded they would not involve themselves in a company which was mixed up in a lawsuit from the beginning. Mr. Pielsticker then found himself alone, and when he found the object he had fought for—viz., the promoting of his company—was lost, he dropped the whole thing. That is what I know of Mr. Pielsticker; the details I do not know.

146. The English Courts have decided in favour of the Cassel Company?—No; they certainly have not. The Cassel Company lost their first patent.

147. *Mr. McGowan.*] You claim that you use a very dilute solution of cyanide in the extraction of your gold, and that that is not affected by the patent of the Cassel Company. Could you give the Committee any reason why the Cassel Company has not taken steps against you for using the cyanide?—We have not used it here yet, as we have not opened up any quartz claims, but we use it in Australia and other places.

148. *Mr. Guinness.*] You said that Pielsticker did not contest this question after he lost the right with regard to the cyanide.—No, he did not.

149. Dr. Findlay says he must have done so, because he employed eminent lawyers before the Comptroller-General on the amendment of the patent. If it was only before the Court for ten or eleven days would it have been possible in that time to have made such a complete test as was made at Johannesburg, in order to bring this question properly before the Court?—They could not have done it in that time; it would have taken months, or half a year.

150. *Mr. McGowan.*] At what date did you first use the dilute solution for the extraction of gold?—We have always used the dilute solution, never a stronger one. That is the very essential thing of our patent. The economy of the patent depends upon the dilute solution.

151. When did you first use cyanide in a dilute solution for the extraction of gold?—I was not with the company at the time, but I think it was in 1887 or 1888, when the Siemens process was first tried, in California and Siberia.

152. Do you know when the Cassel Company first applied for their original patent?—I think, in February, 1888, and then the date of the application for the amendment would have been in 1895.

153. *The Chairman.*] Has it been the fear of the Cassel Company taking proceedings against you that has deterred you from using your process?—They have never proceeded against u

154. Has the reason you have done so been from fear of their doing that?—Not at all. Simply because we have had no tailings to be cyanided.

155. In the event of this becoming law, and you had to pay a royalty, what is your estimate of the amount you would have to pay?—I believe  $1\frac{1}{2}$  or 2 per cent.

156. On what gold you won?—Yes; and our operations may become very extensive.

157. *Dr. Findlay.*] Will you say whether in your specifications you mention the strength of the solution to be allowable?—No; we do not.

158. In that respect you are the same as the Cassel Company?—Yes.

159. Mr. Allen said bromide of cyanogen would exclude that if this passes?—Yes.

160. Would not the patent itself do it?—I believe it would.

161. Do you know that Dr. Gay admitted the patent in this colony?—I am not aware of it.

162. You say you have been using it in Victoria. Do you know that litigation has been proceeding there against the company?—I do not know. I know we have the cyanide in use at Mount Hepburn.

163. You do not know whether litigation has been pending between the Government and the company in Victoria? You do not know whether that is the reason you have not been disturbed in the use of cyanogen?—I do not know.

164. Do you know this question came before Mr. Justice Edwards the other day? Did you read Mr. Justice Edwards's decision?—I did not.

165. You do not know what he has said against this patent?—No. Nobody in New Zealand has the right of the patent. I would advise the Committee to get the evidence of the Chamber of Mines at Johannesburg on the subject.

166. You have not read Mr. Justice Edwards's decision?—I have not.

167. You do not know that he holds our amendment to be a proper amendment?—That may be.

168. *Mr. J. Allen* (to Dr. Findlay).] Will you say, as a legal man, whether subsection (2) of clause 8 covers anything more than the present patent of Cassel?—Yes, it does. I think it covers the strong solutions.

169. *The Chairman.*] Does it cover every solution?—Yes.

170. *Dr. Findlay* (to witness).] So far as the Bill is concerned, it does not present any further obstacle to your patent than the specification of our patent did?—I am not so well aware of that. I think the first paragraph of the specification is the same as the Bill. The second paragraph includes the strong solution.

172. *Mr. McGowan* (to Mr. Greenway).] I see four companies mentioned as being exempt from the operations of the Bill if passed. Have these companies bought out the rights?—Only the companies mentioned, and for use in their own mines.

173. Have they paid the whole of the money?—Yes, a lump-sum down, and have compounded with us to use the process in their mines.

174. And there is no money owing from these mines?—No.

175. In that connection could you give a rough estimate of the amount of money that you consider owing from companies who have been using the cyanide from the commencement of the legal proceedings, outside those companies?—It is about £5,000.

176. And I suppose you reserved to yourselves the right to proceed against those companies for that £5,000?—Yes. We look upon that as part of the purchase-money. We do not look upon it as getting £15,000, but upon getting £20,000.

177. How long has that £5,000 been accruing?—About two years and a half.

178. And the patent runs for four years and a half?—About four years now—a little more, to the 1st February, 1902. By far the largest part of it has accrued.

179. *Dr. Fitchett* (to witness).] Would your objection to the Bill cease if a clause were inserted protecting any rights lawfully existing under any patent? And I may say in justice to the Government that such a clause would have been inserted if such lawful patents existed in New Zealand. The Government was under the impression that no patent existed. Suppose a clause of that sort were inserted, would your opposition exist?—We have no interest other than to guard our own rights.

180. It would satisfy you?—Yes, certainly.

181. *Dr. Findlay.*] The Bill says that nothing therein shall be used to prejudice any lawfully-existing patent in New Zealand. The Government would say they were not lawful, and would fight Mr. Dencker?—We would not fight the Government.

182. *Dr. Fitchett.*] Were the Johannesburg proceedings before the proceedings in England?—No; after.

183. *Mr. J. Allen.*] After the amendment of the patent in England?—Yes. Our point is this: Our patent claims a solution containing cyanide or any compound of cyanide; and the strength of these solutions, as claimed by our amended patent, is of the equivalent of cyanide of potassium—2 per cent. and downwards. We want nothing above 2 per cent., but everything below it. We have worked it since 1889, and our only object is to treat the ores with as low a solution as we could, and that has been our only limit. We have always found that the cyanide will extract the gold from the ore. Directly we get below one-tenth of 1 per cent. we find we leave some in the tank. Different ores require different strengths of solutions. The object always is to treat them with the very lowest possible strength. I have carried out experiments at Waihi to test whether the zinc would extract bullion from the solution at a lower strength than it has been used in New Zealand, and I have taken stamps there which have contained only the slightest trace below 0·01, and that not from stamps which have just been made, but stamps used in the works, and from solutions coming to hand in the ordinary working of the tailings. And the test was made with 14 or 15 tons, which was separated from the rest for the purpose of the trial. Before it went into the zinc-box the solution would contain between 4 dwt. and 5 dwt. of bullion to the ton, and when it came out at the tail of the zinc-box the assay showed no trace, which shows that 99 and a decimal of the bullion was extracted—very much lower than ever before in New Zealand; and this shows that zinc is an excellent precipitate, and if the zinc is properly used, and used by people who understand it, that it can be used for any solution that will economically extract the gold. That has been my experience for the last five or six years.

184. *Hon. Mr. Cadman.*] Can you tell us from your own knowledge what is the strength of the solution of cyanide used by the four companies now exempt?—They vary very much. The Waihi use from 0·25 to 0·3; the Crown, from 0·2 to 0·4; the Waitekauri, I do not know. Directly they use lower than that they find their extraction of gold and silver falls.

185. *Mr. J. Allen* (to *Mr. Greenway*).] Do you contend, *Mr. Greenway*, that the lowest practical solution of cyanide is 0·01?—I did not say so. I said that those are the lowest solutions that have been found necessary in New Zealand.

186. You go further, and say that if you had to use 0·001 your zinc would precipitate satisfactorily. And you differ from *Mr. Dencker* on that point?—Yes. I have made personal investigations.

187. *The Chairman.*] You heard *Mr. Dencker* say that he did not think it would?—Yes.

188. *Mr. Dencker* says that 0·005 would not be satisfactory. Do you contest that?—I have not made a trial. I can only talk with absolute authority on what I have done. My opinion is that the zinc would take it.

*Dr. Fitchett:* The proceedings against the infringement of the Cassel Company's patent were taken at Home. These proceedings failed, but the Court of Appeal allowed an application for the amendment of the patent. That application was contested by the same counsel as contested the proceedings in the Courts, and after this judgment was delivered in favour of the Cassel Company, and the effect was to make it a good patent in England. On the facts before the Court of Appeal in England the patent was sustained as a good patent. The appeal was dismissed, but leave was given to amend the patent. The amendment was granted, and the effect of that was to make it a good patent.

189. *The Chairman* (to *Dr. Fitchett*).] The final English decision would almost certainly be applied here unless new facts were discovered?—Yes; they got all the facts they could up to date, and spent money like water.

190. *Mr. J. Allen* (to *Dr. Fitchett*).] Have any new facts come out since?—Not that I am aware of.

191. *Dr. Findlay* (to *Dr. Fitchett*).] It is true the Court of Appeal assails the action, but on a technical ground?—Yes, purely technical.

*Dr. Fitchett:* The Court of Appeal upheld novelty, invention, and utility, but on a technical defect it required to be amended. That was amended, and the patent stands invulnerable. Any facts since that date would not upset the patent, would not affect the validity of the patent. You would require to show some prior use to 1888. *Mr. Justice Edwards* relied on the English Court of Appeal to guide him in the judgment he made.

## APPENDICES.

### APPENDIX No. 1.

RETURN FURNISHED THE GOLDFIELDS AND MINES COMMITTEE BY THE REGISTRAR OF PATENTS.

NEW ZEALAND LETTERS-PATENT IN FORCE FOR INVENTIONS FOR GOLD-SAVING IN WHICH CYANOGEN OR A CYANIDE IS EMPLOYED.

No. 2775.—1st February, 1888.—The Cassel Gold-extracting Company, Limited (assignees of MacArthur and Forrest). "Improvements in obtaining gold and silver from ores and other compounds."

No. 3181.—13th August, 1888.—Werner Siemens, Berlin. "Improvements in the extraction of gold and other precious metals from minerals and ores containing them."

No. 3296.—11th October, 1888.—The Cassel Gold-extracting Company, Limited (assignees of MacArthur and Forrest). "Improvements in extracting gold and silver from ores or other compounds."

No. 5610.—20th June, 1892.—H. Parkes and J. C. Montgomerie, of Dulwich (Surrey) and Dalmore (Ayr, Scotland) respectively. "Improvements in the extraction of gold and silver from ores or compounds containing the same."

No. 5769.—13th September, 1892.—D. R. S. Galbraith and S. C. Macky, Auckland. "The Galbraith Gold and Silver Extraction Process."

No. 5847.—22nd October, 1892.—J. C. Montgomerie, of Dalmore (Ayr). "Improvements in the extraction of gold and silver from ores or compounds containing the same, and in apparatus for use in the treatment of such materials by means of solvents."

No. 6126.—6th April, 1893.—B. C. Molloy, London.—"Improvements in dissolving gold and other metals out of ores and compounds, and obtaining the metals therefrom."

No. 6396.—1st September, 1893.—J. S. MacArthur and C. J. Ellis, Glasgow. "Improvements in extracting gold and silver from ores and the like."

No. 6736.—28th March, 1894.—E. D. Kendall, Brooklyn (U.S.A.) "Improvements in the method or process of treating gold and silver ores, and a composition of matter for the same purpose."

No. 6775.—27th October, 1893.—J. C. Montgomerie, Dalmore (Ayr). "Improvements in and connection with the extraction of gold and silver from ores or compounds containing the same."

No. 6821.—W. O'C. G. Birkin, Nottingham. "Improvements in processes of and solvents for separating precious metals from their ores."

No. 7328.—13th December, 1894.—H. L. Sulman and F. L. Teed, London. "Improvements in or relating to the extraction of precious metals from their ores."

No. 7337.—17th December, 1894.—J. A. Walker, Kuaotunu. "Improvements in extracting gold and silver from ores and other compounds."

No. 7425.—23rd July, 1894.—J. J. Hood, London. "Improvements in extracting metals with new solvent materials."

No. 7481.—12 March, 1895.—N. S. Keith, Hawarden (Chester, England). "Improvements in separating gold and silver from other materials."

No. 7583.—8th May, 1895.—A. Schmidt, Berlin. "Improvements in the extraction of gold and silver and in solvents for those metals."

No. 7604.—14th May, 1895.—P. de Wilde, Brussels. "A process for extracting gold and silver from their ores, tailings, slimes, and concentrates, and the recovery of a portion of the materials used in such process."

No. 7691.—20th June, 1895.—The Cassel Gold Extracting Company, Limited (assignees of MacArthur and Yates). "Improvements in the process of and apparatus for extracting gold and silver from ores and the like."

No. 8175.—7th January, 1896.—A. E. Morgans, London. "Improvements in extracting precious metals from their ores, and in the production of materials to be used therefor."

No. 8187.—10th January, 1896.—J. Pflieger, Kaiserslauten (Germany). "Improvements in and connected with means and apparatus for effecting the electrolytic precipitating or obtainment of gold and silver from solutions thereof."

No. 8220.—27th January, 1896.—G. J. Adkins, Stamford Hill (England). "New or improved chloro-cyanide salts or compounds."

No. 8281.—14th February, 1896.—J. Park and E. H. Whitaker, Thames. "An improved process for obtaining gold and silver from ores."

No. 8741.—15th August, 1896.—H. Frasch, Cleveland (U.S.A.). "Improvements in mining gold and similar metals."

No. 8752.—17th August, 1896.—J. McTear, London. "Improvements in the extraction of precious metals from their ores, or from compounds containing the same."

No. 8973.—26th October, 1896.—C. W. H. Gopner and H. L. Diehl, Hamburg. "Improvements in the recovery of gold and silver from their solutions."

No. 9643.—30th June, 1897.—J. C. Montgomerie, Dalmore (Ayr), and H. Parkes, Dulwich (Surrey). "Improved means applicable for use in the treatment of ores or compounds containing gold or silver, and in means applicable for use in the treatment of such materials with the aid of solvents."

## APPENDIX No. 2.

## COPY OF NEW ZEALAND SPECIFICATION OF CASSEL GOLD-EXTRACTING COMPANY (LIMITED.)

WHEREAS we, JOHN STEWART MACARTHUR, Technical Chemist, of 15, Princes Street, Pollok-shields, in the County of Renfrew, North Britain, ROBERT WARDROP FORREST, M.D., and WILLIAM FORREST, M.B., both of 319, Crown Street, Glasgow, in the County of Lanark, North Britain, are desirous of obtaining letters patent for securing unto us Her Majesty's special license, that we and such others as we should at any time agree with should from time to time during the term of fourteen years (to be computed from the day on which this instrument shall be left at the Patent Office) make use and vend within the Colony of New Zealand and its dependencies an invention for "Improvements in obtaining gold and silver from ores and other compounds," and in order to obtain the said letters patent we must by an instrument in writing under our hands and seals particularly describe the nature of the said invention, and in what manner the same is to be performed, and make a distinct claim for the special novelty thereof. Now, therefore, the nature and details of the said invention, and the manner in which the same is to be performed, are particularly described in the following statement:—

This invention has principally for its object the obtaining of gold from its ores or other similar compounds, such as mattes and slags, but it is also applicable for obtaining silver from its ores or compounds, and it comprises an improved process which, whilst applicable to ores or compounds generally, is effectual with ores and compounds from which gold and silver have hitherto not been easily obtainable. In carrying out the invention the ore or other compound in a powdered state is treated with a solution containing cyanogen or a cyanide (such as the cyanides of potassium, sodium, or ammonium) or other substance or compound containing or yielding cyanogen, till all or nearly all of the gold and the silver are dissolved; the operation being conducted in a wooden vessel, or a vessel made of or lined with a material not acted on to any considerable extent by the solution or substances contained therein. The solution is then drawn off, and the metal or metals are recovered by any suitable process, and the cyanogen, cyanide, or substance containing or yielding cyanogen may be regenerated. The cyanogen or substance containing or yielding cyanogen may be used as such, or such materials may be taken as will by mutual action form cyanogen, or substance containing or yielding same. Under certain circumstances it may be found desirable to conduct the operation under pressure, in which case a closed vessel must be employed, and in any case, if found advisable, such operation may be carried on under varying conditions of temperature, and in either open or closed vessels.

Whereas a claim simply and broadly for the use of cyanogen, or a cyanide- or cyanogen-yielding substance, might be held to include all strengths of solution, and whereas dilute solutions containing 8 parts or less of cyanogen, or what is equivalent thereto, for every 1,000 parts of water are most advantageous, whilst strong solutions, besides being more costly, are of less practical utility, we hereby disclaim the use of strong solutions.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, we declare that what we claim is: The process for obtaining gold and silver from ores and other compounds consisting in treating such ores or compounds with a dilute solution containing cyanogen, or a cyanide or other substance or compound containing or yielding cyanogen, substantially as specified.

And we do hereby, for ourselves, our heirs, executors, and administrators, covenant with Her Majesty, her heirs and successors, that we believe the said invention to be a new invention as to the public use and exercise thereof; that we do not know or believe that any other person than ourselves is the true and first inventor of the said invention; that we will not deposit these presents at the Patent Office with any such knowledge or belief as last aforesaid.

In witness whereof we have hereunto set our hands and seals, this 12th day of December, 1887.

(L.S.) JOHN STEWART MACARTHUR.

(L.S.) ROBERT WARDROP FORREST.

(L.S.) WILLIAM FORREST.

Witness—ALEXANDER FORSON STEWART, 319, Crown Street, Glasgow.

THE CASSEL GOLD-EXTRACTING COMPANY (LIMITED) THE CYANIDE GOLD-RECOVERY SYNDICATE (LIMITED) AND OTHERS.

JUDGMENT OF THE COURT OF APPEAL.

THIS was an appeal against a decision of Mr. Justice Romer's, which is reported in the *Times* of 9th November last, and in the *Patent Reports*, Vol. xi., p. 638. The plaintiffs are the registered owners of letters patent (No. 14174, of 1887) granted to John Stewart MacArthur and William Forrest for "improvements in obtaining gold and silver from ores and other compounds." The action was brought to restrain the defendant syndicate and two other defendants—Carl Maria Pielsticker and Thomas Gilbert Bowick—from infringing the patent, as the plaintiffs alleged that they had been doing. Mr. Justice Romer dismissed the action on the ground that at the date of the patent, having regard to what was then published and known, there was no real invention in the so-called discovery. The learned Judge also said that, even if the invention was one which could form the good subject of a patent, he thought it had been anticipated by the specifications of two American patents, which were taken out respectively in 1867 and 1885, in the United States, by two persons named Rae and Simpson. By their complete specification the patentees claimed—“(1.) The process of obtaining gold and silver from ores and other compounds, consisting in dissolving them out by treating the powdered ore or compound with a solution containing cyanogen, or a cyanide- or cyanogen-yielding substance, substantially as hereinbefore described. (2.) The process

of obtaining gold and silver from ores and other compounds, consisting in dissolving them out by treating the powdered ore or compound with a dilute solution containing a quantity of cyanogen or a cyanide, or cyanogen-yielding substance, the cyanogen of which is proportioned to the gold or silver or gold and silver substantially as hereinbefore described." The nature of the invention was thus described by the learned Judge: "The invention claimed in the patent is a very simple one, and the claim very comprehensive. It is for the application of a solution containing cyanogen, so as to dissolve the gold and silver in powdered ores. The gold—for I need not further distinguish the silver—is then to be recovered from the solution by any of the well-known ways. The kind of solution to be used as the solvent is described by the specification very broadly. It is to be any solution containing cyanogen or any cyanide soluble in water (such as cyanide of potassium), or any other substance or compound containing or yielding cyanogen. No special apparatus or machinery or device or scheme of any kind is required. The solution is simply to be poured on the ore. You may stir the ore about in the solution if expedition is required; or, if you choose, you may let the solution rest so as gradually to solve the gold in the ore. In fact, the patent really is for an alleged discovery that a solution containing cyanogen can be used to dissolve out the fine gold in powdered ore." The plaintiffs appealed.

Sir R. E. Webster, Q.C., Mr. Moulton, Q.C., Mr. Bousfield, Q.C., and Mr. A. J. Walter were for the appellants; Sir Edward Clarke, Q.C., Mr. Neville, Q.C., and Mr. Goodeve were for the defendant company; Mr. Goodeve and Mr. Wright-Taylor were for the defendant Pielsticker; the defendant Bowick appeared in person.

It was stated by Sir Richard Webster, in the course of his speech, that, by the use of the plaintiffs' method, gold to the amount of £2,000,000 has been already extracted which could not have been extracted by the former methods of extraction, and which would have been entirely wasted.

At the conclusion of the arguments on the 22nd February last their Lordships reserved judgment, which was delivered this morning, affirming the decision of Mr. Justice Romer, and dismissing the appeal, with costs.

Lord Justice A. L. Smith read the following written judgment of the Court: Messrs. MacArthur and Forrest's patent, for the infringement of which this action is brought, bears date the 16th July, 1888, the provisional specification having been filed on the 19th October, 1887, and it is for improvements in extracting gold and silver from their ores by means of what, for the present, we will take to be the application to the ore of a small quantity of cyanogen-yielding substances in solution. We shall hereafter for brevity call these substances cyanide of potassium. The defendants denied the infringement, and also asserted that the plaintiffs' patent was invalid—first, by reason that the discovery as claimed contained neither novelty nor invention; and, secondly, by reason of prior anticipation. A further point was raised, which is that, if the specification is to be read as the plaintiffs read it, the defendants contend that there is such disconformity between the complete and provisional specification as to be fatal to the plaintiffs' claim. The defendants do not deny the utility of the plaintiffs' invention, but they dispute the great commercial importance claimed for it by Sir R. Webster for the plaintiffs. As regards the infringement, the defendants during the first five days of the trial strenuously insisted that their patent, which was said to be an infringement of the plaintiffs' patent, was for the extracting of gold from its ore by means of the conjoint operation of electricity and cyanide of potassium, and was therefore no infringement of the plaintiffs' patent, the electricity which they used being a material part of their invention. When, however, their witness (Mr. Herbert) was being cross-examined, and they were challenged to refer to independent experiment and trial whether their electricity, as used, was not in reality a myth, they refused to do so, and admitted they were infringers of the plaintiffs' patent, and thus this point became disposed of. In considering the question of want of novelty and invention it is necessary to state what we find to have been established in this case. It was proved that for many years prior to the patent in question it was common knowledge that cyanide of potassium would act as a solvent of gold in a finely-divided or precipitate condition in the same way as many other solvents would act, of which perhaps the strongest is *aqua regia*. There is no dispute as to this, and it is common ground. It was also, in our judgment, proved that prior to the plaintiff's patent it was not known that cyanide of potassium would act as a solvent so as to extract gold from its ore. We leave out silver, for it has nothing to do with this case. The way in which gold had theretofore been extracted from the ore in which it was contained had been by subjecting the ore which had been crushed and which contained the gold to a process which is called the amalgamation process; and then by again subjecting that ore to a second process, called the chlorination process, further gold was obtained. These two processes, however, left a residuum of gold in what are termed the tailings, and this residuum could not by any known process at the date of the plaintiffs' patent be commercially obtained, and it went to waste with the tailings, and was lost. That a large amount of gold which otherwise would have gone to waste has been recovered by means of the plaintiffs' patent, in conjunction with another patent which they took out prior to the filing of their complete specification herein, when applied, at any rate, to the tailings of South African ore, has been clearly established, and, indeed, there is no evidence to the contrary. The object which the plaintiffs had in view, and which they attained by their two patents, was by the first to extract the gold from the crushed ore by getting the gold into a state of solution by means of the application of a solution of cyanide of potassium, and then, by their second, which was for an improvement in precipitation of gold by zinc, which was then well known, to extract the gold theretofore brought into solution out of it. It is well known that ore which contains gold also contains baser metals—such, for instance, as copper, iron, lead, and other metal—and the problem which had to be solved was how to extract gold out of the crushed ore and get it into a state of solution without at the same time getting into that solution the other baser metals, or, in other words, how to extract gold from its ore and get it into a state of solution commercially free of the baser metals. That the

plaintiffs solved this problem appears to us upon the undisputed facts of the case established, for it is proved that by their application of a very dilute solution containing an extremely small quantity of cyanide of potassium to the tailings of South African ore they have profitably extracted gold therefrom in a commercially pure state, even though the ore contains only such extremely small quantities as 2 dwt. to 3 dwt. of gold in a ton weight of ore. Professor Austen, of the Mint, stated that in the year 1893 some 500,000 oz. of gold were produced by the cyanide process, and came to this country, a large proportion of which, but for the plaintiffs' process, would have been wasted and unproduced, and this represents a very large sum in pounds sterling. Evidence was unhesitatingly given by, amongst others, Professor Dewar, Professor Austen, and Professor Crookes that a dilute solution of cyanide of potassium has been found to have the properties which the plaintiffs claimed for it—that is, of having “a selective action so as to dissolve the gold in preference to the baser metals, and that this was not known before.” The evidence upon the other side as to this was feeble in the extreme. No evidence was given as to how it was that the plaintiffs brought about the results which they unquestionably did if they did not bring them about in the manner they claimed. A suggestion was made at the Bar that South African tailings were such that the gold therein could be easily extracted therefrom without the cyanide having the properties claimed for it, and it does appear in the evidence that some ores are more refractory than others. Mr. Horland, on behalf of the defendants, however, stated that in the experiments which he had made he found that the base metals—the iron, the copper, and other metals, as the case might be—went into solution along with the gold, and that he had always found in his experiments that in “a short time or a long time, with a strong solution or with a weak solution, he got out both the base metal and the gold together.” We would point out that, though this was the result of Mr. Horland's experiments, it still remains to be answered how did the plaintiffs bring about these results, which they undoubtedly have. To this we can find no answer in the defendants' case. The defendants sought to explain this paucity of evidence which they brought on their part, as to the selective action of small quantities of cyanide of potassium, by asserting that they had been misled into the idea that Sir R. Webster had abandoned his claim to the selective action, and they pointed to an answer he gave to my brother Romer towards the end of his reply. But when the whole course of the trial is looked at we have no manner of doubt that Sir R. Webster never gave up the point at all, and he has fully explained how it was that he came to give the answer he did, and that it had no reference whatever to his abandonment of this claim. We must add that, even assuming defendants thought, when he gave the answer which he did, that he had abandoned his claim to the selective action, that would not account for the meagre evidence which they gave upon this point, for Sir Richard Webster's answer was not given until the whole of the evidence had been closed, and, indeed, not until he had come to almost his last words in his reply upon a six-days' trial. The selective action claimed by the plaintiffs for the application of a very dilute solution containing an extremely small quantity of cyanide of potassium to ore containing gold has, in our judgment, been proved. But, it is said, even if so, yet there was no novelty in what the plaintiffs have claimed, by reason of the information which had been set forth in prior publications. To establish that this was so, a series of published documents was put in evidence by the defendants, commencing with a specification of Elkington in 1840, and ending with the specification of James Hanny in 1887. They were in all twenty-four in number, and amongst them were contained five specifications—viz., Elkington in 1840, Rae in 1867, Sanders in 1881, Simpson in 1885, and Hanny in July, 1887. It is not suggested that under any one of these specifications gold has, in fact, been commercially extracted from its ore. But it is said that these specifications (apart from the question of anticipation which we will deal with hereafter), together with the other documents put in by the defendants, show such a state of general chemical knowledge of the fact that cyanide of potassium would dissolve and thus extract gold from its ore as it is found in nature that no novelty exists in the plaintiffs' invention. We do not propose to go through this list of publications, for it is sufficient to take those which the defendants' witnesses point to as being the best for elucidating that for which they were put in—viz., Faraday's paper in 1857, Rae's specification in 1860, Dixon's paper in 1878, and Simpson's specification in 1885. As regards Faraday's paper, it deals only with gold in its pure state in the form of a very thin leaf or film; it in no way deals with gold as found in nature in ore combined with the other baser metals which are its associates. Faraday knew what many since, if not before, have known—that cyanide of potassium was to some degree a solvent of gold; but he in a way foreshadows its applicability or utility to the extracting of gold from the other baser metals as it exists in the earth. As regards Rae's American patent, which was for treating auriferous and argentiferous ores, he declares that his invention consists in treating these ores with a current of electricity for the purpose of separating the precious metals from the gangue. It is true that he uses chemical preparations—such, for instance, as cyanide of potassium—in connection with the electric current, in such a manner that, by the combined action of the electricity and of the chemicals, the gold contained in the ore is first reduced to a state of solution. He describes how he pours his chemicals upon the rock—*i.e.*, the ore—and then applies his electric current. It appears to us, as far as this specification is concerned, that Rae might just as well have used *aqua regia*, or any other known solvent of gold, in connection with his current of electricity, and brought about his desired result, which, however, as a fact, he never attained. Professor Crookes, under cross-examination, stated the reason why he thought Rae added his electricity was because he had got an imperfect solvent action, and he consequently added electricity. Sir Edward Clarke argued that the first process, as regards the solvent, sufficed without the electricity; but where is the evidence of this? On the contrary, in our judgment, it is established in this case that, unless the solvent—*i.e.*, the cyanide of potassium—is used in the extremely small quantities in solution, as discovered by the plaintiff (and in Rae's patent it is unlimited), it is simply useless, for, as Professor Crookes and others pointed out, a strong solution attacks the baser metals without attacking the gold, whereas a weak solution is feeble and

nil on the baser metals, but attacks the gold. We now come to Dixon's paper, which was read before the Royal Society of New South Wales in August, 1877. It was a paper as to the method of extracting gold, silver, and other metals from pyrites. It first deals with that which was and is a common knowledge—namely, that precipitated gold is soluble in cyanide of potassium if exposed to the air, and, after alluding to Rae's American patent and other matters, he makes this most significant statement. He says: "There being, therefore, no method by which the precious metals could be removed and the baser metals left, it remained to fall back on one of the first principles of metallurgy—viz., to remove the baser metals at the earliest stage, if possible, and leave the precious metals as a residue." Now, this is exactly what the plaintiffs by their invention have shown should not be done, for they remove the precious metals by their invention at the earliest stage and leave the base metals as a residue. And yet the defendants' witness, Vautin, as also Mactear, cite Dixon's paper as possibly the best publication they have to show what they want to establish as to prior general knowledge. In our judgment, this paper of Dixon's is cogent evidence in favour of the plaintiffs, and equally so against the defendants. Now we come to Simpson's American patent of 1885, which was published in this country prior to the plaintiffs filing their provisional specification. In our opinion, of all the documents put in, when understood, this is the only one which even approaches the point which the defendants put them in to establish. It is a chemical patent for improvements in the processes of extracting gold, silver, and copper from their ores. From it, as in the other specifications, no results were ever attained. But, nevertheless, it is necessary to see what information it imparts to the chemical world. By his specification Simpson first of all crushes the ore. This is common to all extractions of gold. He then mixes the crushed ore with his solution in a tub or bath, and he then allows the mixture to stand until the solid matter is settled and the solution is clear. He then precipitates the metal—*i.e.*, the gold which is in the solution—on to zinc. The solution, which he uses for either gold or copper, is made of cyanide of potassium and carbonate of ammonia—viz., 1 lb. of cyanide of potassium and 1 oz. of carbonate of ammonia. He says (we assume pointing to Rae's patent) that he is aware that cyanide of potassium when used with an electric current has been used for dissolving metal, and also zinc has been employed as a precipitate, and the use of these he did not wish to be understood as claiming broadly. He also was aware that carbonate of ammonia had been employed for dissolving such metals as are soluble in a solution thereof, and the use of this he did not claim. "What I claim," he said, "as new is the process of separating gold and silver from their ores, which consists in subjecting the ore to the action of a solution of cyanide of potassium and carbonate of ammonia, and subsequently precipitating the dissolved metal substantially as set forth." The question is: Does this specification add to the stock of common knowledge so as to inform men skilled in chemistry that, by the application of a very dilute solution of an extremely small quantity of cyanide of potassium alone to gold as it exists in ore in nature, when the ore is crushed the gold can be extracted therefrom, leaving behind the baser metals? It is true that Simpson's 1 lb. of cyanide of potassium is about equivalent to the margin of  $\frac{1}{2}$  to 2 of cyanide of potassium in the plaintiffs' specification. It appears to us, as laymen, that the compound composed of the combination of the two chemicals—viz., cyanide of potassium and carbonate of ammonia, in the proportions mentioned—is not only what Simpson was relying upon, but what is the natural meaning of his discovery as described. And it would not lead any one to suppose that a very dilute solution of an extremely small quantity of cyanide of potassium alone would do what it was supposed the compound of the two would do, and which so many desired to attain. But this part of the case does not rest here, for a body of scientific evidence was called as to this. On the plaintiffs' side many witnesses stated emphatically that Simpson's specification would not have led a chemist in 1887 to the knowledge that a solution of cyanide of potassium would act by itself as a solvent of gold in ore, and they gave *in extenso* their reasons for this conclusion. Professor Dewar stated that if he had read Simpson's patent at its date he should have understood that he had discovered the carbonate of ammonia possibly to replace the electrical current, and Professor Austen said the same. On the other side, witnesses, and especially Mr. Vautin, were also explicit that the specification would afford the information. When this evidence is weighed we have no doubt that that given on behalf of the plaintiffs largely preponderates. But there is another fact which seems to us important, and it is this: If Simpson's patent of 1885 informed the chemical world that a small quantity of cyanide of potassium in solution would extract gold from its ore, it is strange that no witness (and we cannot find one) called by the defendants has pledged himself that, before the plaintiffs' discovery, he knew that a very dilute solution containing a very small quantity of cyanide of potassium would do so. Upon this point, from among the plaintiffs' witnesses, we will take Professor Dewar, who stated, "It was not common knowledge to me that a cyanide-of-potassium solution was effective for dissolving gold from its ore"; Professor Crookes, who stated "that, up to a few years ago, his opinion was that cyanide of potassium was of no practical use in getting gold out of its ore"; and Sir Henry Roscoe, who answered the following question thus: Q.—"Did you ever hear in the whole range of your experience of that solution being obtained (*i.e.*, gold into solution from ore) by the simple action of cyanide of potassium upon metallic gold?" A.—"No, not without a current of electricity employed for dissolving it on one side and depositing it on the other." It is true that Mr. Riley, one of the defendants' witnesses, in answer to a question put by Mr. Justice Romer as to whether in the year 1887 any chemist would have doubted that if he had applied a solution of cyanide of potassium to crushed ore it would have solved the fine gold, answered: "It would if the gold was in a sufficiently divided state. It is a question entirely of the division of the gold." But this, it will be seen, did not answer the learned Judge's question, and he further proceeded: "My question to you is, Would a chemist, in the beginning of 1887, have felt any doubt that a cyanide of potassium would have solved the gold and silver?" A.—"I should have no doubt myself if the gold was in a sufficiently fine divided condition it would have dissolved it." This, again, did not answer the question, so the learned Judge asked him this: Q.—"Do you think it would have

required experiment to find that out?" A.—"I think not. I think it was a chemical fact that was generally known." It will be noticed that, even under this pressure, he does not venture to say that he knew it, though he says he thought it was a chemical fact that was generally known. Again, Professor Atfield, called by the defendants, was also asked by the learned Judge: Q.—"Do you think, in the beginning of 1887, any invention was required to discover that a solution of cyanide of potassium could be practically applied to dissolve gold and silver in crushed ore?" A.—"I do not." Which answer, it will be seen, by no means pledges himself that he knew it. Both of these witnesses' answers are matters of opinion, and nothing more; and when we find such men as Professor Dewar, Professor Crookes, and Sir Henry Roscoe stating that they did not know it, and coupling this with the fact that it never had been used for commercial purposes for so doing, we cannot doubt that the fact was not known in the chemical world, and we come to the conclusion that there was novelty in the plaintiffs' discovery; and we adopt what Sir Henry Roscoe stated: that, taking the specifications and everything as a chemist, he certainly did not find any indication that cyanide of potassium, if used alone, would be sufficient to do the work. Novelty and utility being established, it goes some way, at any rate, towards carrying invention. To see if there was invention we turn to Mr. MacArthur's evidence (it is the first time we have attended to it, simply because he is a party to the cause, though it is most important upon many parts of the case), where he describes the researches he made before he hit upon that for which he was seeking. Professor Dewar points to the fact that in nature the conditions are so complex that the question could only be solved by experiment and trial, and Lord Kelvin gave evidence to the like effect. Mr. Mactear, called by the defendants, under cross-examination as to the properties of cyanide of potassium, said: "Cyanide-of-potassium solution is of such a peculiar nature that I do not think any chemist in the present day knows its composition, or knows the reactions taking place within it, and that the knowledge of it is purely experimental," which is entirely in accord with the plaintiffs' evidence upon this point. We would point out that the invention consists, not merely in discovering that cyanide of potassium can be used to extract gold from its ore, but in showing the public the best practical method of doing it, by leaving the baser metals behind, which had never occurred to any one before. We cannot doubt that, upon the evidence given in this case, of which we have only given typical extracts, if the plaintiffs' specification is to be read as contended for by them, there is ample novelty and meritorious invention in their discovery. As to its having been anticipated by the prior specifications, it will be remembered that from not one of them has any commercial result ever been obtained. The law applicable to paper anticipation, which all these are if anticipations at all, is clear, whether you take what Lord Westbury said in *Hill v. Evans*, in *De Gex, F. and J.*, p. 299; or Lord Esher, in *Otto v. Linford* (46, "Law Times Reports," p. 39); or Lord Justice Cotton, in *Erlich v. Thlee* (3, "Patent Cases," 437); or, indeed, any other of the cases upon the subject. It is this: that to constitute a paper anticipation the description in the prior specification must be such that a person skilled in the matter reading it would find it in the invention which is sought to be protected by the patent, and unless this can be found in the writing itself it is not an anticipation at all. In our judgment, the existence of a chemical patent wherein the combined effect of two or more chemicals is claimed in order to bring about a desired result does not by any means constitute an anticipation of a subsequent discovery that by the use of one of the named chemicals the desired result can be obtained, and *a fortiori* where the compound of the two or more has failed to do so; for, as stated by Professor Mills, there "are any number of cases known in chemistry where two things when put together act very differently from what they do apart"; and we entirely agree with an answer of the defendants' witness, Mr. Vautin, that, where the public are told to use a compound of two chemicals, such information certainly does not disclose the fact that either of the two alone will suffice. We are of opinion that neither Simpson's specification nor any of the other four are anticipations of the plaintiffs' invention. We now come to what appears to us to be by far the most formidable part of the case, as regards the validity of the plaintiffs' patent. It is this: Upon the true construction of the plaintiffs' specification have they or not claimed for the use of any cyanide of potassium in solution, no matter what, for the extraction of gold from its ore? If they have, we agree with Mr. Justice Romer that the patent is bad, and it is upon this that the learned Judge has, as it appears to us, mainly based his judgment; for it is then a claim, not only to apply a well-known substance to another well-known substance without stint or limitation, and thus to deprive during the continuance of the patent the public from using what they were theretofore entitled to do, but it is also a claim for that which is of no utility, for, as before stated, unless cyanide of potassium be used in the limited manner the plaintiffs, by their specification and second claim, state it is to be used, it brings into solution the baser metals conjointly with the gold, and no beneficial result is attained. If in the specification there had but been the second claim alone—*i.e.*, for the dilute solution containing the small quantity of cyanide of potassium as therein substantially described—there would not, in our judgment, have been any real difficulty in this case, and we should have been of opinion that this was a good patent; and a passage in the judgment of the Court of Exchequer, delivered by Mr. Baron Bramwell, in *Hills v. London Gaslight Company* (5, H. and N., at p. 369), is very pertinent to this point. The learned Baron, who was dealing with a patent for the purification of gas by the application of hydrated oxides, says this: "Then it is said that the mere application of the hydrated oxides to absorb the sulphuretted hydrogen from coal gas is not the subject of a patent, that property of it being previously well known. With that we do not agree. The answer is that the question is not properly stated. The application of the hydrated oxide is a principle. If a man were to say, 'I claim the use of hydrated oxide of iron for the purification of coal gas,' without saying how it is to be applied, it is possible the objection might be well founded; but here the plaintiff says, 'I claim it in the manufacture of gas in the way I have described,' and he shows how it is to be used. Therefore this objection fails." In our judgment, the plaintiff's invention, as claimed by his second claim, has novelty, invention, and utility; it has not been anticipated, and it has been infringed. The point as

to disconformity when the law applicable thereto is borne in mind, in our opinion, comes to nothing. In the case of *Gadd v. the Mayor of Manchester* (9, "Patent Cases," at p. 529), Lord Justice A. L. Smith stated the law upon this subject, and we do not restate here what he said therein. The plaintiffs, in their provisional specification, state the nature of their invention as being that they treat the powdered (*i.e.*, crushed) ore with a solution of cyanide of potassium till nearly all the gold is dissolved. In a provisional specification no claim is ever made by the patentee; he has not to state therein what he claims or how he carries out his invention, but he must state its nature in such a way that the law officers may see what it is, and so that the identity of its subject-matter with that of the complete specification which is to come thereafter may be ascertained. In the complete specification the patentee has to do much more. Not only has he to state therein what his invention is, but he must particularly describe how his invention is to be carried out and performed, and what he claims; and then comes the time, applying this rule of law to the present case, for the plaintiffs to state the proportions in which they find that the cyanide of potassium is to be used in the solution to carry out their invention; and that is what they have done. We cannot hold that there is any disconformity, as argued by the defendants, assuming the specification to be read as the plaintiffs desire that it should be. But still there remains the question as to what is the true reading of the specification with Claim No. 1 in it. Sir Richard Webster argued that Claim 1, with the words at the end, "substantially as hereinbefore described," limited that claim to the quantity of cyanide of potassium to be used in the solution to be applied to the ore in the same way as Claim 2 did, and he argued that Claim 2 was inserted as being only applicable to the richer ores mentioned in the specification, and that in neither claim was the use of any solution of cyanide of potassium—*i.e.*, cyanide of potassium and ore—claimed. We cannot read the specification in this way. We would if we could, but we cannot do so. It appears to us that Claims 1 and 2 are independent claims, having application to the whole specification, the first making claim for the use of any cyanide of potassium in solution, irrespective of amount, substantially as therein described, and the second making claim for the use of a dilute solution containing a specified quantity of cyanide of potassium substantially as therein described. It appears to us impossible to discard either one or the other, or to hold that both mean the same thing, or that Claim 1 applies to one part of the specification and Claim 2 to another, for this, in our judgment, is not the true construction of the specification as framed. If the first claim had been omitted or disclaimed we should not have been faced with the difficulty we are; but as it is in the specification we are unable to read it as the plaintiffs desire to do, and for this reason, and for this alone, we must with reluctance give judgment for the defendants, and dismiss this appeal, with costs.

*Mr. Moulton*: Your Lordships have found for the plaintiffs on the great bulk of the issues. The costs of the issues that you have found in favour of the plaintiffs will, I presume, be the plaintiffs'.

*Lord Justice A. M. Smith*: You ought to have all the costs about infringement.

*Mr. Moulton*: But about the validity on the ground of anticipation. My learned friends have got a certificate that they have proved certain anticipations and certain objections. Perhaps your Lordships would allow us to come before the Court with regard to that.

*Lord Justice Lindley*: What did Mr. Justice Romer do about these details?

*Mr. Moulton*: Your Lordships see that he gave us the costs of infringement, but he gave the defendants a certificate that they had proved their objections. Now, my Lords, the only objection that your Lordships have found proved, is one based on the construction of the specification with regard to the first claim. The learned Judge in the Court below held Simpson and Rae to be anticipations, so I should submit that, perhaps, we had better come before one of your Lordships.

*Mr. Neville*: I will only mention this (my friend will correct me if I am wrong) that I do not know any exception to the rule laid down by the Court some time ago, that where the Court dismisses the appeal, it does not deal with the costs in the Court below.

*Lord Justice Lindley*: I was thinking of that.

*Mr. Moulton*: Your Lordships did it in the Deeley case.

*Lord Justice Lindley*: Can we discharge the certificate?

*Mr. Moulton*: Your Lordships will have to discharge the certificate if your Lordships find that certain objections were not proved which the learned Judge found were proved. His Lordship certified the whole of the objections.

*Lord Justice A. L. Smith*: If you like to come before me some time after Easter, and you both put down what you want, if I have any difficulty I will adjourn it into Court, but if not I will decide it myself.

*Lord Justice Lindley*: It will not do to do nothing in a case like this.

*Mr. Moulton*: It may mean that we should wish to ask your Lordships for leave to disclaim. Therefore, so far as that is concerned, perhaps your Lordships will allow this to be adjourned, so that we could come before your Lordships at a later date.

*Lord Justice Lindley*: Are we the right people to come to for leave to disclaim?

*Mr. Moulton*: It would have to be done by your Lordships, because it is now before this Court. However, it is a point we should like to consider, if your Lordships will take it that it is adjourned, and not concluded. Then we can bring all these matters before your Lordships.

*Lord Justice A. L. Smith*: Yes, we will adjourn it.

*Mr. Neville*: Then I understand it is adjourned until the first day in next term.

*Lord Justice Lindley*: The first day you can get before Lord Justice A. L. Smith after the vacation. He will be kind enough to hear you in his private room, and if he has any difficulty he will adjourn it into Court.

THIS is the Exhibit marked "B," referred to in the declaration of Percy Howard Henderson, made before me this 1st day of May, 1895.

JOSEPH RENAL, Lord Mayor of London.

I, PERCY HOWARD HENDERSON, of 4, New Court, Lincoln's Inn, in the County of London, England, a member of the Institute of Shorthand Writers, in the employment of Messrs. Walsh and Sons, of the same place, shorthand writers, do solemnly and sincerely declare as follows :—

1. I was present in Court of Appeal No. II. on Tuesday, the ninth day of April, one thousand eight hundred and ninety-five, at the Royal Courts of Justice, Strand, London, England, before the Right Honourable the Lords Justices Lindley and A. L. Smith, when the Right Honourable the Lord Justice A. L. Smith, on behalf of the Right Honourable Lord Halsbury, the said Lord Justice Lindley, and himself, delivered a considered judgment in an appeal from a judgment of the Honourable Mr. Justice Romer, delivered on the eighth day of November, one thousand eight hundred and ninety-four, in an action (1893, C. No. 2608) between the Cassel Gold-extracting Company (Limited), Plaintiffs, and the Cyanide Gold-recovery Syndicate (Limited), Carl Maria Pielsticker, and Thomas Gilbert Bowick, Defendants, and which appeal had been argued on the thirteenth, the fourteenth, the fifteenth, the eighteenth, the nineteenth, the twentieth, the twenty-first, and the twenty-second days of February, one thousand eight hundred and ninety-five.

2. On behalf of the plaintiffs and appellants in the above-mentioned appeal, I took verbatim shorthand notes of the judgment so delivered by the said Lord Justice A. L. Smith.

3. The print which is now produced to me as an exhibit marked "B" has been compared by me with my original notes of the said judgment, as so taken down by me in Court on the said ninth day of April, one thousand eight hundred and ninety-five, and as the result of such comparison I find that the same is a full, true, and accurate transcript of such notes so taken by me as aforesaid.

And I make this solemn declaration conscientiously believing the same to be true, and by virtue of "The Statutory Declarations Act, 1835."

PERCY HOWARD HENDERSON.

Declared at the Mansion House, in the City of London, this first day of May, one thousand eight hundred and ninety-five, before me—JOSEPH RENALS, Lord Mayor, London.

To all to whom these presents shall come, I, Sir JOSEPH RENALS, Kt., Lord Mayor of the City of London, do hereby certify that on the day of the date hereof, personally came and appeared before me PERCY HOWARD HENDERSON, the declarant named in the declaration hereunto annexed, and by solemn declaration, which the said declarant then made before me in due form of law, did solemnly and sincerely declare to be true the several matters and things mentioned and contained in the said annexed declaration.

In faith and testimony whereof, I, the said Lord Mayor, have hereunto signed my name and caused the seal of the office of Mayoralty of the said City of London to be hereunto put and affixed, and the print marked "B," mentioned and referred to in and by the said declaration, to be hereunto also annexed.

Dated in London, the first day of May, in the year of our Lord one thousand eight hundred and ninety-five.

JOSEPH RENALS, Lord Mayor.

FRANK S. JACKSON, Registrar.

*Approximate Cost of Paper.*—Preparation, not given; printing (1,250 copies), £15.

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