

appliances that have the slightest likelihood of being an improvement on the appliances we already have. Experiments of this kind are always made with the greatest willingness. I submit that the department, as a department, has done everything that is possible in actual railway practice to do. We have the most up-to-date appliances. We have made experiments repeatedly ourselves, and we have profited by other people's experiments; and, as an expert, I say that we do not know of any better appliances than those we are using, and we are quite safe in saying that no other railway has appliances superior to our own at the present time. To show how we try to maintain these appliances I will read from the book of locomotive instructions. Rule 323 says, "The chimneys and spark-arresters of all locomotives must be kept perfectly clean. Engine-men neglecting this must be reported." Rule 324 says, "The apparatus used for preventing the emission of sparks must be kept in perfect order. All cases of defect must be reported, and immediate action taken to remedy them." We have also perforated dampers in the ash-pan to prevent cinders getting out in any way. As a matter of fact, we drown them by the overflow from the injectors which is led into the ash-pan. The duty of a fireman when he goes on in the morning to get the engine ready is to clean his spark-arrester in the smoke-box, to thoroughly examine it and to satisfy himself that it is in perfect order, and that there are no holes larger than the regulation size. If there is any hole larger, or any defect, it is his duty to call the attention of the driver to it. Every possible precaution is taken. In the cases before the Royal Commission the spark-arresting appliances were in perfect condition.

106. Are the patents that are being tried local patents, or are they patents that are being tried in other places?—They are local patents.

107. They have had no trial outside New Zealand?—No.

108. How long have you been trying them?—We tried one of them about twelve months ago. The second one, which I have specially in mind, we are trying now. The trial is not yet complete.

109. When will it be completed? Could you furnish me with an interim report?—Not so far. The patentee is making some alterations to it which are not yet complete.

110. Your department is giving every facility for the trial?—Yes, every possible facility.

111. What is the life of one of those plates?—The plates are not renewed, unless necessary, between the workshop overhauls; and a complete overhaul takes place every two or three years.

112. But they are cleaned every day in the year?—Yes, by the fireman, before the engine leaves the shed. They are cleaned and examined.

113. *Mr. Lane.*] In looking over the evidence I see a witness spoke of black smoke: is that indicative of any particular condition of the fire as likely to show that sparks would be emitted?—It is the least likely time for sparks to be emitted. Sparks would be little likely to be formed when there is black smoke coming from the fire and through the tubes and up the chimney; and if sparks were formed their passage through the black smoke would be likely to extinguish them before they left the funnel. When black smoke is coming from the funnel there is the most remote chance of sparks being formed, and it is so unlikely that it might be put down as a very remote possibility.

114. When black smoke is issuing you could more readily distinguish sparks than at any other time if sparks were issuing?—Well, speaking as a practical locomotive engineer, I may say I have never yet been able to see a spark in the broad daylight.

115. Take a train starting as this train was starting from the Rakaia Station: at what force would the sparks strike the grating?—The sparks are not forced against the grating; they are all shot to the front of the smoke-box.

116. What would be the velocity of the air through the perforations?—The velocity of the gases through the perforations would be about the same as the velocity of the air through an ordinary fiercely burning fire. The velocity is not very great. I could not exactly say the velocity of feet per second.

117. It would come at a fair pace, would it not?—Yes; but the sparks go straight away underneath and fall into an out-of-the-way part of the smoke-box, and their tendency is not to impinge on the perforated plate at all.

117A. As to the apparatus you use on the lignite-burning engines, can you use the same apparatus on engines such as the engine that was used on 2nd January, 1897?—No. We have to adapt the apparatus to the nature of the coal, and this necessarily varies, and the most efficient spark-arrester for one coal may not be—and, as a matter of fact, is not—the most efficient for another coal.

118. Would the apparatus used on engines burning lignite-coal be better than the one you have explained is in use with hard coal?—No, not for the reasons already given.

119. Although this is the least likely engine to throw sparks, yet you admit that you cannot stop sparks?—I admit that under certain conditions there is a bare possibility of sparks coming out.

120. But you admit they do come out?—Yes, under certain conditions, but the conditions that day were not such as to render it likely that they would come out.

121. You base that opinion on the statements of your staff who were employed on the engines?—Yes, and from what I actually know of the engines and the train and the grade.

122. Do the gratings crack, or are larger holes ever made in them?—They do not crack. Any defect would be immediately noticed by the fireman.

123. It would not be noticed until the overhaul next morning?—Well, there is really no liability to crack, the plates being of wrought-iron.

124. Do the little pieces chip out?—No.

125. Have you ever seen any of the holes burnt out?—No; but I have seen holes much more contracted with use. The tendency is to contract rather than to enlarge.