DISCUSSION.

The President (Mr. James Shirra) said he would like to ask the author whether any experiments had been made with Lowmoor iron?

Some time ago he read of some tests of a drilling machine drilling a 7/8 inch hole in material of a certain "number Brinell hardness" in four seconds. He had endeavoured to find out what this specified hardness represented, but could not obtain any information on the subject. Thanks to the author this point had now been clearly explained.

Some five or six years ago there was a good deal of controversy with regard to the surveying of steamships, more especially in connection with tail shafts. One gentleman had said: "Why don't you take out the tail shaft and put it in a testing machine?" This would now be quite possible with a portable machine of the type described by the author.

Mr. E. J. Erskine, in proposing a hearty vote of thanks to the author, said that it appeared to him this valuable paper contained a great deal of food for thought, and represented a vast amount of labour in its compilation. Although he was not prepared to discuss it, he desired to express our obligations to the author for bringing his investigations before us.

Mr. J. Scoular, in seconding the vote of thanks, endorsed the previous speaker's remarks. He considered the paper a most interesting one, more especially so to railway men. He would like the author to suggest a method for testing draw-bars and couplings which would prove reliable.

Mr. W. H. German said he had much pleasure in supporting the motion. He was sure the author was very much to be congratulated for his paper, but he felt also that our Association was to be congratulated, inasmuch as the author had issued this paper to the engineering public, under its auspices. He was convinced that it was a very valuable paper, and would enhance the value of the 1908 volume of proceedings, not only to our own members but to those Societies with whom we exchanged our volumes.

The information relating to the new methods of testing materials was of the very greatest importance to the manufacturing engineer who desired to be in the front rank, for it was being more than ever recognised that not only design and workmanship in machinery, but absolute reliability in the materials used in construction is a very leading feature. He was much concerned some little time back over the great number of breakages of truck axles at their Fiji mills. The trucks in question were built in Sydney, and the axles imported from England, under a specification requiring material of from 28 to 30 tensile strength per square inch, with an elongation of 20 per cent. Unfortunately in practice a large number of these axles failed. He then had further tensile tests made here, which proved satisfactory. He then consulted Professor Warren, who suggested making impact tests, which were made, and singularly proved in the face of the successful tensile tests that the material was not suitable. Trial after trial showed that under impact the steel was not suitable for axles, with the result that he had now altered the specified requirements. He might mention that he had also altered the design of the axles by increasing the radius of the fillets at the shoulders of the axles.

With regard to the hardness tests the President suggested

a possible means of utilising the machine described by the author for determining the condition of propeller shafts. But there was another application he thought that might be adopted, and that was in the question of testing the hardness of rails. Eight or nine years ago he found that their rails were rusting away very rapidly in the tropics. On investigation it was found that the soft rails suffered most. He had made inquiries in England as to whether any known test for hardness had been applied to rails, but, so far, had received no satisfactory information, and so had to revert to the ordinary drop tests. He might say that in their specifications for rails they now had increased the percentage of silicon and carbon. He would like to know from the author whether the Brinell test had been applied commercially to rail tests.

Professor W. H. Warren, in reply, said that in testing Lowmoor iron gave excellent results. With regard to the President's suggestion in connection with propeller shafts, it was possible to apply the machine and make impressions for the whole of its length, and from the hardness number determine the tensile strength of the various parts. Rails could be tested in a similar manner. The Brinell test had now been used in England for over three years. The best test for couplings would be a tensile test with a notched bar.

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