

## No. 4.

THE ENGINEER-IN-CHIEF to the HON. THE MINISTER FOR PUBLIC WORKS.

RE supply of Wheels and Axles by the Staffordshire Wheel and Axle Company.

Public Works Office, Wellington, 10th June, 1884.

IN a shipment of the above (80 pairs), received by the "Invercargill" one axle was found broken in the ship's hold, the fracture having occurred close to the inner face of one of the wheel naves, and square across the axle.

The fracture shewed a coarsely crystalline texture, with flaws on each side, and the axle was not bent in any way, and neither it, nor the wheels, shewed any marks of ill-usage.

The breakage, as above described, was of such an extraordinary nature, that it was determined to test a number of the axles in the same shipment, and from the same manufacturers. The test applied was of a similar character to that provided in the English specification, viz:—a weight of one ton falling through a space of 3 feet, the axle to receive three blows on one side, and two blows when reversed, *without breaking*, when resting on supports 3ft. 6in. apart.

As we could not arrange that the supports could be 3ft. 6in. apart, the wheels being in the way, distances respectively of 4ft. 3in., and 5ft. were adopted, the fall of the weight being in the former case 1ft. 10in., and in the latter 1ft. 4in. to 1ft. 5in., which would be equivalent to the English test. A schedule of the tests is attached, viz:—

Five, of axles marked "Staffordshire Wheel and Axle Company," including the one broken in the ship.

Three, of axles marked "Midland Iron Company."

Three, of axles marked "Lancaster Wagon Company." All of which were supplied under contract by the first and third-named firms.

Some old axles were also tested, by way of comparison, viz:—Two old axles, made in Dunedin, and one old axle, marked "S. W. & A. Co."

The last-named axle broke only after twenty blows, increasing in force up to a 7½ft. fall, and the two Dunedin axles broke respectively with twelve blows, and five blows, increasing in force up to 7ft. fall, and 6ft. fall.

Of the Staffordshire Wheel and Axle Company's axles, one broke with six blows, the first three of which were with a fall of only 1ft., two broke with three blows, and one broke with two blows.

Of the Midland Iron Company's, one broke with one blow, one broke with eight blows (increasing fall), and one broke with six blows.

Of the Lancaster Wagon Company's, one broke with twelve blows (increasing fall), and the other two both broke with five blows.

The result of these tests are so unsatisfactory, and so startling, that I dare not recommend the use of any of the axles supplied under the late contracts with the Staffordshire Wheel and Axle Company, and Lancaster Wagon Company, which latter includes those marked "Midland Iron Company."

Steps should be taken to have all these axles replaced with others, of the goodness of which there should be no doubt, and the contracting firms should, in my opinion, be called upon to supply them at their own charge.

The axles which have been broken under the tests should be sent Home, so that the Consulting Engineers, and others concerned, may see the inferior nature of the material supplied.

To save time, I should recommend also, that as many axles as possible may be made in New Zealand, at the various Government workshops, where such work could be executed, so that the imported wheels may be made available as speedily as possible.

The Hon. the Minister for Public Works.

JOHN BLACKETT.

P.S.—The report of the Inspecting Engineer is attached, also a Memorandum by the Storekeeper.

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Enclosure 1 in No. 4.

The INSPECTING ENGINEER to the ENGINEER-IN-CHIEF.

SIR,—

Public Works Office, Wellington, 9th June, 1884.

I have the honor to enclose herewith the result of the testing of carriage axles, ex "British King," "Loch Ken," and "Invercargill."

Of the four axles tested of the Staffordshire Wheel and Axle Company, not one stood the very moderate test, but broke. One broke in the ship's hold. The fracture of these is coarsely crystalline, and the color of the iron, white.

Of the three axles tested of the Midland Iron Company, one stood the test corresponding to that of the English specification, but broke with a four feet drop. The fracture of these axles is crystalline. The crystals, however, are not so large as those of the Staffordshire axles, and there is some grey fibre in the axles that stood the specification test.

Of the three axles tested of the Lancaster Wagon Company, one stood the prescribed test, and did not break until a 5 feet drop was applied for the second time. The fracture of these axles was crystalline, and of a white colour in the middle, and fibrous grey in the outer part.

Attached is also the result of the tests of two similar axles made in Dunedin, and of an old axle marked "S. W. & A. Co.," which has been on the road for some time. These axles stood very severe tests, the fracture in each case being fibrous, and of a grey color. Another old axle, tested by Mr Ashcroft, did not break until a 7 feet drop had been applied repeatedly, and the fracture was grey and fibrous.

To the Engineer-in-Chief.

C. B. KNORPP.