

1922.

NEW ZEALAND.

PIG IRON AND STEEL

(REPORT ON THE PRODUCTION OF) FROM NEW ZEALAND TITANIFEROUS IRONSANDS.

Laid on the Table of the House of Representatives by Leave.

16 Victoria Street, Westminster, London S.W. 1, 24th October, 1921.

ACTING on your instructions, I have supervised the experiments at Messrs. Summerson's works at Darlington, on the production of pig iron and steel from New Zealand titaniferous ironsands, and in an appendix are given details of the experimental runs.

I went down to Darlington on Friday night, 19th August, and on Saturday visited the works to examine the furnace, electrical equipment, &c. It had been arranged to have a run on the following day in the presence of the Right Hon. W. F. Massey, P.C., as a demonstration, but not to form part of the experimental run; this demonstration took place on Sunday, 21st August, and the metal was cast into pigs.

On examining the furnace after this heat the bottom was found to be in a bad condition, and it was decided to repair the hearth before starting the experimental run. This was done, and the furnace charged; but before the heat was ready to tap, the metal cut through the bottom by the side of the steel electrode into the water-jacket used for cooling the electrode, and the furnace had to be stopped. This accident caused considerable delay, and three days were occupied in removing the old steel electrode and thoroughly relining and repairing the hearth of the furnace; and it was not till Friday, the 26th August, that we were able to start again. It was then decided that we should work continuously night and day so long as the furnace-lining lasted; and we had four heats, during which we made 22 cwt. of pig and 4 cwt. 12 lb. of steel, when it became necessary to stop the furnace again for repairs.

For many years pig iron and steel have been made in the electric furnace, and there was no doubt that these products could be produced from the titaniferous ironsands of New Zealand. The special questions which had to be solved were—(1) To what extent the titanium present in the sands passed into the pig iron or steel; (2) in the event of any appreciable quantity passing into the finished products, did they seriously affect the physical properties, and, if so, to what extent? In addition, there was the general economic question whether pig iron and steel could be economically produced in the electric furnace, and more particularly in the Snyder furnace, and whether this furnace was suitable, or the most suitable, for the purpose.

With regard to the special questions of titanium, the results of the experiments show that, as regards both the pig iron and steel, very little titanium passed into the pig iron or steel, and the small quantity present did not have any injurious effects on the physical properties of either the pig iron or steel.

In the production of pig iron in the electric furnace there is always considerable difficulty in ensuring that the carbon shall not be less than 3·5 per cent., the tendency being to produce a material with about 3 per cent. or less which does not possess the identical properties of ordinary pig iron containing 3·5 per cent. or more of carbon produced in the blast furnaces.

For some purposes this low carbon product gives better results than ordinary pig iron, but for other purposes not so good; and I considered it important to demonstrate that pig iron could be produced so that it could be sold as such in the open market. In the first heat made it will be seen that the pig iron contained 3·34 of carbon, and this was obtained by adding, on my suggestion, to the molten metal in the furnace about 40 lb. of "carburite," a special material containing 50 per cent. of carbon, made by coking a mixture of ground-up electrodes and iron swarf, which I have found by experience is more effective in carburizing the metal than ground coke. In the next heat only 10 lb., or three-quarters the quantity of carburite used in the previous heat, was added, as the