

ever, an oxidising slag is employed to remove the impurities from the pig iron, and this slag would tend to corrode the carbon electrodes and itself to become deoxidised, and, therefore, unfit to refine the iron. This difficulty is met in the Heroult furnace by keeping the electrodes above the surface of the slag, so that the current passes into the charge by means of an arc. In the Gin furnace water cooled metal electrodes are used and in the Kjellin furnace electrodes are dispensed with altogether.

In concluding this paper, it may be worth while to consider in what way the electrothermic production of iron or steel will be likely to be of use in Canada.

The production of crucible steel in the electric furnace may be considered to be possible both technically and financially and furnaces might be installed for the production of tool steel which at present is largely imported, the electric current being produced by means of water power or by gas engines run by blast furnace gas.

The utilisation of titaniferous iron sands is a problem of considerable importance. These sands are difficult to smelt partly because sandy ores are difficult to treat in the blast furnace and partly on account of the titanium which produces a very infusible slag.

A. T. Rossi*, of New York, in a paper already referred to furnishes evidence to show that the difficulty of smelting titaniferous ores has been very much exaggerated.

He states that blast furnaces have been run for seven years in England on ores containing 40% of titanitic acid, and that iron slags containing over 30% of titanitic acid have been found to be perfectly satisfactory in an experimental blast furnace at Buffalo.

In smelting such ores in the blast furnace the titanium passes almost entirely into the slag, the iron produced carrying not more than a few tenths per cent. of titanium, but even this small amount appears to decidedly improve the quality of the iron for certain purposes.

In the electric furnace more strongly reducing conditions can be obtained than in the blast furnace and it is possible to smelt a titaniferous ore so as to obtain a rich ferro-titanium, the titanium being reduced to the metallic state instead of remaining as oxide in the slag.

Rossi has added such alloys to ordinary cast iron and finds that the addition of 2% or 3% of a 10% ferro-titanium increases the strength of cast iron about 20% or 30%.

In the absence of analyses it is not possible to say whether this increased strength is due to the addition of the titanium or, for example, to some difference in the amount or condition of the car-

* Trans. Am. Inst. Min. Eng., vol. XXXIII., 1903, p. 179.