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CASTING FERROSILICON.

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To all whom it may concern:

Be it known that I, EMILE DARTE, a citizen of the Dominion of Canada, residing at Welland, in the county of Welland and Province of Ontario, Canada, have invented certain new and useful Improvements in Casting Ferrosilicon, of which the following is a specification.

The invention relates to the casting of ferro-silicon, and particularly to the casting of pigs from metal containing less than about 20% of silicon.

Ferrosilicon of the composition referred to, for example the 15% alloy, is conveniently tapped from the furnace at 1500°–1600° C., this temperature giving a good operation of the furnace. If, however, the pigs are poured at or about this high temperature, so much graphite is rejected by the metal as it cools in the molds or chills, that the pigs are covered with graphite and have cavities filled with it, making the handling of the pigs a dirty and disagreeable task. Furthermore, if a pig casting machine with iron molds is used, the temperature of the metal as cast should be kept as low as possible to avoid injury to the molds.

In accordance with my invention, tapping and casting are carried out at the respective high and low temperatures best adapted for the operations, and the graphite, instead of separating in the molds, is caused to separate in ladles where it blankets the molten metal and delays its cooling for a sufficient time to permit its composition to be adjusted, and to give flexibility to the operation of the plant.

To these ends, the metal is tapped at a relatively high temperature into a ladle, and is permitted to cool therein under the layer of graphite which forms on its surface to the proper temperature for casting, the metal being preferably agitated during the cooling. Because of the relatively slow cooling and the agitation, a more complete and uniform separation of the graphite occurs, and this graphite can be readily skimmed off, leaving a clean metal which rejects but little more graphite while cooling in the pig molds.

I prefer to employ in the process a mixing ladle of sufficient capacity to hold several tappings from the same or different furnaces. The metal may be tapped from the furnaces into smaller ladles which are carried to and emptied into the large mixing ladle, located in a convenient place with respect to the furnaces and to the pig bed or casting machine. The mixing ladle may be arranged to be rocked to agitate the metal therein, or the metal may be stirred by hand labor, or in any other suitable way.

With the arrangement just described, a more uniform composition of the product of the plant is possible. An abnormality of composition in a single tapping is at least partially corrected by the mixing of this tapping with others. In some cases, the abnormalities will be so related as to be compensatory, too high a silicon content balancing one which is too low. Also, additions may be made to the mixing ladle for the adjustment of the composition of the contained metal, for example scrap iron to bring down the silicon content, and high ferrosilicon or metallic silicon to increase the silicon content.

The blanket of graphite covering the metal in the mixing ladle and the use of additions to the metal are valuable for controlling the temperature of the metal. Loss of heat is prevented by the covering of graphite, and promoted by removing the graphite. To expedite cooling, the graphite may be removed in successive portions as it separates, while when slow cooling is desired, all the graphite will be left on the metal until the latter is to be cast. A small quantity of silicon, or a large quantity of 25% ferrosilicon, may have the same effect on the composition of the metal, but the latter will cool it much more. Any additions will of course be deferred so long as minimum cooling of the metal is desired, and as indicated above, the composition of the addition may be so chosen that it will suitably affect both the composition and the temperature of the metal in the ladle.

The phenomenon of graphite rejection on cooling occurs with all iron-silicon alloys from gray iron to about 20% ferrosilicon. With 15% ferrosilicon, there is a very copious separation of graphite, and the invention is especially adapted for the production of alloy of this approximate composition.

I claim:

1. Process of casting ferrosilicon containing less than about 20% silicon, which comprises tapping the metal from the furnace

at a temperature considerably above the lowest at which it can be readily cast, subjecting the metal to controlled cooling to the latter temperature, separating the graphite rejected during cooling, and then casting the metal.

2. Process according to claim 1 in which the metal is agitated while cooling.

3. Process according to claim 1 in which the rate of cooling is controlled by manipulation of the separating graphite.

4. Process of casting ferrosilicon which comprises mixing a plurality of tappings of the metal before casting; and adding to the mixed metal a material containing at least one of the normal constituents of ferrosilicon, the added material being adapted in composition and quantity suitably to affect both the composition and temperature of the mixed metal.

In testimony whereof I affix my signature.

EMILE DARTE.