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METHOD OF MANUFACTURING CAST IRON AND MALLEABLE PIG CASTINGS EMPLOYING BRIQUETTED IRON ALLOYS

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The employment of briquetted ferro-alloys in cast-iron and malleable casting foundries is already known. The briquettes used there consist of ferro-alloys, which are enveloped and pressed with a bonding substance having about the same melting-point as the alloys. As known, the ferro-alloys exist in the briquettes in particles of about the size of peas and grit and by the above-named method of manufacturing, every single particle of the alloy is enclosed by the bonding substance.

The bonding substance melts nearly simultaneously with the alloy and the falling drops of the alloy are enveloped by a layer of slag, by which they are protected against reaction with the oxygen of the blast-wind and against absorption of gas.

When the drops break through the layer of slag, which latter overlies the liquid iron in the melting furnace or in the forehearth of the same, the bonding substance is held back in the slag and the liquid ferro-alloy passes into the liquid iron.

It is known that cast iron smelted in foundry cupolas always contains ferrous oxide. Said ferrous oxide reacts in its liquid condition with the entering, highly-concentrated ferrro-alloys, especially with those metals, for instance chromium, which are adapted for introduction into the cast iron and which at the existing temperatures have a greater affinity than iron for oxygen. For this reason, the added ferro-alloys are almost always consumed in greater or smaller parts by combination with the oxygen in the liquid iron.

The part used for the deoxidation is found in the smelting-slag as oxide and not in the cast iron as a constituent.

It is further known to reduce the loss accompanying the introduction of ferro-alloys into liquid iron or liquid steel by the use of alloys cast as iron cake of suitable arrangement. By said expedient the only loss reduced is that which is caused by the splashing of the ferro-alloys and by the losses occurring on the surface of the iron bath.

One object of the method according to the invention is the saving of the relatively expensive and valuable alloying parts of the briquettes.

The invention consists in binding the oxygen by briquetted ferro-alloys before the alloying ingredients, contained in the same briquette and serving for the improvement of the iron, enter the iron bath. Said oxygen-binding ferro-alloys, which are suitable for the named purpose economically as well as chemically, are intended to protect the valuable alloying ingredients.

Alloys of ferro-silicon-manganese or of silicon-calcium are especially suitable for binding the oxygen in liquid iron.

The proposed improved briquettes are formed in such a way that they contain ferro-alloys for binding the oxygen and also ferro-alloys which are adapted for the improvement of the cast iron by alloying. By the hereafter described measures, the former are the first to pass through the slag cover into the iron bath and they complete their oxygen binding operation before the ingredients of the briquettes which improve the cast iron by alloying run into the iron bath.

This effect is obtained by the use of briquetted ferro-alloys of different particle-sizes, the deoxidizing ingredient having a larger particle size than the alloying ingredient. Preferably, different enveloping substances, a more easily fusible one for the deoxidizing ingredient and a less easily fusible one for the alloying ferro-alloy, are used in one and the same briquette. Preferably, the deoxidizing ferro-alloys are arranged in the outer layers of the briquette and the alloys used for alloying are arranged in the core.

Example: A briquette manufactured according to the invention consists of particles of ferro-silicon-manganese having an average diameter of 2 to 5 mm., enveloped in cement, and ferro-chromium particles having an average diameter of 0.5 to 1.5 mm. enveloped in cement, with which 15% calcium carbonate is mixed. The ferro-silicon-manganese is provided in the outer layer of the briquette and the ferro-chromium forms the core. Owing to said arrangement, the ferro-silicon-manganese passes faster through the slag cover into the iron bath than the smaller particles of the ferro-chromium, which latter because of their smaller mass cannot so quickly permeate through the difficulty fusible slag. Furthermore, the speed with which the ferro-chromium particles pass through the slag is retarded by the difficultly fusible envelope. The latter arrive into the liquid iron bath and alloy with the same at a time when the former have already accomplished their purpose, that is, the binding of the oxygen.

I claim:

1. In the process of manufacturing alloys which includes the step of adding briquettes containing an alloying ingredient to a slag-covered bath of molten metal, the method of decreasing the oxidation loss of said alloying ingredient which comprises surrounding the alloying ingredient with a protective layer of material adapted to deoxidize said bath.

2. In the process of manufacturing alloys which includes the step of adding briquettes containing a comminuted alloying ingredient to a slag-covered bath of molten metal, the method of decreasing the oxidation loss of said alloying ingredient which comprises surrounding the alloying ingredient with a protective layer of comminuted deoxidizing material having a particle size substantially larger than that of said alloying ingredient.

3. In the process of manufacturing cast iron which includes the step of adding briquettes containing a comminuted alloying ingredient to a slag-covered bath of molten iron, the method of decreasing the oxidation loss of said alloying ingredient which comprises enveloping the individual particles of the alloying ingredient with a fusible substance having the slag-forming properties of cement; forming a mass of the so-enveloped particles; and surrounding said mass with a layer of comminuted deoxidizing material to form a briquette.

4. In a process of manufacturing cast iron which includes the step of adding briquettes containing comminuted ferrochromium to a slag-covered bath of molten iron, the method of decreasing the oxidation loss of said ferrochromium which comprises enveloping the individual particles of ferrochromium with a fusible substance having the slag-forming properties of cement; forming a mass of the so-enveloped particles; and surrounding the said mass, to form a briquette, with a layer of comminuted ferro-silicon-manganese alloy the individual particles of which are enveloped with a slag-forming substance which is more fusible than that which envelopes the ferrochromium particles.

5. As an article of manufacture for use in the manufacture of alloys, a briquette comprising a core and an outer portion which substantially envelopes the core, said core containing a comminuted alloying ingredient and said outer portion containing a deoxidizing ingredient.

6. As an article of manufacture for use in the manufacture of alloys, a briquette comprising a core and an outer portion which substantially envelopes the core, said core containing a comminuted alloying ingredient the individual particles of which are surrounded by a fusible substance having the slag-forming properties of cement, and said outer portion containing a deoxidizing ingredient.

7. As an article of manufacture for use in the manufacture of alloys, a briquette comprising a core and an outer portion which substantially envelopes the core, said core containing comminuted ferrochromium the individual particles of which are surrounded by a fusible substance having the slag-forming properties of cement, and said outer portion containing comminuted ferro-silicon-manganese alloy the individual particles of which are surrounded by a slag-forming substance which is more fusible than that which envelopes the ferrochromium particles.

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