

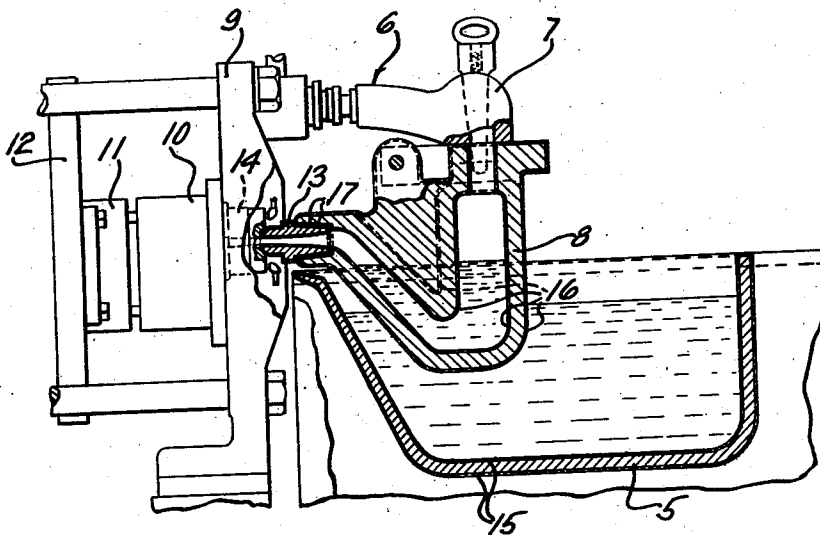
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1,965,340

APPARATUS FOR HANDLING MOLTEN METAL

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APPARATUS FOR HANDLING MOLTEN METAL

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3 Claims. (Cl. 22—69)

This invention relates to apparatus for handling molten metal, and more particularly to apparatus wherein certain parts are provided with a coating to protect them from the action of the molten metal.

In the casting of metals, it is desirable to provide means whereby the casting apparatus may be protected against the erosive attack of the molten metal which is to be cast. The molten metal used in die casting, which may be an alloy composed essentially of aluminum or zinc, attacks and dissolves the iron of the molding equipment and produces an undesirable contamination of the molded articles. A similar problem exists in the case of other apparatus for handling molten metal wherein ferrous metal parts are brought into contact with molten metal which tends to dissolve or corrode the parts.

The primary object of this invention is to provide an improved apparatus wherein a durable and efficient coating is provided to protect the parts against the action of molten metals which may come in contact therewith.

In accordance with this object, the invention contemplates the provision of an apparatus wherein those parts which are subject to attack by the corrosive molten metals are provided with a protective coating consisting preferably of black iron oxide.

A clearer understanding of the invention will be had from the following description, taken in connection with the accompanying drawing, wherein the single figure illustrates the invention as applied to the molten metal contacting parts of die casting apparatus.

Referring now to the drawing wherein reference numerals are used to designate the various parts, there is disclosed the charging end of a die casting apparatus in connection with which the black oxide coating is to be used. The reference numeral 5 designates the pot in which the casting alloy is melted for supplying the apparatus. A charging gun or gooseneck designated generally by the numeral 6 and comprising a cover 7 which is clamped onto a lower molten metal containing portion 8, is pivotally supported by any suitable known actuating mechanism (not shown) for swinging the gooseneck down into the melting pot to receive a charge of molten metal, and then up into engagement with a stationary die plate 9 of the apparatus when the dies are to be charged. A stationary die 10 secured to the stationary plate 9 is engaged by a movable die 11 which is mounted on a reciprocating plate 12 actuated by suitable control ap-

paratus (not shown). A nozzle 13 is secured to the discharging end of the gooseneck for conveying the molten metal therefrom through a water cooled bushing 14 and into the dies 10 and 11. During the charging operation, the lower part 8 of the gooseneck and the nozzle 13 are, of course, brought into contact with the molten metal, and as these parts are usually constructed of cast iron, the molten casting alloy attacks them and dissolves or corrodes their exposed surfaces, as well as dissolving or corroding the melting pot 5 which is also usually constructed of cast iron or other ferrous metal.

The invention contemplates the coating of these ferrous metal parts 5, 8, and 13, with black oxide of iron, preferably formed by the process set forth in Patent 1,690,378 issued November 6, 1928 to Franklin B. Rinck. As disclosed in the Rinck patent, the parts to be coated are placed in an air-tight oven or muffle, brought to a temperature of approximately 1400° F., and subjected to the action of superheated steam which is gradually introduced into the furnace, a small quantity of hydrocarbon oil being placed in a container in the muffle with the iron parts to absorb the excess oxygen which may later be present. As the treating process progresses, the amount of steam admitted is gradually increased, and the oxygen thereof combines chemically with the ferrous metal parts to form a black oxide coating over all of their exposed surfaces.

After the superheated steam is admitted for twenty minutes at maximum pressure, the hydrogen liberated from the steam is driven out of the furnace by opening the door to permit it to burn. An additional quantity of hydrocarbon oil is then placed in the muffle of the furnace and the door immediately closed. The temperature is then raised to about 1420° F., the normal operating temperature of the furnace, and the superheated steam continues to oxidize the parts, until finally after an exposure of forty minutes at this temperature the parts will have an adherent coating of the black oxide produced on all their surfaces both exterior and interior, as designated by the numerals 15, 16 and 17, referring to the melting pot, the gooseneck and the nozzle, respectively. If a smooth protective oxide coating is desired on the parts, they are heated for a considerable time at the higher temperature mentioned, whereas if a more crystalline coating is to be produced, a temperature of about 1400° F. is maintained for the greater length of the process. In either case, the treatment produces an adherent coating which protects the parts against

the solvent and corrosive effect of the molten metals which come in contact therewith, thereby preventing the undesirable contamination of the molten metals and the parts die-cast therefrom with the dissolved iron.

Although the invention has been specifically disclosed in connection with the provision of a protective coating on the parts of a die casting apparatus, it will be understood that the invention may also be applied to other apparatus for handling molten metal, wherever it is desired to protect a ferrous metal element from attack by molten metals or alloys. A particularly useful application of the method may be made in connection with the galvanizing of sheet metal. There the ferrous metal container of the molten galvanizing material is also subject to corrosion the same as the die casting apparatus above described, and an oxide coating provided on the container in accordance with this invention prevents undesirable contamination of the molten galvanizing material with corroded portions of the container. In fact, this oxide coating may be provided on a great variety of ferrous con-

tainers or members used for handling various molten metals because it remains inert for temperatures below 1700° F. and does not become wetted by the molten metal.

It will be understood that the invention may be applied not only to the specific apparatus here disclosed, but is limited only by the scope of the appended claims.

What is claimed is:

1. A ferrous metal member having a surface designed to contact with molten metal, said surface being provided with a protective crystalline coating of black iron oxide to prevent contamination of the molten metal with the ferrous metal.

2. A ferrous metal member having a surface designed to contact with molten metal, said surface being provided with a coating of black iron oxide.

3. Die casting equipment having ferrous metal parts which contact the molten metal, said parts being provided with a black iron oxide coating to prevent contamination of the molten metal with the ferrous metal.

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45	120
50	125
55	130
60	135
65	140
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75	150