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NODULAR IRON MANUFACTURE

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This invention relates to the siderurgical arts and more particularly to that portion of the ferrous technology relating to the production of nodular cast iron. This invention is especially concerned with a process for the conservation and more efficient and reliable utilization of the nodularizing adjuvants.

In current practice, a cast iron base metal of the proper chemistry is rendered nodular by the addition of a small amount of magnesium. The actual addition of magnesium to molten cast iron is complicated by the fact that magnesium exhibits at molten iron pouring temperatures a vapor pressure far in excess of atmospheric pressure. Magnesium is highly flammable and this fact coupled with its volatility render it an extremely fugacious additive from the view point of the iron founder.

In an effort to circumvent this evanescent characteristic of magnesium, the art has had recourse to the addition of magnesium to the molten iron in the form of an alloy containing about eight percent magnesium alloyed with about forty percent silicon and the remainder iron. Even with this comparatively dilute magnesium alloy, the recoveries are undependable and average only about fifteen percent of theory.

We have discovered that this very low yield of magnesium can be at least doubled by the use of a very simple and effective expedient without altering the foundry operation objectionably. This result is obtained by adding the magnesium containing alloy to a ladle prior to the filling of the ladle with molten cast iron, and protecting this magnesium containing alloy by at least partially covering it with a layer of ferrous metal. The composition, mass and temperature of this protecting mass of ferrous metal is not critical as long as objectionable alloys are not introduced, and the mass of the ferrous metal and its temperature are so regulated that the thermal inertia of the ferrous metal is adequate to provide a temporary protection to the magnesium bearing alloy. It is to be understood that a cold layer of ferrous metal will provide the maximum protection with the least mass, and that the mass must be increased if the ferrous metal is added hot or permitted to long remain in the hot ladle prior to the addition of the molten cast iron.

The layer of magnesium containing alloy may be added to the empty ladle, or a portion of the ferrous protecting metal may be first added followed by the magnesium containing alloy and finally the remainder of the ferrous protecting metal.

A typical example of the execution of this invention may be outlined as follows. A ladle capable of containing slightly in excess of one ton of metal is preheated and the bottom of the ladle is covered with a layer of sixty-four pounds of steel punchings, which punchings are about one-eighth of an inch thick. These punchings are added cold. Twelve pounds of the magnesium containing nodularizing alloy are added upon the layer of steel punchings followed by another sixty-four pound addition of cold steel punchings. This in effect assembles a sandwich of nodularizing alloy in steel punchings upon the bottom of the ladle. Approximately one ton of a base cast iron containing approximately four percent carbon and approximately two percent silicon is now poured upon the sandwich. A magnesium recovery of fifty percent is achieved this way as opposed to a recovery in conventional practice of about one-quarter this amount.

We claim:

1. The process of imparting a nodularizing addition of magnesium to a cast iron base metal comprising placing within a ladle a layer of magnesium containing nodularizing material, superimposing upon this layer of magnesium containing nodularizing material a layer of solid ferrous metal at a temperature substantially below the temperature of molten cast iron, and pouring molten cast iron base metal into the ladle.

2. The process of imparting a nodularizing addition of magnesium to a cast iron base metal comprising placing within a ladle a layer of solid ferrous metal at a temperature substantially below the temperature of molten cast iron, superimposing upon this layer of ferrous metal a layer of magnesium containing nodularizing material, superimposing upon the layer of magnesium containing nodularizing material a further layer of ferrous metal at a temperature below the temperature of molten cast iron, and pouring molten cast iron base metal into the ladle.

3. The process of imparting a nodularizing addition of magnesium to a cast iron base metal comprising placing within a ladle a layer of magnesium containing nodularizing material, superimposing upon this layer of magnesium containing nodularizing material a layer of solid ferrous metal having sufficient mass and sufficiently low temperature to protect the magnesium from excessive loss from the ladle, and pouring molten cast iron base metal into the ladle.

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