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MOLD COATING COMPOSITION

Harold A. Kelly, Youngstown, Ohio, assignor to The Mahoning Paint & Oil Company, H. P. Daugherty, receiver

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This invention relates to metal molds and materials for coating the same, and, more particularly, is concerned with ingot molds and coating material adapted to be applied to the surfaces thereof against which the molten metal flows during pouring of the ingot.

I have found that in casting steel ingots in relatively large ingot molds that surface checking, fissures and blemishes both on the ingot mold and on the cast ingot are liable to occur and often do with known prior coating materials, particularly when ingots of high alloy or special steels are cast in the ingot molds. Such checks, fissures, or blemishes must be removed prior to final rolling of the steel and are and have been a constant source of annoyance, expense, and labor in steel mills. Moreover, the tendency to produce larger and larger ingots, and to reduce the speed of pouring, as well as the use of hot tops have all added to the difficulty.

It is the general object of my invention to avoid and overcome the foregoing and other difficulties of and objections to known ingot molds and coatings therefore by the provision of a relatively inexpensive, readily applied material for coating ingot and similar molds, and which is superior to known coatings, improves the character and surface of the ingot poured, and saves the surface of the ingot mold so that it can be used for a greater number of casting operations.

Another object of my invention is to provide an ingot mold for steel ingot casting and wherein the ingot mold has a coating on its metal engaging surface which improves the buildup of the ingot, reduces and largely prevents surface cracks, fissures, and blemishes on the surface of the cast ingot and also on the surface of the mold, and which facilitates stripping of the ingot from the mold.

Another object of my invention is to provide a material for coating ingot molds and the like and which includes a pigmenting material, a drying oil, a resin, and a thinner.

Another object of my invention is the provision of a coating for ingot molds which serves as a buffer between the surface of the ingot and the mold during and after pouring with the coating gasifying and oxidizing to provide the buffer as a film or layer between the ingot mold and the ingot proper.

The foregoing and other objects of my invention are achieved by the provision of an ingot mold having a coating thereon including a drying oil, a resin, a thinner, and a pigmenting material. More particularly, the drying oil usually is of vegetable origin but may also be of animal origin. The resin may be of the synthetic or natural type. The thinner is usually of the petroleum type and of mineral origin but may be of a vegetable origin. The pigment is selected from a group including aluminum, pitch, graphite, or saw dust, all oxidizing materials. The coating may be brushed, sprayed, dipped, or otherwise applied to the surface of the mold.

Although the principles of my invention are broadly applicable to coating any type of metal mold to facilitate the casting of metal therein, nevertheless, my invention is particularly concerned with ingot molds, coated ingot molds, and material for coating ingot molds. The difficulties encountered with large molds handling considerable quantities of very hot steel are much greater than those encountered in small molds handling small quantities of metal at lower temperatures. Hence, my invention will be described having particular reference to ingot molds with which it is primarily concerned.

According to the principles of the invention I provide a coating material including a drying oil, a resin, a thinner, and a pigmenting material. The drying oil is preferably of the vegetable type, as for example, linseed oil, China-wood oil, castor oil, or perilla oil. A drying animal oil, such as fish oil, may sometimes be used.

The resin which I incorporate in my coating composition includes synthetic or natural resins. Synthetic resins include coal tar base resins which are by-products of the coke oven industry. Also, synthetic resins which are by-products of the petroleum industry may be used. Again, I may use resins of the glyptol, vinyl acetate, phenol formaldehyde, or other types. Suitable natural resins, rosins and rosin derivatives may also be used.

The thinner is ordinarily of the petroleum type, such as naphtha or kerosene, but it may be of the vegetable type, such as turpentine.

The pigmenting material is selected from the group including aluminum powder, pitch, graphite, and saw dust. Usually, only one of these pigmenting materials is employed but I contemplate adding one or more of the pigmenting materials to the coating material in order to achieve the desired effect. The pigmenting materials have in common the characteristic that they are oxidized by the hot metal poured into the ingot mold to achieve the buffer or film forming characteristic hereinafter more particularly discussed. I have found that aluminum as a pigment is very satisfactory for ordinary steel

and also rimming steel, but that when the coating is applied to an ingot mold adapted to be poured with a high alloy steel it is desirable to use graphite or pitch as the pigmenting material.

In the formation of my improved coating material I preferably employ between about .5 and about 4.5 parts of drying oil by weight, between about .5 and about 4.5 parts of resin by weight, between about 3 and about 6 parts of thinner by weight, and between about 1 part and 15 parts of pigmenting material by weight.

It should be noted that the total amount of drying oil plus resin employed in a coating composition made in accordance with the foregoing example is between about 3 parts and about 5 parts by weight. In other words, if the amount of drying oil used is towards its upper limit then a relatively small amount of resin is used; if the amount of drying oil used is towards its lower limit then the amount of resin used will be towards its upper limit; and if the amount of drying oil used is near the middle of its limits then the amount of resin used will be toward the middle of its limits; and in any event, the total amount of drying oil plus resin will fall within the limits defined.

Further, it should be understood that when aluminum is used as a pigment that usually between about 1 and about 3 parts by weight are employed, whereas with the other carbonaceous pigmenting materials greater amounts can be included, for example, even up to 15 parts by weight, and usually between about 2 and about 8 parts by weight.

In one typical coating composition I employ about .75 part of drying oil by weight, about 3.5 parts of resin by weight, about 4 parts of thinner by weight, and about 2 parts of pigment by weight. In this typical composition of my improved coating material, which has proved to be very satisfactory in actual use, the drying oil which I employ is linseed, the resin which I employ is para coumarone, the thinner which I employ is mineral spirits, and the pigment I employ is aluminum powder. In this embodiment of my invention it is possible to change the relative amounts of drying oil and resin used, for example, about 3 parts of drying oil may be used and 1 part of resin.

In another example of my improved coating material I employ about 1.5 parts by weight of China wood as a drying oil, about 2 parts by weight of modified phenolic as a resin, about 3.5 parts by weight of naphtha as a thinner, and about 2 parts by weight of powdered pitch as a pigment.

In still another coating composition I employ about 1.5 parts by weight of fish as a drying oil, about 2 parts by weight of congo gum as a resin, about 3.5 parts by weight of turpentine as a thinner, and about 5 parts by weight of graphite as a pigment.

Once the various constituents of the coating material are put together they are thoroughly agitated and mixed so that the resin and pigment are completely dissolved or suspended in the solution of the drying oil and thinner. Thereafter, the coating material is brushed, sprayed, or otherwise applied to the interior surface of the ingot mold where it rather quickly dries to form a coating on the interior surface of the mold. Now when molten steel at a relatively high temperature is poured into the ingot mold the coating material oxidizes in whole or part and forms a gas which I believe provides a layer between the molten metal and the surface of the ingot mold. This not only improves the character of the cast ingot by reducing surface cracks, fissures, and other blemishes thereon, but also, acts to protect the surface of the ingot mold against similar defects and blemishes so that the life of the ingot mold is noticeably prolonged. Stripping of the ingot from the mold is likewise facilitated. Further, I have discovered that the grain structure, buildup, and general character of the poured ingot is improved which is of outstanding importance.

From the foregoing, it will be recognized that the objects of my invention have been achieved. My improved coating for ingot molds substantially prolongs their normal operating life, and the work of chipping or surfacing the ingot to remove any surface defects or blemishes is materially reduced. The quality of the ingot is improved, and stripping of the mold and ingot is simplified.

While in accordance with the patent statutes, I have specifically described my invention, it should be understood that I am not to be limited thereto or thereby, but that the scope of my invention is defined in the appended claims.

I claim:

1. A coating composition for ingot molds and the like comprising between .5 and 4.5 parts by weight of a drying oil, between .5 and 4.5 parts by weight of a resin, between 3 and 6 parts by weight of a thinner, and between 1 and 15 parts by weight of a pigment.

2. A composition for coating ingot molds and the like comprising between .5 and 4.5 parts of linseed oil by weight, between .5 and 4.5 parts of para coumarone by weight, between 3 and 6 parts of mineral spirits by weight, and between 1 and 15 parts of aluminum by weight.

3. A coating composition for ingot molds and the like and comprising about 1.5 parts by weight of China-wood oil, about 2 parts by weight of modified phenolic resin, about 3.5 parts by weight of naphtha, and about 2 parts by weight of powdered pitch.

4. A coating composition for ingot molds and the like and comprising about 1.5 parts by weight of a drying oil, about 2 parts by weight of a resin, about 3.5 parts by weight of a thinner, and about 5 parts by weight of a carbonaceous pigment.

HAROLD A. KELLY.