MOLD DRESSING COMPOSITION


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3 Claims. (Cl. 106—38.25)

This invention relates to the casting of molten metals and is more particularly concerned with dressings for molds into which are to be cast molten copper or copper-based alloys.

In the casting of molten copper or copper-based alloys it is usual to provide a surface dressing to the interior of the mold. However, the criteria for a satisfactory dressing are such that the formulation of such a dressing is fraught with difficulty.

Thus, the constituents of the dressing must be easily mixable to give a material which can be coated consistently. The dressing must be readily applied to the mold surface by swabbing, brushing or spraying, to give an even coating and, once applied, should not run off the surface or be easily blown from the mold surface. Accordingly, it is generally desirable that the dressing should have a consistency of the general nature of an oil. Dressings of which the consistency is more like water on the one hand or viscous-like treacle on the other, are generally unsuitable.

Further, the dressing must be able to withstand the impingement of molten metal on it when the latter is poured into the mold and must not form powder or vapor mixtures of an explosive character. When non-oxidizing conditions must be achieved, as is usually the case if the molten metal contains zinc, the dressing should provide such conditions.

The dressing must not, of course, react with the molten metal, or with the mold wall and should not be such as to lead to blowing, spitting or gas-entrapment in the molten metal. Water-oil mixtures are, for this reason, not satisfactory.

After casting is completed the cast metal, e.g. billet or slab, should strip easily from the mold so that the inclusion in the dressing of materials which leave adhesive residues is to be avoided. The dressing should produce a smooth surface on the casting, free from burn or unburnt occluded dressing, ripple marks, scabs, pits or oxide inclusions. Preferably the dressing should be substantially wholly consumed during the casting operation so that there is little residue, or so that what residue remains is easily removable from the mold.

Bearing in mind these desiderata, two main types of mold dressing for copper and copper-based alloys have been developed, known respectively as "inert" and "flame" dressings.

Inert dressings are used for copper and copper-based alloys requiring no reducing atmosphere and are usually water-based. They generally comprise mixtures of bone ash and water, china clay and water, or talc and water. Some binding agent such as bentonite or gum is needed to key the dressing on to the mold wall. Dressings such as these can only be used on chill molds which are warmed to drive off moisture before use. They cannot be used on water-cooled molds.

Flame-type dressings are used for copper-zinc alloys, i.e. brasses, including those containing lead, tin, aluminum, iron and manganese additions, e.g. the alloys BSS 250 and 251. These dressings are all oil-based and typical ones contain a proprietary mineral oil, e.g. Shell "Carner" or Mobil oil "Flowrex," with a suitable filler, e.g. charcoal, carbon black, graphite or lamp black, all being —100 mesh grading. The filler addition is generally up to 25%, and is included to thicken the dressing, to absorb the oil carrier and prevent this from running down the sides of the mold when its viscosity is reduced by the increase in temperature when commencing casting and, as with the inert dressings, to provide an insulating layer on the mold to help prevent welding of molten metal to the mold wall.

For brasses of high copper content, e.g. 80/20 copper/zinc, tallow may be added to the basic oil/carbon dressing. Other oils can be used, e.g. rape oil, cotton seed oil, lard oil in place of the mineral oils but these are generally two or three times the price of mineral oils.

In the course of casting the molten metal the dressing is consumed giving flame and smoke. Optimally the amount of smoke should be a minimum in order to avoid the formation of dense black smoke of noxious character.

Unfortunately, the oil/carbon dressings which are used to provide a reducing atmosphere within the mold, because of their inherent tendency to increase the color content of the casting, may, by increasing the ratio of carbon to oxygen, generate vast quantities of black smoke during their burning. The black smoke emitted often exceeds the Ringelmarrn scale when discharged from a foundry furnace stack and to reduce the amount of carbonaceous smoke given off into the atmosphere very costly fume extraction and dust precipitation equipment has to be installed.

It is an object of the present invention to provide a flame-type dressing which while meeting the desiderata set forth above, at the same time avoids the generation of excessive smoke.

According to the present invention there is provided a mold dressing which comprises in admixture a mineral oil, fatty acid pitch and a filler, the mineral oil being present in only a minor proportion. Any mineral oil such as those mentioned above can be employed. The filler may also be any of those conventionally employed, e.g. talc, bone ash or china clay, but these tend to leave heavy deposits in the mold which present some difficulty of removal from the mold after the casting operation. Accordingly it is preferred to employ carbon of particle size —100 mesh, and even at —300 mesh, which is much superior in this respect. The carbon may be in the form of charcoal, lamp black or carbon black.

By the term "fatty acid pitch" is meant the fatty acid-containing residue obtained when oils containing fatty acid esters are subjected to distillation to recover valuable constituents therefrom, e.g. the pitch residue obtained by the distillation of vegetable oils.

Since the dressings of this invention include both mineral oil and, preferably, carbon, it is necessary so to formulate the composition as to minimize the generation of black smoke during the casting operation. It has been found that this can be achieved while still providing a surface, on the finished casting, as good as the surfaces obtained using conventional dressings.

According to the preferred from of the present invention, therefore, a mold dressing comprises 5 to 15% of carbon of —100 mesh particle size, 5 to 15% of mineral oil and the remainder, to make 100%, being fatty acid pitches.
pitch. It will be noted that the quantity of filler necessary (carbon, 5-15%) is substantially less than is required in conventional dressings (25%).

The following example will serve to illustrate the invention:

Example

A mold dressing is formulated of:

<table>
<thead>
<tr>
<th>Percent</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon, -100 mesh size</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Fatty acid pitch</td>
<td>5</td>
<td>15</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Mineral oil</td>
<td>85</td>
<td>10</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

The fatty acid pitch and oil are mixed together and stirred with a paddle mixer for four or five minutes. The carbon is then stirred into the oil-pitch mixture to produce the final dressing. Since these compositions have a more heat-stable viscosity (i.e. the viscosity is not too seriously reduced by increase in temperature) and are more sticky or tacky than the conventional dressings, they stay in position on the mold walls without the necessity of including in the composition any emulsifying agent. The composition of this invention may be used in dressing a chill mold or a water-cooled mold.

Using this dressing the smoke produced on casting the molten copper or copper-based alloy is very much reduced compared to that of a standard oil dressing using carbon filler, and the flame produced is also much reduced below that of the standard oil/carbon dressing. Such smoke as is produced from this dressing contains little carbonaceous material, and thus can be allowed to enter the atmosphere without having to install extraction equipment as referred to above.

Nevertheless, the dressing gives an excellent surface finish to the cast metal.

I claim as my invention:

1. A flame-type mold dressing for use in the casting of copper base metal, said dressing consisting essentially of an admixture of 5 to 15% by weight of a viscous mineral oil, 5 to 15% by weight of at least one filler selected from the group consisting of carbon, talc, bone ash, and china clay, and the remainder, to make 100%, of fatty acid pitch.

2. A mold dressing composition according to claim 1 wherein the filler is carbon of minus 100 mesh particle size.

3. A method of dressing a mold to be used for casting molten copper base metal which comprises applying to the internal surface of the mold a mold dressing composition which consists essentially of an admixture of 5 to 15% by weight of a viscous mineral oil, 5 to 15% by weight of at least one filler selected from the group consisting of carbon, talc, bone ash, and china clay, and the remainder, to make 100%, of fatty acid pitch.

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