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COMPOSITION FOR USE IN CASTING

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This invention relates to a lubricating composition for use in casting and for like purposes, and the method of producing the same.

The composition is designed primarily for the lubrication of casting dies to facilitate the removal of the casting from the die and to protect the die from injury and wear by the removal of the casting. Such a die comprises two or more parts, at least one of which is movable to open the die and permit the removal of the casting. It also usually includes guide pins for the movable part, an ejector pin, or pins, to eject the casting, and one or more core pins, or the like, to form cavities in or holes through the casting. It is important that the die shall be lubricated to prevent the casting from sticking in the die and to protect the die, particularly those parts thereof which are wholly or partly surrounded by the molten metal, such as the core pins, and are tightly gripped by the casting, due to shrinkage in cooling. In the absence of proper lubrication the removal of the casting subjects such parts to severe wear and scoring and sometimes causes the breaking of pins. It is also important that the die be protected against corrosion and pitting and that the casting itself be protected against discoloration or other injury.

Various lubricants for this purpose have been used heretofore but none has been entirely satisfactory. For example, my Patent No. 2,115,127 of April 26, 1938, discloses a composition of oil, graphite and lime which was quite satisfactory in some respects but had undesirable characteristics which restricted its use. The oil used contained animal fat in an amount such that the consumption of the oil produced an objectionable amount of smoke and left in the die a carbon deposit which "built up" in time to an extent which required more or less frequent removal. The graphite also left some carbon deposit in the die and stained the castings. The lime had relatively small lubricating properties. In spite of these shortcomings that composition was superior to other available compositions for the same purpose and was marketed in substantial quantities.

The object of the present invention is to provide a composition which will adequately lubricate and protect casting dies, and similar devices, and will be free from the objectionable features of my prior composition and of all other compositions of which I have knowledge.

A further object of the invention is to provide a vehicle for the solids of the composition which will volatilize without producing smoke or gases

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in objectionable amounts, and which will leave no appreciable residue in the die.

A further object of the invention is to provide such a composition in which the refractory and lubricating properties of the solid component are very high.

A further object of the invention is to provide such a composition which will form on the surfaces to which it is applied a very thin tough coating or film which will not be built up by successive applications of the composition.

A further object of the invention is to provide such a composition which will both lubricate the die and protect the same against corrosion and pitting.

A further object of the invention is to provide such a composition which will not stain or otherwise mar the casting.

A further object of the invention is to provide such a composition in which the solid component will be retained in suspension for a long period of time.

A further object of the invention is to provide such a composition in which the quantity of solid material is small in proportion to the quantity of oil.

Other objects of the invention may appear as the composition is described in detail.

My improved casting composition comprises a heat resistant fluid vehicle, having a substantial viscosity in which is suspended a finely comminuted solid component having high heat resistance and good lubricating qualities. The vehicle is preferably an oil and should have high flash and fire temperatures and a relatively high viscosity but, preferably, the viscosity should be such as to permit the composition to be applied by spraying. It should be of such a character that when consumed by the heat of the molten metal it will leave no objectionable deposit on the die and will produce little or no smoke or objectionable gases. In practice very satisfactory results have been secured with an oil sold by the Standard Oil Company of Ohio, under the designation "2-B Calender Oil" and which has, approximately a flash temperature of from 520° to 530° F., fire temperature of from 590° to 600° F., and a viscosity of 160 Saybolt seconds at 210° F.

The solid component should have good lubricating properties and should be highly resistant to heat, and of a character such that when the oil is consumed there will remain on the die a very thin tough coating or film of lubricating heat resisting material which will permit the easy removal of the casting and the easy movement

of the movable part of the die. In order to secure in the solid component the desired high degree both of heat resistance and of lubricating quality I have found it desirable to form the solid component of two ingredients, one of which has superior heat resistance and the other of which has superior lubricating qualities. Excellent results have been obtained by the use of finely comminuted mica and talc. Both talc and mica are of a refractory nature and both are lubricants but the talc has substantially greater heat resistance than has the mica and the mica has better lubricating properties than has the talc. Thus by combining the mica and talc I provide a solid component having heat resistance and lubricating properties substantially greater than would result from the use of either material alone. Due to these characteristics the solid component not only forms a thin lubricating and protecting coating or film on the surfaces of the die but also greatly reduces the transfer of heat from the molten metal to the die.

Commercial talc consists largely of magnesium silicate but contains a smaller amount of calcium oxid, or lime, and it is to be understood that magnesium silicate in other forms may be substituted for the talc, and that lime may be used either with or without the magnesium silicate. The lime has high refractory value but very little lubricating value and would not add materially to the lubricating properties of the composition.

The amount of solids required is small in proportion to the amount of oil, and while the proportions may be varied with more or less satisfactory results, the best results have been secured by a composition comprising eight pounds of mica and six pounds of talc combined with forty gallons of oil. In preparing the composition it is desirable to heat the oil to approximately its boiling point and to gradually mix the finely powdered mica and talc with the heated oil, the mica and talc being preferably mixed one with the other and added to the oil simultaneously. When the composition is prepared in this manner the solids are very intimately mixed throughout the oil and are retained in suspension for long periods of time.

The composition may be applied to the die, or other parts to be protected, in any suitable manner which will provide the proper distribution over the surfaces which are to be protected, as by spraying. The oil provides a fluid vehicle for the solids and also contributes to the lubricating properties of the composition but the introduction of the molten metal into the die causes the oil to be consumed rather quickly. Due to the absence of animal fat and other smoke producing ingredients the consumption of the oil does not produce smoke or gases in an objectionable amount and it leaves no objectionable residue on the die. The high temperature and the volatilization of the oil converts the powdered mica and talc into a very thin, tough lubricating and protecting coating or film which completely covers the surfaces to which the composition has been applied and enables the die to be opened and the casting removed very easily and without danger of injury to either the die or the casting. The composition produces no gases or bubbles, does not pit or corrode the die and does not stain the casting. In fact, the casting as it comes from the die is brighter and of better appearance than are castings made without the use of any lubricant. The coating does not accumulate or "build up" on the die surfaces, due to repeated appli-

cations, but sufficient portions of the coating are removed during the ejection of the castings to maintain the coating at a thickness which is almost microscopic. Because of this extreme thinness of the coating it does not appreciably modify the dimensions of the die and no compensation is necessary even when the dimensions must be within very close tolerances. After a casting has been removed sufficient coating remains on the die surfaces to enable successive casting operations to be effected without additional application of the composition. Apparently the composition penetrates the surface portions of the die and is thus retained thereon, as from five to thirty casting operations can be effected on one application of the composition, the number of operations so effected depending largely upon the character of the metal being cast and the temperature at which it is cast.

In casting some of the more difficult pieces it may be desirable to increase the lubricating qualities of the composition and this may be done by adding to the solid component a substance having a high lubricating value. Powdered slippery elm bark is suitable for this purpose and I have found that by adding two pounds of slippery elm bark to the above described composition its lubricating properties are substantially increased without any adverse effect, as the powdered bark leaves no objectionable residue.

My composition, as above described, is of a superior character and has all the characteristics essential to the proper lubrication of casting dies. It has high lubricating and refractory values; it forms an extremely thin and tough coating or film which not only lubricates but protects the surfaces to which it is applied, and the casting, against injury; it enables successive casting operations to be effected with a single application of the composition; it leaves no objectionable residue or deposit on the surfaces; it does not stain or otherwise mar the casting; it does not produce smoke, gases or bubbles in objectionable amounts; it does not build up on the die; it requires only a small amount of solids in proportion to the amount of oil; it is easily applied; and it can be produced at relatively low cost. While the primary purpose of the composition is the proper lubrication of casting dies it may be used to advantage for the lubrication of various devices, particularly where the lubricated parts are subjected to high temperatures.

While I have described the preferred constituents and proportions of my composition, and the preferred method of producing the same, I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art. Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A composition for lubricating casting dies consisting essentially of a viscous petroleum oil substantially free from smoke or gas producing substances, and finely powdered mica and talc suspended in said oil in the proportions, by weight, of mica 3% and talc 2% of the weight of said oil, said proportions being such that upon the elimination of the oil by the heat of the casting operation said mica and talc will form a very thin tough film on the surface of the die.

2. A composition for lubricating casting dies consisting essentially of a viscous petroleum oil, and finely powdered mica and talc suspended in

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said oil approximately in the proportions of 8 pounds of mica and 6 pounds of talc to each 40 gallons of oil.

3. A composition for lubricating casting dies consisting essentially of a viscous petroleum oil having approximately a flash temperature of from 520° to 530° F., a fire temperature of from 590° to 600° F., and a viscosity of 160 Saybolt seconds at 210° F., and finely powdered mica and talc suspended in said oil approximately in the proportions of 8 pounds mica and 6 pounds talc to each 40 gallons of oil.

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