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METHOD FOR MAKING SAND MOLDS

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5 Claims. (Cl. 164—40)

ABSTRACT OF THE DISCLOSURE

A method for the production of sand moulds in which a pattern is pretreated with a surface coating, after which moulding sand is compressed against the pattern at a pressure of at least 80 lbs. per square inch. The composition of the surface coating is such that it penetrates into the surface of the sand adjacent the pattern, under the applied pressure, so as to act as a mould release agent during the production of the mould, and as a mould dressing in the subsequent use of the mould for casting molten metal. The coating is applied as a colloidal suspension of a refractory material, such as graphite, mica, or talc, in a liquid carrier, such as paraffin oil or kerosene.

This application is a divisional of my copending application Ser. No. 436,675, filed Mar. 2, 1965, and now abandoned.

This invention relates to the production of foundry moulds based essentially on compacted sand.

Sand moulds are commonly made by compacting "green" sand into a mould or flask against a desired pattern and possibly, though not necessarily, drying the product. The sand may be compacted by various means, e.g. hand ramming or by the use of apparatus of which the so-called squeeze-moulding machines may be regarded as typical. The moulding pressures employed in such squeeze-moulding machines are generally of the order of 25 to 70 lbs. per square inch. Usually the pattern is treated on its surface with a so-called "separating" or "stripping" agent before the sand is compacted into position; the function of this agent is to facilitate removal of the compacted sand mould from the pattern.

In recent years methods have been developed for the production of sand moulds which employ substantially higher pressures. Such methods are generally referred to as "high-pressure moulding" and the term is used in its usual meaning in this specification, the pressure developed being more than 80 lbs. per square inch, generally from 100–400 lbs. per square inch and frequently even higher e.g. up to 1000 lbs. per square inch. The advantage of the system is that one can produce hard moulds which are handleable, strong and rigid, and the castings produced in such moulds have excellent definition, close tolerance and good surface finish. A further advantage of the process is the high rate of production possible. Since the effect of high pressure moulding is to reduce the permeability of the sand mould obtained it is usually preferable to employ, instead of natural sand, a so-called "synthetic" sand which consists of silica sand particles with a controlled addition of clays, or a treated natural sand, i.e. "semi-synthetic." By appropriate choice of the sand used it may readily be established that the permeability is reduced by the initial application of pressure to a level at which it remains on further pressing.

Although a very good surface finish is obtained on castings made by the use of moulds produced by such high pressure moulding, difficulties arise in stripping the casting from the mould. To overcome the stripping problem, a mould dressing is usually applied to the surface of the

completed mould, such dressing generally consisting of a solid, particulate, refractory and/or lubricating material in a liquid carrier. It will be appreciated that the dressing forms an added layer on the mould surface, causing loss of dimensional accuracy and, unless it is applied evenly, definition will also suffer.

According to the present invention there is provided a method for the production of sand moulds which comprises compressing moulding sand against a pattern at a pressure of at least 80 lbs. per square inch, the pattern being pre-treated with a surface coating of a composition which, under the pressure obtaining, penetrates into the surface of the sand adjacent the pattern thereby acting as a mould-release agent during the production of a mould and as a mould dressing in the subsequent use of the mould for coating molten metal. As a result, not only is the sand mould readily separated from the pattern with relative ease but it carries, on and in its surface, the coating composition originally applied to the pattern. Furthermore, when a metal casting is made by the use of the sand mould, the casting is readily separated from the sand mould whilst preserving both the definition and tolerance obtainable with high-pressure moulding techniques. Thus, by means of the invention, the single composition serves to facilitate stripping of both the pattern and, subsequently, the casting from the mould. It is to be observed that attempts to achieve a like process, when making sand moulds by the older lower pressure methods, have failed to afford to the resulting sand mould any surface condition facilitating separation of the casting from it when in use. Presumably, this is because, at low pressures, the composition is not adequately transferred from the pattern to remain as a surface layer on or in the surface of the sand mould.

Preferably, according to the present invention, the composition used consists of a suspension of a colloidal or semi-colloidal refractory material in a liquid carrier. The refractory material is preferably in the form of flakes or platelets rather than granules and materials of particular value are graphite, mica and talc. The liquid carrier is preferably chosen to have a flash point high enough to minimise or avoid the risk of explosions or fire hazards in use. It preferably has a low viscosity and is sufficiently hydrophobic as to prevent the wet sand adhering to the pattern. Liquids of especial value are the light mineral oils, e.g. paraffin oil or kerosene. It is also advantageous to include in the composition a surface active compound acting as a dispersing or emulsifying agent. Large numbers of surface active compounds are known and commercially available so that it is not necessary to list them. Exemplary classes are the amine salts of higher fatty acids and the condensates of ethylene oxide with long chain fatty alcohols, or phenols or aromatic amines.

A specific composition which may be used is formulated substantially as follows (by weight):

	Percent
Paraffin-oil (kerosene)	12
Lamp black	12
Colloidal graphite concentrate (10–12% solids)	76
	100

To 100 parts of this composition up to 10% of a surface-active emulsifying agent e.g. triethylanolamine oleate or a condensation product of ethylene oxide with a long chain alkyl alcohol, e.g. lauryl alcohol or octadecyl alcohol, may be added. This addition helps penetration of the composition into the wet sand.

In use a coating of the composition is spread onto the surface of the pattern, the wet sand is compressed against the pattern by high pressure moulding to compact the sand

and produce a sand mould, the mould is stripped from the pattern and possibly dried out and molten metal is cast in the mould. The casting is stripped from the mould.

It is found that both stripping of the mould from the pattern and removal of the solidified casting from the mould is achieved very readily and that providing a fine sand has been used for the moulding, the surface finish of the casting is of such high quality that it can be favourably compared with the product of investment casting.

I claim as my invention:

1. A method for the production of sand moulds which comprises compressing moulding sand against a pattern at a pressure of at least 80 lbs. per square inch, the pattern being pretreated with a surface coating of a composition which is a colloidal suspension of a refractory material in a liquid carrier and which under the pressure obtaining, penetrates into the surface of the sand adjacent the pattern and thereby acts as a mould release agent during the production of the mould and as a mould dressing in the subsequent use of the mould for casting molten metal.

2. A method according to claim 1 wherein the said composition is a colloidal suspension of a flake refractory material in a liquid carrier.

3. A method according to claim 2 wherein the flake refractory material is selected from the class consisting of graphite, mica and talc.

4. A method according to claim 1 wherein the liquid carrier of said composition is a light mineral oil.

5. A method according to claim 1 wherein the said composition comprises a surface active agent.

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