

UNITED STATES PATENT OFFICE

2,358,002

PRODUCTION OF SAND CORES

William C. Dearing and Leonard S. Meyer, Toledo, Ohio, assignors, by mesne assignments, to Libbey-Owens-Ford Glass Company, a corporation of Ohio

No Drawing. Application November 5, 1942,
Serial No. 464,647

3 Claims. (Cl. 22—194)

The invention relates to the production of sand cores for casting operations, and particularly to the production of green sand cores that are subsequently baked to produce finished cores.

In many casting operations it is necessary to use metal molds called "core boxes" for forming cores from green sand. Great difficulty has been caused by sticking of portions of the green sand core in the metal core box and consequent breakage of the core during its removal from the core box. Such sticking has interfered to a considerable extent with the attainment of rapid production in many casting operations, and the waste of time caused by sticking of green sand cores in core boxes has increased production costs.

The green sand from which cores are formed contains a considerable portion of water and also contains certain adhesives or resinous binders that are required to hold the sand together in the molded core. Such adhesives or binders are soluble in water. It has now been discovered that the sticking of green sand cores in metal core boxes is due to the deposition of a thin film of an aqueous solution of the adhesive or binder on the interior of the core box. The first green sand core that is molded in a new core box does not usually stick, but each core that is molded in the box deposits a thin film of an aqueous solution of the binder on the interior of the box. The successive films of solution evaporate and leave a tacky coating of the binder, which causes sticking.

The principal object of the invention is to provide a method of preventing sticking during the forming of green sand cores in metal molds. More specific objects and advantages are apparent from the description, which merely discloses and illustrates the invention and is not intended to impose limitations upon the claims.

In the present method of preventing a sand core from sticking to a metal mold, the interior of the mold is coated with a substantially water-insoluble, normally-liquid fatty acid. If desired the coating of the interior of the mold may be caused to take place by incorporating such a fatty acid in the green sand from which the core is formed. Incorporating the fatty acid in the green sand insures uniform and complete coating of the interior of the mold. However, fatty acids are relatively expensive, and it has now been discovered that the prevention of sticking can be carried out much more economically by using a solution of the fatty acid in a relatively cheap water-insoluble, non-tacky organic solvent for coating the interior of the mold.

Sticking is not prevented when such an organic solvent is used alone, but sticking is prevented when a very small proportion of the fatty acid is used with the organic solvent. The employment of the organic solvent greatly reduces the amount of the fatty acid that it is necessary to use in order to prevent sticking.

Since a relatively cheap organic solvent may be used, the organic solvent is preferably incorporated in the green sand so that it is brought into uniform contact with all portions of the interior of the metal mold. Often the fatty acid is relatively expensive so that it is more economical to apply the fatty acid to the interior of the mold before the green sand is introduced. A coating of the fatty acid applied to the interior of the mold must be renewed from time to time. If the fatty acid is incorporated in the green sand, the consumption of the fatty acid is greater but the operation of periodically coating the interior of the mold is unnecessary.

Any substantially water-insoluble, normally-liquid fatty acid may be employed. Either an unsaturated fatty acid such as ricinoleic acid or a saturated fatty acid such as caproic or lauric acid may be used. A mixture of the fatty acids obtainable from soy beans may be used.

In some cases it is undesirable to have a fatty acid present in the finished core. The present method may be used in the production of finished cores containing no fatty acid either by using the fatty acid merely to coat the interior of the core box or by incorporating in the green sand a fatty acid that is volatile at the baking temperature to be used in producing the finished core.

The organic solvent employed may be any organic liquid which is a solvent for the particular fatty acid used and which is non-tacky and substantially insoluble in water. Usually the most convenient organic solvent is a cheap petroleum distillate, kerosene or the like. The organic solvents used may vary with the fatty acids employed, but they may be selected from the class consisting of hydrocarbons, substantially water-insoluble alcohols and organic liquids in general. The solvent should be non-viscous but it is preferably not so volatile so as to be highly inflammable. It is desirable that the organic solvent be volatile at the temperature at which the core is to be baked so that it disappears during the production of the finished core.

If the fatty acid is incorporated in the green sand, the preferred proportion of fatty acid is simply the minimum proportion that prevents sticking under the conditions of operation. With

various green sand mixes and various conditions of operation, the proportion of fatty acid that it is necessary to incorporate in the green sand in order to prevent sticking may vary widely. However, if an amount of petroleum distillate equal to about $\frac{1}{2}$ per cent of the weight of dry sand is incorporated, an amount of fatty acid equal to about 0.1 per cent of the weight of dry sand is usually a sufficient proportion in the green sand to prevent sticking. Both when the fatty acid is incorporated in the green sand and when the fatty acid is applied to the interior of the core box, an amount of the organic solvent in the green sand equal to about $\frac{1}{2}$ per cent of the weight of dry sand usually gives satisfactory results although a greater amount may be employed if desired as a precautionary measure. A smaller amount of the solvent may be used if the amount of fatty acid incorporated in the green sand or applied to the interior of the core box is increased.

In addition to the ingredients mentioned, the green sand should contain the customary proportion (roughly 5 per cent) of water and the customary proportion (roughly 1 per cent) of binders, such as a corn flour adhesive and a thermosetting urea-formaldehyde condensation product.

Various embodiments of the invention may be devised to meet various requirements.

Having described our invention, we claim:

1. A method of preventing a sand core including an aqueous binder solution from sticking to a metal mold that comprises coating the interior of the mold with a substantially water-insoluble, normally-liquid fatty acid by incorporating such a fatty acid in the green sand from which the core is formed.
2. A method of preventing a sand core including an aqueous binder solution from sticking to a metal mold that comprises coating the interior of the mold with a substantially water-insoluble, normally-liquid fatty acid and incorporating a substantially water-insoluble, non-tacky organic solvent for the fatty acid in the green sand from which the core is formed.
3. A method of preventing a sand core including an aqueous binder solution from sticking to a metal mold that comprises incorporating a substantially water-insoluble, normally-liquid fatty acid and a substantially water-insoluble, non-tacky organic solvent for the fatty acid in the green sand from which the core is formed.

WILLIAM C. DEARING.
LEONARD S. MEYER.