

UNITED STATES PATENT OFFICE.

THEOPHEILES D. LUCIER, OF DETROIT, MICHIGAN.

PROCESS OF MAKING MOLDS.

No Drawing.

Application filed September 25, 1920. Serial No. 412,851.

To all whom it may concern:

Be it known that I, THEOPHEILES D. LUCIER, a subject of the King of England, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Processes of Making Molds, of which the following is a specification.

My invention relates to improvements in permanent molds.

It has for its object to produce a mold capable of resisting the intense heat encountered in many molten alloys and one which will cleave readily from the casting leaving a perfectly smooth surface.

I use a plastic mixture of pulverized graphite and coal tar or pitch. The tar or pitch must be heated as hot as it will stand without burning and the graphite is heated to a temperature sufficient to maintain the tar or pitch as a liquid while a thorough mixture is being made.

The molds or patterns used must also be heated to a temperature sufficient to maintain the liquid condition of the tar or pitch until the plastic mixture has been forced or pressed into the desired form. Just before the plastic mixture is applied, the heated molds or patterns must be thoroughly oiled to prevent sticking of the material.

After the mixture has been pressed into shape, the pressure is maintained by clamps or any other suitable means until the mass is thoroughly cooled, to avoid checking, warping, or irregular expansion.

When thoroughly cooled, the body is released and removed from the mold or pattern, packed in fine carborundum or other finely divided refractory material, firmly clamped in position, and placed in a suitable oven. Heat is gradually applied until a temperature of approximately sixteen hundred degrees Fahrenheit is reached. This heating drives off the volatile portions of the tar or pitch binder and this temperature is maintained for four to eight hours, which causes the remainder of the binder to become carbonized. The carbonized binder holds the graphite in a solid, compact mass.

The body with its carborundum packing left intact is then removed from the furnace and allowed to become entirely cooled before it is unpacked. Air must not be allowed to strike it until it is thoroughly cool.

A carbonized mold produced in this man-

ner may be used for all ordinary castings and it will not warp or change its shape when heated even to a very high temperature. The difficulty commonly encountered in the use of all ordinary molds is the presence of gases in cases where the mold is extremely hot. Even the carbonized mold described would not be entirely free from such gases.

In the casting of dies it is desirable for perfect result that no gas at all shall be present when the mold is heated. This desirable result may be attained by converting all of the carbon in the mold to graphite. The carbonized mold is loosely packed and placed between the contact points of an electric furnace. Sufficient current is used to convert into graphite the carbon derived from the tar or pitch as a binder. This will ordinarily be accomplished in about two hours. The mold is now substantially pure graphite and has quite different properties from the carbonized mold. No precautions are necessary in cooling it down from the high temperature used in the electric furnace. It has been found that a heated mold so produced may be sprayed with water or even dipped into water without cracking.

The finished mold is not affected by changes of temperature or by the action of water.

This highly refractory material may also be used for ladles, crucibles, cupola linings, as a substitute for fire brick and in other locations where the material must stand a high temperature and severe usage.

In certain cases, the graphite may be replaced in part or altogether by another refractory substance, such as soapstone, clay or sand.

What I claim is:—

1. The process of making molds which consists in shaping a plastic mixture of graphite and coal tar or pitch to a desired configuration, carbonizing the tar or pitch while maintaining the configuration and then converting the carbonized tar or pitch into graphite.

2. The process of making molds which consists in preparing a mixture of heated graphite with liquid coal tar, applying hot, plastic mixture to a heated mold or pattern under pressure, maintaining the pressure until the mixture is cool, packing the arti-

cle in a finely divided refractory material, holding it in position while raising the temperature to a point at which the tar becomes carbonized, maintaining the temperature
5 until the carbonization is completed, and then subjecting it to the action of an electric current until the carbonized tar becomes converted into graphite.

3. The process of making molds which
10 consists in heating pulverized graphite, mixing therewith heated coal tar or pitch, pressing the plastic mixture while hot into close contact with a heated mold, or pattern, and maintaining the pressure until the
15 article is cool, then separating it from the mold or pattern, packing it in a refractory material, raising the temperature to approximately sixteen hundred degrees Fahrenheit, maintaining that temperature for
20 four to eight hours, placing it between the contact points of an electric furnace and ap-

plying electric current until the article is substantially completely graphitized.

4. The process of making a mold which consists in applying a hot plastic mixture of graphite and coal tar or pitch to a heated mold under pressure, maintaining the pressure until the mixture is cool, packing the molded article in a refractory material to preserve its form while raising
30 the temperature to a point at which the tar becomes carbonized, and heating the article to a temperature at which the carbonized tar becomes converted into graphite.
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In testimony whereof I affix my signature in presence of two witnesses.

THEOPHEILES D. LUCIER.

Witnesses:

LEWIS E. FLANDERS,
ARTHUR MINNICK,