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D. H. MELOCHE

DOUBLE COATING FOR PERMANENT MOLDS

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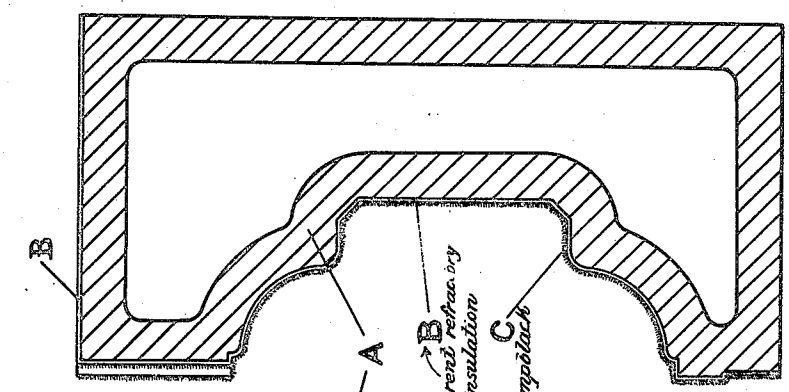

FIG. II

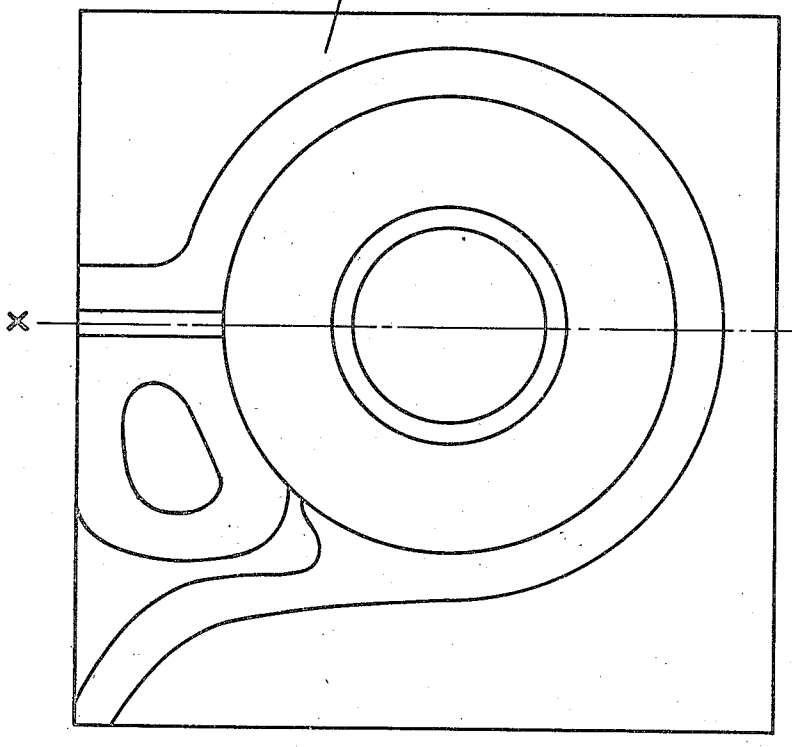

FIG. I

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Patented May 6, 1924. 1,492,694

UNITED STATES PATENT OFFICE.

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DOUBLE COATING FOR PERMANENT MOLDS.

Continuation of application Serial No. 579,927, filed August 5, 1922. This application filed March 5, 1923. Serial No. 623,053.

To all whom it may concern:

Be it known that I, DANIEL H. MELOCHE, a citizen of the United States, residing at 2241 Gladstone Ave., Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Double Coatings for Permanent Molds, of which the following is a specification.

This invention relates to an improved double coating of lampblack and a refractory for the protection of iron molds and for the production in iron molds of soft (easily machineable) castings having their cast surface free from hard spots, pin holes and similar defects.

This application is a continuation of my application, Serial No. 579,927, filed August 5, 1922.

This application covers a coating of lampblack superimposed over an insulating coating of a refractory material, the lampblack coating being of such a thickness as to considerably prolong the cooling period of the iron casting.

Heretofore it has been customary to apply a thin coating of graphite for the purpose of lubricating the iron as it flows into the mold. By using instead of graphite an excess of lampblack I have discovered that the surface of the casting is made more machineable, possibly because the excess of lampblack is dissolved in the iron and probably because the lampblack, being pulverulent, provides a vent and also reduces the cooling rate.

Figure I shows a hollow mold.

Figure II shows a cross sectional elevation on the plate X—Y of the mold.

The coating I use is prepared as follows:

I first place on the surface of the hollow metal mold A a heat-insulating lining B of an adherent refractory, preferably the lining described in my co-pending application, Serial No. 581,239, filed 11 August 1922, allowed 31 Jan. 1923.

Over this coating, which is a permanent coating of fire clay about $\frac{1}{64}''$ in thickness, I super-impose a renewable coating of pulverulent lampblack C obtained preferably by the application of burning acetylene. In order to know whether or not I have sufficient lampblack so that the molten iron never comes in actual contact with the refractory lining I observe whether, after the casting is ejected from the mold, there remains on the surface of the mold a practically intact coating of lampblack.

By so doing I make sure that the atmosphere in which the iron is solidified is a reducing atmosphere, as one of the chief tendencies to be overcome in the casting of iron is the tendency of the iron to oxidize. The objection to iron containing iron oxide is, I believe, that such iron is very apt to form a skin of iron oxide which prevents the complete filling of the mold.

Another indication of whether or not I am securing the desired results is the time between the casting of the iron in the metal mold and the time at which the casting is sufficiently solid so that it may be ejected. With a two pound casting of irregular shape with thicknesses varying between $\frac{3}{16}''$ and $\frac{3}{4}''$ I find that a period of 30 seconds will give me the most satisfactory results as far as machineability is concerned.

If the time is too long I reduce the thickness of the lampblack. If the time interval is too short I increase the lampblack until I obtain this result.

In order to avoid the tendency which exists, when applying this thick coating of lampblack, for residual lampblack to "build up" or accumulate in the recesses and thus prevent the complete filling of the mold with iron it is necessary to clean the mold and remove much of this surplus lampblack which remains after the casting is ejected. This surplus lampblack, together with any dirt that may adhere to the mold surface, is best removed by means of a strong blast of air applied after the castings are ejected and before the lampblack is applied, as set forth in the co-pending application of Joseph L. Dostal, Serial No. 568,405, filed 15 June 1922.

The removal of the lampblack is regulated by the pressure of the air in the cleaning device shown in the above application. An air pressure of approximately 50 pounds per square inch is used and the lampblack is removed to such an extent that of the total quantity of lampblack on the mold when the iron is cast in the mold more than 50% is fresh lampblack. The fresh lamp-

black appears to be more active than the lampblack which remains over after the casting has been ejected and it is for this reason as well as for the reasons set forth above that the air blast is used to thoroughly clean the molds of any superfluous lampblack and dirt.

This blast of cleaning air also assists in preventing the temperature of the face of the mold exceeding 1150° F., above which temperature I have found that the lampblack will not adhere. In order to obtain soft castings it is necessary to maintain the temperature of the mold lining above 650° F.

In addition to the substantially intact coating of lampblack which remains on the mold after the castings are ejected I have found that the scale forming on the castings after they are ejected from the molds is another indication of whether the double coating I have invented is being properly applied. I believe this scale is a thin coating of iron saturated with carbon which is consumed when the red hot casting comes in contact with the air.

At any rate I have found that unless this scale is formed I am not getting the soft castings which is the object of using this double coating.

By the use of a hollow mold having walls ½" thick I am enabled to raise the temperature of the mold to the desired temperature with as little loss of time and castings as possible.

Further, a hollow mold is peculiarly adapted to cooling. The casting of hollow molds is more practicable than the casting of solid molds as segregation and porosity is reduced to a minimum by the central core.

What I claim is:

1. A permanent mold having a hollow wall surrounding a mold cavity, an adherent refractory insulating coating applied to the surface of said cavity, and a thick outer coating of amorphous carbon applied to said refractory insulating coating, said carbon being of sufficient thickness to considerably prolong the cooling period of the casting.

2. A hot permanent mold having a hollow wall surrounding a mold cavity, an adherent lining of inert refractory insulating material applied to the wall of the cavity, and a second lining of amorphous carbon superimposed over said insulating lining, said lining of carbon being relatively thick so as to adhere to the insulating lining and to considerably prolong the cooling period of said casting.

3. In a permanent metal mold having a hollow wall surrounding a mold cavity, an adherent permanent refractory insulating coating applied to the surface of the cavity and a freshly applied coating of amorphous carbon applied to said refractory insulating coating of a thickness sufficient to permit a substantially intact coating of lampblack to remain after each successive casting has been formed within the mold.

4. In a permanent mold having a mold cavity, a permanent refractory insulating coating applied to the surface of the cavity and a freshly applied coating of amorphous carbon applied to said refractory insulating coating of a thickness sufficient so that 30 seconds will elapse between pouring and solidification so as to produce a soft gray machineable casting having a cast surface free from hard spots and pin holes.

5. In a permanent mold having a mold cavity, a permanent refractory insulating coating applied to the surface of the cavity and maintained at a temperature between 650° F. and 1150° F., and a freshly applied coating of amorphous carbon applied to said refractory insulating coating of a thickness sufficient so that 30 seconds will elapse between pouring and solidification so as to produce a soft gray machineable casting having a cast surface free from hard spots and pin holes.

6. In a permanent metal mold having a hollow wall surrounding a mold cavity, a permanent refractory insulating coating applied to the surface of the cavity and a freshly applied coating of amorphous carbon applied to said refractory insulating coating of a thickness sufficient so that 30 seconds will elapse between pouring and solidification so as to produce a soft gray machineable casting having a cast surface free from hard spots and pin holes.

7. In a permanent metal mold having a hollow wall surrounding a mold cavity, a permanent refractory insulating coating applied to the surface of the cavity and maintained at a temperature between 650° F. and 1150° F., and a freshly applied coating of amorphous carbon applied to said refractory insulating coating of a thickness sufficient so that 30 seconds will elapse between pouring and solidification so as to produce a soft gray machineable casting having a cast surface free from hard spots and pin holes.

8. A permanent mold having a mold cavity, a refractory insulating coating applied to the surface of said cavity, and a thick outer coating of amorphous carbon applied to said refractory insulating coating, said carbon being of sufficient thickness to considerably prolong the cooling period of the casting.

9. A permanent mold having a mold cavity, a lining of inert refractory insulating material applied to the wall of the cavity, and a second lining of amorphous carbon superimposed over said insulating lining, said lining of carbon being relatively

thick so as to adhere to the insulating lining and to considerably prolong the cooling period of said casting.

10. A double coating for a permanent mold adapted to continuously produce iron castings, consisting of an inert refractory insulating coating applied to the mold and an outer coating of amorphous carbon applied to said insulating coating and maintained at such a thickness that the carbon coating remains practically intact after each successive casting has been ejected from the mold.

11. A double coating for a permanent mold adapted to continuously produce iron castings, consisting of an inert refractory insulating coating applied to the walls of a mold cavity and an outer coating of amorphous carbon constantly maintained at a thickness sufficient to permit combustion of some of the carbon coating producing a reducing atmosphere during a casting operation, and to remain substantially intact after each successive casting.

12. A double coating for a permanent metallic mold adapted to continuously produce iron castings, consisting of an inner refractory inert insulating coating applied to the mold cavity, and an outer coating of amorphous carbon applied to said inner coating and constantly maintained at a thickness sufficient to retard the freezing of iron within the mold to render the castings soft and to permit each successive casting to be ejected without exposing said inner lining.

In testimony whereof I affix my signature.

DANIEL H. MELOCHE.