

UNITED STATES PATENT OFFICE

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TREATMENT OF PLASTER OF PARIS BONDED MOLDS WITH LIQUID HYDROCARBON PRIOR TO AUTOCLAVING

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This invention relates generally to the treatment of plaster molds for use in metal casting and more particularly to the treatment of plaster of Paris bonded molds processed in accordance with the process of Bean Patent 2,220,703, dated November 5, 1940.

According to the process of the Bean patent, after the initial set of the wet plaster mix comprising essentially water, plaster of Paris, and finely divided refractory material, the green plaster mold is placed in an autoclave and subjected to steam under pressure to convert calcium sulfate di-hydrate to calcium sulfate hemi-hydrate and to leave free water distributed through the plaster. The mold is thereafter removed from the autoclave and allowed to stand for a number of hours at room temperature whereby the hemi-hydrate is rehydrated to di-hydrate. The mold is then dried to remove the free water from the plaster. Plaster bonded molds processed according to Patent 2,220,703 become granular in structure on the interior, while the surface, in general, remains fine grained and smooth. The effect of the treatment is to increase the permeability of the material so as to permit escape of gases generated in the mold during casting while providing a smooth skin at the surface of the mold giving better definition to the surface of the casting.

At times some difficulty has been experienced with plaster bonded molds in accordance with the Bean patent in that the surface of the molds become granular, especially in grooves, and places where the amount of evaporation from the surface is less than ordinary. The primary object of this invention is to provide a relatively simple and inexpensive method of treating plaster of Paris bonded molds so as to eliminate the tendency for forming the granular material at the mold surface.

I have discovered that treating the green mold surface after the initial set of the wet plaster mix and before autoclaving, by applying a liquid hydrocarbon thereto protects the mold surface during the subsequent steps and inhibits formation of granular material on the surface. The mold treated with the liquid hydrocarbon is then given the regular processing in accordance with the Bean patent.

The liquid hydrocarbon may be applied to the green mold surface in any desired manner so long as the mold surface is thoroughly wetted thereby. Preferred practice is simply to dip the green plaster mold in the liquid hydrocarbon for a short time. The time of immersion is not particularly critical. In general, prolonged immer-

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sion has no particular adverse effect, though immersion of much over 5 minutes probably should be avoided because of possible damage to the surface of the mold and because the longer times of treatment are unnecessary.

An example of a preferred liquid hydrocarbon is one consisting of 10% of paraffin oil and 90% kerosene. The percentage of paraffin oil is not especially critical. The foregoing combination is recommended because of its cheapness and general availability and because of the fact that kerosene alone is not completely effective in all cases where the treated green molds stand around for several hours before they are given the autoclave treatment. This is probably due to the kerosene tending to wick into the body of the mold and away from the mold surface. The paraffin oil is a light oil designated as "mold oil" by all the major oil companies which sell the same to foundries, etc., as a mold release agent. The "mold oil" is a light paraffin oil and is understood to contain a small percentage of lard oil.

Kerosene alone has been used but, as noted above, is not as satisfactory as the combination which includes the small proportion of paraffin oil. Diesel distillate which is quite similar to kerosene may be used either by itself or with a small proportion of paraffin oil as in the examples given in which kerosene is used. Other liquid hydrocarbons having properties generally similar to the examples given above may be employed. However, as indicated above, the materials of the specific examples are preferred because of commercial availability and cheapness.

The dipping of the green mold is usually done within a time interval not greater than six hours before the mold is placed in the autoclave. However, the use of the combination including kerosene and paraffin oil allows even more latitude in elapsed time—for example, up to twenty-four hours.

After dipping the molds are set on a rack. What kerosene does not drain off in the first few seconds is quickly absorbed into the mold.

The green plaster of Paris bonded mold after being treated with the liquid hydrocarbon is subsequently given the autoclave treatment with steam under pressure to convert the calcium sulfate di-hydrate to calcium sulfate hemi-hydrate and to leave free water distributed throughout the mold. The mold is then removed from the autoclave and allowed to stand for a number of hours whereby the hemi-hydrate is rehydrated to di-hydrate. The mold is then dried to remove all or substantially all of the remaining free water

from the plaster. The autoclaving and subsequent steps are in accordance with the teachings of the Bean patent.

The treatment with the liquid hydrocarbon in accordance with the present invention has the important effect that it inhibits granule formation at the very surface without adversely affecting the recrystallization of the interior. Many inhibitors prevent the surface from becoming granular but also prevent recrystallization of the interior wherever they penetrate the surface, thus destroying most of the value which otherwise would be obtained by the autoclaving and other treatment of the Bean patent.

While the specific embodiments of the invention described herein deal with the formation of plaster of Paris bonded molds, it will be understood that the principles of the invention have application also in the formation of plaster of Paris bonded cores processed in accordance with Bean Patent 2,220,703.

Various changes and modifications of the embodiments of my invention described herein may be made without departing from the principle and spirit of the invention.

I claim:

1. The process of forming a plaster of Paris bonded mold or core which includes forming a desired shape from a mixture comprising essentially water, plaster of Paris and finely divided refractory material, setting the plaster, immersing the set plaster shape in a liquid hydrocarbon consisting of about 90% kerosene and 10% of light paraffin oil, removing from said liquid hydrocarbon the plaster shape, thereafter dehydrating the set plaster shape as thus treated to convert calcium sulfate di-hydrate to calcium sulfate hemi-hydrate and to leave free water distributed throughout the shape, thereafter rehydrating the hemi-hydrate to di-hydrate and then drying the shape to remove the free water from the shape.

2. In a process of forming a plaster of Paris bonded mold or core by forming a desired shape from a mixture comprising essentially plaster of Paris, finely divided refractory material and water, setting the plaster, dehydrating the set plaster to convert calcium sulfate di-hydrate to calcium sulfate hemi-hydrate and to leave free water distributed throughout the shape, thereafter rehydrating the hemi-hydrate to di-hydrate and then drying the shape to remove substantially all of the free water therefrom, the im-

provement which consists in thoroughly wetting the surface of said set plaster shape prior to the dehydrating step with a light liquid hydrocarbon.

3. A process as in claim 2 in which the liquid hydrocarbon consists essentially of kerosene.

4. A process as in claim 2 in which the liquid hydrocarbon oil consists essentially of Diesel distillate.

5. A process as in claim 2 in which the liquid hydrocarbon consists essentially of kerosene and contains a small percentage of light paraffin oil.

6. In a process of forming a plaster of Paris bonded mold or core by forming a desired shape from a mixture consisting essentially of plaster of Paris, finely divided refractory material and water, setting the plaster, dehydrating the set plaster to convert calcium sulfate di-hydrate to calcium sulfate hemi-hydrate, thereafter rehydrating the hemi-hydrate to di-hydrate and then drying the shape to remove substantially all of the free water therefrom, the improvement which consists in thoroughly wetting the surface of said set plaster shape with liquid hydrocarbons having properties substantially similar to those of kerosene prior to said dehydrating step.

7. The process of forming a plaster of Paris bonded mold or core which comprises forming a desired shape from a mixture consisting essentially of plaster of Paris, finely divided refractory material and water, setting the plaster, immersing the set plaster shape in a hydrocarbon liquid consisting essentially of kerosene, removing from said hydrocarbon liquid the plaster shape, thereafter dehydrating the set plaster shape as thus treated to convert calcium sulfate di-hydrate to calcium sulfate hemi-hydrate and to leave free water distributed throughout the plaster shape, thereafter rehydrating the hemi-hydrate to di-hydrate and then drying the shape to remove the free water from the shape.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
2,220,703	Bean	Nov. 5, 1940

OTHER REFERENCES

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