

UNITED STATES PATENT OFFICE

2,435,121

METHOD OF CASTING LIGHT METALS

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This invention relates generally to non-metallic molds for use in metal casting and is particularly concerned with the treatment of the non-metallic mold or mold material to control or eliminate a kind of porosity in the casting resulting from what may be termed "mold reaction."

It sometimes happens in the manufacture of high quality, non-ferrous metal castings, particularly light metal castings such as castings of aluminum, magnesium, or alloys of these metals, that a particular kind of porosity is formed in the castings as a result of "mold reaction." It appears that this kind of porosity may be caused by gases which are formed by reaction between one or more of the components of the mold and one or more components of the molten metal or alloy being cast in the mold. It appears also that gases such as hydrogen present in the molten metal or alloy as it is cast may be a cause of porosity. The primary object of this invention is to correct or eliminate porosity due to "mold reaction."

I have discovered as a result of considerable work and experimentation that compounds containing the cyanide radical applied to the mold have a powerful effect in inhibiting or preventing porosity due to "mold reaction." It is only necessary that the cyanide compound be applied to the surface portion or portions of the mold that are to be contacted by the hot molten metal in the metal casting process. The cyanide compounds contain the poisonous cyanide radical and therefore precautions must be taken in using these compounds. The cyanide compounds should be applied to the mold when the mold is relatively dry. One method of applying the cyanide compound that has been found particularly advantageous is to make up the compound as a spray material and spray the material onto the surface portions of the mold cavity which will be contacted by the molten metal in the metal casting process. In this way a thin film or coating is formed on the surface portions of the mold to be contacted by the hot molten metal in the mold.

Typical cyanide compounds that may be employed include: sodium thiocyanate, potassium thiocyanate, sodium ferricyanide, potassium ferricyanide, and similar cyanide compounds.

The use of the cyanide compounds as mold sprays has been found of especial advantage in producing high quality light metal castings in plaster of Paris molds in accordance with the process of Bean Patent 2,220,703, granted November 5, 1940. According to the Bean process,

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after the initial set of the wet plaster mix the 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 throughout the plaster mold. 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 thereafter dried to remove practically all of the free water from the plaster. The effect of this 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.

In using the cyanide compound as a mold spray in plaster molds such as those produced in accordance with the Bean process it is important that the cyanide compound be applied to the mold surface when it is relatively dry. Otherwise the cyanide compound will decompose in the presence of hot water vapor such as is present in the early stages of the drying of the mold.

A cyanide spray for plaster molds produced in accordance with the Bean process and employed for casting aluminum alloys that has been found of especial advantage, is one consisting of a 30% solution of sodium and potassium ferricyanide in water.

While the specific embodiment of the invention described herein deals with the use of cyanide compounds applied to mold surfaces, it will be understood that cores which may be used in molds also may have the cyanide compounds applied thereto.

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

I claim:

1. A method of making a light metal casting by use of plaster molds comprising substantially plaster of Paris which includes applying a small amount of material consisting essentially of a cyanide compound to the mold surface to be contacted by molten light metal and then casting molten light metal in the mold as thus treated.

2. A method of making a light metal casting by use of a plaster mold comprising substantially plaster of Paris which includes spraying a thin coating consisting essentially of a cyanide compound onto the mold surface to be contacted by molten light metal and then casting molten light metal in the mold as thus treated.

3. A method of making a light metal casting by use of a plaster mold consisting of 15 to 90% plaster of Paris and the balance refractory material, which includes spraying a thin coating consisting essentially of a cyanide compound onto the surface of the plaster mold to be contacted by molten light metal and thereafter casting molten light metal into said plaster mold as thus coated.

4. A method of making a light metal casting by use of a plaster mold comprising substantially plaster of Paris which includes spraying the surface of said plaster mold to be contacted by molten metal in the metal casting operation with a solution consisting of sodium ferricyanide and potassium ferricyanide in water, and thereafter casting the light molten metal in the plaster mold as thus treated.

MORRIS BEAN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
569,251	Stevens	Oct. 13, 1896
1,706,858	Myers	Mar. 26, 1929
2,220,703	Bean	Nov. 5, 1940

FOREIGN PATENTS

Number	Country	Date
3,170	Great Britain	Nov. 26, 1862