C. B. JACOBS.

METHOD FOR MAKING METAL CASTINGS.

APPLICATION FILED MAY 23, 1913.

1,249,101. Patented Dec. 4, 1917

Fig. 1.

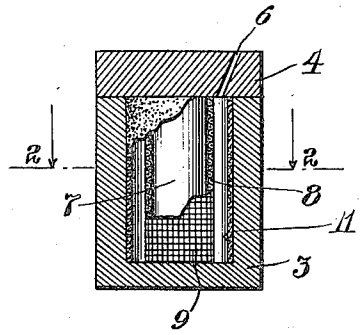
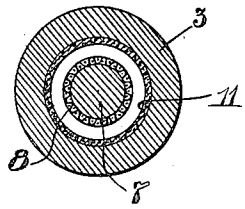


Fig. 2.



Attest:

Charles B. Jacobs, Inventor:

by

Wm. J. Dolan, Atty

UNITED STATES PATENT OFFICE.

CHARLES B. JACOBS, OF GLEN RIDGE, NEW JERSEY, ASSIGNOR TO AMERICAN ABRASIVE METALS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD FOR MAKING METAL CASTINGS.

1,249,101. Specification of Letters Patent. Patented Dec. 4, 1917.

Application filed May 23, 1913. Serial No. 769,446.

To all whom it may concern:

Be it known that I, CHARLES B. JACOBS, a citizen of the United States, and a resident of Glen Ridge, Essex county, State of New Jersey, have invented certain new and useful Improvements in Methods for Making Metal Castings, of which the following is a specification.

This invention has for an object to provide a method of producing metal castings with protective layers or with surface portions or facings having properties or characteristics different from those of the metal forming the body portions, said protective layers or surface portions, whether interior or exterior, being of any desied form and dimensions. These and other objects of the invention will be in part obvious and in part more fully explained in the following description:

The invention consists in the novel methods and improvements herein set forth.

According to one feature of the invention, a protective layer or facing having the desired characteristics is produced upon a casting by coating or facing the corresponding surface in the mold in which the casting is to be formed with a material having or adapted to produce the desired characteristics, said material being in the proper physical form best adapted to produce the desired results, and securing this coating or facing to the mold surface in a suitable manner, as by suitable mechanical means or as by a cement which is adapted to act as a flux for the molten metal introduced into the mold to form the main body of the casting.

While the invention may be applied to the manufacture of castings adapted for a great variety of purposes and comprising many different metals, it is particularly useful as applied to the production of castings comprised in the main of iron or steel or so-called "semi-steel" and allied metals, which may be termed generally the "ferrous metals" because by the practice of this invention the inherent advantages of these metals as to strength, rigidity, cheapness, etc., may be realized without the presence of their inherent disadvantages, such as liability to corrosion, erosion, disintegration or distortion by heat, etc. By means of this invention the castings may be provided with protective layers or facings adapted to protect the body portions from any or all of the above-indicated and other destructive influences, and the protective layers or facings may be provided within or at any desired part of or throughout the entire surface of the casting, irrespective of the form, location, or dimensions of such surfaces, or, if desired, protective layers or facings of different characters may be provided at different parts of a single casting.

The protective layer or facing may be formed of any material having the desired characteristics and which will not interfere with the casting process or be destroyed or dissipated by the heat of the metal which is to compose the main body of the casting when said metal is in a molten state. This material may be a mineral, natural or artificial, such as mineral wool, spun glass, and the like, which will be fused by the heat of the molten metal forming a substantially continuous layer or facing. As a protective layer or facing for ferrous metal castings, for example, another metal or alloy, such as copper, tin, lead, aluminum, bronze, and the like, may be used.

A refractory material, such as asbestos fiber, adapted to resist disintegration or deformation by heat, may be used. Moreover, a metal will be in some cases better adapted for mechanical purposes or to enhance the appearance of a facing, while a fusible mineral will be better adapted to act as a non-conductor of electricity. Where a protective layer or facing having the characteristics of both classes of materials is desired the same may be employed in convenient form as in two or more successive layers of the materials.

Whatever may be the nature of the material employed for the protective layer or facing, preferably its physical form should be such as best to adapt it to the results desired. I have, in a previous application, Serial No. 669,492, filed January 4th, 1912, patented September 14, 1915, No. 1,153,231, described the use of the protective facing material applied in a finely divided or comminuted condition, and have fully described the use of minerals and metals in that form, and a method of applying them to the parts of the mold it is desired to protect in the corresponding portions of the castings.

I have found that in certain cases, it is economical or of other practical advantage to apply the facing or coating material in a form other than a finely divided or com-

minuted condition. For instance, material such as mineral wool, spun glass, asbestos fiber, and metals such as copper, lead, tin, aluminum, bronze, and the like, may be obtained in sheet or other form, as in strips, braids, or wire, in which forms under certain conditions it is advantageous to apply them rather than in the form of finely divided or comminuted material.

As an example, if it is desired to coat the interior surface of a pipe or a hollow chamber with spun glass, or mineral wool, the material may be wound in strip or sheet form around the core, which forms a part of the mold. It may be fastened to the core in a suitable manner as by mechanical means, such as wiring, or it may be applied to the core by means of a suitable cement, such as soluble glass, or a paste made of a mixture of soluble glass and some other material which would be dissipated by the heat of the casting metal, such for instance, as soluble glass and rye flour or other suitable paste in general use by core makers, which paste is then hardened or solidified preferably by the application thereto of heat. The core is then set in the mold in the usual manner and the casting metal poured in.

This method of casting is illustrated in the accompanying drawings which form part hereof, and in which Figure 1 is a vertical section of a mold adapted for the casting of a hollow pipe, and Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1. The mold 3 is provided with the customary cope 4 through which is formed the pouring hole 6. About the core 7 is arranged the material 8 with which it is desired to coat the inner surface of the pipe, and said coating is shown as being held in place by a wire netting 9. For purposes, such as heretofore explained, a refractory material 11 is arranged on the surface of the mold proper and becomes a part of the finished casting, forming a protective facing therefor.

The thickness of the protective facing or coating on the core may be varied with the character of the casting it is desired to produce, the object being to have the material melt and form a practically continuous coating on the interior of the casting.

Where it is desired to protect the inner surface of a pipe or a hollow chamber against the disintegration or distortion by heat that would ordinarily take place in a metal casting, or where it is desired to lower the heat conductivity of such pipe, or chamber, a protective coating formed of asbestos, in suitable form, as tape, twine, or sheets, may be applied to the core by winding the material in suitable form around the core, and securing it thereto by suitable means, such as wiring, or by means of a cement, formed of soluble glass and other suitable materials, the cement forming a flux for the casting material, which frees it from oxids, and causes it to bind to the fibers of the asbestos sheet or twine, producing a practically continuous layer of asbestos on the interior surface of the casting.

Where it is desired to protect the interior of a ferrous metal casting, as for example a pipe, or hollow chamber, with other metals, such for instance, as copper, or lead, or a mixture of the same, the material may be used in a convenient form, as in the form of a sheet, or wire, or braid, and wound on the core and fastened by mechanical means, such as wiring, or by means of a cement composed of soluble glass and rye flour, and the like, which is afterward hardened as by applications of heat. The core is then set in the mold in the usual manner and the casting metal poured in. The thickness of the coating or protective material may be varied, according to the character of the casting it is desired to produce, the object being to have the facing metal melt and form a practically continuous coating alloyed to the surface of the casting.

For certain purposes, such as protection of a ferrous metal casting against the action of corroding liquids, as sulfuric acid, it may be desirable to form a protective coating of more than one metal or other material or of a combination of metals and other materials. For instance, it may be desired to form the coating of lead and copper, in which case the lead may be applied in the form of thin sheets, or lead wool, rolled out into braid, or sheets, and the copper in the proper physical form superimposed upon the lead, the relatively high melting point of the copper protecting the lead against dissipation from the heat of the casting metal, and causing it to alloy with the copper, which in its turn alloys with the body of the ferrous metal casting.

As another example of the application of this invention, it may be desirable to form a protective coating of two or more metals or minerals to a single mold surface, such for instance as spun glass, lead and copper. In this case the spun glass is applied first and the lead and copper in suitable physical form superimposed on the glass in the order named or the relative order of the successive layers of material of which the protective coating is formed may be varied to suit the character of the protective coating required. Furthermore one part of the mold surface may be protected by one material and another part by a material of different character, depending on the conditions it is required to meet in the finished casting.

The protective coatings above described may be secured to the various parts of the mold and form an outside facing or protec-

tive coating, as well as for the protection of interior surfaces. Where the coating is to form a facing on the casting, the coating may be applied directly on one of the mold surfaces in a desired form as in the form of sheets or strips, and secured to the mold surface, which it is desired to protect, by means of cement, composed of soluble glass or soluble glass and rye flour, or it may be secured to the mold by mechanical means, such as nailing. Successive layers of different materials may be applied in this manner to any particular part of the mold which it is desired to protect. When the mold surface which is to receive the coating or facing material for any reason, as delicacy of construction, cannot receive the paste treatment or the mechanical fastening of the facing without danger of injury, as in the case of green sand molds of certain shapes and forms, such a surface may be first hardened or toughened by moistening it with cement and then drying it in accordance with the method set forth in application Serial No. 669,491, filed Jan. 4, 1912 and patented September 14, 1915, No. 1,153,230. Where the surface of the mold to receive the protective facing is of such form or so located that the facing material will not rest thereon by gravity or cannot be made to adhere thereto by first moistening the surface of the mold with cement or paste, the facing material may be made to conform to the surface of the mold in a suitable way, as by pressing it into shape over a form and holding it in its proper position in the mold by chaplets or other suitable mechanical means.

Advantages of the invention other than those above set forth or suggested will be obvious to those skilled in the art, and it is to be understood that the invention in its broader aspects is not limited to the particular mode of procedure nor to the employment of the specific materials herein described, as many variations in both the materials and the treatment of them may be resorted to without departing from the main principles of the invention and without sacrificing its chief advantages.

I claim:

1. A method of producing a metal casting with a protective layer, which method consists in applying to a surface of the mold in which the casting is to be formed the protective material, fastening said protective material to the mold surface by mechanical means, and then introducing into the mold the metal in a molten state.

2. The method of producing a metal casting with a protective layer, which method consists in applying to a surface of the mold in which the casting is to be formed, layers of different metals each different from that of which the body of the casting is to consist, and adapted to be fused by the heat of the body metal when in a molten state, different metals being applied to different portions of said mold surface, securing said metals to said mold surface with a paste composed of soluble glass and other suitable material and then introducing the body metal in a molten state.

3. The method of producing a ferrous metal casting with a facing having properties different from those of the metal of which the body of the casting is to be formed, which method consists in coating a surface of the mold in which the casting is to be formed with a paste composed of a soluble glass and a suitable material, applying to this coating a layer of a material adapted to be fused by the heat of the body metal when in a molten state, said layer being secured to the mold surface by mechanical means, drying the coating, and then introducing into the mold the body metal in a molten state.

4. The method of producing a metal casting with a protective layer, which method consists in coating the surface of the mold in which the casting is to be formed with a paste, applying to this coating a layer of the protective material, drying the coating, then introducing into the mold the metal in a molten state, and causing the latter to take up the coated layer for a permanent surface covering.

5. The method of producing a metal casting with a protective layer of the character described, which method includes covering with soluble glass the surface of the mold wherein the casting is to be formed, applying thereto the protective material, and pouring the molten metal into the mold next to the combined layer and covering.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES B. JACOBS.

Witnesses:

THOS. D. KEIM,

RALPH P. SPOONER.