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H. F. TAYLOR ET AL
METHOD OF DETERMINING EFFECT OF MOLD CONDITIONS ON METAL CASTINGS
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FIG. 1

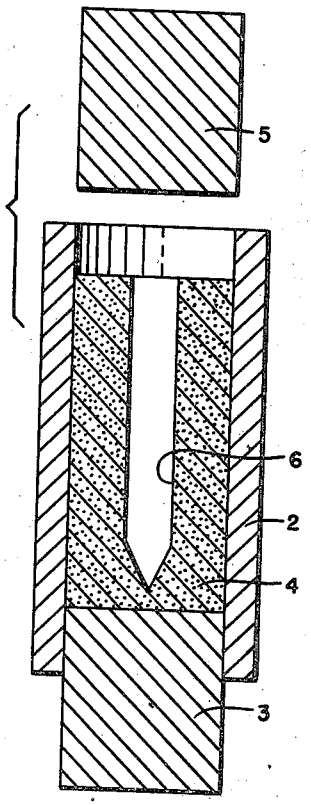
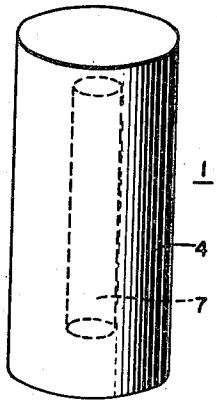


FIG. 2



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METHOD OF DETERMINING EFFECT OF MOLD CONDITIONS ON METAL CASTINGS

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2 Claims. (Cl. 73—15)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates to metal casting, and more particularly to a method whereby the effect on metal casting of the mold conditions may be accurately determined.

It is well known in metal casting that the material selected for the mold may have a very definite effect on the quality of the casting, and particularly upon the quality of the surface of the casting. The heat involved in casting metals causes the mold material adjacent the casting to become very hot, and may cause the material to fuse, or to react with the casting metal, or both. To a considerable degree, also, the particular material used for the mold determines the mold atmosphere, and the mold atmosphere directly affects the formation of penetration defects resulting both from metal penetration and from oxide penetration. The examination of cast articles and the determination of the effect of various molding conditions upon the cast articles therefore becomes a matter of considerable importance.

An object of the present invention is to provide an efficient and simple method of determining the effect on a casting of the mold conditions present and particularly of the mold material and atmosphere employed.

In accordance with one embodiment of this invention, a metal pin is embedded in a cylindrical block of the mold material to be tested and the article so formed is heated at a predetermined temperature for a predetermined period of time. The article is then removed from the furnace and opened for examination of the casting and the mold material. By repeating the test with different time and temperature conditions or under different mold atmosphere conditions, an accurate analysis of the effect of mold conditions and particularly mold material and mold atmosphere on a particular metal being cast may be made.

Other objects and advantages of the present invention will be apparent from the following detailed description taken in conjunction with the drawings, wherein:

Fig. 1 is a sectional view of a molding device employed in accordance with this invention for embedding a metal pin in a specimen block of mold material; and

Fig. 2 is a detailed, perspective view of a specimen block of mold material having a metal pin embedded therein.

In accordance with the method of this invention, a specimen block 1 such as illustrated in Fig. 2, is prepared, having a metal pin 7 located therein. While this invention will be described in conjunction with the use of sand as a mold material, it will be understood that other mold materials are equally adaptable to the method of this invention.

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Referring now to the drawings, and particularly to Fig. 1 thereof, it will be seen that the apparatus used in preparing the specimen block 1 may include a metal cylinder 2 of the desired internal cross-sectional size. A longitudinally movable ram 3 is disposed in one end thereof and a quantity of sand material 4 to be tested placed in the open end of the cylinder. Thereafter, a second ram 5, which is illustrated spaced just above the open end of the cylinder 2, is moved downwardly to bear against the sand 4 and to slightly compact it. The ram is then removed from the cylinder and a suitable diameter pointed rod, such as a pencil, is pushed downward into the center of the sand to form a recess 6 into which a pin 7, such as shown in Fig. 2, may be inserted. The pin 7 is, of course, made of a metal the characteristics of which are to be tested. It is desirable that the pin 7 be located substantially in the middle of the sand so that when in the next step, the ram 5 is again pressed against the sand 4, both ends of the pin will be equally covered with sand. In this step, the ram 5 is moved into the cylinder 2 and the molding device transferred to a suitable apparatus whereby the rams may be pressed together to uniformly compact the sand 4 about the pin.

The specimen block 1, which should then have an appearance similar to that illustrated in Fig. 2, is then removed from the cylinder 2 and transferred to a furnace, wherein it is heated at a predetermined temperature for a predetermined period of time. The heating may take place in air, in a vacuum, or under a gas, or combination of gases. The nature of the test will, of course, determine the length of time for which the specimen block is left in the furnace as well as the temperature and atmosphere present in the furnace. In addition to the foregoing variations, it is feasible to coat the metal pin or the specimen block, or both, with various mold washes in order to study their effect upon the casting.

After the specimen block has been heated in the furnace for the desired length of time and to the desired temperature, it is removed therefrom and opened to permit examination of the mold material and the metal pin in accordance with usual laboratory techniques.

It will be apparent from the foregoing that a simple and rapid method of determining the effect of mold conditions and particularly of mold material and mold atmosphere upon a casting has

been provided by this invention and that the actual conditions present during casting may be substantially duplicated. At ordinary casting temperatures some reaction usually occurs between the mold material and the metal pin, this reaction being evidenced by the formation of gases and oxidation of the metal. The extent of this reaction and the formation in the metal of defects resulting therefrom may be readily observed in accordance with this invention.

While but one embodiment of this invention has been shown and described, it will be understood that many changes and modifications may be made therein without departing from the spirit or scope of the present invention, which is limited only by the appended claims.

The invention shown and described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A method of determining the effect of mold conditions on casting, comprising embedding a metal pin in a quantity of mold material to form a composite article, heating the article to cause a reaction to take place between the metal pin and the mold material, and then opening the article to permit examination of the pin and the mold material.

2. A method of determining the effect of mold conditions on casting comprising, embedding a metal pin in a quantity of mold material, heating the assembly at a given temperature and for a given time which heating substantially duplicates conditions present during casting, and then opening the assembly to permit examination of the pin and the mold material.

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No references cited.