Method of Making Abrasive Metal Castings

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Figs. 1, 2, 3
This invention relates to method of making abrasive metal castings, an object of the invention being to provide a method which will result in abrasive metal castings which will be superior to castings of this type heretofore made.

This invention has particularly to do with the making of castings in which particles of abrasive material are embedded in the surface of the casting, for example, as metal treads for stairs to prevent slipping and undue wear although, of course, the invention in its broad aspect includes any form of casting in which abrasive material is incorporated in a wearing face.

In the manufacture of castings of this type heretofore known, the abrasive material has been caused to be embedded in the surface of the casting, and various methods have been employed to accomplish this result.

I am aware, of course, of the employment of methods including powder, water glass and the like, which results in the more or less coating of the particles in the mold, and it is the broad purpose of my invention to provide a method of making castings of this type in which the particles of abrasive material will not be coated on the back or rear portions thereof so that there will be a firmer anchorage of the particles in the metal so as to give a more uniform and durable surface than has heretofore been made.

Broadly, my invention includes the employment of a wet adhesive or adherent coating which is first applied to the surface of the mold, then placing the particles of abrasive material in the mold said particles adhering to the adhesive so as to be held against movement during the casting operation, but it is to be understood that the adherent or adhesive material acts only to hold the particles in place and does not coat the back or major portions of the particles, and the third step includes the pouring of the molten metal into the mold, said molten metal when cooled having the particles of abrasive securely embedded in it.

My invention, therefore, consists in certain novel steps in the method, all of which will be more fully hereinafter described and pointed out in the claims.

The accompanying drawing illustrates three essential steps of my improved method, it being understood, of course, that these views are grossly exaggerated to illustrate the invention.

Figure 1 is a fragmentary view in section showing a portion of the sand mold having the wet adhesive material thereon, which constitutes the first step of the method;

Figure 2 is a view similar to Figure 1 showing the particles of abrasive material held to the surface of the mold by the adhesive material, which constitutes the second step of the mold; and

Figure 3 is a similar view showing the abrasive particles projecting beyond the metal which surrounds them and which is held from the mold by the refractory portion of the adhesive material.

1 represents a sand mold, 2 a coating of adhesive material, 3 particles of abrasive material, and 4 metal in the surface of which the abrasive particles 3 are embedded. It is understood, of course, that the invention is not limited to any specific form of mold as any desired shape of article may be provided, nor is the invention limited to the particular metal employed. It is the usual practice, however, to provide a mold, 1, which is ordinarily a sand mold of the desired shape to form the casting, so that I have and shall refer to this mold 1 as a sand mold, although the invention is not to be limited to this specific expression.

In carrying out my improved method I first cause a wet adhesive, 2, to adhere to the surface of the mold 1. This wet adhesive may be constituted of a mixture of graphite and molasses water or I may employ clay suspended in water, and the wet adhesive may be sprayed onto the surface of the mold, and while it is still wet the second step of the method is employed, that is, locating the particles of the abrasive 3 on the wet adhesive material 2.

As above stated, the drawing grossly exaggerates the size and proportions of the parts, but Figure 2 illustrates clearly the second step of the method in which the particles of abrasive 3 are held by the wet adhesive coating 2 with the upper or rear portion of the particles of abrasive exposed but uncoated, as I deem it of very great importance that these portions of the abrasive particles 3 be free from any coating whatever so that when the molten metal is poured into the mold, constituting the third step of the method, this molten metal will engage the surface of the particles without any intervening coating material which might interfere with the proper anchorage of the particles of abrasive material in the surface of the metal.

During the pouring of the molten metal into the mold the heat of the metal causes part of the adhesive to escape in the form of gas. The re-
fractory portions of the adhesive, such as graphite or clay mentioned above, cannot escape and act as an intervening layer between the molten metal and the surface of the mold, thus preventing the metal from making direct contact with the mold. Those portions of the abrasive particles which have penetrated this layer are exposed in the finished casting.

The thickness of the layer of refractory material and therefore the distance that the molten metal will be spaced from the surface of the mold, depends of course upon the relative proportions of the refractory material and the volatile matter so that the projection of the particles of abrasive beyond the surface of the metal may be regulated from a maximum to a point where they are substantially flush with the metal surface.

An abrasive metal casting made in accordance with my improved method is a distinct improvement in this art, in that the abrasive particles are securely anchored and embedded in the metal and may be made to project slightly therefrom; and the wearing quality and the anti-slipping quality of the casting are improved over any casting of this type heretofore known.

What I claim is:
1. The herein described method of making abrasive metal castings which consists in applying to the inner surface of a mold a wet adhesive containing a mixture of refractory material and volatilizable material, depositing, on said adhesive, particles of abrasive material and subsequently pouring molten metal into the mold, thereby driving off the volatile portion of the adhesive and leaving the refractory portion between the surface of the mold and the metal.
2. The herein described method of making abrasive metal castings which consists in coating portions of the interior of a mold with an adhesive layer having refractory material therein, depositing, on said adhesive, particles of abrasive material, and subsequently pouring molten metal into the mold, said adhesive material holding said abrasive material from movement during the flow of the metal and the refractory material in the adhesive preventing the metal from coming into direct contact with the surface of the mold, thereby permitting a projection of particles of abrasive beyond the surface of the finished metal casting.

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