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MOLD MATERIAL FOR CASTING METALS

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5 Claims. (Cl. 22—188)

This invention relates to improvements in compositions for casting metals and more particularly to the use of one form of mica as the principal component part of molds in which metals are cast.

An important object of this invention is to provide a new composition of matter for casting metal objects. The material is a form of mica which is of a compressible yielding character and which when used as molding material forms a porous non-fracturing body with smooth slightly yielding faces against which the metal lies. The new composition of matter employed for casting metals is expanded mica or mica which has so treated that the individual particles have lost their natural flaky condition and instead have a soft yielding granular character very similar to that of sawdust. Suitable binder material is provided for cohering the particles of expanded mica together and when a mold of this character is dried as by a baking process it forms a sufficiently strong mold capable of several hundred casting operations before becoming unfit for use.

Heretofore, several attempts have been made to use mica in its natural flaky state for lining or facing molds, for core material, or for forming a small component part of a mold mixture for casting metals. No attempts however were made to use expanded mica, the particular form of mica described herein, as either a minor or principal component part of a mold mixture. Expanded mica has distinctly different characteristics from that of natural mica, characteristics which I have found lend themselves especially desirable for casting metals. A mold formed of this particular type of mica is sufficiently firm and indestructible so that many uniform metal castings can be made from the same mold before the mold becomes unfit for use. It provides, however, slightly yielding or elastic faces against which the molten metal lies which follow the expansion and contraction of the metal as it hardens. Properties of this character are not found when mica is used in molds in its natural state, whether in sheet, flaked or pulverized condition.

The important ingredient of my invention, expanded mica or vermiculite as it is known in the trade, is formed by heat treating natural flaked mica so that the stiff flaked state of the mica is destroyed and in its place a soft yielding granular form of mica is provided. One mode of manufacturing expanded mica is to convey relatively small sheets of mica of approximately one-half to one inch square size through a furnace in which gas flames play on the mica sheets. In this treatment the individual sheets or flakes of mica are puffed up or exploded into small curled granular particles of varying sizes similar in appearance and feel to that of sawdust. When compressed as between the fingers, particles of expanded mica yield to the pressure and flatten out to a comparatively smooth surface conforming to the contour of the fingers between which they are pressed. This soft yielding characteristic is present on the faces of molds composed of expanded mica yet the faces are sufficiently firm so that when properly bonded by a suitable binder and dried they will stand up for many casting operations. Molds of this character are especially desirable for manufacturers who make many castings of a given object and who do not desire to make a new mold for each casting operation.

Various binders may be used to stick or hold fast the particles of expanded mica while the mold takes an air set prior to baking and drying the same in an oven. Refractory binders such as silicate of soda, china clay, chrome clay, dextrin, and casein and those going under the trade names of Lumnite and Hitempite cement may be used. A preferred mixture of a binder and expanded mica is that in which the expanded mica forms approximately 60% to 80% of the mixture by volume.

In practice, it is desired to use expanded mica of a substantially uniform size. Expanded mica between screenings of 30 and 60 mesh are to be preferred but it is understood that the use of either larger or smaller sizes fall within the scope of this invention. The expanded mica and the binder material are mixed thoroughly together before use. The mixture is then compactly pressed around a pattern to form a mold cavity into which the molten metal will be poured. After the removal of the pattern the mixture holds its shape until it is heat treated and dried such as in a baking oven. This removes the water content from the binder material used. The resulting mold is light, porous and yieldable but the particles of expanded mica are sufficiently firmly coalesced together that they will not chip or break down under the heat of the molten metal brought into contact therewith. The face of the mold is not as soft and yieldable as the face of wet sand molds which give at the lightest touch. Considerable finger pressure must be exerted to dent the surface of the present mold.

Prior to the pouring of the molten metal the facing of the mold cavity may be washed or

coated as is understood in the art. A highly desirable face wash is a water mixture of expanded mica particles of finer size than that used in the mold material. Another highly desirable face wash is finely ground graphite mixed with water. Other face washes may be used if desired. When the molten metal is poured into the mold cavity, the porous nature of the mold will allow for the escape of gases so that the metal will lie closely against the face of the mold thereby producing a coating that corresponds perfectly to the contour of the pattern used in making the mold.

The above described mold of expanded mica is especially desirable for casting lower melting point metals such as aluminum, bronze, copper, Dow metal and others. It is understood, however, that the use of expanded mica in molds for casting higher melting point metals is included within the purview of this invention. Many casting operations may be performed by the same mold and up to several hundred uniform castings from each mold may be expected without any cracking or fracturing of a mold surface.

What I claim is:

1. A mold to receive molten metal composed entirely of expanded mica particles held together by a binder, and a facing for the mold cavity composed of expanded mica particles of finer size than that used in the mold proper.

2. A mold to receive molten metal composed entirely of expanded mica particles held together by a binder, and a facing for the mold cavity composed of a water mixture of finely ground graphite.

3. A mold to receive metal castings having a wall portion formed of expanded mica held together by a refractory binder and characterized as slightly yielding to pressure and sufficiently porous to permit escape therethrough of gasses.

4. A mold to receive metal castings having a wall formed of slightly resilient expanded mica particles held together by a binder and porous to the escape of gas therethrough.

5. A mold to receive metal castings having a wall portion comprising mica particles of soft yielding granular condition held together by a binder and being porous to the passage of gas therethrough, said expanded mica particles constituting 60% to 80% by volume of said wall structure.

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