UNITED STATES PATENT OFFICE.

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MOLD MIXTURE

1,380,398. Specification of Letters Patent. **Patented June 7, 1921.**

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To all whom it may concern:

Be it known that I, VICTOR LOUGHEED, a citizen of the United States, and a resident of San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Mold Mixtures, of which the following is a specification.

In making certain kinds of highly accurate castings, such as dental inlays and small brass or other machine parts, the result is secured by providing a pattern of wax or other similar material cast or molded in a metal or other die, with or without subsequent finishing, and coating and surrounding this pattern with mold or investing material from which, after the mold is hardened or set, the pattern is removed by the expedient of melting, dissolving, or burning out the wax, after which the casting is produced by pouring molten metal into the cavity. It is known that when a very refractory metal is used in this system of casting, the mold material, if a good heat conductor, will chill the metal too rapidly and prevent it from filling the mold completely. In addition to this the desirability has been recognized of having the finished mold of a porous nature so as to vent, more or less freely from its interior air and gases which, if retained, will form blowholes and render the finished casting unsound.

I have discovered that there is an important inter-relationship between the three factors of heat conductivity of the mold material, the porosity of the mold material, and the pressure required for introducing the molten metal. For example, even if the mold has such relatively high conductivity that it chills the molten metal rapidly, the latter may nevertheless be caused to fill the cavity if the mold be made very porous and the pressure for forcing the metal in be very high. On the other hand, if the mold is an exceedingly bad conductor of heat, so that metal poured into it remains molten for a relatively long period of time, then the porosity of the mold may be very slight and the pouring pressure very low, and despite these adverse factors the metal will find its way to every portion of the cavity before solidifying, even with work involving the most intricate and delicate patterns.

Heretofore the best results in die-casting have been secured with mold material composed mainly of mixtures of silica or various silicates, with calcium sulfate serving as a binder, subordinate ingredients, such as asbestos, carbid of silicon, corundum, etc., being added or substituted in part if desired to secure the known advantages or effects of such materials in a mold mixture; such mold mixture being stirred up to a suitable consistency with water, then poured around the pattern or patterns, permitted to set, and finally fired at a relatively high temperature to drive off all or part of the water. But all such compositions of the constituents named, and even with the aforesaid subordinate constituents added, involve the objection previously referred to, namely, that they are better conductors of heat than is desirable, or that their coefficiency of heat conductivity is too great for their porosity.

The object of my invention is to provide a mold material of substantially the same chemical constituency as the above named previously used mold materials, but of such physical qualities as will render them of low heat conductivity and great porosity. To these ends I employ kieselguhr or diatomaceous earth, the essential characteristic of which, in its purest form, is that it is of very pure silica with immense numbers of microscopic pores that make it an extremely poor conductor of heat. The best mixture for my purpose I have found to be one in which the principal volume is made up of kieselguhr and calcium sulfate in about the proportion of one and one-half parts by volume of kieselguhr to one part by volume of calcium sulfate. Because of the extreme lightness of kieselguhr, these proportions are equivalent to about one part by weight of kieselguhr to four parts by weight of calcium sulfate. But I do not confine myself to the use of this particular binder since other ingredients or binders can be used; nor to this particular proportion, since the binder, calcium sulfate, for instance, may be in the proportion of from two to five parts by weight to one part by weight of kieselguhr.

Moreover, any of the mold substances heretofore used, such as asbestos, carbid of silicon, corundum, etc., may be included in my improved mold mixture without depart-

ing from the spirit of the invention so long as kieselghur is employed in sufficiently large volumes to materially cut down the heat conductivity of the bold aggregate.

I claim:

1. A mold material composed of calcium sulfate and kieselguhr, with the volume of kieselguhr in excess of that of calcium sulfate.

2. A mold material composed of from two to five parts by weight of calcium sulfate to one part by weight of kieselguhr.

3. A mold material composed of kieselguhr, a suitable binder, and other mold materials in subordinate quantities.

Signed at Chicago, Illinois, this 25th day of July, 1919.

VICTOR LOUGHEED.