

UNITED STATES PATENT OFFICE.

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MOLD FOR MAKING CASTINGS OF ALUMINUM AND ALUMINUM ALLOYS.

No. 915,728.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EARL BLOUGH, a citizen of the United States, and resident of Parnassus, Westmoreland county, and State of Pennsylvania, have made new and useful Inventions Relating to Molds for Making Castings of Aluminum and Aluminum Alloys, of which the following is a specification.

This invention relates to molds for casting aluminum and aluminum alloys, and relates especially to molds comprising ordinary foundry sand and carbonaceous difficultly oxidizable material of a dense character, the aluminum alloys being quickly chilled and thus given increased strength and toughness by reason of the increased heat conductivity of the mold caused by the carbonaceous material. For this purpose 10 to 20 per cent. or so of finely ground carbonaceous material may be incorporated with ordinary foundry sand without impairing its desirable qualities in green sand molding, although, of course, the proportion of carbonaceous material used may vary considerably.

The carbonaceous material is preferably dense, difficultly oxidizable and comprises crystalline carbonaceous material so as to best give the desired increase of heat conductivity to the mold and effect the proper chilling of the casting. Suitable fixed difficultly oxidizable carbonaceous material may be prepared by finely grinding 50 parts of good petroleum coke and 25 parts of electric light carbon or similar material and thoroughly incorporating them with 25 parts of coal tar pitch as in a suitable kneading machine. The mixture may be formed into suitable blocks under heavy pressure in any desired apparatus, such as an extrusion press, and the molded pieces are then preferably thoroughly carbonized for a considerable time at high temperature. This may be readily done by packing them in a suitable electric furnace and subjecting them for ten days or more to an intense heat greatly in excess of the heat of the metal used in the casting process. In this way the volatile material is thoroughly expelled and the carbon is given a very dense apparently crystalline structure so as to be a very good heat conductor and difficultly oxidizable. This material may be ground in any way to the desired fineness which should approximate that of the sand with which it is incorporated. For ordinary fine castings where a good

grade of foundry sand is used this carbonaceous material may be ground so that about 85% passes through a hundred mesh sieve and about 60% passes through a two hundred mesh sieve.

When 15% or so by volume of this fine fixed carbonaceous material is thoroughly incorporated with ordinary foundry sand the bonding properties of the sand are substantially unimpaired and green sand molds may be made with the same facility as where ordinary foundry sand alone is employed. When such molds are poured in the casting of aluminum alloys the metal in contact with the face of the mold is suddenly chilled by reason of the increased conductivity of the mold caused by this highly conductive carbonaceous material and the castings are given a finely crystalline structure and a very considerable increase in tensile strength. With an ordinary aluminum alloy containing about 8% of copper the tensile strength is increased from 15% to 25% in this manner. The castings have the same soundness as castings formed in ordinary sand molds, since the venting qualities of the sand are unimpaired by the incorporation of such carbonaceous material which also because of its fixed character does not cause blowing by the evolution of any gaseous material when the hot metal comes into contact therewith. Molds made of this material can be dumped and the sand riddled without difficulty, and as the carbonaceous material is not readily oxidizable the sand may be used repeatedly without special treatment and without substantial diminution of its valuable chilling properties, only needing to be sufficiently dampened or tempered before being forced into the flasks to form molds in the ordinary green sand molding process. The ingredients specified in the illustrative composition may be replaced in whole or in part by other carbonaceous material, preferably of a dense or crystalline character and having the other properties referred to.

Having described this invention in connection with illustrative molds, compositions and methods of procedure, to the details of which disclosure the invention is not, of course, to be limited, what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. The green sand mold for making castings of aluminum alloys formed from or

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dinary foundry sand with which about 15% of finely ground, dense, difficultly oxidizable, carbonaceous material, substantially fixed at the heat of the molten metal used, has
5 been incorporated to chill the metal and strengthen the casting by the increased heat conductivity of the mold.

2. The green sand mold for making castings of aluminum alloys formed from ordinary foundry sand with which a considerable proportion of finely ground, dense, carbonaceous material, substantially fixed at the heat of the molten metal used, has
10 been incorporated without destroying the bonding properties of the sand, to quickly chill the metal and strengthen the casting by the increased heat conductivity of the mold.

3. The green sand mold for making castings comprising aluminum formed from ordinary foundry sand with which a considerable proportion of carbonaceous material, substantially fixed at the heat of the molten metal, has been incorporated without
15 destroying the bonding properties of the sand, to quickly chill the metal and strengthen the casting by the increased heat conductivity of the mold.

4. The green sand mold for making castings comprising aluminum formed from sand with which a considerable proportion of carbonaceous material having substantially the same fineness as the sand, has been incorporated, to quickly chill the metal and

strengthen the casting by the increased heat conductivity of the mold. 35

5. The green sand mold for making castings comprising considerable proportions of aluminum formed from sand with which a considerable proportion of ground, highly
40 heat-conductive, inert material substantially fixed at the heat of the molten metal used has been incorporated to strengthen the casting by the increased chilling action of the mold upon the metal used. 45

6. The green sand mold for making castings comprising aluminum formed from ordinary foundry sand with which less than 25% of ground, difficultly oxidizable, carbonaceous material, substantially fixed at
50 the heat of the molten metal used, has been incorporated without destroying the bonding properties of the sand to strengthen the casting by the increased chilling action of the mold upon the metal used. 55

7. The green sand mold for making castings comprising aluminum formed from the material substantially free from carbonaceous material volatile at the heat of the metal used, and comprising less than 25%
60 of ground, difficultly oxidizable, heat conductive material to strengthen the casting by the increased chilling action of the mold on the metal used.

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Witnesses:

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