

UNITED STATES PATENT OFFICE.

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MELTING AND CASTING MAGNESIUM AND ALLOYS THEREOF.

1,028,216.

Specification of Letters Patent.

Patented June 4, 1912.

No Drawing.

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To all whom it may concern:

Be it known that we, BERTHOLD HOFFMANN and ROBERT SUCHY, subjects of the German Emperor, and residents at Griesheim-on-the-Main, Germany, have invented certain new and useful Improvements Relating to Molding and Casting Magnesium and Alloys Thereof, of which the following is a specification.

Melting and casting magnesium and alloys thereof, and especially those that are rich in magnesium, has hitherto presented many difficulties, because, even at the lowest possible temperature required for casting the metal enters into reaction with the constituents of the air, becoming coated, for instance, with a black skin consisting of the lower oxids and nitrids and finally burning so that the casting becomes soiled to an objectionable degree.

Processes are already known according to which the aforesaid difficulties are overcome, but the process in accordance with this invention possesses over these, the advantages of great simplicity, cheapness, and reliability.

We have discovered that the propensity of molten magnesium and alloys thereof to enter into reaction with the air is mitigated by the addition of a small amount of calcium so that, at the temperatures in question, magnesium and its alloys can be cast without any oxid and nitrid being formed or any other injurious action taking place. Thus for instance magnesium and its alloys, when mixed with from one tenth to one half of one per cent. of calcium flow, in the air, in a silver-white stream, from the crucible, without the aforesaid dark skin being formed and burning taking place. They fill up the molds in a perfect manner, and they give dense clean castings which do not effloresce under the action of the air. They come out of chilled molds quite clean and leave sand, or loam, molds, without an objectionable skin. This remarkable action of calcium, can be obtained with an addition of even less calcium than that above stated. Magnesium, or magnesium alloys, treated, as aforesaid, with calcium, can be heated

much above melting point without entering into reaction with the air and this property is not lost after repeated remelting. Besides this the presence of calcium has the further advantage, that it forms with the hydrogen, mostly contained in magnesium and its alloys, a hydrid which covers the surface of the fused metal, or alloy, thus greatly facilitating the production of dense castings free from hydrogen bubbles. It is not necessary to use the calcium, in the metallic form, as it can be introduced in the form of an oxid, or other compound, capable of being reduced by magnesium. Lime which is cheap and generally obtainable can be used; Clemens Winkler (see *Berliner Berichte* 23, 122) having already shown that it can, like other oxids, be reduced by magnesium. The calcium can be furnished in any other suitable manner to the metal, for instance by the addition of a calcium compound during the electrolytic manufacture of magnesium. If an alloy is to be produced, the calcium may be used alloyed with one of the components of the alloy.

The following examples will illustrate how this invention can be carried out in practice, but it is not limited thereto:

Example 1: Into a suitable crucible 10 kilograms of magnesium and 50 grams of calcium, are introduced and the crucible is covered with a lid and heated to 700° centigrade. After energetic stirring, the melt is ready for casting.

Example 2: 10 kilograms of magnesium and 70 grams of powdered burnt lime are introduced into the crucible and the operation is further conducted as in Example 1.

It will be appreciated that the amount of calcium employed is so small that it cannot impart to the metal the characteristics of a calcium alloy. In fact the calcium so nearly disappears during the operation that the cast metal contains only a trace thereof, no more pronounced than the traces of other metals commonly existing in magnesium as innocuous impurities.

We claim:—

The herein described process of melting

and casting magnesium and alloys thereof
which consists in melting and casting said
metal in the presence of calcium, the amount
of calcium employed being so small that it
5 cannot impart to the metal the character of
a calcium alloy.

In testimony whereof we have signed our

names to this specification in the presence of
two subscribing witnesses.

BERTHOLD HOFFMANN.

ROBERT SUCHY.

Witnesses:

FRANZ HASSLACHER,

ERWIN DIPPEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
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