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PROCESS OF REFINING MAGNESIUM AND ITS ALLOYS.

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The present invention relates to a process of refining magnesium and alloys containing at least 85% of magnesium, the remainder being aluminum or zinc or both.

In the U. S. Patent Nos. 1,524,470 and 1,576,080 processes are described according to which magnesium and its alloys are refined by melting the raw metal with a small amount of magnesium chloride or of a mixture of magnesium chloride and a thickening medium such as magnesia, calcium fluoride etc.

Now I have found that improved results are obtained when during the above mentioned process metallic calcium and manganese is introduced into the molten metal. The metallic calcium combined with manganese exercises a refining action which cannot be attained to the same extent when employing either magnesium chloride or magnesium chloride with the addition of a thickening medium. It surpasses furthermore the refining action of mixture of magnesium chloride and a thickening medium with the addition of either calcium or manganese.

I have also found that this process shall be carried out in such a manner that as the final product an alloy is obtained containing a certain percentage of calcium and manganese. I have found that the alloys containing from 0.01 to 0.1% calcium and from 0.1 to 0.4% manganese the remainder being magnesium or a magnesium alloy of at least about 85% magnesium, possess highly anticorrosive properties.

To perform my process I proceed as described in the following example. In the first stage, metallic calcium is introduced at about 700° C. into the molten metal covered with the thickened melt of salts as described in the cited specification so as to attain a concentration of about 0.5% of calcium metal in the molten metal. Hereupon the metal is thoroughly washed with the salt melt by intense stirring until the main quantity of the calcium metal is removed from the metal, which may be ascertained by observing the surface of the molten metal. Thereupon, the salt layer having disappeared from the surface, its specific weight having surpassed that of the metal by taking up the impurities, a fresh amount of the salt melt is added containing anhydrous manganous chloride in quantity theoretically sufficient to form an alloy with 1% Mn and the melt is stirred anew while heating up to temperatures of about 900° C. to reduce part of the added manganous chloride to metal and to alloy the latter with the magnesium. It is important to continue this operation until the continuously decreasing percentage of calcium amounts from 0.01% to 0.1% at most, and the increasing percentage of manganese has attained a maximum of 0.4%, a percentage of 0.1 generally being sufficient.

After the stirring is finished a last portion of the salt melt is placed upon the surface of the metal. During the succeeding cooling, the regulus and the stirred and mixed salt melt will separate so that after attaining the best casting temperature, ascertained by experiment, the pure metal can be cast. The casting temperature depends upon the composition of the alloy employed and is a different one for magnesium-zinc, magnesium-aluminum, magnesium-zinc-aluminum &c.

If desired the method may be modified by adding calcium and manganese simultaneously, for instance, in the form of an alloy of calcium with manganese, and then keeping the temperature at a higher level from the beginning. Also instead of introducing the manganese in the nascent state (using manganous chloride or other compounds capable of being reduced by magnesium), the metal may be introduced in the form of metallic manganese, or of appropriate alloys rich in manganese, the other component of which is also a desirable constituent of the magnesium alloy, but this process of operating requires special precaution and experience, owing to the limited alloyability of manganese and to the higher temperatures which consequently are to be employed.

Although the reactions taking place in connection with the present process of refining raw magnesium or raw magnesium alloys are not completely clear in all details, it is quite sure that calcium as well as manganese exercise a refining action which cannot be attained to the same extent by employing either of both metals alone. The simultaneous content of 0.1% Ca at most and up to 0.4% Mn is not only innoxious, but rather desirable for the benefit of at-

taining the above-mentioned improved anti-corrosive properties of the metal produced according to the present invention.

I claim:

1. The process of refining magnesium and its alloys containing at least 85% Mg which comprises stirring the molten metal with magnesium chloride and a substance capable of acting as a thickening medium on magnesium chloride, introducing calcium and manganese into the molten metal, and continuing the treatment until the refined metal contains 0.1% of calcium at most and up to 0.4% of manganese.

2. The process of refining magnesium and its alloys containing at least 85% Mg which comprises stirring the molten metal with magnesium chloride and a substance capable of acting as a thickening medium on magnesium chloride, introducing into the molten metal calcium metal and a manganese compound capable of being reduced by magnesium, and continuing the treatment until the refined metal contains 0.1% of calcium at most and up to 0.4% of manganese.

3. The process of refining magnesium and its alloys containing at least 85% Mg which comprises stirring the molten metal with magnesium chloride and a substance adapted to act as a thickening medium on magnesium chloride, introducing into the molten metal calcium metal and manganous chloride, and continuing the treatment until the refined metal contains 0.1% of calcium at most and up to 0.4% of manganese.

4. A new alloy of magnesium containing from 0.01 to 0.1% calcium and from 0.1 to 0.4% manganese, the remainder being an alloy of at least 85% magnesium.

In testimony whereof I have hereunto set my hand.

GUSTAV PISTOR.