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METHOD OF SURFACE TREATING OBJECTS OF CAST MAGNESIUM BASE ALLOYS

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1 Claim. (Cl. 148—6)

This invention relates to a method of surface treating objects of cast magnesium base alloys.

For the production of objects, such as casings, fittings and the like, for example mounts for fieldglasses, cast magnesium base alloys are being used to an increasing extent, especially in the form of pressure die-castings. For such pressure die-castings, magnesium base alloys are generally used which contain, in addition to other alloying constituents, at least 4% of aluminium.

In order to impart to the surface of the metal a uniform appearance and at the same time adequate resistance to corrosion, it is customary to subject the surface of the cast objects to dipping or pickling treatment with known agents, such as dichromate solutions. It has however hitherto been impossible, with the known dips, to obtain a layer of uniform, flawless appearance on the surface of the casting; moreover, it was not possible to obtain uniform surface layers of dark to black coloration on pressure die-cast objects consisting of magnesium base alloys having an aluminium content of over 4%. Since the layers are also intended to afford a more or less effective protection against corrosion to the base metal, it is particularly important that the surface layer should be uniform.

According to the present invention, objects of the foregoing kind are subjected to a combined treatment which consists in first subjecting the castings to heating at a temperature above 320° C. for several hours, whereupon, after the cooling which need not necessarily be effected by quenching, a protective layer is produced on the thus pretreated casting by one of the known dipping or pickling processes.

The present invention advantageously may be used as a preliminary treatment to a process for the production of coloured protective layers on castings of magnesium base alloys as described in a co-pending application Ser. No. 315,184, entitled "Process for the production of coloured protective layers on castings, especially die-castings, of magnesium base alloys" and filed on even date herewith, of which application we are two of the joint inventors. The said application relates to a process for the production of coloured protective layers on magnesium base alloy castings, especially pressure die-castings, such alloys containing more than 4% of aluminium, which comprises first subjecting the casting to a preliminary pickling in a bath containing a dichromate, and thereupon treating the casting in a dip or pickling solution containing a dichromate and an organic colouring matter not decomposed by the said dichromate.

The heat treatment preceding the pickling tends to cause variations in the crystalline texture of the casting—occasioned for example by segregation, non-uniform distribution of the constituents of the alloy and the like—to disappear, this enabling a uniform and evenly coloured protective layer to be produced by the dip or pickling liquid on the entire surface of the metal. The heating of the present invention need not however be carried so far that the heterogeneous structure of the alloy is converted into a completely homogeneous one by the formation of a solid solution.

Example 1.—A housing of a field-glass, consisting of a die-casting (magnesium base alloy containing 7.5% of aluminium), is heated to a temperature of 360° C. for three hours and thereupon cooled in the air to room temperature. After being pickled in 8% nitric acid—an operation taking a few seconds—and subsequently being rinsed in water, the object is placed in an aqueous dip containing per litre 100 grams of a salt mixture composed of equal parts of sodium dichromate and magnesium sulphate, and short-circuited outside the bath against an electrode of a more electronegative metal, such as iron, also suspended in the solution. The housing is removed from the bath after about 30 minutes, briefly rinsed in hot water and dried in the atmosphere. On the surface of the metal has been deposited a protective layer of matt appearance, which is uniformly black in colour and which imparts to the base metal a high degree of protection against atmospheric corrosion.

Example 2.—A pressure die-casting consisting of a magnesium base alloy containing 9% of aluminium and 1% of zinc, is heated to a temperature of 350° C. for three hours and thereupon cooled in the air to room temperature. After being pickled in nitric acid of about 8% strength —an operation taking a few seconds—and subsequently rinsed in water, the object is treated with an aqueous solution containing 100 grams of a mixture of 70 grams of magnesium sulphate and 30 grams of dichromate per litre at a temperature of 90° C. After 30 minutes the object is removed from the solution and, without previous rinsing, is dipped in a colouring bath heated to a temperature of 90° C. and containing 50 grams of sodium dichromate and 20 grams of water-soluble nigrosin (see "Farbstofftabellen" Gustav Schultz, 6th edition, 1931, No. 986) per litre of aqueous solution, and is left therein for

15 minutes. After removal from the bath, the casting is washed for a short time in hot water and air-dried. The deep black, tightly adhering protective layer deposited on the metal has a matt appearance and protects the surface of the casting in a high degree against corrosion.

We claim:

A process for producing a coating of uniform appearance upon a casting of a magnesium base alloy containing at least about 4 per cent of aluminum, which comprises subjecting said magnesium base alloy casting to a heat treatment at a temperature above about 320° C. for a period of time sufficient to cause at least partial homogenization of the alloy, and then subjecting said casting to a preliminary pickling in a bath containing a dichromate and being free from organic coloring matter and thereafter treating said casting in a solution containing a dichromate and an organic coloring agent not decomposed by the said dichromate.

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