Patented July 29, 1941

2,250,473

UNITED STATES PATENT OFFICE

2,250,473

COATING MAGNESIUM ARTICLES

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No Drawing. Application May 24, 1940, Serial No. 336,962

12 Claims. (Cl. 148—6)

This invention relates to an improved method of forming a protecting coating upon articles of magnesium and its alloys. It also concerns a method of coloring such coatings.

An object of the invention is to provide a method of producing strongly adherent, extremely dense corrosion-resistant coatings on magnesium and its alloys. Another object is to describe such a method in which the coating may be formed in a wide variety of colors.

According to the invention, protective coatings are produced by subjecting a magnesium or magnesium alloy article to the action of an aqueous alkaline solution, the process being carried out under pressure at a temperature between about 150° C. and about 250° C. Colored coatings may be prepared by adding to the treating solution a dye soluble therein.

In practice the magnesium or magnesium alloy article is first cleaned, as by wire brushing, sandblasting, acid pickling, or buffing according to the lustre desired in the ultimate coating. The degree of lustre depends upon the smoothness of the metal surface before being subjected to the coating process. For example, sandblasted metal exhibits a relatively dull coating, while buffed or polished metal exhibits a smooth lustrous surface, after treatment according to the invention.

After the cleaning operation, the article is immersed in an aqueous alkaline solution, at a temperature between about 150° and 250° C., the treatment being carried out in a closed vessel and under a pressure at least equal to the vapor pressure of the solution at the operating temperature. The treating solution is usually made by dissolving in water one or more alkalies, preferably an alkali metal hydroxide, such as sodium, potassium, or lithium hydroxide. Other alkaline agents, such as lime, may sometimes be employed, although less satisfactorily. Alkali concentrations in the range of 2 to 20 per cent or more by weight are suitable, with about 10 per cent being preferable, particularly with sodium hydroxide.

While the process may be conducted at any temperature between 150° and 250° C., temperatures in the range between about 170° and about 210° C. give definitely superior coatings, and optimum results are obtained at about 200° C. The duration of the treatment may be from 1 to 30 minutes or more, depending on the temperature. At 200° C. a time of 5 minutes suffices.

By the process described there is produced upon the magnesium or magnesium alloy article a coating which appears to be integral with the article, is relatively thin, flexible, hard and dense. The coatings according to the invention are far superior in density and corrosion resistance to coatings prepared by known aqueous or alkaline treatments at lower temperatures, and can be produced on any magnesium-base alloy, rather than on certain types of alloys only.

A further advantage of the invention is that the coatings can be obtained in a wide variety of colors simply by including in the aqueous alkaline solution a small proportion of a dye which is soluble therein and is chemically stable under the conditions of treatment. In general, a quantity of dye corresponding to between about 0.1 and about 0.5 per cent by weight of the solution is used, depending upon the shade desired. The coating thus obtained is homogeneously colored throughout, so that if the coating becomes scratched, no serious mar or color streak is evident.

The following dyes are illustrative of those suitable for use in the process, the number opposite the dye name being that of the "Colour Index," 1st edition, January 1924, published by the Society of Dyers and Colourists, Assurance Buildings, Bradford, Yorkshire, England:

Dye	Color Index No.
Pontacyl Light Green SF Yellowish	670
Malachite Green	657
Wool Green BS	737
Janus Green	133
Aniline Red	677
Methyl Red	211
Pigment Scarlet 3B	216
Fast Crimson 6BL	57
Eosine Yellow	768
Quinaldine Yellow	801
Indian Yellow G	146
Naphthol Yellow S	10
Nitrazine Yellow	640
Methyl Violet	680
Crystal Violet 6B	681
Methylene Blue 2BC	922
Aniline Blue	689
Alizarin Blue S	1067
Eosine Bluish	771
Benzo Blue 2B	406
Alizarin Blue G	1066
Fast Acid Black N2B	304
Diazine Black "H" Extra	401
Niagara Sky Blue 6B	518
Acid Blue-Black	246
Diamine Black BH	401
Orange II	151
Orange GG	27

Dye	Color Index No.
Methyl Orange	142
Alizarin Y 20% Paste	1040
Fluorescein	766
Rosolic Acid	724
Bismark Brown	331
Phenolphthalein	764
Acid Fuchsine	30
Azo Fuchsine 6B	154
Rhodamine B	749
Xylene Cyanol FF	715
Cochineal	1239
Alizarin Cyanine	1050
Bordeaux B	88
Safranine 6B	843
Lanafuchsine 6B	54
Dimethyl-amino-azo-benzene (Butter Yellow)	19

The foregoing description is illustrative rather than strictly limitative, the invention being coextensive in scope with the following claims.

This application is a continuation-in-part of my co-pending application, Serial No. 224,510, filed August 12, 1938.

I claim:

1. The method of producing a corrosion-resistant coating upon an article formed of a metal selected from the class consisting of magnesium and magnesium alloys which comprises subjecting the article to the action of a solution consisting of water and an alkali at a temperature between about 150° C. and about 250° C. and under a pressure at least equal to the vapor pressure of the solution at the operating temperature.

2. A process according to claim 1 wherein the alkali is an alkali metal hydroxide.

3. The method of producing a corrosion-resistant coating upon an article formed of a metal selected from the class consisting of magnesium and magnesium alloys which comprises subjecting the article to the action of a solution consisting of water and between about 2 and about 20 per cent by weight of an alkali metal hydroxide, at a temperature between about 150° C. and about 250° C. and under a pressure at least equal to the vapor pressure of the solution at the operating temperature.

4. A process according to claim 3 wherein the temperature is between about 170° C. and about 210° C.

5. A process according to claim 3 wherein the temperature is about 200° C.

6. A process according to claim 3 wherein the alkali metal hydroxide is sodium hydroxide.

7. A process according to claim 3 wherein the alkali metal hydroxide is lithium hydroxide.

8. The method of producing a colored corrosion-resistant coating upon an article formed of a metal selected from the class consisting of magnesium and magnesium alloys which comprises subjecting the article to the action of a solution consisting of water and an alkali and a small proportion of a dye soluble therein, the treatment being carried out at a temperature between about 150° C. and about 250° C. and under a pressure at least equal to the vapor pressure of the solution at the operating temperature.

9. A process according to claim 8 wherein the alkaline solution is an aqueous solution of an alkali metal hydroxide present in a concentration between about 2 and about 20 per cent by weight of the solution, and wherein the treatment is carried out at a temperature between about 170° C. and about 210° C.

10. An article formed of a metal selected from the class consisting of magnesium and magnesium alloys and having thereon an adherent corrosion-resistant coating produced according to the process of claim 1.

11. An article formed of a metal selected from the class consisting of magnesium and magnesium alloys and having thereon an adherent corrosion-resistant coating produced according to the process of claim 3.

12. An article formed of a metal selected from the class consisting of magnesium and magnesium alloys and having thereon a homogeneously colored adherent corrosion-resistant coating produced according to the process of claim 8.

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