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RUSSELL E. LOWE, OF NEW YORK, N. Y., ASSIGNOR TO DOHERTY RESEARCH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

SURFACE PROTECTION FOR MAGNESIUM ALLOYS

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This invention relates to surface protection of metals in order to render the surface resistant to corrosion. More particularly the invention relates to the surface protection of magnesium alloys.

Magnesium alloys have found many useful applications in the arts. Magnesium alloys, however, exhibit a tendency to surface corrosion in the presence of hot water even if the water is comparatively free from traces of corroding chemicals. This tendency to corrosion has seriously mitigated against the use of magnesium alloys in places where they would otherwise be particularly desirable on account of their lightness and great strength.

This invention has among its objects to modify the surface of magnesium alloys in such a manner that the surface shall be able to withstand the corroding effects of various corroding fluids but more particularly hot water.

Another object is to provide a simple and easily practiced process for treating the surface of magnesium alloys to effect such surface change as will enable them to withstand the corroding effects of hot water.

In accordance with the present invention, I provide magnesium alloys with a surface coating of a phosphorus compound. This coating preferably consists of a surface film of ammonium-magnesium-phosphate. Magnesium phosphate alone forms a coating which very materially resists the corroding action of hot water and in many applications of the metal will prove sufficient for its intended purpose. The combination of the two salts, however, provides a more resistant surface and is consequently to be preferred.

The manner of applying the protective coating is an important feature of the invention, the preferred process being as follows: The surface of the magnesium-alloy object or article should be thoroughly cleaned preparatory to treatment as by pickling and washing. The best results are indicated when the article is dipped in a weak solution of nitric acid ranging from 8% to 12%— a 10% solution being preferred. After the article has been cleaned as aforesaid it is immersed in a relatively weak solution of phosphoric acid, a 5% solution being preferred, and is allowed to remain in the solution until a black film has developed after which it is removed from the solution and washed. The coating thus provided greatly improves the hot-water-corrosion-resisting qualities of the alloy object and the object thus treated may be used without further surface treatment. A more resistant coating is, however, very desirable in many applications of the metal. I prefer, therefore, to continue further surface treatment as follows: After the first coating has been applied as specified, I immerse the object in a relatively weak solution of ammonium phosphate, preferably a 5% solution. The time of immersion should be rather extended. The best results are indicated when the time of immersion is from 2 to 5 days, the time varying to some extent with the strength of the solution. After being removed from the solution the object is washed and flame dried and is then ready for use. The practical limits of both the phosphoric acid solution and ammonium phosphate solution have been found to be between 4% to 6%.

What I claim is:

1. A magnesium alloy provided with a surface coating of a double salt of phosphoric acid.

2. A magnesium alloy provided with a surface coating of ammonium magnesium phosphate.

3. A method of providing magnesium alloy with a protective coating comprising initially immersing said alloy in a 4% to 6% solution of phosphoric acid long enough to allow a film to form thereon, and finally immersing it in a 4% to 6% solution of ammonium phosphate for a period ranging between two to five days, washing, and heat drying the coating thus formed.

4. A method of providing magnesium alloy with a protective coating comprising initially dipping said alloy in a mild cleaning solution of nitric acid, washing, immersing said alloy in a 5% solution of phosphoric acid long enough to allow a film to form thereon, and finally immersing it in a 5%

solution of ammonium phosphate for a period of two to five days.

5. A method of providing magnesium alloy with a protective coating comprising initially dipping said alloy in an 8% to 12% cleaning solution of nitric acid, washing, immersing said alloy in a 4% to 6% solution of phosphoric acid long enough to allow a phosphate film to form, and finally immersing it in a 4% to 6% solution of ammonium phosphate for a period of more than twenty-four hours.

In testimony whereof I affix my signature.

RUSSELL E. LOWE.