

## UNITED STATES PATENT OFFICE

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## PLATING ALUMINIUM AND ITS ALLOYS

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4 Claims. (Cl. 204—3)

My co-pending application Serial Number 572,440 filed under the date of October 31, 1931 relates to a method of producing firmly adherent galvanic coatings on aluminium and its alloys, wherein a metal oxide film formed thereon electro-chemically, preferably by anodic action, is partially reduced cathodically in an alkaline plating bath with the simultaneous deposition of a flash coating of copper, brass or other metal having a similar galvanic action and the final galvanic coating is deposited on said flash coating.

It is further well known to produce the anodic oxidation not only by a direct current in an acid bath, but also by means of an alternating current in the same bath which serves for reducing and for the preliminary galvanic treatment. In this case a special bath comprising sodium carbonate, sodium hydroxide, double cyanide of potassium and of copper and also double cyanide of potassium and of zinc, was used for the execution of the combined first and second step of the method. This procedure has the advantage that only two different baths are necessary. But this advantage is offset by the variation of the bath which takes place because of the preliminary galvanic treatment. The metal, for instance brass, precipitated during the said treatment must be replaced by the addition of corresponding quantities of cyanides. Thereby the bath becomes more and more alkaline and is soon useless for the first step of the said combined method.

According to this invention these drawbacks are avoided by working at first in a bath of an alkaline metal carbonate having a comparatively low concentration of about 20 to 80 grams  $\text{Na}_2\text{CO}_3$ , for example, in 1 liter of water. It is very important in the new method that the solution of sodium carbonate is totally free of chlorine. Experiments have shown that the coatings on aluminium which are obtained according to the new method are better than those which are produced with other well known methods.

The special advantages of the new method are as follows: (1) The use of low concentrations of alkali favours the formation of films of oxidized nature which are readily reduced in the following preliminary treatment in the galvanizing bath. (2) The duration of working is not limited to a definite time, but may be changed within large limits up to 30 minutes without the danger of unfavourable effect upon the oxide film. (3) The solution has a simple composition and is therefore cheap. (4) The solution is alkaline and it is impossible to make the flash coating bath useless by poorly rinsing the objects to be coated be-

fore treating them in the flash coating bath. The rinsing can be even dispensed with, if desired. This is highly advantageous because the chromic acid, formerly employed in the first bath, is taken up by the pores of the aluminium object and eventually renders the flash coating bath useless.

In a specific embodiment of my invention, representing a practical plating operation, certain aluminium objects to be coated were immersed in a solution containing 40 grams  $\text{Na}_2\text{CO}_3$  per liter and were connected as electrodes to a source of alternating current of 40 volts for 5 minutes.

The so prepared oxidized objects were then treated in a copper and zinc containing flash coating bath, being connected as cathodes to a source of direct current of about 5 volts until a thin film of brass was produced, in this case about 5 minutes. The deposition of brass in this operation did not take place immediately but only after some time as the oxide film had to be sufficiently reduced at first. The preliminary flash coating treatment lasted only a very short time. After this preparation the objects were rinsed and thereafter plated in a suitable bath.

What I claim is:

1. In the process of producing firmly adherent galvanic metallic coatings on aluminium and its alloys wherein the objects to be plated are anodically oxidized, thereafter made cathodes in an alkaline flash-coating bath and finally plated in a finish-coating bath, the step which comprises anodically oxidizing said objects in a dilute solution of an alkaline metal carbonate free of chlorides.

2. The step of claim 1 wherein the objects to be plated are anodically treated by the use of alternating current.

3. The step of claim 1 wherein the anodic oxidizing bath contains from 20 to 80 grams per litre of sodium carbonate.

4. The step of claim 1 wherein the objects to be plated are anodically oxidized by the use of an alternating current of about 40 volts.

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