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PROCESS FOR THE ELECTROLYTIC PRODUCTION OF OPAQUE LAYERS, SIMILAR TO ENAMEL, ON ALUMINIUM AND ITS ALLOYS

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2 Claims. (Cl. 204—58)

The invention relates to a process for the electrolytic production of opaque layers, similar to enamel, on aluminium and its alloys, wherein a continuous and alternating current is used.

Many processes for producing protection layers on aluminium and its alloys are already known, which are based on baths of anodic oxidation, containing salts of various metals, as for instance titanium. But it should be remarked, to this purpose, that the titanium salts, as titanium oxalate, titanium phosphate, etc., under the temperature and electrochemical operation conditions, in an oxidation bath, and particularly in the anodic oxidation zones, are extremely unstable, and the bath can only operate under normal conditions, for a short time.

It is already known, that the bleaching and the opacity of the layer are due to the titanium oxhydrate deposits, which are to be transformed into anhydride, also by means of thermic treatments. This confines the probability of a progressive depletion of the bath and hence the necessity of rigorous and continuous controls, in order to obtain a production uniformity.

According to the invention, these inconveniences are avoided and it avoids the formation of protection oxide layers, having a white-opaque colour on aluminium and its alloys, by using the formation of such crystalline types of aluminium oxide, as to make its surface entirely opaque.

These layers are also apt to take different colourings when immersed in colour baths, or when a reaction of the same takes place with special chemical agents.

The invention is substantially characterised by the fact, that the bath is fundamentally constituted by aqueous solutions of magnesium or zinc chromates, separately or joined with other soluble and stable salts of aforesaid metals, containing chromic acid in such sufficient quantity as to entirely keep said salts into solution.

It has been noted already under certain conditions, that the aqueous solution of chromic acid, without other addition, succeeds in giving a layer of half-opaque white oxide on aluminium articles being connected with the positive pole of a source of continuous current and immersed in the aforesaid bath. The magnesium and zinc salts allow the bath to always produce such a layer of white-opaque oxide as to remove any metallic appearance from the surface.

The layer being formed under the following mentioned conditions, is very fire proof and does not crack as the oxide layers formed by the ordinary processes, when the same are submitted to a high temperature. Moreover, this layer is hard, very much proof against corrosion, abrasion and wear.

The bath, according to the characteristics required for the layer, may have compositions comprised within the following limits:

Zinc chromate or other simple or compound (A) zinc salts: from 0.5% to 20%;
Chromic acid: from 5% till saturation in distilled water, or
(B) Magnesium chromate, or other simple or compound magnesium salts: from 0.5% to 20%;
Chromic acid: from 5% till saturation in distilled water, or
Zinc chromate or other simple or compound (C) zinc salts: from 0.5% to 20%;
Magnesium chromate or other simple or compound magnesium salts: from 0.5 to 20%;
Chromic acid: from 5% till saturation in distilled water.

These zinc or magnesium salts may be added together or separately, and, for certain purposes, the solution of chromic acid in water will be used with the addition of minimum quantity (5%) of magnesium as well as of zinc salts. The same are intended to operate under the following conditions of tension, current density and temperature:

Alternating and continuous current at the tension from 10 to 25 volts;
Current density: from 1.8 to 2.5 ampere per square decimetre;
Temperature: from 20° to 80° C.

The invention comprehends of course also the layers obtained by the above described process and the articles provided with such layers; and it is understood that the particulars for practicing the invention may vary, without departing from its limits.

What we claim is:

1. The process for making an anodic deposit upon an article of aluminium and its alloys which consists in immersing the article in an aqueous solution consisting essentially of chromic acid, zinc chromate and magnesium chromate and making the article the anode of an electric circuit through the solution.

2. The process for making an anodic deposit upon an article of aluminium and its alloys which consists in immersing the article in an aqueous solution consisting essentially of chromic acid having a strength of between five percent and its saturation point at 20° C., from one-half to twenty percent of zinc chromate and five percent of magnesium chromate and making the article the anode of an electric circuit through the solution.

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