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## METHOD OF COLORING THE SURFACE OF ALUMINUM OR ITS ALLOYS FOR ACID PROOF AND ALKALI PROOF

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3 Claims. (Cl. 148—6)

This invention relates to a method of forming a colored anticorrosive film layer of aluminum on the surface of aluminum the object thereof being to form a colored acid proof and alkali proof film layer on the surface of aluminum.

If direct or alternating current is passed with aluminum or an anode or/and cathode in suitable electrolyte, for instance, aqueous solution of oxalic acid, sulphuric acid, boric acid, silicic acid, chromic acid or salts of these acids, the surfaces of said metal undergo oxidizing action and are changed into a porous and anti-corrosive oxidized film layer.

Now, the present invention is based upon the above knowledge and is characterised by forming a colored acid proof and alkali proof (anti-corrosive) film layer on the surface of aluminum, which comprises in combination the steps of providing an anticorrosive acid and alkali proof film layer on the surface of aluminum by subjecting aluminum to the electro-chemical anodic treatment in electrolyte, for example, aqueous solution of oxalic acid, sulphuric acid, boric acid, silicic acid, chromic acid or salts of these acids, and coloring the aluminium thus treated with direct dyestuff, using the colloidal or glutinous aluminum hydroxide produced in said anodic treatment as a mordant, and heating and pressing or compacting the same in superheated steam for about half an hour.

As the electrolyte employed in this invention, may be mentioned aqueous solution of oxalic acid, sulphuric acid, boric acid, silicic acid, chromic acid or salts of these acids, for instance, ammonium oxalate, and as for oxalic acid, 2 or 3% of it is advantageously used; in case of chromic acid, 3 or 4%; and in case of ammonium oxalate, 3 or 4%. With regard to dyestuff, the undermentioned are employed:

Red—Siricus red—Supramine red.
Blue—Siricus blue—Milling blue.
Yellow—Siricus yellow—Milling yellow.
Black—Oxamine light black—Paratine fast black.

The following is a practical example of the coloring operations according to the present invention:

Immerse the aluminum subjected to anodic treatment in the boiled solution of direct dyestuff belonging to coal tar dyes or acidic dyestuff, for example, siricus red or supramine red and drop in a small quantity of acetic acid, and the acetic acid will penetrate the porous film structure of aluminum or its alloys and combine with their substances to form aluminum acetate and again by hydrolysis will be converted to glutinous film of aluminum hydroxide and be precipitated into the porous structure.

$$2Al+6CH_3COOH=(CH_3COO)_6Al_2+3H_2$$

$$(CH_3COO)_6Al_2+6H_2O=Al_2(OH)_6+6CH_3COOH$$

The above glutinous ammonium hydroxide adsorbing and combining with the dyestuff, forms an insoluble color lake layer of aluminium oxide the reason why acetic acid is added on this occasion is to cause it to act upon the glutinous aluminum hydroxide produced in the oxidized film layer in the initial electro-chemical anodic treatment and thus to furnish said film layer with strong absorbing power for a dyestuff.

Next, expose it to superheated steam for about 30 minutes, and then the dyestuff will be turned into lake and at the same time the porous oxidized film layer may be changed into an oxidized compact and water proof film layer of characteristic colors.

Thus, the surface of aluminum is colored in an acid-proof and alkali-proof (anti-corrosive) manner. The article manufactured according to this invention is not only anticorrosive, but also has an endurable color which does not fade easily. It may be used mainly as building materials, for example, ceiling boards, and the cages of elevators, inner side boards of cars, table wares, furniture and other articles for domestic use, and industrial art work.

I claim:

1. In the method of forming an anti-corrosive oxidized and colored film layer on the surface of aluminum by first forming an oxide coating on the aluminum and then treating the oxide coating with a dye, the features comprising subjecting the aluminum to electro-chemical anodic treatment in an electrolyte including an aqueous solution of a substance capable of producing the oxide, being of the class consisting of oxalic, sulphuric, boric, silicic and chromic acids and the salts thereof, and in addition to the electrolytic production of the aluminum oxide simultaneously producing a glutinous aluminum hydroxide, then while applying direct dyestuff to the aluminum in order to color it, using said glutinous aluminum hydroxide as a mordant for the dye, and subjecting the aluminum thus treated to heat and pressure in superheated steam for about one half hour so as to obtain a compact oxidized film layer of characteristic colors.

2. In the method of forming an anti-corrosive oxidized and colored film layer on the surface of

aluminum by first forming an oxide coating on the aluminum and then treating the oxide coating with a dye, the features comprising subjecting the aluminum to electro-chemical anodic treatment in an electrolyte including an aqueous solution of oxalic acid, and in addition to the electrolytic production of the aluminum oxide simultaneously producing a glutinous aluminum hydroxide, then while applying direct dyestuff to the aluminum in order to color it, using said glutinous aluminum hydroxide as a mordant for the dye, and subjecting the aluminum thus treated to heat and pressure in superheated steam for about one half hour so as to obtain a compact oxidized film layer of characteristic colors.

3. In the method of forming an anti-corrosive oxidized and colored film layer on the surface of aluminum by first forming an oxide coating on the aluminum and then treating the oxide coating with a dye, the features comprising subjecting the aluminum to electro-chemical anodic treatment in an electrolyte including an aqueous solution of oxalic acid, and in addition to the electrolytic production of the aluminum oxide simultaneously producing a glutinous aluminum hydroxide, then while applying direct dyestuff to the aluminum in order to color it, using said glutinous aluminum hydroxide as a mordant for the dye and compressing and heating the aluminum thus treated in superheated steam for about one half hour so as to obtain a compact oxidized film layer of characteristic colors.

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