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METHOD OF BEAUTIFYING AND PROTECTING SURFACES OF ALUMINUM AND ALUMINUM ALLOYS

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The subject matter of this invention is an economical electroplating process for enhancing, beautifying and protecting surfaces of aluminum and the dominant object thereof is to provide a pearly iridescent finish on aluminum that is non-tarnishable and such iridescent finish can be applied according to the process disclosed herein on aluminum in sheet, casting, or on fabricated form even though such sheet, casting or fabricated form is of pure aluminum or an alloy thereof.

Where aluminum is exposed to the atmosphere, it is well known that an oxide coating forms on its exposed surfaces, thereby depreciating the natural brilliance thereof. Hence polishing is required to bring back the desired brilliance. Thus another important object of the invention resides in the provision of a coating that will remain bright and lustrous permanently, having an impervious finish not vitally affected by dampness or moisture or by fingering. A further object resides in providing an economical process or method of treating aluminum or alloys thereof in causing thereon a spectrum effect, namely, the variegated colors of the spectrum to shine or emanate therethrough to provide a pleasing and permanent surface having a desired lustrous finish thereon.

According to the improved process herein the work, namely the aluminum or alloy thereof is the anode in an electrolyte of hydrofluosilicic acid ranging from 5-40% by volume in water. The operating temperature of the electrolyte is approximately 40-100° F. and the voltage 6-40 volts. For the cathode, carbon is utilized although satisfactory results have been obtained in the use of copper. The aluminum or aluminum alloy is cleaned prior to plating by any means well known in the art. Where dulling the surface of the aluminum or alloy thereof is immaterial, then a cleaning bath of sodium hydroxide 4 oz. per gallon may be used at a temperature of 160° F. Pursuant to the cleaning operation, it is advisable to dip the work into a 50% solution by volume of nitric acid. Thereafter the work is rinsed in clear water and is ready for plating. Satisfactory results have been obtained in the use of an acid electrolyte employed in accordance with the process herein comprising 20% of hydrofluosilicic (H_2SiF_6) acid and 60% water (H_2O) by volume. The voltage utilized is approximately fifteen volts with approximately ten amperes per square foot of work. The area of the copper cathode preferably is three times the area of the work to be processed.

The temperature of the electrolyte is approximately 65° F., and the duration of the process is approximately one to three minutes depending upon the thickness of the coating desired. Thus due to the relatively short time required in the plating process, no sealing operation is necessary since the work comes out of the bath resistant to staining.

Following the removal of the work from the electrolyte bath, just the ordinary drying procedure is employed, to wit, such as dipping the work in hot water and drying in sawdust or allowing the work to air dry.

No polishing is needed after this process in that the work, that is, the aluminum or aluminum alloy which is treated in the electrolyte bath and constitutes the anode therein, comes out of the plating tank bright, having as previously pointed out a lustrous pearly iridescent coating shining through the silvery color.

Further according to the process herein, the coated aluminum or aluminum alloy plated as hereinbefore set forth can be immersed in aniline dyes and the pearly iridescence will shine and emanate through the dye thus producing iridescence in that color. Hence, if a gold aniline color is put on, the resulting color will be a bright gold with all the colors of the spectrum emanating or shining through thereby making an iridescent gold finish.

Other pleasing and attractive effects may be obtained by spraying stopoff lacquer on the work through a stencil or a screen of wire mesh. Due to the short time required in the matter of carrying out the herein process or method, the plating or coating will start forming on the parts of the work that are not covered with the lacquer and then the solution will eat off or dissipate the stopoff lacquer thus causing the portions that were stopped off to have a lighter finish than those portions that are fully exposed or not stopped off. Consequently the result is a two tone effect.

By the present invention and more particularly by the herein electro plating process, pearly iridescent silvery finishes are readily produced on aluminum or its alloys in a relatively short time in the matter of providing an aluminum oxide coating or finish that is impervious to finger stains, without a sealing operation. Moreover the iridescent color may be controlled depending upon the aniline dye employed as herein stated.

We claim:

1. The herein described electro chemical proc-

ess which comprises; subjecting a body of cleaned aluminum as an anode to a solution consisting essentially of water and substantially 5-40% by volume of hydrofluosilicic acid only and under electrical pressure of about 6 to 40 volts for a time sufficient to provide a surface finish on said body emanating iridescent colors.

2. The herein described electro chemical process which comprises; subjecting a cleaned body of aluminum as an anode to a solution consisting essentially of water in substantially 5-40% by volume of hydrofluosilicic acid only at an operating temperature from substantially 40-100 degrees F. and under electrical pressure of about 6 to 40 volts for a time sufficient to provide a lustrous surface finish on said body emanating iridescent colors.

3. The herein described electro chemical process which comprises; subjecting a body of cleaned aluminum as an anode to a solution consisting essentially of water in substantially 5-40% by

5 volume of hydrofluosilicic acid only at an operating temperature from substantially 40-100 degrees F. for a time interval not exceeding three minutes and under electrical pressure of about 6 to 40 volts to provide a lustrous surface finish on said body emanating iridescent colors.

4. The herein described electro chemical process which comprises; subjecting a body of cleaned aluminum as an anode to an aqueous solution consisting of substantially 20% of hydrofluosilicic acid only at an operating temperature of approximately 65 degrees F. under electrical pressure of approximately 15 volts and under a current density on said anode of approximately ten amperes per square foot and for a time interval not exceeding three minutes to provide a lustrous surface finish on said body emanating iridescent colors.

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