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ADHERENT ALUMINUM COMPOUND

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6 Claims. (Cl. 148—6)

This invention relates to an adherent aluminum compound comprising an aluminum, or a predominantly aluminum alloy treated to make it highly adherent, particularly with respect to synthetic varnishes and enamels.

It has heretofore been suggested that aluminum might be made adherent to rubber by an etching process, in which the material is subjected to hydrochloric acid until a dark powder is formed thereon, and then immediately vulcanizing rubber to the black-coated aluminum. It has now been discovered that aluminum treated in a similar manner to produce a black film may be made adherent to varnishes by a further course of treatment. The present invention is also applicable to aluminum alloys, whereas the previous process was effective only on pure aluminum. The present process is applicable not only to pure aluminum, but to aluminum alloys, such as aluminum-copper, aluminum-magnesium, aluminum-silicon-magnesium, and aluminum-silicon-copper.

In accordance with this invention, the aluminum or alloy thereof is cleaned, for example with 3 to 5% caustic alkali solution (preferably caustic soda), at a temperature of 60 to 70° C. A cleaning operation of 2 to 10 minutes is generally satisfactory, the time depending upon the type of aluminum used. After the cleansing operation, the material is rinsed clean, preferably in warm water, and is then dipped into an acid cleaning bath, for example a 10% nitric acid solution, after which it is again rinsed in cool water.

The chemically clean metal is then immersed in a bath of a halide acid, preferably hydrochloric acid, to produce a black or gray film thereon. Such film may be produced by the use of a hydrochloric acid solution containing 15 to 30% by volume of a 36° technical acid. The temperature of the acid should be not lower than 50° C. and not more than 80° C.

Normally an immersion period of 2 to 10 minutes is satisfactory to produce the film, this likewise depending upon the type of aluminum used.

Following the production of the film, the acid is removed in water and the coated aluminum dipped in caustic alkali solution for a period sufficient to remove the black or gray film. Afterwards, the metal is rinsed in warm water and then dipped in nitric acid solution with a concentration preferably from 5% up to concentration to whiten it, and the whitened material rinsed well with water.

The resulting aluminum or aluminum alloy has a remarkable adhesion to synthetic varnishes and enamels, for example, varnishes of the phenolic, urea, alkyd, vinyl and coumarone

resin types, and particularly those of the heat hardenable type. The resulting coating has great tenacity and is highly resistant to the mechanical effects of impact and abrasion, as well as highly resistant to chemical reaction.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible in view of the prior art.

I claim:

1. A metal of the class consisting of aluminum and predominantly aluminum alloys having a whitened surface thereon having the adhering characteristics of aluminum which has been cleaned in 3 to 5% caustic alkali solution at a temperature of 60 to 70° C. for a period of 2 to 10 minutes, washed, dipped in a 10% nitric acid solution, washed, immersed in a 15 to 30% by volume solution of 36° technical hydrochloric acid for 2 to 10 minutes at a temperature between 50 and 80° C. to produce a dark film, washed, immersed in caustic alkali solution to remove the film, washed in warm water and whitened by a dip in nitric acid solution having a concentration from 5% upwards and then washed.

2. The method of treating a metal of the class consisting of aluminum and predominantly aluminum alloys to produce an adherent surface thereon, which comprises cleaning a surface of the metal, subjecting the cleaned surface to a halide acid to produce a dark film thereon, removing the film therefrom with caustic alkali solution and thereafter subjecting the surface to a nitric acid bath to produce a whitened surface.

3. The method as set forth in claim 2 in which the halide acid is hydrochloric acid and it is employed at a temperature of approximately 50° C. to 80° C.

4. The method as set forth in claim 2 in which the halide acid is hydrochloric acid and its concentration is approximately 15% to 30% by volume of 36° technical acid in water.

5. The method as set forth in claim 2 in which the nitric acid has a concentration above 5% in water.

6. A metal of the class consisting of aluminum and predominantly aluminum alloys having a whitened surface thereon, having the adherent characteristics of aluminum which has been cleaned, the cleaned surface subjected to a halide acid to produce a dark film thereon, the film removed with caustic alkali solution and the surface thereafter whitened by subjection to a nitric acid bath.

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