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ALUMINUM TREATING PROCESS

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1 Claim. (Cl. 204—15)

This invention relates generally to a method of treating the surface of metallic objects and particularly to a method of treating the surface of aluminum products.

In the manufacture of certain products of aluminum, it is required that the surface be treated to protect it against corrosion and that a certain area or spot on the surface be electrically conductive for the purpose of attaching thereto an electrical connector, such as a ground connection. The preferred protection against corrosion of an aluminum product is acquired by anodizing the surface thereof, but, as is well known, the anodized finish provides a very poor electrical conductor. As a result, it has been the practice to anodize the entire surface of an aluminum product and then grind off the anodized finish in a selected area or spot and daub this spot with any of the well known acidic chromate conversion solutions that is both corrosion resistant and has a satisfactorily high electrical conductivity. This method achieved the result, but the steps of grinding and daubing are both cumbersome and expensive and it has been found that when the solution is daubed onto the area or spot, following the anodizing step, that the solution penetrated the anodized aluminum with resultant chemical action that discolored the finished anodized surface.

Accordingly, it is the principal object of the invention to provide an improved aluminum product treating method which obviates the above mentioned objections.

More specifically, it is an object of the invention to provide an improved method of treating the surface of an aluminum product to obtain a relatively small area of the surface electrically conductive and the entire surface corrosion resistant by a particular order of method steps that avoid interaction of the corrosion resistant and electrical conductor materials and accompanying discoloration of the surface of the product.

A further object of the invention is to provide an improved method of treating the surface of an aluminum product to obtain a relatively small area thereof electrically conductive and the entire area corrosion resistant by a particular order of method steps that eliminates the aforementioned grinding operation and at the same time generally facilitates the treating of the product.

Other objects of the invention will become apparent from the following detailed description of the invention.

In carrying out the process of the present invention, the first step is to apply to a cleaned surface of the aluminum object, a coating of a composition which is both corrosion resistant and electrically conductive. Preferably this is accomplished by an acidic chromate conversion treatment of the surface of the aluminum object, as such treatments are extremely simple to perform and are very inexpensive. As is well known, the application of an acidic chromate conversion treatment to an aluminum surface converts a thin layer of the aluminum surface by chemical reaction into a non-metallic form to produce a protective, electrical conductive film. Specifically, the conversion treatment may be effected by using a hexavalent chromium compound (chromic acid or a bichromate), and activators having a pH in the range of about 2. The solution may contain of from 1 to 4 oz. of the compound per gallon of water. This aqueous solution may be daubed or brushed onto the surface of the aluminum object to be treated, but preferably, the object is immersed into a bath of the solution to facilitate

production. Immersion time may vary from about 5 seconds to about 6 minutes. The object is then preferably rinsed in cold water and dried at a temperature preferably of about 150 degrees Fahrenheit.

After the treated object is dry, a portion of the surface thereof, selected for attachment of an electrical connector, is covered and protected against removal by a mask. The mask may be a suitable adhesive tape or paint, or any other suitable masking material that is alkali and acid resistant and will withstand a temperature of 150° F. The remainder, or unmasked film is then removed from the surface of the object preferably by submerging the object in a caustic bath, such as, sodium hydroxide. As is well known, the sodium hydroxide will attack the aluminum and destroy the adhesion between the aluminum and the chromate to quickly strip the chromate from the product. With the mask still in place, the cleaned product is then anodized by the well-known electrochemical process to impart to the surface of the aluminum a decorative protective coating except, of course, for the area or spot beneath the mask. Finally, the mask is removed to expose the non-anodized, electrically conductive area to which an electrical connector, such as a ground connection, may be subsequently attached.

Any suitable chromate conversion solution may be used that is both corrosion resistant and electrically conductive, such as an aqueous solution of a chromic compound selected from the group consisting of chromic acid and water-soluble salts thereof, and ferricyanic or ferrocyanic acid and water-soluble salts thereof, and mixtures of the same. The application of such a solution to an aluminum surface results in a thin layer of the surface metal being converted by chemical reaction into a non-metallic form or amorphous mixed metallic oxide surface coating that is both protective and electrically conductive. Below are two examples of a group of solutions that may be used with the present method:

I

Chromic acid	g./l.	25
Potassium ferricyanide	g./l.	5
Temperature	° F.	70
pH		0.8
Immersion time	minutes	5

II

Sodium bichromate	g./l.	7.5
Potassium ferricyanide	g./l.	5
Sodium fluoride	g./l.	1
Nitric acid (42° Bé)	ml./l.	3
pH		1.5
Immersion time	minutes	5
Temperature	° F.	80

From the above description it should be appreciated that the particular order of the steps of my method enhances material handling and facilitates production by eliminating the need of grinding away a spot on a completely anodized surface in order to provide electrical conductive surface for a ground connection. In addition, by first applying the electrical conductive coating of chromate to the product, and then anodizing the remainder of the surface of the product, except for the masked spot, I avoid the above mentioned chemical reaction and resultant discoloration that occurs if the surface is first anodized and chromate then daubed onto an exposed spot of the porous aluminum surface.

What is claimed is:

The method of treating the surface of an aluminum object to protect the entire surface of the aluminum against corrosion and render a portion of the surface conductive for an electrical connection, which method

comprises first applying a chromate conversion coating to the entire surface of the object to form an electrically conductive mixed metallic oxide surface coating integral with the aluminum surface, said mixed metallic oxide surface coating being formed by contact between the entire surface of the aluminum and an aqueous solution including a hexavalent chromium compound and having a pH of approximately 0.8 to 2, thereafter forming an alkali and acid resist mask on a portion of the electrically conductive metallic oxide surface coating, removing the unmasked mixed metallic oxide surface coating from the aluminum surface by submerging the object in a caustic bath of sodium hydroxide, anodizing the unmasked aluminum surface of the object, and finally removing the mask.

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