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METHOD OF CHROMIUM PLATING

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4 Claims. (Cl. 204—1)

This invention relates to a method of chromium plating, and more particularly to a method of chromium plating over a previously chromium plated surface or a surface of a chromium alloy.

Due to chemical changes in the surface of a chromium plated object when exposed to the atmosphere or when the chromium plating process is interrupted, it is impossible, at least with certain well known electroplating processes, to consistently plate chromium over a previously chromium plated surface or over the surface of a high chromium content alloy.

In order to chromium plate a previously chromium plated surface, it has been customary in many instances heretofore to completely strip an article of a previously applied chromium plate and replate the entire coating.

An object of the present invention is to provide an effective and efficient method of electroplating on a chromium surface.

In accordance with the preferred embodiment of the invention, a chromium plated surface which is to receive a further electroplated coating of chromium is placed in an electrolytic cell containing a hot solution of sodium carbonate and made the cathode therein for one or more minutes after which the article is withdrawn and etched in a hydrochloric acid solution until the surface becomes discolored, the extent of discoloration necessary for any particular type of work can be readily determined by trial. The surface is then washed in cold water whereupon a further chromium plated coating may be applied thereto.

The invention is particularly applicable when chromium plating with the well known Sargent solution using an aqueous chromic acid and sulfuric acid solution having a proportion of from one to five grams of sulphate radical to 250 grams of chromic acid per liter of solution. The chromium surface to be chromium plated is first immersed in a hot solution of an alkaline compound, such as sodium carbonate, trisodium phosphate, sodium hydroxide or the like, contained in an electrolytic cell. The article to be plated is made the cathode of the cell and a potential preferably of about 6–18 volts is impressed upon the electrodes while the article is in the alkaline solution, as a result of which hydrogen is liberated at the surface of the article and acts as a reducing agent for any oxides that are present. There also appears to be a beneficial hydrogen bombardment of the surface which exposes the chromium by removing a passive film therefrom. This process is continued for one or more minutes after which the article is withdrawn from the bath and is etched in a suitable acid solution, such as a solution of hydrochloric or sulphuric acid. This treatment results in the formation of a black smut comprising chromium chloride or chromium sulphate on the surface of the article and after removal from the acid solution the object is washed well in cold water and placed in the chromium plating bath. The smut is not removed during washing but acts as a protective layer on the surface until the article is placed in the plating bath where it is removed by the plating process before plating begins. The plating process is then carried out in the usual manner.

The process lends itself admirably to the repair of defective chromium plated work, such as parts which have not been entirely covered in a previous plating operation or parts which have become defective or worn in service. Also chromium plating operations on parts requiring close limits for the thickness of deposit can be controlled very accurately since the part can be removed from the plating solution, the thickness of the deposit determined and an additional deposit applied if necessary. In some cases it is also found that when work cannot be completed during the regular working day, the parts may be treated in accordance with the invention the following day and the plating continued.

The invention also makes it possible to electroplate firmly adherent coatings of other metals particularly copper on chromium by treating the chromium surface as described.

It will be evident that the embodiments of the invention herein described are merely illustrative and that many changes and modifications may be made therein without departing from the spirit and scope of the invention.

It is also to be understood that the term "chromium surface" as used herein and in the annexed claims is intended to include not only a surface of substantially pure chromium, but also a surface of high chromium content such as is presented by an alloy containing chromium.

What is claimed is:

1. A method of chromium plating on a chromium surface which comprises placing the article to be plated in a bath consisting essentially of a solution of an alkaline compound, passing a current through the solution with the article as a cathode, immersing the article in an acid solution of the group consisting of hydrochloric and sulphuric acids until a black smut is formed on the surface of the article, and electroplating the article in a chromic acid bath.

2. A method of chromium plating on a chro-

mium surface which comprises placing the article in a bath consisting essentially of an alkaline solution of a sodium compound passing a current through the solution with the article as a cathode, immersing the article in an acid solution of the group consisting of hydrochloric and sulphuric acids until a black smut is formed on the surface of the article, and electroplating the article in a chromic acid bath.

3. A method of chromium plating on a chromium surface which comprises cathodically treating the article in a bath consisting essentially of a solution of an alkaline compound, immersing the article in a hydrochloric acid solution until a black smut is formed on the surface of the article, and electroplating the article in a chromic acid solution.

4. A method of chromium plating on a chromium surface which comprises cathodically treating the article in a bath consisting essentially of a solution of an alkaline compound, immersing the article in a sulphuric acid solution until a black smut is formed on the surface of the article, and electroplating the article in a chromic acid solution.

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