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TREATMENT OF METALS PRIOR TO ELECTRO-PLATING

Roy Alfred Ulfketel Huddle and Oliver Flint, Strand, London, England, assignors, by mesne assignments, to the United States of America as represented by the United States Atomic Energy Commission

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This invention relates to the electrodeposition of metals upon metallic surfaces for the purpose of giving protection or a desired finish to the surfaces, and is concerned primarily with the preparation of such surfaces to receive electrodeposits.

Normally in electroplating operations metal surfaces are initially sand blasted to remove scale and oxide or other corrosion deposits, after which further mechanical preparation, including polishing, and an electrochemical cleaning operation are ordinarily performed to prepare the surface for the electroplating operation. It has now been observed that if such electrochemical cleaning is carried out on the metals uranium, zirconium, titanium, tantalum, niobium, molybdenum, tugsten or vanadium, electrodeposits on the surfaces so cleaned show poor adherence and give little protection to the metals. The poor quality of such deposits is believed to be due to the presence of a hydrous oxide coating on the metals, which is not removed by usual anodic electrolytic treatments and may even be induced by such treatments.

The object of the invention is to provide a pretreatment for the metals specified which will allow of satisfactory adherent deposits of other metals to be laid down on such metals by normal methods of electrodeposition.

According to the invention surfaces of the metals are subjected to shot blasting preferably by ferrous metal shot to remove hydrous oxide coating normally present, and the surfaces so treated are given a coating of copper, preferably by displacement from a copper salt solution.

After the treatment of the invention, the metals are found to be relatively inert towards the atmosphere, even at raised temperatures, and to aqueous electrolytes. They may be subjected to electroplating operations by normal methods and take on electrodeposits which show good adherence.

The copper salt is preferably copper sulphate which is employed in aqueous solution acidified by sulphuric acid. The coating of copper may result from displacement of copper by the metal alone or deposition may be assisted by passage of current between a copper electrode in the solution and the metal surface, the latter being the cathode.

With the metals specified the shot blasting, besides removing hydrous oxide coatings, appear to induce some passivation of the surface, owing probably to either the presence of a very thin anhydrous oxide film (of the order of molecular thickness), or a similar film of iron compound which does not prevent or adversely affect subsequent electrodeposition on the surface.

The following is a preferred way of carrying the invention into effect as applied by way of example to zirconium.

Example

A surface of zirconium metal is shot blasted employing 120 grit of iron and an air pressure of 100 lbs. per square inch. Each part of the surface is subjected to action of the shot blast for approximately 30 seconds. The zirconium metal surface is then immersed in the following solution for approximately 5 minutes.

Copper sulphate	gms. per litre	200
Sulphuric acid	do	48
Aluminum sulphate	do	24
Surface active agent	percent	0.1

At the conclusion of the treatment the zirconium with its copper coating is washed with water and may then be arranged in a usual plating bath, for example a nickel bath and an electrodeposit formed on it by usual methods.

The copper coating applied to the metals set out above may serve not only as a protective finish to the metal until a further deposit of a protective metal is applied, but also as an aid in rolling, drawing or pressing of the metal.

Any of the metals uranium, titanium, tantalum, niobium, molybdenum, tungsten or vanadium may be substituted for zirconium in the example with like effect.

We claim:

1. A method of treating the surface of a metal of the group consisting of uranium, zirconium, titanium, tantalum, niobium, molybdenum, tungsten and vanadium which consists in the steps of subjecting the surface to shot blasting using ferrous metal shot, coating the shot-blasted surface with copper, and electrodepositing upon the copper a protective metal.

2. A method according to claim 1 wherein the copper is applied to the shot-blasted surface by displacement from a solution of a copper salt.

3. A method according to claim 1 wherein the protective metal is nickel.

4. A method of treating the surface of a metal of the group consisting of uranium, zirconium, tantanium, tantalum, niobium, molybdenum, tungsten and vanadium which consists in the steps of shot-blasting the surface employing 120 grit of iron for approximately 30 seconds on each part of the surface, immersing the shot-blasted surface in an aqueous solution containing copper sulphate, sulphuric acid, aluminum sulphate and a surface active agent for approximately 5 minutes to form a coating of copper thereon, washing the surface, then making it the cathode in a nickel electroplating bath and forming an electrodeposit of nickel thereon.

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