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ANODIC BRIGHTENING AND POLISHING OF METAL

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2 Claims. (Cl. 204—140.5)

My invention relates to the brightening and polishing of metal by an electrolytic method.

Steel and iron have thus processed in anodic baths mainly consisting of perchloric acid. Perchloric acid, under certain conditions, is extremely explosive and hence is applicable only with severe safety precautions. It is an object of my invention to eliminate such danger without foregoing the production of an excellent brightening or polishing effect.

It is also known from U.S. Patent 2,542,779, to anodically brighten or polish metal parts by means of a water-containing mixture of sulphuric acid and fluoboric acid. Such mixtures are susceptible to being impaired and destroyed by cathodic and anodic current densities above rather moderate limits. It is therefore another object of my invention to provide for excellent brightening or polishing without entailing such susceptibility to trouble.

According to my invention, I use for the anodic brightening or polishing of metal, such as steel, an etching bath consisting essentially of fluoboric acid and concentrated phosphoric acid in water-free form. The use of such an acid mixture according to the invention eliminates the explosion danger of the conventional perchloric acid mixtures and also excels them in brightening effect. In comparison with the known water-containing solution of fluoboric acid and sulphuric acid, an anodic bath according to the invention is not damaged by high cathodic and anodic current densities.

I have further found, according to another feature of my invention, that similar advantages are achieved by partially or wholly substituting the concentrated phosphoric acid of the bath by concentrated non-aqueous acetic acid.

The brightening effect of the electrolyte according to the invention is not appreciably dependent upon temperature and is obtained within a wide range of current densities. Good results are secured particularly when operating at normal room temperature (20° C.) with anodic current densities of 40 amps. per 100 cm.^{2}.

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The preparation of water-free solutions of fluoboric acid and phosphoric acid and/or acetic acid is preferably carried out with the aid of water-free barium borofluorate. The fluorate is produced in conventional manner and has been found readily soluble in concentrated phosphoric and/or acetic acids. Preferably, a saturated solution of barium borofluoride in concentrated phosphortic acid is used. The effect is further improved if, prior to using the solution, the barium ions are caused to precipitate by adding concentrated sulphuric acid to the bath in stoichiometric quantity relative to the barium content of the bath. The resulting barium sulphate is practically completely insoluble in the resulting acid mixture. A slight excess of sulphuric acid does not impair the polishing action of the bath.

I claim:

1. A method of brightening steel and iron metal, comprising subjecting the metal to anodic etching in a water-free electrolyte consisting of a water-free saturated solution of barium borofluoride in water-free phosphoric acid.

2. A method of brightening steel and iron metal, comprising subjecting the metal to anodic etching in an essentially water-free electrolyte consisting of a water-free solution of fluoboric acid in water-free phosphoric acid, said solution being prepared by dissolving barium borofluoride in phosphoric acid to saturation of the latter and precipitating the barium as barium sulfate by adding a stoichiometric amount of sulfuric acid.

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