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PROCESS OF ELECTRODEPOSITING CHROMIUM

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This invention relates to processes of electrodepositing chromium, and aims to provide improvements therein.

The invention provides a novel process of depositing chromium, by which a good quality of plate, both as to structure, brightness, and color may be obtained, and with good efficiencies for chromium plating. The invention has the further advantage that the electrolytic solution may be used with lead lined tanks without affecting the lining, chromic acid, especially in combination with acids or salts of strong acids being quite active in attacking most substances suitable for use as containers.

The invention further provides a process of electroplating chromium which may be used without etching polished surfaces of articles to be plated.

The invention further provides a novel chromium plate, having a lighter or whiter shade than plate produced by other processes of depositing chromium, this being of importance where the color of silver is to be approximated.

According to the present invention, chromic acid is used as the electrolyte. The catalyst or addition agent is a compound of fluorine, usually a fluorid, such as chromic or sodium fluorid. We have obtained satisfactory bright plates using as catalyst or addition agents the following:—

Chromic fluorid
Sodium fluorid
Fluosilicic acid (H_2SiF_6)
Fluoboric acid (H_2BF_6)
Hydrofluoric acid;

the substances being arranged substantially in their order of efficiencies. Hydrofluoric acid, while serviceable, very considerably decreases the efficiency of plating as compared with the other substances given above. Temperatures from 15° C. to 35° C. are quite suitable, and current densities from ½ to 1 ampere per square inch are suitable, the lower current density being preferred for bright, fine-grained deposit.

The efficiency of the current in depositing chromium varies with the amount of fluorid used in the bath. With a solution containing 250 grams per liter of chromic acid the best efficiency has been found to be around 3 grams per liter of the fluorine compound, calculated as chromium fluorid, decreasing above and below this amount, the fluorine radical being the constituent of importance. In amounts up to about 10 grams per liter of the fluorid the solution does not etch polished surfaces of articles (steel, iron, brass, for example) placed therein for electroplating.

Boric acid added to the aforesaid catalyst or addition agents, or even to other catalysts or addition agents such as sulphuric acid and sulphates, gives good results.

A mode of procedure is as follows:—A bath is made up containing 250 grams per liter of chromic acid (CrO_3) and 3 grams per liter of chromium fluorid (or an equivalent amount of sodium fluorid). The article to be plated, a polished piece of flatwear (a spoon) for example, is connected to the cathode bus-bar and a current of ½ ampere per square inch passed through the solution. A lead-lined tank is used to advantage, as the solution does not attack the lead lining. The starting temperature may be room temperature of 15–20° C., which may increase to about 30° or 35° C. in large tanks, in warm weather, due to the heat of the current. The temperature may be kept constant at a desired temperature by suitable heating and cooling means.

The process may be carried out by other modes of procedure than that herein specifically described.

The process involving the use of fluorine compounds of the fluoboric acid type is claimed in our application Serial No. 586,700, filed January 14, 1932.

What is claimed is:

1. A process of electroplating chromium comprising passing an electric current through a solution containing chromic acid and a soluble fluorine-containing compound, said compound being fluosilicic acid, the amount of fluosilicic acid being that amount which contains the same amount of fluorine as that contained in 10 grams per liter or less of CrF_3 for a solution containing 250

grams per liter CrO_3, and a proportionately higher or lower fluosilicic acid content for a higher or lower CrO_3 content.

2. A process of electroplating chromium comprising passing an electric current through a solution containing chromic acid and a soluble fluorine containing compound, said compound being fluosilicic acid, the amount of fluosilicic acid being that amount which contains the same amount of fluorine as that contained in approximately three grams per liter of CrF_3 for a solution containing 250 grams per liter CrO_3, and a proportionately higher or lower fluosilicic acid content for a higher or lower CrO_3 content.

In witness whereof, we have signed our names.

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