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METHOD, APPARATUS, AND ELEMENTS THEREOF FOR USE IN THE ELECTRODEPOSITION OF CHROMIUM

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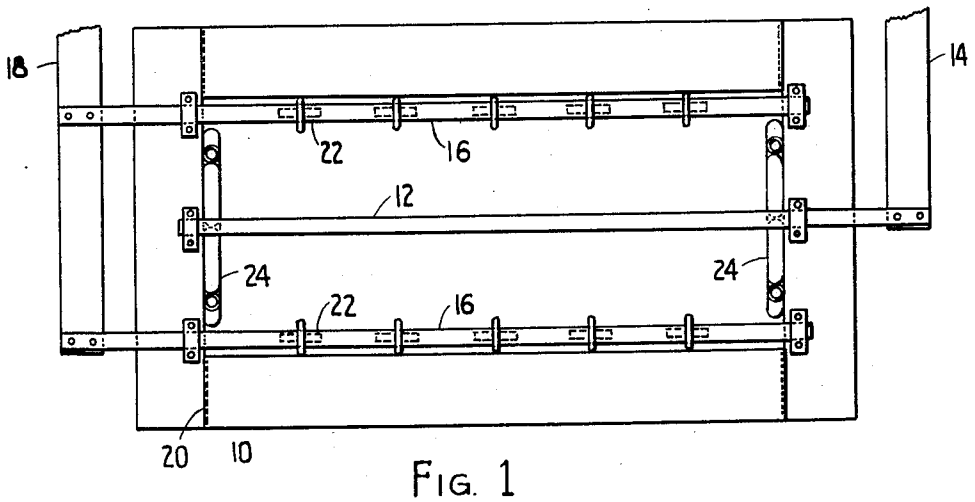


FIG. 1

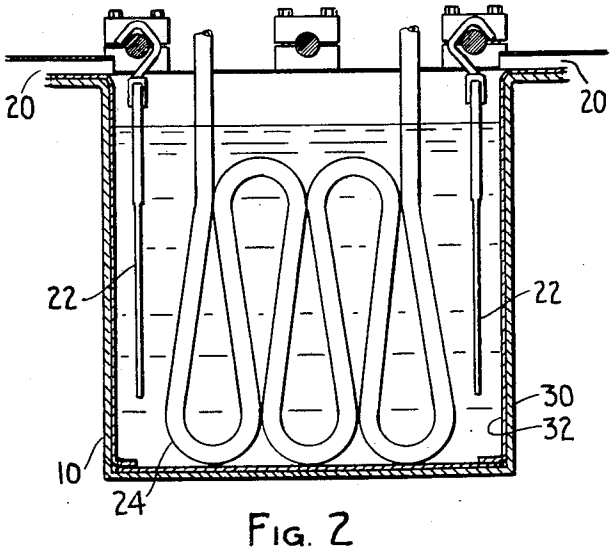


FIG. 2

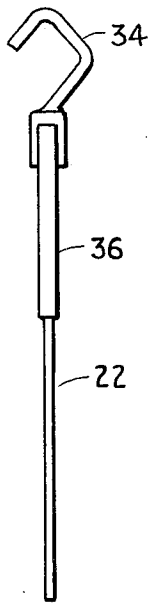


FIG. 3

Charles H. Eldridge INVENTOR

BY

Gustav R. Thompson ATTORNEY

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METHOD, APPARATUS, AND ELEMENTS THEREOF FOR USE IN THE ELECTRODEPOSITION OF CHROMIUM

Charles H. Eldridge, Detroit, Mich., assignor to United Chromium, Incorporated, New York, N. Y., a corporation of Delaware

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7 Claims. (Cl. 204—5)

This invention relates to apparatus and elements thereof for use in the electrodeposition of chromium and provides improvements therein.

As is well recognized in the art of chromium deposition, a want exists for apparatus (tanks, coils, anodes, etc.) more serviceable than that heretofore available and suitable for common use. Ceramic and glass apparatus and elements are used, but these are fragile and limited as to size. Iron apparatus and elements have been used, but the iron dissolves and objectionably contaminates the bath. Lead apparatus and elements (the term being used herein to cover lead, inclusive of antimony lead, lined apparatus) have been most commonly and generally used in the electrodeposition of chromium. Lead apparatus and elements have some drawbacks, as they require special care (which is not always known and given) to prevent perforation due to the attack thereon of acids and acid radicals contained in the bath—the commonly used baths containing chromic acid and acid radicals in quantity and relative amounts which have such attack. Another drawback is the encrustation of the parts with sulphates and chromates, which offer resistance to the flow of current (particularly anodes) and resistance to temperature interchange (heating and cooling coils). Then from time to time there are unexplained failures with lead apparatus, and renewals and replacements are expensive, and there are other drawbacks.

By the present invention I provide an apparatus and elements thereof which is much more resistant to attack by chromium plating solutions, and which will give superior service to lead apparatus and elements and avoids much of the special care required for preserving the latter.

The invention provides apparatus and elements thereof which may be formed with substantially the same facility and flexibility and by substantially the same methods as lead apparatus and elements, and which may have the advantage of greater rigidity (while still maintaining ductility) than even the lead known as "hard lead".

Lead anodes used in the electrodeposition of chromium are especially susceptible to attack, and the present invention provides anodes which are much less susceptible to attack than such lead anodes.

An embodiment of the invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a top plan view of an apparatus for the electrodeposition of chromium and embodying the present invention.

Fig. 2 is a transverse vertical section, drawn on twice the scale of Fig. 1.

Fig. 3 is an enlarged detail view of an anode.

Referring to said drawing, numeral 10 designates a tank or container provided with the usual or any suitable arrangement of cathode bus-bars 12, cathode-current conductor 14, anode bus-bars 16, anode-current conductor 18, and suitable ducts 20.

Numeral 22 designates the anodes, and 24 the coil or coils used for controlling the temperature of the bath—cooling coil, heating coil or both kinds of coils. The apparatus may comprise more or less elements of those mentioned and not mentioned as may be necessary or desirable.

According to the invention the apparatus and/or its elements, particularly the parts which are immersed in the chromium-deposition bath or otherwise subjected to the action of the solution, are formed of an alloy of lead and tin, the base or predominant part of which is lead.

Beneficial effects according to the invention are obtained with a tin content as low as three percent (3%). With a tin content of five percent (5%) and more the corrosion is practically negligible. The preferred tin content is about seven percent (7%).

Ductility and malleability sufficient for practical working is maintained with a tin content up to and including about ten percent (10%).

With cast parts the content of tin may exceed ten percent, but there does not appear to be any substantial advantage in materially exceeding ten percent of tin, as both the cost and the brittleness increases with increased tin content.

The tank 10 is preferably formed of sheet-steel (though wood or other low-cost material may be used) as indicated at 30, and provided with a lining 32 of the hereindescribed lead-tin alloy. The lining 32 is preferably applied in the form of ductile and malleable sheets of the alloy within the hereindescribed range, and the edges may be joined or lapped and joined by "burning" such as is practiced in socalled "lead-burning." The coils 24 are preferably formed of extruded, or drawn alloy, or of strips of the alloy formed into hollow form and the edges closed by "burning", the alloy preferably being within the range hereindescribed for obtaining ductility and malleability whereby fragility is avoided.

The anode 22 is preferably made of strips of the hereindescribed alloy, and the upper end provided with the usual hook 34 by which it is suspended from the anode bus-bar 16. At the solution-line the anode is preferably made of in-

creased thickness, as indicated at 36, to provide more material against wastage by corrosion, as it is found in chromium deposition that corrosion most readily occurs at the solution-level.

The invention may receive other embodiments than those herein specifically illustrated and described.

What is claimed is:—

1. An element of a chromium plating installation which is in contact with a chromic acid solution, consisting essentially of a lead-tin alloy containing a minimum of approximately three per cent tin.

2. An element of a chromium plating installation which is in contact with a chromic acid solution, consisting essentially of a lead-tin alloy containing approximately three to ten percent inclusive of tin.

3. An element of a chromium plating installation which is in contact with a chromic acid solution, consisting essentially of a lead-tin alloy containing approximately seven percent tin.

4. An anode for chromium plating in a bath containing chromic acid consisting essentially of a lead-tin alloy containing a minimum of approximately three percent tin.

5. An anode for chromium plating in a bath containing chromic acid consisting essentially of a lead-tin alloy containing approximately three to ten percent inclusive of tin.

6. An anode for chromium plating in a bath containing chromic acid consisting essentially of a lead-tin alloy containing approximately seven percent tin.

7. In a process of chromium plating in which the bath contains chromic acid, inhibiting sediment due to the action of the chromic acid by forming the parts of the installation which are in contact with the chromic acid of an alloy essentially of lead and tin containing a minimum of approximately three percent tin.

CHARLES H. ELDRIDGE.