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ANODE BASKET WITH DANGLER FOR ELECTROLYTIC PLANTING

Filed April 6, 1962

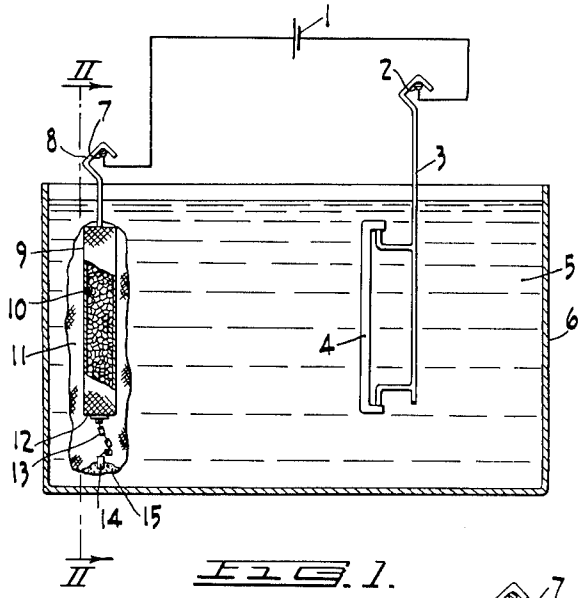


FIG. 1.

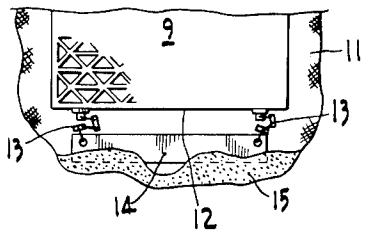


FIG. 2.

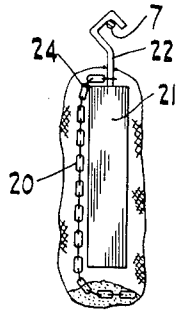


FIG. 3.

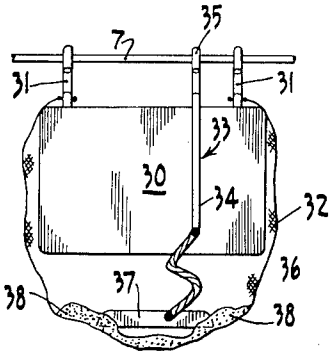


FIG. 4.

Inventors
Kergan Wells
William Kyle Wells
By Cushman, Darby & Cushman
attorneys

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ANODE BASKET WITH DANGLER FOR ELECTROLYTIC PLATING

Kergan Wells, Toronto, Ontario, and William K. Wells, Richmond Hill, Ontario, Canada, assignors to W. W. Wells Limited, Scarborough, Ontario, Canada

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9 Claims. (Cl. 204—297)

This invention relates to a method and apparatus for electroplating, particularly nickel plating.

In Canadian Patent 634,495 issued January 9, 1962 there is described a method and apparatus for nickel plating using an acid electrolyte nickel, having the purity of electrolytically refined nickel as the anode, contained in a basket, such baskets comprise titanium or a metal of similar resistance to corrosion in the acid plating bath and become polarized when electrolysis is proceeding. The baskets may also include parts made of plastic coated metal or other electrically insulating and uncorroded substance.

In the process of the Canadian patent it is also set out that the basket may be surrounded by a fabric bag of cotton, glass or other non-corrosive non-conductive fibre, sometimes containing a filter paper to collect any sludge. The use of similar types of bags with conventional nickel anodes, containing alloying additives for nickel plating baths, is also mentioned in the patent.

It is well known in the nickel plating art that the fabric bags used with nickel anodes are effective in collecting small particles of nickel and other substances falling from the anodes and therefore in preventing their contamination of the bath. These particles are not chemically soluble in the bath electrolyte and thus remain in the bag. Occasionally the quantity of particles falling from any one anode can be quite large due to unpredictable variations in the internal structure of the conventional anode or where the pieces of electrolytic nickel in the basket are or become unduly small. This situation is aggravated in instances where the fabric bag is suspended independently of the anode and therefore may remain unemptied when the anode is changed or refilled. In these circumstances the weight becomes too great, the bag bursts and spreads its contents throughout the cell. Many of the particles, particularly the nickel, being magnetic deposit on the cathode causing roughness to the surface of any articles in that particular cell being plated.

Following the teaching of the present invention the problems of bag failure can be lessened or virtually avoided, the invention being particularly suitable when the electrolytic nickel employed in a basket is of granular or small particle size.

More particularly in accordance with the invention there is provided for electrolytic plating including an anode and a bag for said anode for collecting particles falling from said anode, a dangler, comprising titanium electrically joined to said anode and including a flexible portion, for engaging said particles and for electrically connecting the particles to the anode.

Reference will be made to the drawings in which:

FIGURE 1 shows a side view in section of an electrolytic cell including a basket anode to which is attached a flexible dangler in accordance with the invention;

FIGURE 2 shows an end view sectioned along the line II—II of FIGURE 1;

FIGURE 3 shows a side view in section of a further embodiment of the invention in conjunction with a conventional nickel anode; and

FIGURE 4 shows a view similar to that of FIGURE 3, but employing an embodiment of the invention wherein

the dangler hangs directly from the anode bar and only the lower part is made flexible.

Referring now to FIGURES 1 and 2 a power source shown as battery 1 supplies current between the cathode bar 2 and anode bar 7 of an electrolytic cell comprising casing 6 and electrolyte 5. An object 4 to be plated is suspended upon a bracket 3 hung from bar 2. An anode basket 9 of a metal uncorroded by, but becoming polarized in, the bath solution 5, preferably of titanium, hangs by means of electrically conducting hooks 8 from bar 7. The basket contains nickel pieces 10. A fabric bag 11 surrounds or contains the basket and depends slightly below it. To the bottom portion 12 of basket 9 a pair of chains 13 of titanium carrying a bob 14, also of titanium, are connected for example by welding or riveting. The bob 14 rests on the bottom of the bag 11.

When the cell is in operation, a deposit 15 of nickel and other sludge falling from the anode starts to build up. The chain 13 and bob 14 being constructed of titanium metal are not corroded by the bath and being connected to the anode become polarized. The dangler comprising bob 14 and chain 13 thus makes electrical connection between the deposit 15 and the anode. Good electrical connection is maintained between the links of chain 13 because the whole is surrounded by electrolyte which has the property of reducing the contact resistance between the adjacent touching surfaces. The bob 14 by extending over a substantial width of the bag helps to ensure contact when the particles are not uniformly distributed over the bottom of the bag. The connection between the sludge 15 and the anode leads to continuous electrolytic solution of the nickel in the sludge as though it still formed part of the material in the anode. This has the two-fold advantage of making full use of the nickel so that there is negligible waste and prevents a build up of particles in the bag which could lead to bursting. The magnetic property of nickel ensures that all the nickel particles in the sludge hold together as a single mass or only a few separate masses and thus as long as part of a mass of sludge touches the dangler there is always good electrical contact between all this nickel and the anode.

In FIGURE 3 there is shown a second embodiment in which a flexible dangler 20 is associated with a conventional anode 21 of the solid type. The slab anode 21 may be replaced by elecrtolytic nickel sheet which is used in some plating applications. The dangler 20 comprises a chain having links of titanium the uppermost link of which is slid over the hook 22 used for suspending the anode from bar 7. The chain also touches the anode at point 24. Satisfactory electrical connection along the chain will occur as long as there is not an undue distance of run through air, that is many link to link contacts, before the submerged portions is reached.

Although the dangler has been shown as a chain or a chain terminated by a bob of titanium, it is clear that contact to the material in the bag could be made by means of a thin flexible sheet, a mesh, or flexible wire, or could comprise a rigid upper part connected to the anode or basket or anode bar 7 with a flexible lower portion capable of resting in the bottom of the bag. There being flexible connection to the material accumulating in the bag because fabric bags will stretch and a rigid member would not remain in contact with the accumulating material as the bag descended.

As a further embodiment, FIGURE 4 shows a conventional anode or in certain applications electrolytic nickel sheet 30, suspended from bar 7 by hooks 31, and contained within a fabric bag 32. A dangler 33 comprising titanium rigid upper portion 34 which is hooked

at 35 over rod 7 (or could be hooked over the top of the anode) and dips into bag 32. The dangler 33 may alternatively be hooked over the anode 30 if this is more convenient in any particular installation. At the lower end of portion 34 a titanium cable 36 is connected (such as by welding) which carries a titanium strip bob 37 connected to its other end. Electrical contact is thus made between the anode 30 and sludge 38 collecting in the bag.

From the foregoing disclosure it will be seen that in a bag equipped with a dangler of which some embodiments have been described, there will be no great build up or accumulation of the nickel and therefore no excess weight which might cause the bag to break. Since these particles will tend to dissolve there is less possibility of fine ones working through the mesh of the fabric to cause roughness of deposit on the cathode, even though the fabric bag is intact. The only particles which will remain in the bag will be impurities in the nickel which will form only about 1% or less of the original quantity of particles falling into the bag. This reminder being of such small amount need be removed only after a considerable time interval, and in fact probably the life of the bag will expire for other known reasons before emptying would become necessary.

Whilst the description has shown the use of a dangler comprising titanium, it is expected that other elements from the group of reactive metals, zirconium, columbium, hafnium, tantalum and tungsten would perform well. The dangler is expected to be useful also in acid plating electrolytes other than the nickel ones described. It has ben successfully employed in acid copper plating wherein the electrolyte comprised copper sulphate with sulphuric acid, and where a copper anode was contained in an anode bag for collecting particles falling from the anode.

We claim:

1. In apparatus for electrolytic nickel plating wherein an anode comprises a basket at least partially comprising titanium for receiving pieces of nickel therein and for effecting electrical contact to said nickel, and a bag surrounding said basket for collecting particles falling from the basket, the improvement of a flexible titanium dangler within said bag effecting electrical connection between said anode and said particles collected in said bag.

2. In electrolytic plating apparatus including an anode and a bag containing said anode for collecting particles falling from said anode, a dangler in said bag and comprising titanium electrically joined to said anode and including a flexible portion, for engaging said particles and for electrically connecting the particles to the anode.

3. Apparatus as defined in claim 2 wherein the dangler comprises a titanium bob for engaging said particles.

4. Apparatus as defined in claim 2 wherein the dangler comprises a linked chain for engaging the particles.

5. Apparatus as defined in claim 2 wherein the dangler comprises a linked chain and a titanium bob at the end of said chain.

6. Apparatus as defined in claim 2 wherein the dangler includes a rigid upper portion and a flexible lower portion.

7. Apparatus as defined in claim 2 including a hook on said dangler for connecting to an anode bar for said anode.

8. For use in electrolytic plating apparatus of the type having a plating bath, an anode bag containing an anode, and wherein an electrically conducting body to be plated is cathodic; the improvement in said anode which comprises, a basket pervious to electrolyte for containing pieces of anodic material for plating on said body, said basket being at least partially constructed of a metal which is uncorroded by, but becomes polarized in, said bath and which effects electrical contact to the material, and a flexible dangler comprising a metal which is uncorroded by, but becomes polarized in, said bath connected to said basket and of a length to make electrical connection to particles falling from said basket and collected in said bag.

9. Apparatus as defined in claim 8 wherein said metals are titanium.

References Cited by the Examiner

UNITED STATES PATENTS

2,104,812	1/1938	Phillips	204—283

FOREIGN PATENTS

634,495	1/1962	Canada.

JOHN H. MACK, *Primary Examiner.*

JOSEPH REBOLD, *Examiner.*