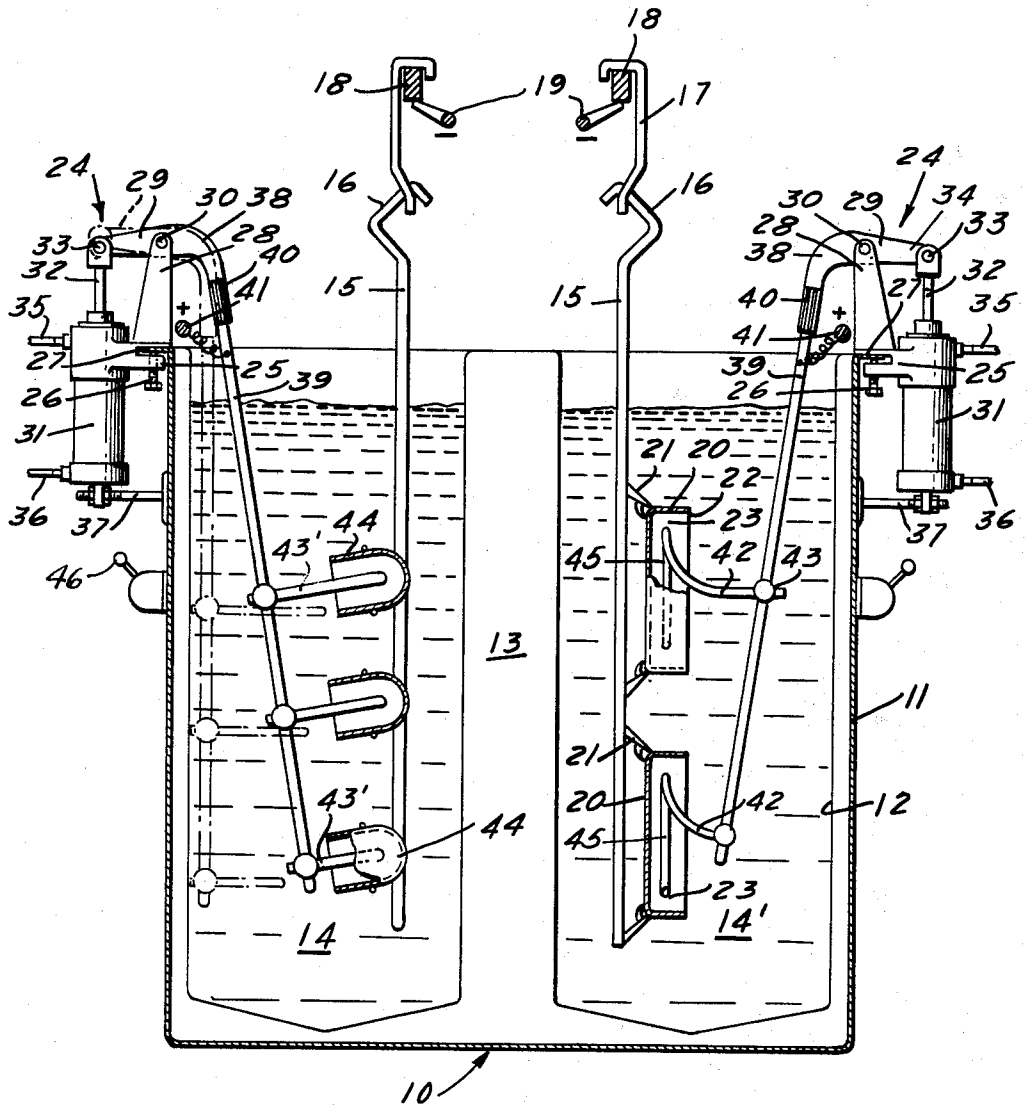
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ANODE SHIFTING DEVICE FOR ELECTROPLATING APPARATUS

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Alfred F. Gualdieri Sr.,
Milton A. Plantin,
INVENTORS.

BY
Robert W. McManigal
Attorney

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ANODE SHIFTING DEVICE FOR ELECTRO-PLATING APPARATUS

Alfred F. Gualdieri, Sr., 2212 N. Braeburn, Fullerton, Calif., and Milton A. Plantin, 4545 Clubhouse Drive, Lakewood, Calif.

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The present invention relates generally to electroplating apparatus; and is more particularly concerned with improved means for plating the interior of hollow-like articles during a normal plating cycle.

Heretofore it has been a problem, when utilizing conventional plating apparatus, to satisfactorily plate the interior of deep dished or cupped objects without removing, resetting or otherwise disturbing the normal plating cycle.

With the foregoing in mind, it is one object of the present invention to provide an anode which is movably supported in such a manner that it may be placed, when desired, within the cupped or cavity portion of the object, during a normal plating cycle, whereby it is possible to obtain a more uniform plating than with conventional apparatus, and in which it becomes unnecessary to reset or otherwise disturb the object during normal plating cycle.

A further object is to provide a movable anode carrier which is so arranged that projecting anodes thereon may be moved so as to project into the hollow object or article while in a plating position, and which is provided with actuating means which may be connected into automatic and time controlled circuits which enable carrying out of the plating operation automatically.

Another object is to provide anode carriage and supporting means in the form of an accessory which may be applied to a plating tank as a unitary operatively associated assemblage, without the necessity of special installation procedures.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing the invention without placing limitations thereon.

Referring to the accompanying drawing, the single figure therein illustrates an anode supporting arrangement according to the present invention, the invention being disclosed as embodied in a plating tank of conventional construction.

Referring more specifically to the drawing, for illustrative purposes the present invention is shown as being applied to a plating tank as generally indicated at **10**. Tanks for this purpose may be variously constructed, and in the present instance is disclosed as comprising an outer shell **11** and an inner lining **12**. Such tanks may be constructed to provide a single cavity or a compartment, and if desired may be provided with one or more partitions as indicated at **13** so as to separate the tank into a plurality of separate plating compartments or cavities. In the present instance, the tank is shown as being separated into two compartments, namely, a compartment **14** and compartment **14'**, each of which is adapted to contain its own plating solution, object supporting rack and anode carrier mechanism. Since the mechanism in each tank compartment is similarly constructed, it is believed that an explanation of the inventive embodiment as applied to a single tank will clearly disclose the invention.

In each tank, there is provided an object or article supporting rack **15** which is provided with one or more hooks **16** by means of which the rack may be suspended from associated hanger fittings **17** carried by an elongate support member **18** preferably of conducting material and having connection with a bus bar or other member **19** connected with the negative side of an electrical circuit.

The rack **15** may be variously constructed and arranged to support one or more dished or cupped shaped objects as indicated at **20**. These objects may be conventionally supported in the usual manner by fingers as indicated at **21**, clamps or other appropriate mechanical support. Irrespective of the type of support, the object should be supported so that the open end of each object as indicated at **22** will face in a similar direction and provide in effect an access opening to the interior cavity or hollow portion **23** of the object.

The accessory anode supporting structure as generally indicated at **24** comprises a bracket structure **25** which is arranged to be clamped as by means of one or more clamping screws **26** to a rim portion **27** of the tank shell.

Integrally formed with the main body of the bracket is an upwardly projecting arm **28** which forms a support for a lever member **29**, this lever being rockably supported by a pivot **30** between its ends.

Adjacent and outwardly positioned with respect to the arm **28**, is a double acting power cylinder **31** having an operatively associated piston connected with an actuating rod **32** which extends upwardly alongside the arm **28** and is connected at its outermost end by means of a pivot pin **33** to an end **34** of the lever member. As thus arranged, the power cylinder is outwardly disposed of the tank shell and projects generally downwardly from the rim of the tank. Fluid connections **35** and **36** permit controlled actuation of the lever **29** in opposite directions. If desired the lowermost end of the cylinder **31** may be anchored by anchor stud means **37** to the tank shell.

The other end **38** of the lever **29** is shown as being curved so as to form a deflected end which extends generally downwardly along the arm **28**, in spaced relation thereto. This deflected end is secured to a carrier structure **39** through an intervening insulator **40** which permits the carrier to be directly connected with a bus bar **41** having connection with the positive side of an electrical circuit.

The carrier **39** may be constructed so as to form in effect a main anode, or it may constitute a framework which will support main anodes for use in the plating operation generally. In addition to the main carrier **39**, it is proposed to provide adjustable anodes **42** which project from the carrier and may be supported by an adjustable connection **43** thereon. The anodes **42** may assume various configurations. For instance, the anode may be a straight rod or bar as indicated at **43'** so as to be extendable into a cup-shaped object as indicated at **44**. On the other hand, the anode **42** is shown as having a curved outer end portion **45** which will more or less generally peripherally conform to the interior wall of the dished object **20**.

By utilizing an anode supporting structure and operating mechanism as described above, movement of the anodes **42** may readily be accomplished so as to position the electrode so that it will extend through the opening **22** into the interior or cavity of the object and thus facilitate internal plating thereof. On the other hand, when desired, the carrier may be moved to a position so that the electrode will be withdrawn from the interior of the object.

For convenience in controlling the operation of the power cylinder **31**, a manually operable switch **46** may be placed on the side of the tank, or a foot switch (not shown) placed in a convenient location for controlling with conventional valve means the supply of fluid to the power cylinder **31**.

It is also within the concept of the present invention that automatic timing control may be provided to control

the power means and the movement of the carriage 39 according to a predetermined cycle of operation.

Various modifications may suggest themselves to those skilled in the art without departing from the spirit of our invention, and hence, we do not wish to be restricted to the specific form shown or uses mentioned, except to the extent indicated in the appended claim wherein portions of the claim have been separated for clearness and not for emphasis.

We claim:

Electroplating apparatus, comprising:

(a) a tank;

(b) a rack for supporting a plurality of articles having electrical connection with a cathode terminal in plating positions one above the other in said tank;

(c) a carrier including an elongate member extending into said tank, said member being pivotally supported at one end at one side of the tank for swinging movement of its other end relative to said rack;

(d) means for adjustably supporting on said elongate member a plurality of anodes have electrical connection with an anode terminal, the anodes projecting from the elongate member a greater distance as their position approaches the pivot end of the member, and said anodes being movable as a unit with said elongate member to positions closely adjacent said articles and to positions distantly spaced from said articles; and

(e) means for adjustably swinging said elongate member to change the position of said anodes with respect to said articles.

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JOHN H. MACK, *Primary Examiner.*

MURRY TILLMAN, *Examiner.*

A. B. CURTIS, W. VAN SISE, *Assistant Examiners.*