Nov. 14, 1944. C. W. ELSENHEIMER 2,362,474

ELECTROPLATING APPARATUS

Filed July 25, 1941

Fig. 1.

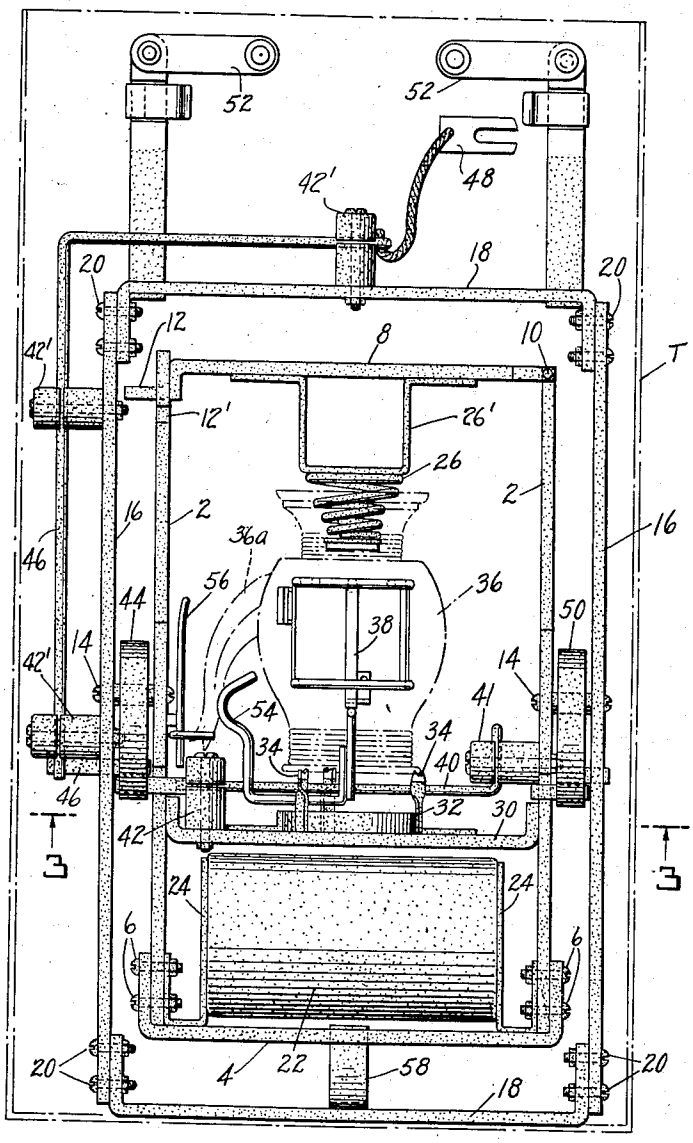


Fig. 2.

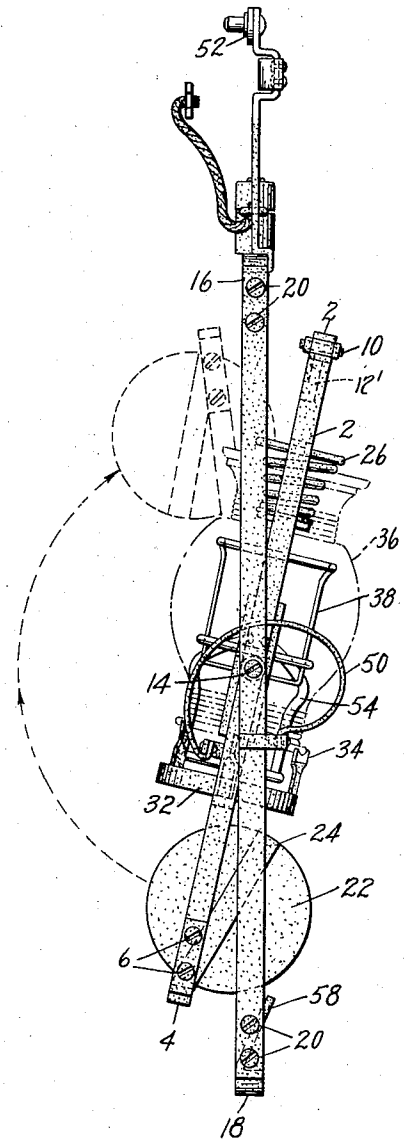
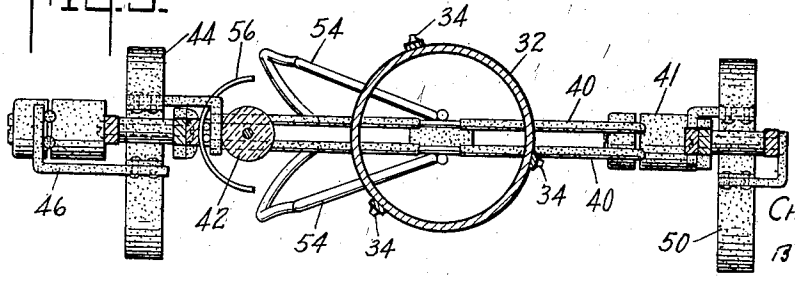


Fig. 3.



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ELECTROPLATING APPARATUS

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10 Claims. (Cl. 204—297)

This invention relates to the art of electroplating, and particularly the plating of hollow-ware.

One object of the invention is a novel and improved apparatus for electroplating hollow-ware which is characterized by the facility with which the apparatus may be operated and the efficient and uniform character of the plating effected on both the outside and inside of the hollow article.

More particularly the apparatus embodying the invention includes means whereby the complete filling of the hollow-ware article with the electrolyte is assured during the plating operation, and still more particularly, a simple apparatus which may be readily immersed in the electrolyte with the hollow articles assuming an erect position completely filled with the electrolyte upon immersion and an inverted empty position upon withdrawing of the apparatus.

Other objects of the invention will hereinafter appear.

For an understanding of the invention, reference may be had to the accompanying drawing, of which

Fig. 1 is a side view of a plating apparatus embodying the invention;

Fig. 2 is a view of the apparatus taken at right angles to the view of Fig. 1; and

Fig. 3 is an enlarged horizontal sectional view taken along the line 3—3 of Fig. 1.

In the particularly embodiment of the invention illustrated, the new plating apparatus includes an inner frame comprising side members 2, an end member 4 fixedly secured to the side members 2 by bolts 6 and a second end member 8 which is pivotally connected at 10 to one side member 2 and releasably connected to the other side member 2 by a latch 12, 12'. The side members 2 of this inner frame are pivotally mounted, as by pins 14, on side members 16 of an outer frame which includes end members 18 secured to the side members 16 by bolts 20.

A combined weight and float 22 is secured adjacent end members 4 of the inner frame, as by brackets 24 having their lower ends (Fig. 1) formed into U-members resting on the cross piece 4 and secured by the bolts 6 to the side frames 2. A spring article-supporting or clamping member 26, 26' is mounted as by welding on the inner side of the end member 8 of the inner frame. A cross member 30, welded or otherwise secured to the side members 2 of the inner frame, carries a ring 32 from which project forked support prongs 34. Spring support 26 and forked prongs 34 engage opposite ends of the article of hollow-ware to be plated, for example the teapot 36 and hold the same firmly therebetween.

An electrode 38 adapted to be enclosed by the article 36, is mounted on conducting rods or wires 40, which rods are supported by insulators 41 and 42 mounted on side member 2 and cross member 30 respectively. Rods 40 are electrically connected by means of a flexible metal ribbon 44 to a conductor 46 insulatedly mounted on the outer frame by the insulator supports 42' and connected to a terminal 48. A similar metal ribbon 50 electrically connects side members 2 and 16 of the inner and outer frames respectively.

Preferably an additional electrode comprising wires 54 connected to the electrode 38 is provided adjacent the spout 36a of the article 36 for aiding in the deposition of plate in the recess between spout and body of the article. A further electrode 56 is attached to the inner frame 2, from which it receives a negative potential during the process of plating. This latter electrode prevents "burning" on the end of the spout; "burning" being the poor, rough, whitish plate which is apt to occur on projecting portions of articles receiving an electroplate.

The outer frame is provided with any suitable means for suspension within the plating tank. As shown, these means may comprise arms 52 which are adapted to be locked to a metal bar (not shown) which is suitably suspended over the tank and connected to the negative side of the plating circuit. All connecting parts of the above described apparatus that are subject to immersion in the electrolyte are covered with a flexible isulating material with the exception of the upper portion of arms 52, the electrodes 38, 54 and 56, the tips of the prongs 34 and the inside of the cup-like end of spring 26.

In operation of the above described apparatus the open neck of the article 36 is first positioned on the prongs 34 and end member 8 is then latched by latch 12, 12' to close the inner frame and bring spring 26 into engagement with the base of the article. The entire assembly is then lowered into the plating tank T, containing the electrolyte. As the assembly is lowered, the float 22 causes the inner frame to pivot about the pins 14 and to rotate in the direction of the arrow in Fig. 2 through an arc of substantially 180 degrees. The hollow article 36 being thus emersed during the reversal of position. The electrolyte completely fills the same and the article, during the plating operation, is held in erect position by the buoyancy of the float 22.

Plating is effected by connection from a suit-

able source of positive potential to terminal 48 and to a plurality of positive electrodes or anodes (not shown) suspended in the tank and by connection of the negative potential of the circuit to the supports 52 by way of the suspending rod therefor. The circuit for the internal plating of the article thus being from terminal 48 through wires or rods 46, flexible ribbon 44, wires 40 to the positive electrodes or anodes 38 and 54, through the electrolyte to article 36 serving as the negative electrode, from the article 36 to the inner frame 2 by way of spring 26—26' and also by way of prongs 34 and member 30 and finally from frame 2 through flexible ribbon 50 and outer frame member 16 to supports 52. The circuit for the external plating of the article 36 is from the positive electrodes or anodes suspended in the tank, through the electrolyte to the article 36 and thence, as above described for the internal plating circuit, to the supports 52.

Upon completion of the plating operation, the rack is lifted from the electrolyte and the float 22 now acting as a weight causes reverse rotation of the inner frame about the pivots 14 with consequent emptying of the article 36 before removal from the tank.

In Fig. 1 the plating apparatus is indicated as within the tank T, shown in dotted lines.

For convenience the apparatus has been shown in Fig. 1 in the position assumed when outside of the electrolytic bath, that is with the member 22 serving as a weight. It will be understood of course, that when the apparatus is within the tank T and immersed in an electrolyte, the inner frame will be in the position indicated in dotted lines in Fig. 2 with the member 22 serving as a float.

As shown best in Fig. 2, the center of the weight or float 22 is preferably slightly offset from the plane of the inner frame. This causes the free position of the inner frame when the rack is out of the bath to be at a slight angle to that of the outer frame and imparts a rotating couple to, and insures positive turning of, the inner frame upon submersion. A stop 58 secured to the lower end member 18 prevents over travel of the inner frame upon removal from the bath.

From the above description it will be apparent that the invention provides a simple yet efficient plating apparatus for hollow-ware that insures the filling of the article with the electrolyte upon immersion into the tank and the subsequent automatic emptying thereof upon removal from the tank, with consequent uniform plating of the same both inside and out. The rack may be easily and economically manufactured and is sturdy and efficient in operation and may be manipulated with the greatest facility.

I claim:

1. An apparatus for use in electroplating an article of hollow-ware comprising in combination an outer frame, an inner frame pivotally mounted in the outer frame, support means on the inner frame for holding the article to be plated, a member carried by said inner frame serving as a float to rotate said inner frame upon immersion of the apparatus in a bath and as a weight to return said inner frame to its initial position upon removal from the bath and electrodes insulatedly carried by the inner frame in proximity to the article.

2. An apparatus for use in electroplating an article of hollow-ware comprising in combination an outer metallic frame, an inner metallic frame pivotally mounted on said outer frame for rotation about a horizontal axis, a member carried by said inner frame adjacent one end thereof, an electrode insulatedly carried by said inner frame, means carried by said inner frame for supporting the article of hollow-ware to be plated with its open end facing said member and with said electrode within but out of contact with, said article, said member serving as a weight to hold said inner frame in a position where the open end of said article is lowermost when the apparatus is not submerged in an electrolyte and serving as a float to rotate said inner frame upon submersion of the apparatus whereby the article is automatically filled with electrolyte upon submersion into a bath and automatically emptied upon removal therefrom.

3. In an electroplating apparatus for hollow-ware, a frame pivotally mounted for rotation about a horizontal axis, means carried by said frame for supporting an article of hollow-ware having an open mouth, a member carried by said frame and acting as a weight to pivot said frame into position where the mouth of the article is lowermost when the frame is not submerged in an electrolyte and acting as a float to rotate said frame in the opposite direction upon submersion into an electrolyte.

4. An apparatus for use in electroplating an article of hollow-ware comprising an outer frame adapted to be conductively connected to and supported within a tank containing an electrolyte, an inner frame pivotally mounted on said outer frame for rotation about a horizontal axis, a drum mounted on said inner frame adjacent one end thereof, means carried by said inner frame for supporting the article to be electroplated with the open mouth thereof facing said drum, a flexible conducting strip connecting said inner and outer frames, a terminal insulatedly mounted on said outer frame, an electrode insulatedly carried by said inner frame and positioned to be within the article when mounted on said support means and a flexible conductor connecting said electrode and said terminal, said drum serving as a float upon submergence of the apparatus in an electrolyte to rotate said inner frame in one direction and as a weight, upon removal of the apparatus from the electrolyte to rotate the inner frame in the opposite direction.

5. An apparatus for use in electroplating an article of hollow-ware comprising an outer frame adapted to be conductively connected to and supported within a tank containing an electrolyte, an inner frame pivotally mounted on said outer frame for rotating about a horizontal axis, a drum mounted on said inner frame adjacent one end thereof, means carried by said inner frame for supporting the article to be electroplated with the open mouth thereof facing said drum, a flexible conducting strip connecting said inner and outer frames, a terminal insulatedly mounted on said outer frame, an electrode insulatedly carried by said inner frame and positioned to be within the article when mounted on said support means and a flexible conductor connecting said electrode and said terminal, said drum serving as a float upon submergence of the apparatus in an electrolyte to rotate said inner frame in one direction and as a weight, upon removal of the apparatus from the electrolyte to rotate the inner frame in the opposite direction, said drum being mounted on said inner frame with its center of gravity out of the plane of said inner frame and a stop being provided which is carried by said outer frame in a position to engage and thereby

limit the rotation of said inner frame upon removal of the apparatus from the bath.

6. An apparatus for electroplating an article of hollow-ware comprising an electrolytic bath, a frame adapted to be lowered into and lifted from the bath, support means for the hollow-ware mounted on said frame and pivotable with respect thereto, and means responsive to the immersion of said frame into the electrolytic bath for adjusting said support means to a position to support the article in upright position when within the bath and responsive to removal from the bath for adjusting the support means to a position to support the article in inverted position, the support means carrying a buoyant device which reverses the position of the support relatively to the frame when immersed in the electrolyte.

7. An apparatus for electroplating an article of hollow-ware comprising an electrolytic bath, a frame adapted to be lowered into and lifted from the bath, support means for the hollow-ware mounted on said frame and pivotal with respect thereto, and means responsive to the immersion of said frame into the electrolytic bath for adjusting said support means to a position to support the article in upright position when within the bath and responsive to removal from the bath for adjusting the support means to a position to support the article in inverted position, the support means being movable about the carrying frame through substantially 180° for insuring the filling of the hollow article during the immersing operation and the emptying of the same upon the withdrawal of the device from the electrolyte.

8. An apparatus for electroplating an article of hollow-ware comprising an electrolytic bath, a frame adapted to be lowered into and lifted from the bath, support means for the hollow-ware mounted on said frame and pivotable with respect thereto, and means responsive to the immersion of said frame into the electrolytic bath for adjusting said support means to a position to support the article in upright position when within the bath and responsive to removal from the bath for adjusting the support means to a position to support the article in inverted position, the support means carrying a buoyant device for moving the support from one position to the other when immersed and said device being offset from the vertical plane through the carrying frame so as to impart an operating couple to said support when immersed.

9. An apparatus for electroplating an article of hollow-ware comprising an electrolytic bath, a frame adapted to be lowered into and lifted from the bath, support means for the hollow-ware mounted on said frame and pivotable with respect thereto, and means responsive to the immersion of said frame into the electrolytic bath for adjusting said support means to a position to support the article in upright position when within the bath and responsive to removal from the bath for adjusting the support means to a position to support the article in inverted position.

10. An apparatus for electroplating an article of hollow-ware comprising a carrying frame and supporting means for said hollow-ware carried thereby adapted to be dipped into an electrolytic bath, said support means being pivotally mounted on the frame for relative movements thereon and being weighted to assume a definite position relatively thereto when out of the bath with the hollow ware in self-emptying position and means responsive to the immersion of said frame and supporting means in the bath and operatively connected with said supporting means for shifting the position of said supporting means relatively to the frame from said definite position upon immersion to the reversed position with the hollow-ware right side up and filled with electrolyte.

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