July 19, 1932. A. H. HANNON 1,868,320

ELECTROPLATING MACHINE

Original Filed March 13, 1931

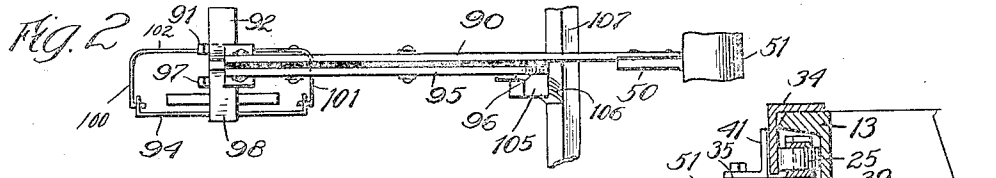


Fig. 2

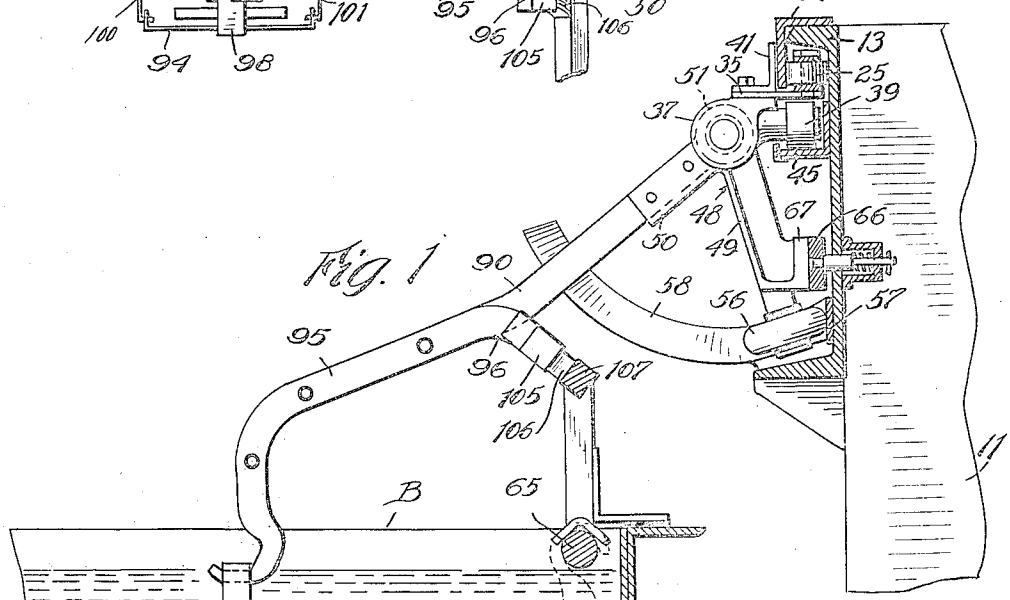


Fig. 1

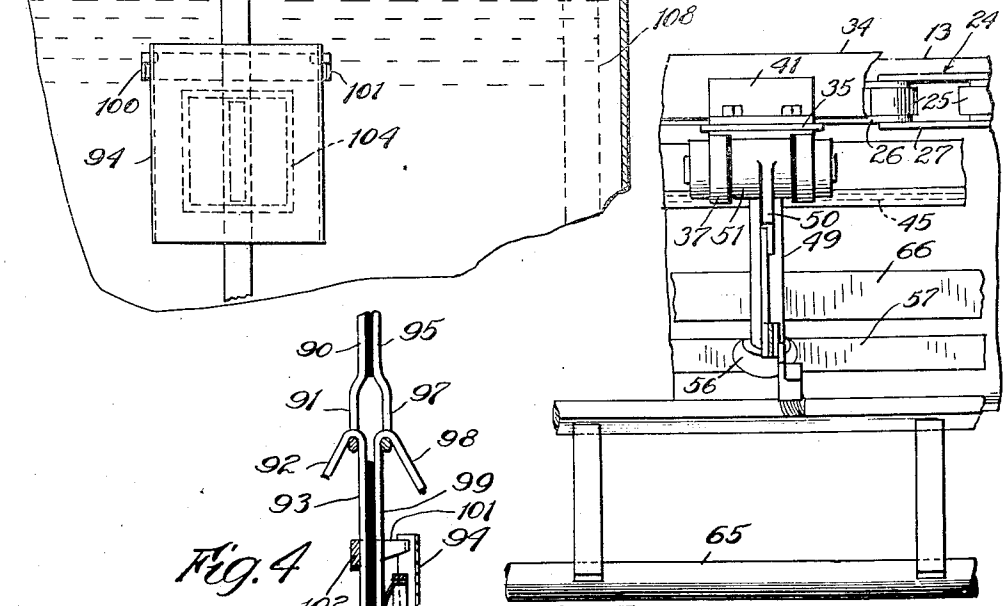


Fig. 3

Fig. 4

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ELECTROPLATING MACHINE

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This invention relates to improvements in electroplating machines such as shown in my companion application of even date, and relates more particularly to means for suspending an electrode on the work carrier arm in close relation to the work and supplying current thereto.

In some classes of plating, such as chromium plating, it is necessary to have an electrode positioned in close relation to the work in the solution on account of the poor "throwing power" in the plating process. The electrode serves to distribute the current and hence the plate over the surface of the work, and this may be an auxiliary electrode of insoluble material, the metal for the plating being supplied by soluble bars stationarily suspended in the tank.

Therefore among the objects of this invention are to provide a work carrier means having relatively insulated portions for carrying the work and the electrode along together through the tanks in closely spaced relation; to provide such a device in which the work is easily handled in attaching or detaching the work from the carrier; and to provide a simple arrangement for automatically connecting the current to the insulated portions of the carrier at the time when the work is lowered into the plating tank.

Other objects and advantages will become apparent in the following description, with reference to the accompanying drawing, in which an illustrative embodiment of my invention is shown.

Fig. 1 is a fragmental cross section of the plating machine in which parts, such as the conveying mechanism, correspond to the mechanism which is more fully shown and described in said application, the same reference characters being used for the same parts.

Fig. 2 is a plan view of the carrier arm.

Fig. 3 is a front elevation of parts shown in Fig. 1, with the carrier arm in section.

Fig. 4 is a front elevation of the outer end of the carrier arm.

At the side of the plating tank B is mounted a longitudinally extending channel frame member 13, supported by vertical columns 11. On the top flange of the frame member is secured an angle member 34, which has one leg portion depending in spaced relation from the web of the channel member. In this space is laterally guided a chain belt comprising the rollers 25, and at intervals on the lower side of the chain are attached the projecting plates 35 to which the brackets 36 are secured. A short angle member 41 is secured to the top of the plate 35 for engaging the outer surface of the depending portion of the angle 34 directly opposite to the two adjacent chain rollers. An anti-friction roller 39 is provided on the inner side of the bracket for riding on the supporting rail 45 which is fixedly mounted on the web of the channel. In this manner the bracket is firmly supported and guided as it is moved horizontally along on the side of the frame by the chain belt which is continuously driven, as described in said application.

Each bracket has two spaced lugs 37 in which is pivotally mounted, for vertical movement with respect to the bracket, the arm member 48 which has a depending portion 49, and an outwardly projecting portion 50. On the lower end of the arm portion 49 is mounted a supporting roller 56, which travels on the cam track 57, mounted on the side of the frame and at the ends of the tanks arcuate cam projections 58 are provided in the track for raising and lowering the arm to carry the work over the end of the tank. The arm is electrically insulated from the bracket and the roller 56 is insulatingly mounted on the arm, to protect the frame from the plating current, and a current carrying connection is made to the arm when the arm is in the lowered position, as shown in Fig. 1, by means of a bus bar 66 which extends along the lower portion of the frame and is yieldably mounted thereon, the bus bar being slidably contacted by the integral portion 67 of the arm.

To the arm portion 50 is riveted an extension or bar 90, which extends out over the tank and is provided with a hook 91 at the outer end for engagement of the hook 92 of the work support rack bar 93. Thus when the arm is lowered into the tank, the work 94,

suspended on the rack, is directly connected electrically, to the bus bar 66.

On one side of the outer portion of the arm extension member 90 is insulatingly mounted a bar 95 which conforms substantially to said member and forms a portion of the arm as a whole. The bar 95 has a downwardly projecting portion 96 on the upper end, and at the outer end the bar 95 has a hook 97 formed therein for engagement of the hook 98 of the electrode supporting bar 99 which is rigidly attached to the work rack bar 93, and insulated therefrom.

The piece of work 94 is hung in front of the bar 99 on the projections 100 and 101 of the bracket 102 which is mounted on the rear side of the bar 93; and the rectangular frame electrode 104 is mounted on the bar 99 so that it is in spaced relation with the work and the current flowing between the work and the electrode is thereby distributed. On the downwardly projecting portion 96 of the insulated bar 95 is mounted a brush holder 105, which holds a plurality of flexible copper plates 106 for contacting with the bus bar 107. For convenience the bar 107 may be mounted on the rod 65 which is commonly mounted at and extends along one side of the tank for supporting the soluble anodes 108 and supplying current thereto.

In the plating operations the bar 65 is usually connected to the positive side of the electrical source, and the bus bar 66 to the negative side so that the current will flow from the soluble electrodes 108, from which the plating metal is taken, through the solution to the work where the metal is deposited. The current then flows from the work, back through the carrier arm to the negative side of the source. In this arrangement the frame 104 serves as an auxiliary positive electrode for supplying current to the work, taking metal directly out of the solution which is saturated with metal taken from the bars 108. In some operations it is desirable to reverse the flow of the current, and this may be readily accomplished by connecting the bar 107 to the positive side of the source and the bar 66 to the negative side.

In this invention a simple construction and arrangement of parts is provided for obtaining the double contact at the end of the carrier arm. The electrode can be permanently attached to the work rack so that it can be hung on the arm at the same time and is maintained in fixed relation with the work as the work is carried through the tanks. The bus bars for carrying the heavy plating current are well protected in every respect, and a firm sliding contact is automatically made to the bars without the provision of extra parts or special movements of the mechanism.

While I have illustrated and described but one illustrative embodiment of my invention, many alterations and omissions may be made without departing from the spirit of the invention, as defined in the following claims:

1. In an electroplating machine, a plating tank, a work carrier arm extending over the tank, the arm being moved horizontally along the tank and pivotally supported to swing vertically, means for swinging the arm up as it is moved over the ends of the tank, the work being suspended on the end of the arm, a bar insulatingly mounted on the outer end of the arm for supporting an electrode in close relation to the work, and a current carrying bus bar extending along the tank slidably contacted by said bar in lowered position of the arm for supplying the plating current.

2. In an electroplating machine, a plating tank, a work carrier arm extending over the tank, the arm being pivotally supported to swing vertically and moved along in a horizontal plane, means for raising and lowering the arm as it is moved along at the ends of the tank, the work being suspended on the end of the arm, a bar insulatingly mounted on the outer portion of the arm for supporting an electrode in close relation with the work, and two bus bars extending along the tank for supplying the plating current, one bar being contacted by the arm in lowered position and the other bar being contacted by the bar.

3. In an electroplating machine, a plating tank, a work carrier arm extending over the tank, a bracket moved horizontally along the tank, an arm extending over the tank pivotally mounted on the bracket to swing up and down, means for raising the arm at the ends of the tank, a bar insulatingly mounted on the outer portion of the arm, the arm and the bar having hooks at their ends, the work being suspended from one hook and an electrode from the other hook, and two current carrying bus bars of relatively opposite polarity extending along the tank, one bus bar being contacted by the arm in lowered position and the other bus bar being contacted by the bar.

4. In an electroplating machine, a plating tank having an electrode supporting rod extending along one side thereof, a frame mounted at one side of the tank, a bracket slidably supported on one side of the frame, means for moving the bracket along the frame, a carrier arm pivoted to the bracket and extending over the tank, means for swinging the arm up at the ends of the tank, a bar insulatingly mounted on the side of the outer portion of the arm, the arm and the bar each having a hook at the outer end respectively for supporting the work and an electrode in close relation with the work, a current carrying bus bar mounted on the side of the frame and contacted by the arm in lowered position, and a current carrying bus

bar connected to said electrode supporting rod and contacted by the bar, said bus bars being of opposite polarity.

5. In an electroplating machine, a tank, a frame extending along the side of the tank, a bracket slidably guided and supported on the side of the frame, means for moving the bracket along the frame, an insulated work support arm pivoted to the bracket and overhanging the tank, means for raising and lowering the arm for carrying the work into and out of the tank, a bar for supporting an electrode, said bar being mounted on the side of said arm and insulated therefrom, and a bus bar extending along the tank for contacting with said arms in lowered position to supply current thereto for plating the work.

6. In an electroplating machine, a plating tank, a frame mounted at one side of the tank, a conveyor chain extending along the side of the frame and guided laterally thereon, a bracket firmly attached to the chain, an insulated arm for supporting the work pivoted to the bracket and extending over the tank, a cam track for slidably supporting the arm mounted on the frame and having projecting portions for raising and lowering the arm as the arm is carried over the end of the tank, a bus bar mounted on the frame and slidably contacting with the arm in lowered position, a bar insulatingly mounted on the outer portion of said arm, for supporting an electrode in close relation to the work, and a bus bar extending along the tank which is slidably contacted by said insulated bar when the arm is lowered, said bus bars being connected to the opposite polarities of an electrical source.

7. In an electroplating machine, a tank, a frame extending along the side of the tank, a bracket slidably guided and supported on the side of the frame, means for moving the bracket along the frame, an insulating work support arm pivoted to the bracket and overhanging the tank, means for raising and lowering the arm for carrying the work into and out of the tank, an arm mounted on the side of said arm and insulated therefrom, and bus bars mounted on the frame of the tank for contacting with said arms in lowered position to supply current thereto for plating the work.

Signed at Springfield, Ohio, this 4th day of February, 1931.

ALBERT H. HANNON.