

Dec. 14, 1948.

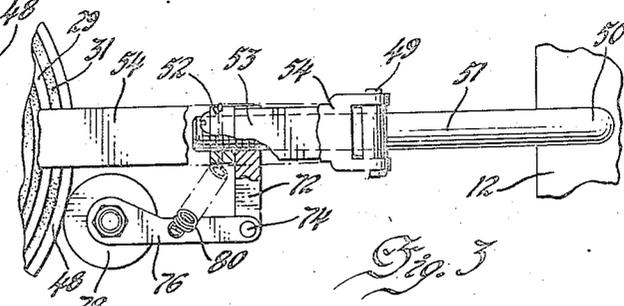
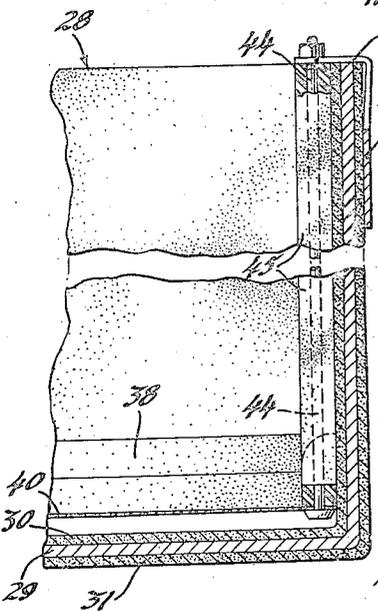
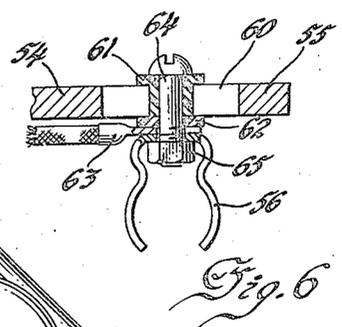
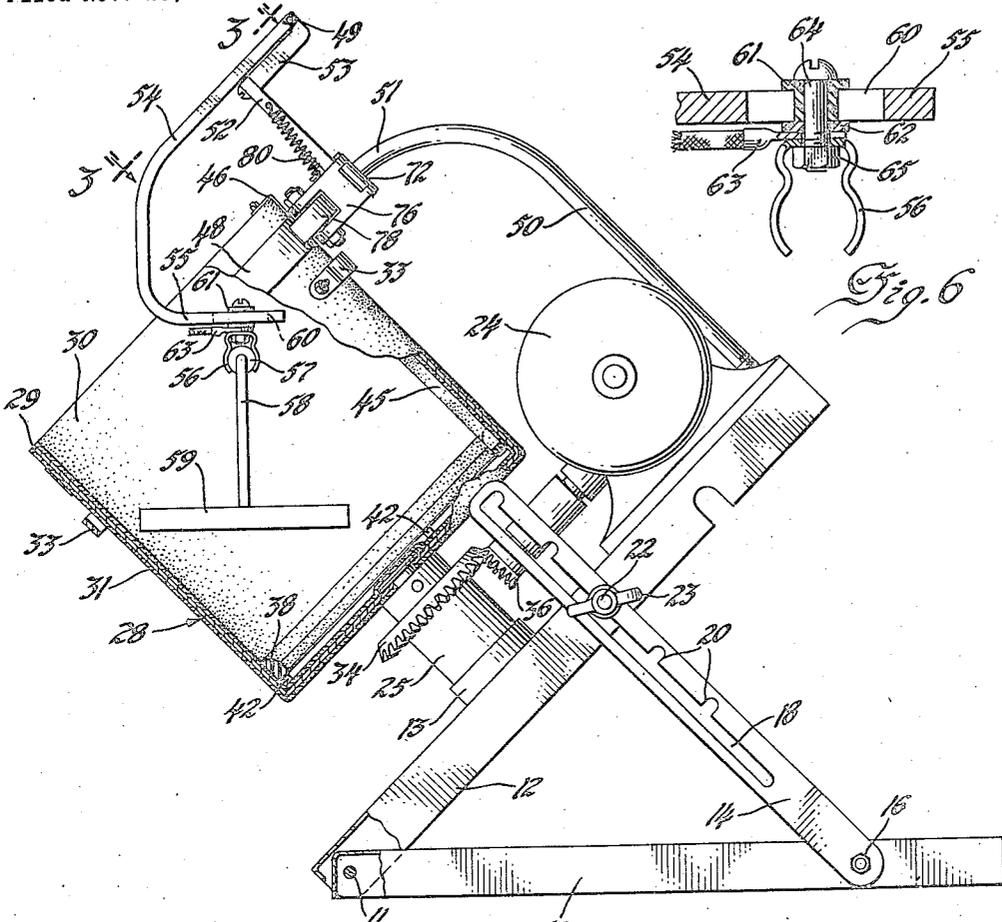
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2,456,185

ELECTROPLATING APPARATUS

Filed Nov. 23, 1944

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

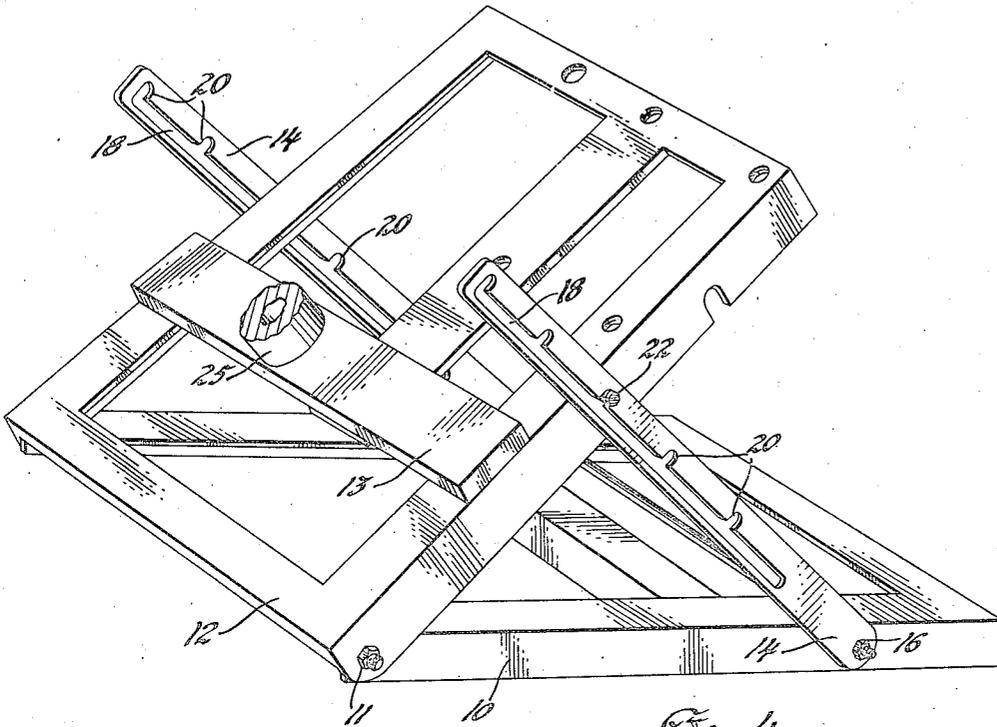


Fig. 4

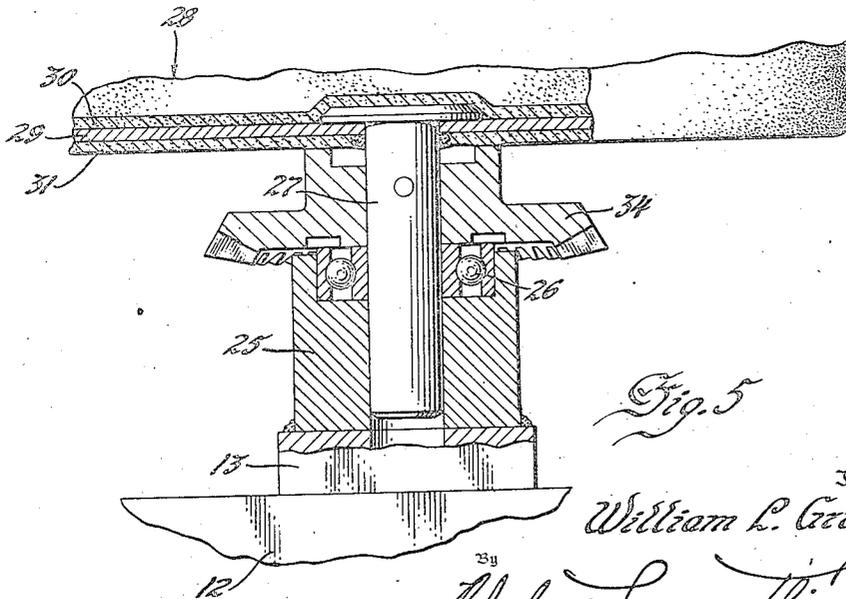


Fig. 5

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# UNITED STATES PATENT OFFICE

2,456,185

## ELECTROPLATING APPARATUS

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Application November 23, 1944, Serial No. 564,751

4 Claims. (Cl. 204—214)

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This invention relates to an electroplating apparatus and more particularly is concerned with a barrel electroplating apparatus.

Among the objects of the invention are the following: to provide improvements in barrel-type plating devices; to provide a barrel plating apparatus of simple and light weight construction and one especially adapted for plating parts of relatively small sizes, such as, for example, screws, bolts, nuts, brackets, hooks, etc.; to provide a barrel plating apparatus of simple construction having a wide range of adjustments; to provide an improved barrel plater having simplified means of adjusting the anode for various positions of adjustment of the barrel; to provide improvements in barrel platers whereby the barrel is easily removed from, and replaced in, the apparatus; to provide a barrel plater having simple means for adjusting and changing the adjustment of the barrel; to provide a barrel plater of simple and compact construction; to provide an improved barrel construction for use in barrel-plating apparatus; and to provide improvements in barrel plating equipment adapted to be readily converted to accommodate different plating solutions and parts to be plated.

Other objects and advantages of the invention will become more apparent from the detailed description which follows, attention being directed to the accompanying drawings which illustrate a device in accordance with one embodiment of the invention.

Figure 1 is an elevational view with parts broken away and in section of a barrel plating apparatus in accordance with said embodiment of the invention.

Figure 2 is a sectional view on an enlarged scale of a portion of the device of Figure 1, showing more clearly the relationship between the barrel and associated parts.

Figure 3 is a fragmentary view taken substantially on line 3—3 in Figure 1, certain parts being broken away to show the construction more clearly.

Figure 4 is a perspective view on a somewhat enlarged scale of a portion of the apparatus shown in Figure 1.

Figure 5 is a view with parts broken away and in section of a portion of the apparatus of Figure 1, illustrating more fully the relationship between the barrel, a means for rotating the same and means permitting the barrel and a gear and spindle connected therewith to be lifted from the device as a unit.

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Figure 6 is a detail view with parts in section showing more clearly and on an enlarged scale, a portion of the device of Figure 1.

In the drawings, 10 represents a base to which is hinged at 11 a frame 12. The hinged frame is adjustably held in an inclined position during plating by means of straps 14 pivoted at 16 to the base 10. Each strap 14 is slotted at 18. The slots are enlarged at spaced intervals to form spaced seats 20 which are adapted to accommodate threaded pins 22 fixed to opposite sides of the frame 12. A wing nut 23 engages the threaded end of each pin 22. The slots, seats, pins and wing nuts provide for adjustably mounting the frame in any one of a plurality of inclined positions as will be readily understood. The wing nuts, when tightened, secure the parts in any position of adjustment.

The frame 12 has a cross-bar 13 to which is welded a boss 25. The boss 25 has a thrust bearing 26 adjacent the upper end thereof. Extending within and journaled in the boss 25 is a flanged spindle 27 which is secured to a barrel or bucket indicated generally at 28 for containing the electrolyte. The barrel is made up of a central section 29 of metal which is covered both inside and out by a plastic layer or liner such as "Koroseal," which is a vinylchloride plastic, "neoprene," which is a synthetic rubber made by polymerization of chloroprene, or other plastic inert with respect to the plating solution or electrolyte. The inner layer of plastic is indicated by 30 and the outer layer by 31. Fixed to the barrel are handles 33. Resting on the thrust bearing 26 and fixed to the spindle 27 is a gear 34. The gear 34 is engaged and driven by a gear 36 which in turn is driven by a motor 24 mounted on the frame 12. Thus the construction is such that the barrel and means for rotating the same are movable as a unit with the hinged frame. Within the barrel adjacent the lower portion thereof is a ring-shaped member 38 formed of fabric treated with "Bakelite," a phenol formaldehyde resin or similar non-metallic material which snugly engages the inner walls of the barrel to secure a metallic screen 40 in position adjacent the lower or bottom of the barrel. A plurality of similar spacers 42 spaces the screen from the bottom of the barrel. The metallic screen serves as support for the parts to be plated and as a part of the system for conducting plating current. The ring 38, screen 40 and spacers 42 are removable. A metallic rod 44 having its lower end in current conducting engagement with the screen extends upwardly within a sleeve 45 of duck treated with

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"Bakelite" or similar non-metallic material arranged in the barrel adjacent one side wall. A current conductor 46 joins the upper end of the rod 44 with a flat ring 48 of copper or other suitable current conducting material, said ring being secured to the outside of the barrel adjacent the upper end thereof.

Extending upwardly from the frame 12 is a post 50, the upper end portion 51 of which curves toward the barrel. The extreme end of portion 51 is threaded and carries a bracket made up of parts 52 and 53 firmly secured together. Hinged at 49 to part 53 is a curved bar 54, the lower end portion 55 of which extends within the upper end of the barrel. The lower end portion 55 of the curved bar has secured thereto a spring-clip 56 having a seat for engaging the ball-end 57 of a rod 58. To the lower end of the rod 58 is secured an anode 59 of the metal to be deposited. Figure 6 illustrates more fully the means for securing the spring-clip to the lower end 55 of the curved bar. Portion 55 has an elongated slot 60 therein. A flanged-sleeve 61 of "Bakelite" or similar material has its flanged-end resting on the upper face of the end 55 of the bar. Below the sleeve is a washer 62 of "Bakelite" or similar material of greater dimension than the width of the slot 60. Below the washer is a current conductor 63 and next the spring-clip. The flanged-sleeve 61, washer 62, conductor 63 and spring clip are fastened together by a bolt 64, and nut 65. The flanged-sleeve 61 and washer 62 are made of a suitable dielectric such as "Bakelite" and electrically insulate the spring-clip and conductor 63 from the end portion 55 of bar 54 in any position of adjustment of the parts in the elongated slot 60.

The portion 51 of the post 50 also carries a bracket 72 to which is pivoted at 74 an arm 76, the free end of which carries a roller 78 of copper or other suitable conducting material. The roller is spring-biased into engagement with the flat ring 48 as by means of spring 80 fixed to the arm 76 and member 52.

In operation the parts to be plated are placed in the electrolyte in the barrel 26, the barrel and hinged frame 12 being held in an inclined position by means of the slotted straps 14. The degree of inclination may be readily varied depending on the conditions and the frame held in any position of adjustment. The slotted-strap construction permits bringing the frame 12 into a position resting on the base 10 if desired in order to occupy less space when the device is not in use. By means of the spring-clip 56 the anode 59 is held in any desired position in the electrolyte in the barrel. The position of the anode may be readily changed by moving the ball-end 57 of the rod 58 carrying the anode within the ball-shaped seat of the spring-clip. The spring-clip has sufficient strength to frictionally hold the ball-end of the rod 58 and anode in any position of adjustment. The slot 60 permits further adjustment, if desired.

The positive side of a source for supplying direct current (not shown) leads to conductor 63 and by means of the spring clip and rod 58 to the anode 59. The opposite or negative side of the direct current source is electrically joined to the roller 78, as for example, by a conductor secured to the arm 76. The plating current will pass from the anode through the electrolyte to the parts to be plated on the metallic screen 40 in the lower portion of the barrel, then through the screen, rod 44, and conductor 46 to the ring 48, and thence to the roller 78 and to the negative side of the

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electric power source. During the plating operation the barrel is rotated by means of the electric motor and gearing 34, 36 and the roller 78 is spring-biased into contact with the ring 48. Thus the ring and contacting roller permit the plating current to flow in all positions of rotation of the barrel.

When the desired amount of metal has been plated on the parts to be plated the plating current is cut off. The curved bar 54 and the anode supported thereby are then moved by swinging the bar about the hinge 49. The roller 78 is moved from contact with the ring 48, and the barrel and associated parts may then be removed by the operator grasping the handles 33 and lifting thereon. This simple operation removes the barrel, electrolyte and plated parts therein, flanged spindle 27 and gear 34 as a unit. The electrolyte may then be removed from the barrel and the barrel used, if desired, in the subsequent cleaning and rinsing operations which may be given the plated parts. The barrel and parts carried thereby are then replaced in the apparatus and the device is ready for plating other work.

As an illustrative example, small steel screws have been plated in the apparatus with a thin electrodeposit of cadmium using a conventional aqueous cadmium plating electrolyte and anode of cadmium. If desired to plate parts with another metal it is a simple matter to remove the barrel and electrolyte, then dump the electrolyte from the barrel, rinse the barrel, change the screen if necessary, insert a sufficient amount of the other electrolyte and replace the barrel with the different electrolyte in the apparatus. A different anode will be employed in place of the cadmium anode.

I claim:

1. In barrel electroplating apparatus, a base, a frame hinged to the base, means for adjustably holding the frame in any one of a plurality of inclined positions, a tubular boss fixed to said frame, a bearing at the upper portion of said boss, a spindle mounted for rotation in said tubular boss, a plating barrel having plastic inner and outer liners and fixed to the upper end of said spindle for rotation thereby, a gear fixed to said spindle and resting on said bearing, said barrel, spindle and gear being removable as a unit by moving said spindle upwardly out of said tubular boss, a second gear engaging the first gear, an electric motor carried by the hinged frame for driving said second gear, a continuous ring-shaped current conductor carried on the outside cylindrical surface of the barrel, a support carried by said frame, an arm having one end pivoted to said support, a roller of current conducting material carried by the other end of said arm, a spring connected to said arm at a point between the pivoted end and said roller for biasing said roller into contact with said ring-shaped current conductor, a screen of current conducting material in said barrel adjacent the bottom thereof, a current conductor joining the ring-shaped current conductor and the screen, a hinged-bracket carried by said support having its lower end portion adjacent the top of the barrel, a spring-clip electrically insulated from and carried by the hinged-bracket, an anode, and an anode support having a universal joint connection with the spring-clip.

2. In barrel electroplating apparatus, a base, a frame hinged to the base, means for adjustably holding the frame in any one of a plurality of in-

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clined positions, a tubular boss fixed to said frame, a bearing at the upper portion of said boss, a spindle mounted for rotation in said tubular boss, a plating barrel having inner and outer liners of non-metallic material fixed to the upper end of said spindle for rotation thereby, a gear fixed to said spindle and resting on said bearing, said barrel, spindle and gear being removable as a unit by moving said spindle upwardly out of said tubular boss, a second gear engaging the first gear, an electric motor carried by the hinged frame for driving said second gear, a continuous ring-shaped current conductor carried on the outside cylindrical surface of the barrel, a support carried by said frame, an arm having one end pivoted to said support, a roller of current conducting material carried by the other end of said arm, a spring connected to said arm at a point between the pivoted end and said roller for biasing said roller into contact with said ring-shaped current conductor, a screen of current conducting material in said barrel adjacent the bottom thereof, a current conductor joining the ring-shaped current conductor and the screen, a hinged-bracket carried by said support having its lower end portion adjacent the top of the barrel, and an anode adjustably supported by said hinged-bracket.

3. In barrel electroplating apparatus, a base, a frame hinged to the base, means for adjustably holding the frame in any of a plurality of inclined positions, a tubular boss fixed to the frame, a thrust bearing in the upper end of said boss, a spindle mounted for rotation in said boss, a plating barrel having non-metallic inner and outer surfaces and fixed to the upper end of the spindle for rotation thereby, a gear fixed to the spindle and resting on said thrust bearing, said barrel, spindle and gear being removable as a unit by moving said spindle upwardly out of said tubular boss, a second gear engaging the first gear, an electric motor carried by the frame for driving said second gear, a continuous ring-shaped current conductor carried by the outside cylindrical surface of the barrel, a support carried by said frame, an arm having one end pivoted to said support, a roller of current conducting material carried by the other end of said arm, a spring connected to said arm at a point between the pivoted end and roller for biasing said roller into contact with said ring-shaped current conductor, a removable screen of current conducting material in said barrel adjacent the bottom thereof, a current conductor connecting the ring-shaped current conductor and screen, a hinged-bracket carried by said support having its lower end portion adjacent the top of the barrel, and adjustable means carried by the hinged-bracket for holding an anode in position in the barrel.

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4. An apparatus for electrodepositing metal comprising a base; a frame hinged to the base; means for holding the frame in any one of a plurality of inclined positions consisting of a pair of slotted straps having spaced seats formed therein and being pivoted to the base, a pair of threaded pins fixed to the hinged frame and means for securing the pins in the spaced seats; a tubular boss fixed to the frame; a thrust bearing carried by the tubular boss; a spindle mounted for rotation in said tubular boss; a plating barrel having plastic inner and outer liners and fixed to the upper end of the spindle for rotation thereby; a gear fixed to said spindle and resting on said thrust bearing; said barrel, spindle, and gear being removable as a unit by moving said spindle upwardly out of said tubular boss; a second gear engaging the first gear; an electric motor carried by the hinged frame for rotating said second gear; a continuous ring-shaped current conductor carried on the outside cylindrical surface of the barrel; a support carried by said hinged-frame; a first arm having one end pivoted to said support; a roller of current conducting material carried by the other end of said first arm; spring means connected to said first arm at a point between the pivoted end and the current conducting roller for biasing said roller into contact with the ring-shaped current conductor in all positions of rotation of the barrel; a screen of current conducting material in said barrel adjacent the bottom thereof; a current conductor joining the ring-shaped current conductor and screen; a second arm hinged at one end to said support; a spring clip electrically insulated from and carried by the free end of the hinged arm; an anode; and an anode support having a universal joint connection with the spring clip.

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