July 2, 1963 A. LAZARO 3,096,270

ELECTROPLATING APPARATUS

Filed Jan. 25, 1961

FIG. 1

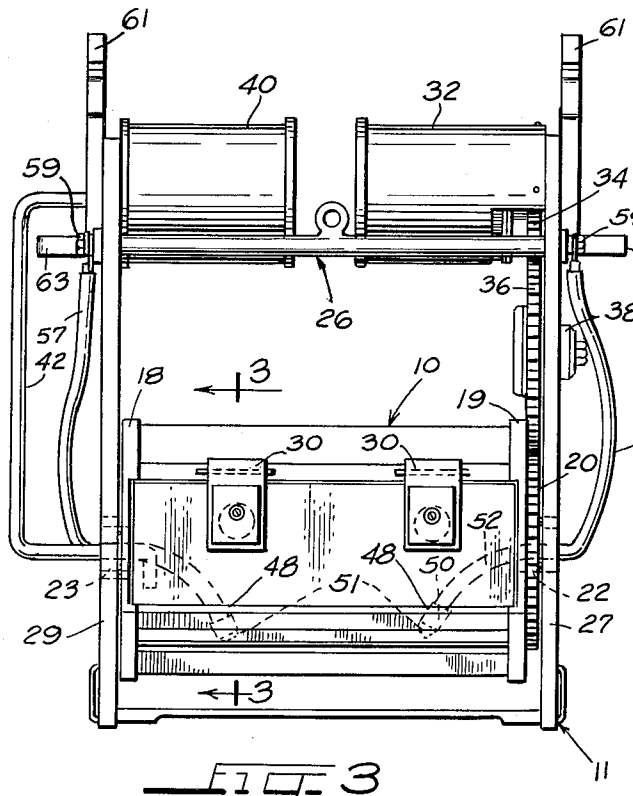


FIG. 2

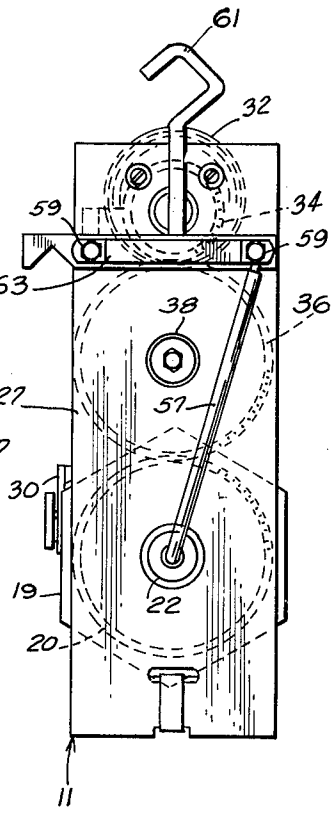
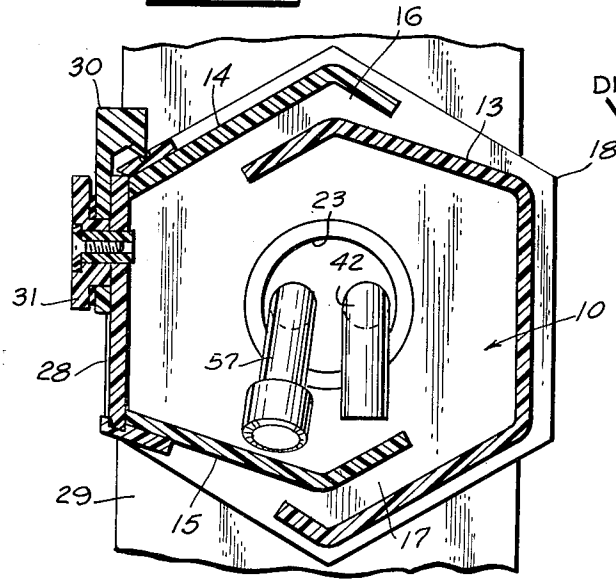


FIG. 3



DIRECTION OF ROTATION

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3,096,270
Patented July 2, 1963

3,096,270

ELECTROPLATING APPARATUS

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Filed Jan. 25, 1961, Ser. No. 84,910
4 Claims. (Cl. 204—213)

The present invention relates to an apparatus for electroplating and is particularly concerned with apparatus of the type in which a plurality of relatively small articles may be placed in a container and immersed in a plating solution while the container is rotated in order to insure the uniform application of the plating solution to the articles.

Prior art devices of this type have always been perforated in order to enable plating fluid to gain entry or exit from the container which is commonly referred to as a plating barrel. The use of perforations in an electroplating barrel has many disadvantages, the correction of which forms a primary object of this invention. These perforated electroplating barrels are particularly disadvantageous when it is desired to electroplate small parts because the parts can be lost in the electroplating solution if the perforations are not small enough. Therefore, in order to electroplate a number of small parts of different size, it becomes necessary to have a plurality of plating barrels with different size perforations to accomplish immersion of the parts in the electroplating solution without losing them in the solution.

It is, therefore, an object of this invention to provide an electroplating apparatus which has a new and improved electroplating barrel.

It is further an object of this invention to provide an electroplating barrel which can be employed with a number of different sized parts, the limit in size being determined by how big the parts are rather than how small they are.

It is further an object of this invention to provide an electroplating barrel that has means for enabling the electroplating solution to enter and leave the barrel without allowing small sized parts to escape into the electroplating solution.

Other objects and advantages will be apparent from the following description and the accompanying drawing in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawing:

FIG. 1 is a side elevational view showing the electroplating apparatus with a preferred embodiment of the electroplating barrel of this invention.

FIG. 2 is a front elevational view of the apparatus illustrated in FIG. 1.

FIG. 3 is a fragmentary sectional view of the apparatus illustrated in FIG. 1 taken on a plane of the line 3—3 of FIG. 1 looking in the direction of the arrows.

Referring generally to the figures in the drawing, a new and improved electroplating barrel is shown in combination with a self contained portable electroplating apparatus which includes a motor associated with a gear train to drive the barrel and a pump to draw the spent electroplating fluid therefrom. The electroplating barrel is constructed with unconnected walls which form elongated slots therebetween so that when the barrel is rotated in a certain direction, electroplating fluid is caused to enter the barrel without allowing the parts that are being electroplated to escape therefrom. However, it is intended that this invention should not be limited to the specific type of electroplating apparatus and barrel construction illustrated. But rather it is intended that this invention is to apply to electroplating apparatuses having barrels with solid unperforated walls which are unlike the ordinary barrel constructions having tiny perforations therein which allow small parts being electroplated to escape into the electroplating solution if the perforations are not of the proper size. Still further, it is intended that this invention include all types of exhaust means in combination with a barrel of my construction whenever electroplating fluid is enabled to leave the electroplating barrel without allowing articles that are being electroplated to escape.

Referring more specifically to FIG. 1, an electroplating barrel 10 is illustrated in combination with a portable electroplating device 11. The electroplating barrel 10 has solid non-perforated walls 13, 14 and 15 which are arranged so that the barrel has a substantially polygonal cross-section with certain sides unconnected as shown in FIG. 3.

The electroplating barrel 10 is made of a chemically inert material such as plastic. A pair of elongated slots 16 and 17 are formed between the unconnected walls of the barrel 10, these slots being disposed with respect to the walls so as to enable electroplating solution to enter the barrel without allowing the parts to be electroplated to escape when the barrel is rotated clockwise as indicated in FIG. 3.

The barrel has a pair of hexagonally shaped flat end plates 18 and 19 which are suitably grooved to receive the walls 13 at both ends thereof, thereby forming the ends of the barrel. As shown in FIG. 1, both end plates have hub members 22 and 23 attached thereto at the center thereof so that the barrel 10 can be rotatably journalled by the side members 27 and 29 of the electroplating apparatus frame 26. The end plate 19, which is in close proximity to the side member 27, has a gear 20 fixedly attached thereto, the gear also being made out of a chemically inert material such as plastic. The gear 20 is also journalled by the hub member 22 so that when it is rotatably driven, the electroplating barrel is caused to rotate.

The barrel 10 is horizontally disposed in frame 26 and it has a door 28 which is attached to the barrel by a pair of hinges 30, the hinges having threaded members 31 whereby they may be removed from the barrel to enable the door 28 to be in turn removed therefrom.

As can be seen from FIG. 3, the barrel door 30 can form one side of the substantially hexagonally shaped barrel. The other sides are formed by the walls 13, 14 and 15. Walls 14 and 15 each respectively form individual sides of the hexagonal barrel and co-operate with wall 13 which forms three sides of the barrel to form the elongated slots 16 and 17. The slots 16 and 17 are formed by the unconnected ends of the walls as a result of the walls being overlapped and bent inward toward the center of said barrel. The slots are for the purpose of enabling electroplating fluid to enter the barrel 10 without allowing the parts that are to be electroplated to escape. When the barrel 10 in FIG. 3 is rotated, electroplating fluid is scooped in through the slots 16 and 17 and the parts that are being electroplated are caused to move to the bottom side of the barrel.

An electric motor 32 is mounted on frame 26 above the barrel 10, as shown in FIG. 1. The motor rotatably drives a pinion gear 34 which is attached thereto. The gear forms part of a gear train which comprises the gear

20 and a gear 36, which is disposed between gear 34 and gear 20 to transmit rotative motion therebetween.

The gear 36 is journalled on a hub member 38 which is fixedly attached to side member 27. A pump means 40 is also mounted above the barrel 10 on the frame 26 and is shown communicating with the barrel through a conduit 42, which is attached to the barrel 10 through the end plate 18 substantially at the center thereof as shown in FIG. 3.

In order to provide the connection for the articles to be electroplated with an electrical circuit, the barrel 10 is provided with one or more, preferably two, electrodes 48. The electrodes 48 have metallic heads 50 which may be cylindrically shaped and may have conically pointed end portions 51. These electrodes are preferably made of non-corrodible metal, such as nicket, silver, or stainless steel. These electrodes are connected to insulated conductors 57. The insulated conductors protrude through the center of hub members 22 and 23 to make connection with terminals 59. The terminals 59 fasten the insulated conductors 57 to the frame 26 by being screwed therein.

The electrical energy is furnished to the terminals by an outside source, not shown. When the electrical circuit is completed, the parts to be plated form the circuit between the two electrodes 50 by their contact therewith. The electroplating fluid covers both the electrodes and articles, but the contact resistance between the electrodes and the articles is so much less than the resistance of the electroplating solution that the major part of the current passes through the articles which are to be electroplated, thereby causing electroplating of the parts.

In order that the electroplating apparatus 11 may have its barrel 10 immersed in an electroplating fluid, it has a pair of hooks 61 attached to the end members 27 and 29 of the frame 26. With this type of construction, the electroplating apparatus may hang from an energized busbar and immerse the electroplating barrel without immersing its pump means 40 and motor 32. Handle members 63 are also provided and are attached to frame 26 so that the operator of the electroplating apparatus may grasp the handles to lift the apparatus 11 off of the busbar and out of the electroplating solution, as seen from FIG. 1. The barrel 10 may be supported by its frame end members 27 and 29 when it is removed from the electroplating solution. Thus, parts may be added and removed from the barrel 10 without any damage being occasioned from resting the barrel on the ground.

The operation of the electroplating apparatus is substantially as follows:

The barrel 10 may have its hinge members 30 removed in order to remove the cover 28 and to place a supply of small metal articles in the barrel 10 on a bottom wall member, as shown in FIG. 3. Then the cover may again be secured to the barrel 10 while the barrel 10 is supported on the frame 26 by frame members 27 and 29. The apparatus may then be lifted and placed with its hook connectors on a busbar which can be disposed so that when the electroplating apparatus is suspended from the busbar, the electroplating barrel will be immersed in a tank of electroplating solution. The motor 32 and the pump 40 may then be energized. The barrel 10 will then be rotated at a slow speed in the clockwise direction. Due to the polygonal nature of the barrel, the articles to be electroplated will be caused to tumble over and over in the solution and they are in electrical connection with the electrodes 50. During this time, the electroplating solution is effectively scooped into the barrel through its elongated slots 16 by the barrel's rotation. By the fluid only being caused to move in one direction and enter the barrel 10 through the elongated slots, the parts to be electroplated do not escape into the solution at the slot openings. The spent electroplating fluid is removed from the electroplating barrel through the conduit 42 by the suction of the pump 40 and is caused to be redeposited in the electroplating fluid that the barrel 10 is immersed in.

Thus, it will be observed that I have invented an improved self contained portable electroplating apparatus which has solid non-perforated walls and, therefore, can be interchangeably used for electroplating small parts which vary in size. Also, the size of the barrel to be used is only governed by how large the parts are rather than how small they are.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention and I do not want to be limited to the concise details of construction set forth but desire to avail myself of all changes within the scope of the appended claims.

I claim:

1. A self contained portable electroplating apparatus comprising: an electroplating barrel having solid non-perforated walls, a pair of end plates in opposing relation, each of said walls' sides being fixedly attached to a single one of said end plates, said walls being unconnected and overlapped at certain locations, said walls' unconnected ends forming slots therebetween to admit electroplating fluid when rotated in a certain direction without allowing parts to be electroplated to escape from said barrel, a motor associated with said electroplating barrel for rotatably driving it in one direction, and exhaust means associated with said barrel to enable spent fluid to be exhausted from said barrel without allowing said parts to be electroplated to escape.

2. A self contained portable electroplating apparatus, as defined in claim 1, wherein said barrel's walls form one or more longitudinal slots therein.

3. A self contained portable electroplating apparatus, as defined in claim 1, wherein said barrel has a substantially polygonal cross-section.

4. A self contained portable electroplating apparatus comprising: a frame, a driving motor carried above and by said frame, a pump means carried above and by said frame, a pinion gear associated with said motor, a pair of depending parallel side members attached to said frame, a solid nonperforated electroplating barrel having a pair of end plates at each end thereof, said end plates having grooves on their inner opposing sides, said grooves being shaped to receive said walls of said barrel, plastic sheets forming the walls of said barrel and having the sides thereof fixedly attached to a single one of each of said end plates in their grooves, said walls being unconnected and overlapped at certain locations, said walls' unconnected ends being bent inward toward the center of said barrel to form slots therebetween, said slots being formed to admit the electroplating fluid into said barrel without allowing parts to be electroplated to escape from said barrel, means for rotatably supporting said end plates on said depending parallel side members, said end plates, depending parallel side members and said latter means being formed with an axial aperture at each end of the barrel, one of said axial apertures being larger than the other, an insulated terminal being secured to each of said depending parallel members, one of said terminals protruding through each of said apertures in said end plates and being provided at its end with a metallic head, a conduit connected to said pump and protruding through said larger axial aperture, at one end of said barrel, a gear carried by one of said end plates and being associated with said pinion gear, and support means made of an electrical conducting material carried by said depending parallel members and electrically connected to said insulated terminals for simultaneously supporting said apparatus on a bus-bar and connecting the conductors and parts to be electroplated inside said barrel to one terminal of a source of direct current, whereby when said motor and pump means is running, said barrel is caused to rotate and admit fluid into said barrel through said slots and said pump means causes fluid to leave said

barrel through said conduit and parts in said barrel are electroplated.

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