Dec. 27, 1966 A. LAZARO 3,294,663

ELECTROPLATING APPARATUS

Filed May 14, 1963

FIG.1

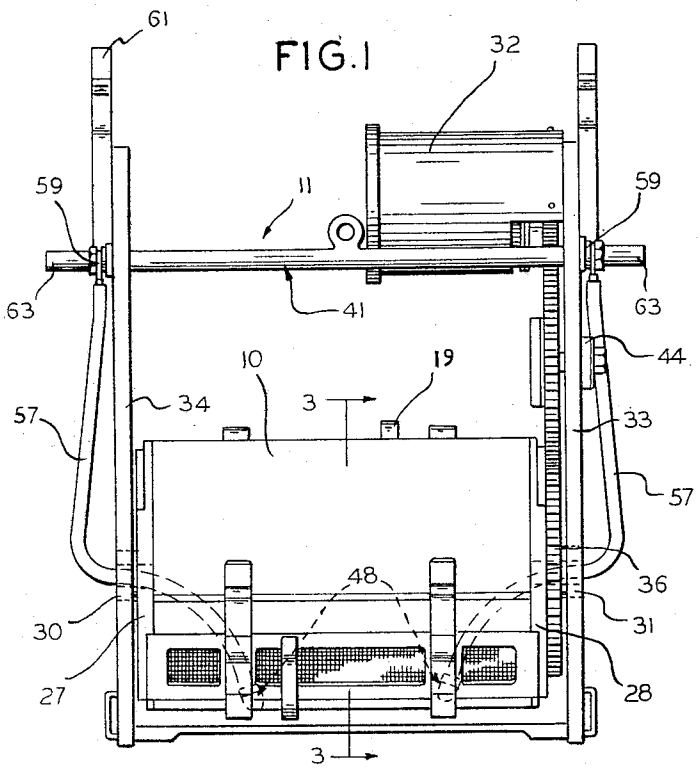
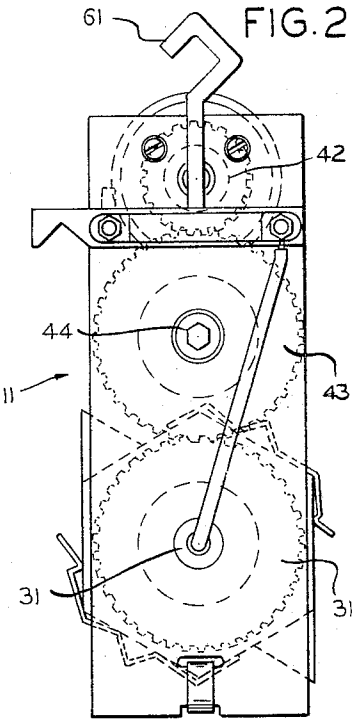


FIG.2



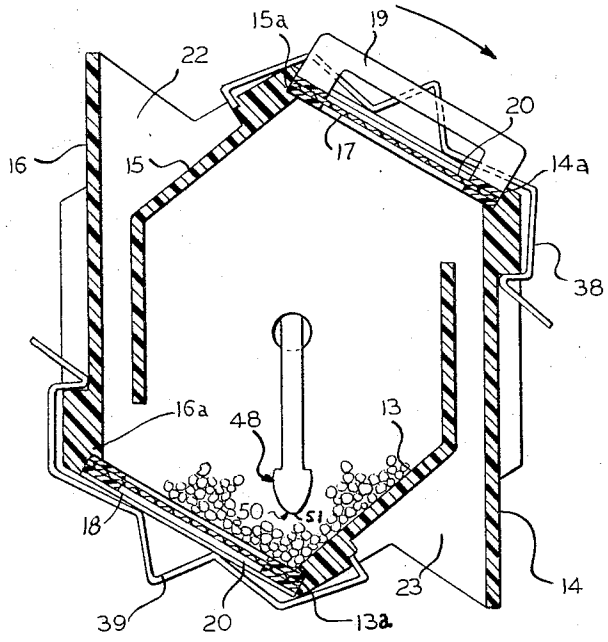


FIG.3

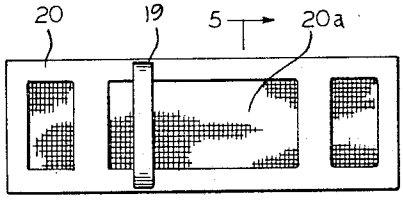


FIG.4

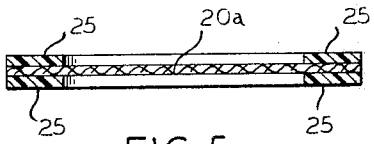


FIG.5

INVENTOR.
ANTON LAZARO

BY

Irwin C. Alter

ATTORNEY

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ELECTROPLATING APPARATUS

Anton Lazaro, 2022 N. California Ave.,
Chicago, Ill. 60608

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This application is a continuation-in-part of application 84,910, now Patent No. 3,096,270.

This 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 a 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. Because the only means of entry of plating fluid into a plating barrel of this type is through the perforations, the size of parts being plated determines the size of perforations necessary in said plating barrel to enable the proper amount of plating solution to circulate through the barrel. The use of perforations in the electroplating barrel is 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. This can happen frequently when utilizing a plating barrel having perforations for electroplating small parts of different sizes. The only way to avoid this is to have a plurality of plating barrels with different size perforations to accomplish immersion of the parts in electroplating solution without losing them in the solution. And to utilize different barrels as a practicality is nearly impossible.

In my prior co-pending application entitled Electroplating Apparatus, Serial No. 84,910, now Patent No. 3,096,270 of which this application is a continuation-in-part, I have provided a solid non-perforated barrel having slot means wherein electroplating fluid can enter and leave a barrel without allowing small articles that are being electroplated to escape. I mentioned that other exhaust means than that which is specifically mentioned in my application can be provided to obtain the above objective. In this application, I teach a different exhaust means to be embodied in my invention to accomplish the stated object of enabling electroplating fluid to enter and leave a barrel without allowing articles that are being electroplated to escape regardless of the size of the articles. Namely I have provided an electroplating device which has in combination, among other things, a slotted electroplating barrel which has non-perforated walls instead of the conventional perforations, inserts are removably mounted into the walls. The inserts comprise fibrous meshed material wherein electroplating fluid can be exhausted without exhausting articles to be electroplated.

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 become more readily apparent from reading the following description in connection with the accompanying drawing wherein:

FIG. 1 is a side elevational view of my invention embodied in a self contained electroplating apparatus,

FIG. 2 is a front elevational view of FIG. 1,

FIG. 3 is a cross sectional view of the electroplating barrel illustrated in FIG. 1 taken on a plane passing through line 3—3 and looking in the direction of the arrows,

FIG. 4 illustrates a portion of the electroplating barrel of my invention which has meshed fibre inserts removably mounted therein to accomplish the objects hereinabove mentioned, and

FIG. 5 is a cross sectional view of FIG. 4 taken on a plane passing though the line 5—5 and 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. The electroplating barrel is constructed with walls that are non-perforated which are unconnected and overlapped at certain locations to form longitudinal slots therebetween so that when the barrel is rotated in a certain direction, electroplating fluid is caused to enter the barrel through the slots without allowing the parts that are being electroplated to escape therefrom. In addition to the longitudinal slots, the non-perforated walls have other unconnected portions to receive non-perforated fibrous meshed inserts therein at certain locations to enable spent electroplating fluid to be exhausted therefrom without letting parts to be electroplated to escape.

Referring more specifically to FIGURE 1, an electroplating barrel **10** is embodied in a self-contained portable electroplating device **11**. As is illustrated in FIGURE 3 the electroplating barrel **10** has solid non-perforated walls **13**, **14**, **15**, **16**, **17** and **18**. Some of the wall sections, such as walls **17**, **18** are arranged so that the non-perforated fibrous meshed inserts **20** can be removably fastened thereto to form a barrel that has substantially a polygonal cross section with certain unconnected and overlapped walls forming slots therebetween. The noted portions **17**, **18** are preferably not the overlapping wall sections.

The electroplating barrel **10** can be made of any chemically inert material such as plastic. A pair of elongated longitudinal slots **22** and **23** are formed between the unconnected and overlapped longitudinal portions of the walls of the barrel **10**, these slots being arranged so as to allow electroplating fluid to be admitted to the barrel when it rotates clockwise as indicated in FIGURE 3. As illustrated in FIGURES 4 and 5, the non-perforated fibrous meshed inserts **20** are rectangular in shape and can be constructed by having any chemically inert material, such as plastic **25** sandwiched together with non-perforated fibrous meshed material **20A** therebetween. It is however intended that the scope of this invention include other shapes and means for incorporating non-perforated fibrous meshed material into the electroplating barrel, as illustrated, in order that spent electroplating fluid can be exhausted from the barrel without allowing parts to be electroplated to escape therefrom. I prefer the embodiment illustrated because it enables the fibrous meshed material to be replaced periodically as the need arises due to any irregularities of the material. However, the non-perforated fibrous meshed material could be permanently incorporated in a wall of an electroplating barrel .

The barrel **10** has a pair of hexagonally shaped flat end walls **27** and **28** in opposing relationship which are suitably grooved to permanently receive the transverse edges of longitudinal walls **13**, **14**, **15**, **16**, **17** and **18**. The non-perforated fibrous meshed inserts **20** are received in a pressed fit relationship by the unconnected shoulder portions **13***a*, **14***a*, **15***a*, **16***a* of the walls of the barrel **10**. The inserts **20** are sized in length to form a press fit with

the end walls **27** and **28**. As shown in FIGURES 1 and 2, both end walls **27** and **28** have hub members **30** and **31** attached thereto at the center thereof so that the barrel **10** can be rotatably journalled by the side members **33** and **34** of the electroplating apparatus. The hexagonal shaped flat end wall **28**, which is in close proximity to the side member **33**, has a gear **36** fixedly attached thereto, the gear also being made out of a chemically inert material such as plastic. The gear **36** is also journalled by the hub member **31** so that when it is rotatably driven the electroplating barrel is caused to rotate.

The barrel **10** is journalled in side members **33** and **34**, as illustrated in FIGURE 1. The non-perforated fibrous meshed inserts **20** are removably attached to the barrel and are received by the walls of a barrel as illustrated in FIGURES 1 and 3. The inserts **20** have handles **19** and when the inserts **20** are in position they are held firmly against the shouders of the walls by the clamps **38** and **39**. Therefore when it is desired to put parts to be electroplated in the barrel or to remove the non-perforated fibrous meshed inserts **20** it is merely necessary to dismantle the clamps **38** or **39** from the walls of the electroplating barrel and remove the inserts **20** by gripping the handles **19**. Each of the longitudinal slots **22** and **23** are formed by the walls **16** and **14** being overlapped respectively with the walls **15** and **13**, the walls **15** and **13** being bent inward toward the center of the barrel to prevent parts from escaping through the slots **22** and **23** when the barrel is being rotated. It will be seen therefore that when parts are placed in the electroplating barrel and the barrel is caused to rotate, electroplating fluid is scooped up by the slots **22** and **23** and said parts are unable to escape through the slots. Still further the spent electroplating fluid in the barrel is exhausted through the non-perforated fibrous mesh inserts **20**. And the parts that are being electroplated are also caused to fall to and lay at the lowest portion of the electroplating barrel.

An electric motor **32** is mounted on the frame **41** above the barrel **10**, as shown in FIG. 1. The motor rotatably drives a pinion gear **42** which is attached thereto. The gear forms part of a gear train which comprises the gear **43** and a gear **31**. The gear **43** is journalled on a hub member **44** which is fixedly attached to side member **33**, and is disposed between the gears **31** and **42**. 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 noncorrodible metal, such as nickel, silver, or stainless steel. These electrodes are connected to insulated conductors **57**. The insulated conductors protrude through the center of hub members **30** and **31** to make connection with terminals **59**. The terminals **59** fasten the insulated conductors **57** to the frame **41** 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 **48** 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 **33** and **34** of the frame **41**. With this type of construction, the electroplating apparatus may hang from an energized bus-bar and immerse the electroplating barrel without immersing its motor **32**. Handle members **63** are also provided and are attached to frame **41** so that the operator of the electroplating apparatus may grasp the handles to lift

the apparatus **11** off of the bus bar and out of the electroplating solution. As seen from FIG. 1, the barrel **10** may be supported by its frame and members **33** and **34** when it is removed from the electroplating solution. Thus, parts may be added and removed from the barrel **10** without any damage being occasioned by resting the barrel on the ground.

The operation of the electroplating apparatus is substantially as follows:

The barrel **10** may have its non-perforated fibrous mesh inserts removed in order to place a supply of small metal articles in the barrel **10** on a bottom wall member, as shown in FIG. 3. Then one of the inserts **20** may again be secured to the barrel **10** while the barrel **10** is supported on the frame **41** by side members **33** and **34**. The apparatus may then be lifted and placed with its hook connectors on a bus bar which can be disposed so that when the electroplating apparatus is suspended from the bus bar, the electroplating barrel will be immersed in a tank of electroplating solution. The motor **32** 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 **22** and **23** 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 exhausted from the electroplating barrel through the openings in the non-perforated fibrous meshed material **20***a* and is 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 non-perforated fibrous mesh means for exhausting spent electroplating fluid therefrom without allowing parts to be electroplated to escape. Therefore my device 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 electroplating apparatus comprising: an electroplating barrel having solid non-perforated walls forming the longitudinal sides of said barrel, said non-perforated walls having at least one insert of non-perforated fibrous meshed material incorporated therein, said walls having longitudinal portions that are unconnected and overlapped, said unconnected and overlapped portions forming at least one slot therebetween to admit fluid when rotated in a certain direction without allowing parts to be electroplated to escape from said barrel, whereby spent electroplating fluid can be exhausted from said electroplating barrel through said non-perforated fibrous meshed portions without allowing said parts that are being electroplated to escape.

2. A self-contained electroplating apparatus comprising: an electroplating barrel having solid non-perforated walls forming the longitudinal sides of said barrel, a pair of end walls in opposing relation, each of said wall sides being fixedly attached to a single end wall, said barrel having at least one non-perforated fibrous meshed insert removably attached to said barrel, said walls having longitudinal portions that are unconnected and overlapped, said unconnected and overlapped portions forming at least one slot therebetween to admit fluid when rotated in a

certain direction without allowing parts to be electroplated to escape from said barrel whereby spent electroplating fluid can be exhausted from said electroplating barrel through said non-perforated fibrous meshed insert without allowing said parts that are being electroplasted to escape.

3. A self-contained electroplating apparatus, comprising: a pair of end walls in opposing relation, an electroplating barrel having solid non-perforated walls forming the longitudinal sides of said barrel, each of said non-perforated walls transverse sides being fixedly attached to a single end plate, said non-perforated walls having at least one non-perforated meshed insert removably attached thereto, said walls having unconnected and overlapping longitudinal portions that form at least one slot therebetween to admit fluid when rotated in a certain direction without allowing parts to be electroplated to escape from said barrel, said walls also having at least a pair of longitudinal sides with shoulder portions formed thereon, said pair of longitudinal sides being distinct from the said overlapping portions, said non-perforated fibrous meshed insert being rectangularly shaped and removably received by said shoulders of said walls, and clamp means for removably attaching said fibrous meshed insert whereby spent

electroplating fluid can be exhausted from said electroplating barrel through said removable non-perforated fibrous meshed portions without allowing parts that are being electroplated to escape and said non-perforated fibrous meshed portions can be replaced.

4. The self-contained electroplating apparatus of claim 1 wherein each of said non-perforated wall sides are fixedly attached to only a single end plate.

5. The self-contained electroplating apparatus of claim 1 and a motor associated with said electroplating barrel to rotate said barrel.

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JOHN H. MACK, *Primary Examiner.*

W. VAN SISE, *Assistant Examiner.*