L. POTTHOFF.

ELECTROPLATING APPARATUS.

APPLICATION FILED JAN. 31, 1916.

1,285,369.

Patented Nov. 19, 1918.

2 SHEETS—SHEET 1.

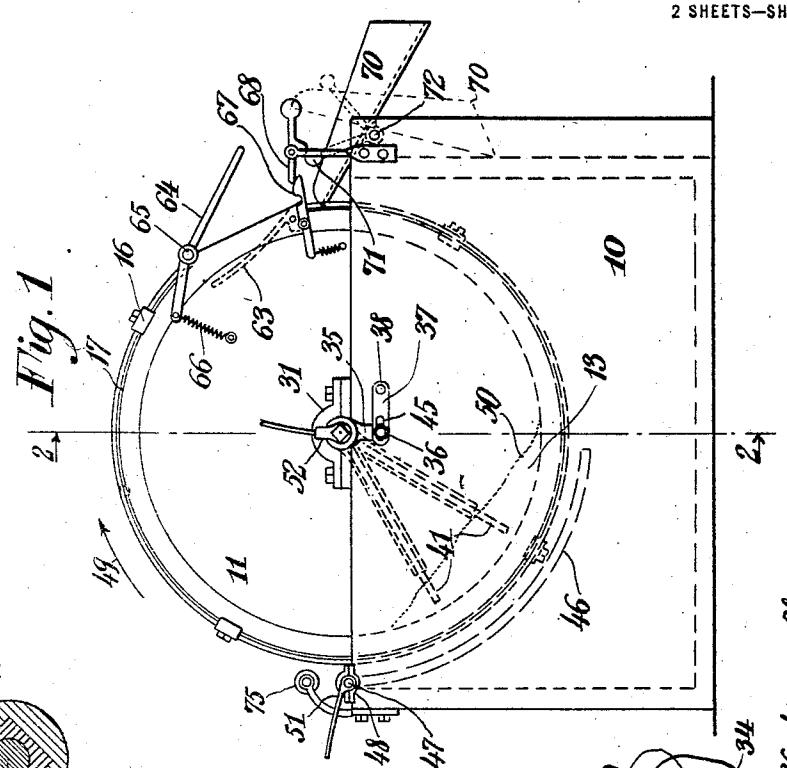


Fig. 1

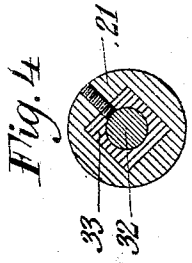


Fig. 4

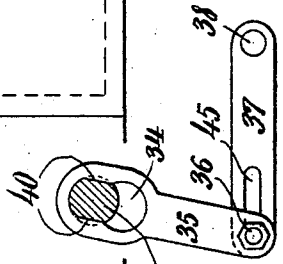


Fig. 3

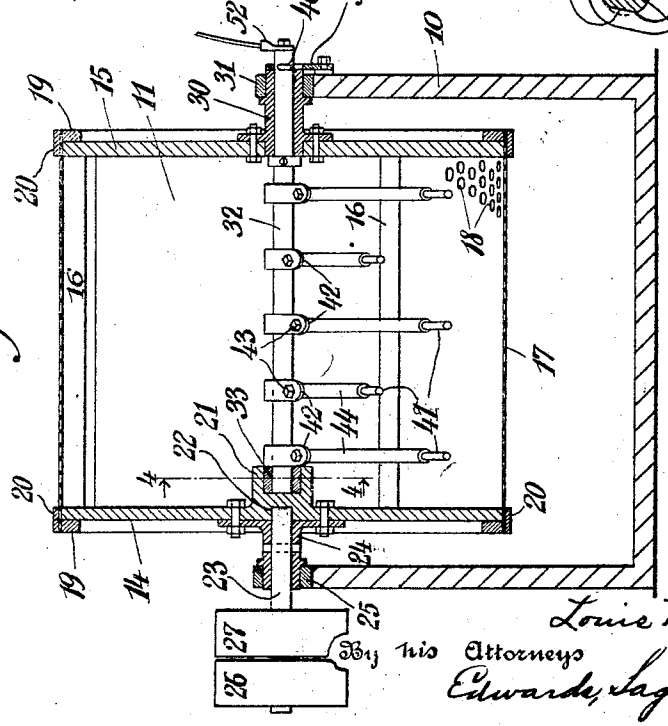


Fig. 2

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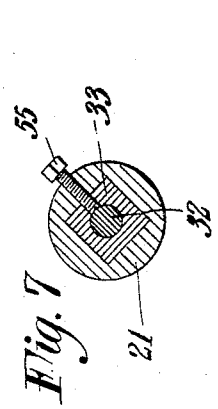



Fig. 7

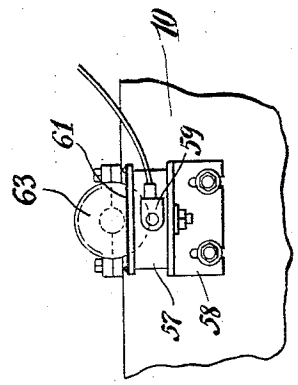



Fig. 6

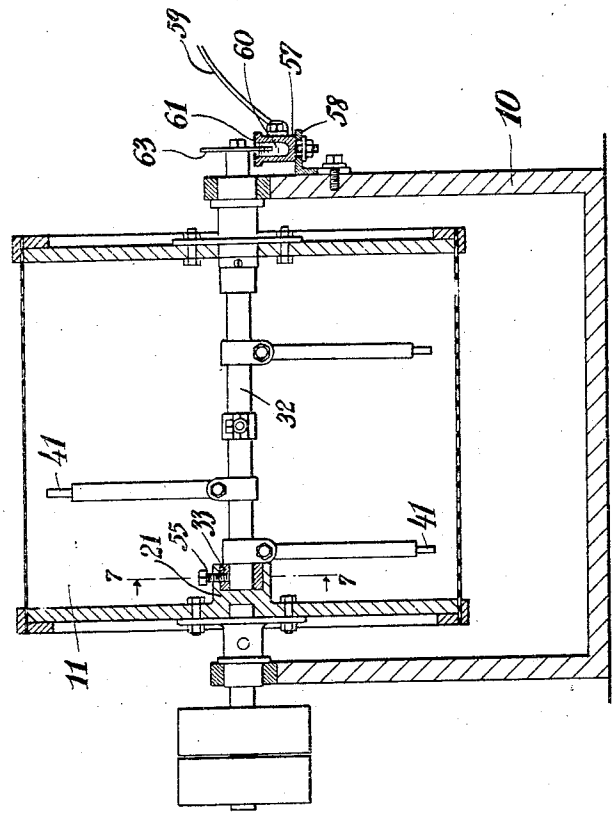



Fig. 5

Inventor

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By his Attorneys

Edwards, Sager & Wooster

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# UNITED STATES PATENT OFFICE.

LOUIS POTTHOFF, OF FLUSHING, NEW YORK.

## ELECTROPLATING APPARATUS.

1,285,369. Specification of Letters Patent. Patented Nov. 19, 1918.

Application filed January 31, 1916. Serial No. 75,268.

*To all whom it may concern:*

Be it known that I, LOUIS POTTHOFF, a citizen of the United States, residing at Flushing, in the county of Queens and State of New York, have invented certain new and useful Improvements in Electroplating Apparatus, of which the following is a full, clear, and exact specification.

This invention relates to plating apparatus, and particularly to electroplating apparatus of the type in which a container carries the articles to be plated in the electrolyte.

An object of the present invention is to construct the carrying means of non-conducting material to confine the plating currents to useful paths avoiding current leakage and the undesirable plating of parts of the apparatus itself.

Another object of the present invention is to construct a tumbler barrel of non-conducting material to minimize the leakage of current therethrough. Hitherto these barrels have been made of wood which when soaked with the electrolyte becomes practically a conductor affording ready passage for current leakage and consuming a large part of the total current supplied. To avoid this loss this invention provides a tumbler barrel composed entirely of non-conducting material as glass, porcelain, celluloid or bakelite. Such a material is non-conducting, non-absorbent and impervious to action of the electrolyte and retains these properties without deterioration in use.

A further object of my invention is to provide cathode arms of a material which will not accumulate a deposit of the plating metal. With this object in view these arms are made of aluminum, as it is found particularly in electroplating articles, that the deposited coat on the aluminum cathode will easily flake off. Therefore, in the present apparatus where the cathode arms are used to agitate and move the articles being plated aluminum arms will automatically clear themselves of any deposit.

A further object of this invention is to arrange the anode terminal outside of the barrel and support the cathode terminals from a central shaft within the barrel in such a way that the effective current will pass directly from the anode through the electrolyte to the articles and thence through the cathode terminals.

Another object of the present invention is to construct a carrying basket to not only support the articles being plated, but also to conduct the current to the articles by the supporting means and to so cover the conducting means by insulating material that they are completely protected from the electrolyte.

In the accompanying drawings,

Figure 1 is a side elevation of the machine;

Fig. 2 is a sectional view on line 2—2 of Fig. 1;

Fig. 3 is a view on an enlarged scale of the bracket for holding the cathode;

Fig. 4 is a sectional view on line 4—4 of Fig. 2;

Fig. 5 is a view similar to Fig. 2, but showing the cathode arranged to rotate with the barrel;

Fig. 6 is a side elevation on an enlarged scale of the cathode terminal contact;

Fig. 7 is a sectional view on line 7—7 of Fig. 5.

In the embodiment of the invention illustrated in Figs. 1 to 7, inclusive, the electrolyte is contained in the tank 10, and tumbler barrel 11 supported in bearings 31 on the sides thereof holds the articles 13 immersed in said electrolyte. The barrel is composed of two opposite heads 14 and 15 connected by cross bars 16 and sections of thin stock 17 bent into arcuate form to fit the heads and provided all over with holes 18 as indicated in one corner of Fig. 2. These holes render the stock porous allowing free flow of the electrolyte therethrough. Around the outer edge of each head is fastened a ring 19 overhung by the projecting edges of sections 17 which are held in place on the heads and ring by an outer rim 20. The barrel parts are composed entirely of non-conducting material which is unaffected by the electrolyte. The head 14 is solid throughout and is provided on its inner face with boss 21 while its outer face is bored as at 22 to receive the end of the shaft 23, fast in hollow journal 24 attached to head 14. Journal 24 rotates in bearing 25 on the side of tank 10 and the loose and driving pulleys 26 and 27 are mounted on shaft 23.

Head 15 is bored to receive one end of the hollow journal 30 running in bearing 31. Through journal 30 extends the shaft 32 having its inner end supported in bearing 33 in boss 21 of head 14. Near its outer end shaft 32 has grooves 40 at opposite sides to

receive the narrow part of slot 34 of the bracket arm 35 adjustably pivoted at 36 to link 37 pivoted on the side of the tank at 38. The lower end of slot 34 is enlarged to fit over shaft 32 and allow said shaft to pass therethrough; when the shaft is completely inserted so that its inner end is properly borne by bearing 33, grooves 40 will allow bracket 35 to be lowered into position indicated in Fig. 3, holding the shaft 32 rigidly in place. Shaft 32 carries the cathode arms 41 fastened thereto by straps 42 and bolts 43. These arms may be arranged in any convenient manner on the shaft preferably in one or more rows in staggered relation as shown in Figs. 1 and 2 when the shaft 32 is held stationary and they extend to within a short distance from the periphery of the barrel to contact with the articles being plated and may be provided with protective sleeves 44 at their inactive portions. In order to avoid the accumulation of the plated metal on the cathode arms these arms are made of aluminum from which the deposited metal will be readily flaked off by the articles being plated. In my apparatus the cathode arms not only carry the current from the articles being plated, but also act to stir and agitate them. The resultant constant rubbing of the work against aluminum cathodes keeps them clear of deposited metal. The arms are individually adjustable on the shaft by loosening bolts 43 to accommodate the apparatus to different tumbler speeds and varying plating conditions and all the shafts may be adjusted together by adjustment of pivot 36 in slot 45 of the link 37. Outside of the barrel 11 and near the periphery thereof is the curved anode terminal 46 supported by shaft 47 held in brackets 48 on the sides of the tank.

In operation, tumbler barrel 11 is rotated in the direction of the arrow 49 in Fig. 1 and the articles assume the position approximated by dotted line 50. They are constantly agitated by movement of the barrel periphery and are stirred by contact with stationary cathode arms 41 and the ridges formed on the inside of the barrel by the cross bars and the pocket 63. Current entering by terminal 51 attached to shaft 47 passes through anode 46 and the electrolyte to the articles being plated, thence to the cathode arms 41 to the shaft 32 and out by terminal 52. All other paths are insulated against the passage of current by constructing the barrel of insulating material.

In plating articles of certain shapes and sizes it is desirable to have the cathode arms 41 rotate with the tumbler barrel so that there is no relative movement between the arms and barrel. In such case access is gained to the interior of the barrel by the removal of one of the peripheral sections 17; and set screw 55 (Fig. 5) threaded through bearing 33 is tightened to hold the shaft 32 rigid with said bearing. Arms 41 are also distributed in a different manner to project in all directions toward the barrel periphery and bracket arm 35 is removed from engagement with grooves 40. The current is conveyed from shaft 32 by mercury 60 in cup 57 fastened by bracket 58 to the side of tank 10 and provided with wire terminal 59 and cover 61 slitted for the disk 63 rotating with shaft 32. This form of negative terminal may, of course, also be used when the shaft is stationary and where frequent changes from the stationary to the rotating arrangement are necessary the alterations are simplified by continued use of the mercury terminal. Then the only alterations necessary to change the cathode from stationary to rotary operation are the readjustment of arms 41, the tightening or loosening of set screw 55 and the raising or lowering of bracket arm 35.

Within the barrel 1 is formed a pocket 63' by extending across the barrel an inclined plate at an angle to the periphery. The sections 17 are discontinued at the pocket which is closed by an automatically actuated cover 64, the pocket and cover forming an opening into the barrel for the insertion and removal of the work. As shown in Fig. 1, the pocket extends transversely across the barrel opening into the barrel in such direction that when the barrel is rotated in the direction opposite that of the arrow articles will be caught by the pocket and will be in position to be discharged upon the automatic opening of cover 64. This cover is pivoted to the barrel at 65 and is opened by springs 66 when the latches 67 are automatically tripped by fingers 68. This tripping only occurs when the barrel is rotated in a direction opposite to that of the arrow 49 for in normal operation in the direction of the arrow the fingers tip around their pivots when engaged by the latches. A chute 70 is provided to receive and guide the articles discharged from the pocket. This chute when not in use is tipped to dotted line position, Fig. 1; when articles are to be taken from the barrel it is tipped to full line position and the direction of rotation of the barrel reversed to fill the pocket 63 and trip the cover 64. The chute is held in either position by counterweight 71 which swings with the chute from one side to the other of pivot bar 72. Continued reverse movement of the barrel automatically closes the cover by contact with spring arms 75 fastened to tank 10.

From the foregoing description it will be seen that this invention provides an electroplating apparatus which is efficient and easy to manipulate. The non-conducting material of which the barrel is composed con-

fines the electrical current to the useful circuits. The aluminum cathode arms automatically shed any accumulations of plated metal and do not have to be removed and reduced in size, nor do the articles adhere to them. The tumbler can therefore be easily and completely emptied. The ready adjustments of the cathode arms and the means provided for rendering them stationary with the tank or rotatable with the barrel accommodate the apparatus to a variety of articles.

It will be understood that the apparatus is capable of embodiment in various other forms without departing from the spirit or scope of the invention disclosed as defined in the appended claims.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent, is:—

1. In electroplating apparatus, the combination with a horizontal supporting shaft having cathode arms for conducting the current from the articles being plated, of means suspending the articles to be plated in contact with said arms and comprising a rotatable tumbler barrel mounted on said shaft and having heads and periphery wholly of non-conducting, non-absorbent material, so that no conducting material is interposed in the electrolyte between the shaft and the periphery of the barrel, except the cathode arms, and the current is wholly confined to a useful path through the articles, and an anode in the electrolyte outside the said barrel.

2. In an electroplating apparatus, the combination with a rotatable tumbler barrel, of cathode arms therein, and releasable means for holding said arms stationary or permitting them to rotate with the barrel according to the character of the articles being plated.

3. In an electroplating apparatus, the combination with a rotatable tumber barrel, of inside cathode arms of a material non-adherent to the anode metal, and releasable means for holding said arms stationary or permitting them to rotate with the barrel according to the character of the articles being plated.

4. In an electroplating apparatus, a receptacle for the electrolyte, barrel tumbling means containing the articles to be plated, a cathode support within said tumbling means, means for holding said support stationary with the receptacle, means for moving said support with the tumbling means, and means supplying current to said cathode support when either stationary with the receptacle or moving with the tumbling means.

5. In an electroplating apparatus, the combination with a tumbler barrel carrying the articles to be plated, driving means connected to one head of said barrel, an angularly adjustable shaft passing through the other head and having a bearing in said first named head, adjustable cathode arms extending from said shaft, and an anode member supported outside of said barrel.

In testimony whereof I affix my signature.

LOUIS POTTHOFF.