No. 864,782. PATENTED SEPT. 3, 1907.

H. J. GUTTMAN.

TUMBLING BARREL.

APPLICATION FILED AUG. 7, 1905.

3 SHEETS—SHEET 1.

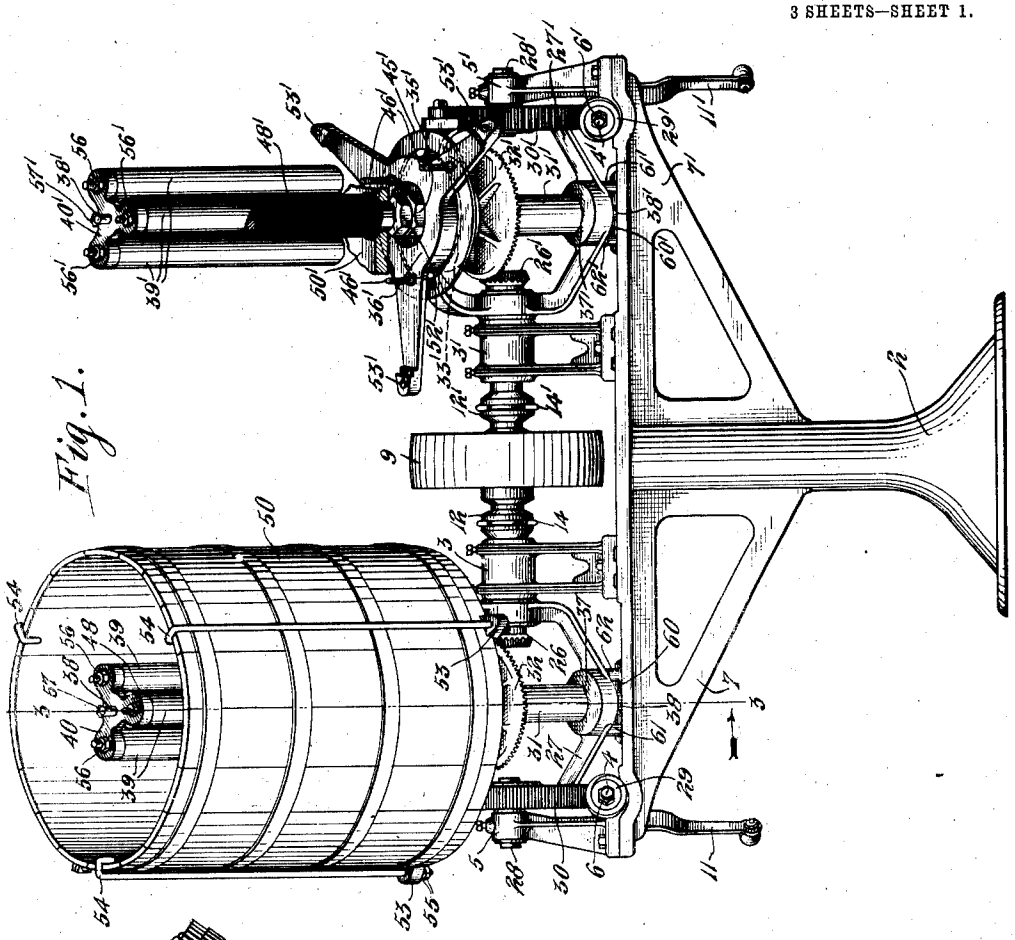


Fig. 1.

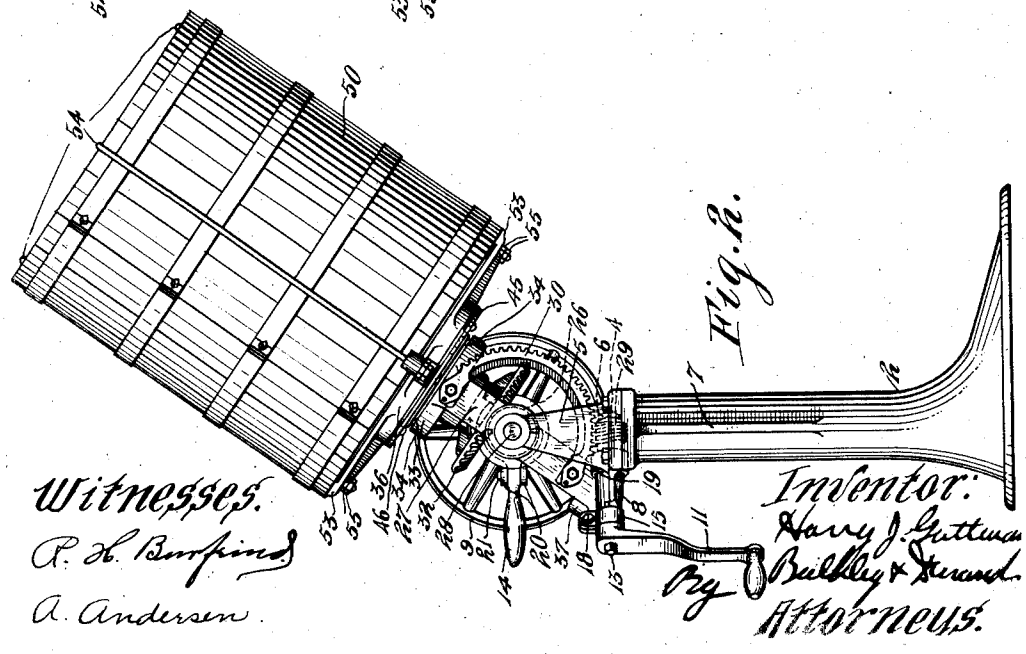


Fig. 2.

Witnesses.

R. H. Burpins

A. Andersen

Inventor:

Harry J. Guttman

By Bulkley & Durand.

Attorneys.

No. 864,782. PATENTED SEPT. 3, 1907.

H. J. GUTTMAN.

TUMBLING BARREL.

APPLICATION FILED AUG. 7, 1905.

3 SHEETS—SHEET 3.

Fig. 6.

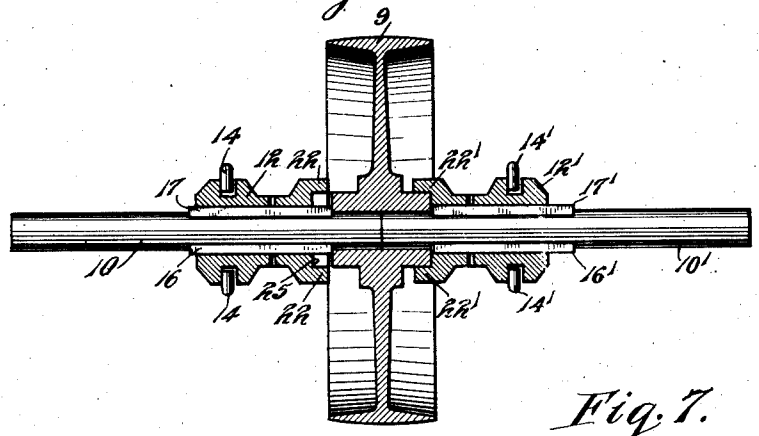


Fig. 7.

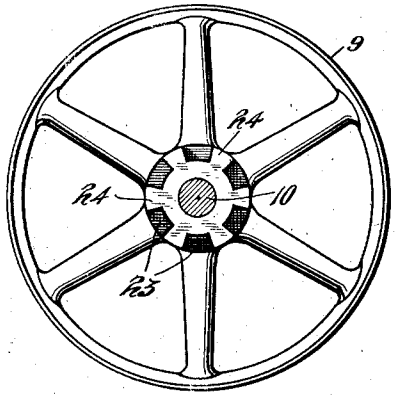
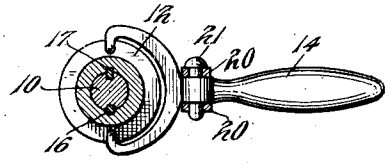


Fig. 9.



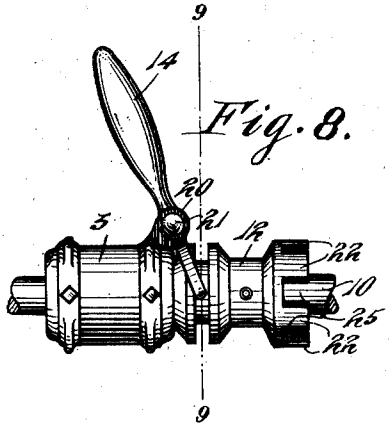
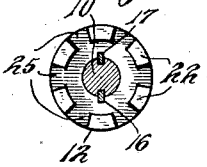


Fig. 8.

Fig. 10.



Witnesses.

R. H. Burfind

A. Andersen.

Inventor:

Harry J. Guttman

By Bulkley & Durand

Attorneys.

UNITED STATES PATENT OFFICE.

HARRY J. GUTTMAN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-THIRD TO ALEXANDER E. KEITH AND ONE-THIRD TO SAMUEL COLE, OF CHICAGO, ILLINOIS.

TUMBLING-BARREL.

No. 864,782. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed August 7, 1905. Serial No. 273,016.

To all whom it may concern:

Be it known that I, HARRY J. GUTTMAN, a citizen of the United States of America, and a resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Tumbling-Barrels, of which the following is a specification.

My invention relates to tumbling barrels in general, but more particularly to tumbling barrels for use in connection with the electro-plating of different articles, and especially to tumbling barrels of such character that the articles may be tumbled about while being electro-plated, thereby insuring a finished and highly polished article at the end of the electro-plating process—that is to say, without resorting to a polishing or finishing operation after the electro-plated articles have been removed from the barrel.

Generally stated, the object of my invention is the provision of an improved, simplified and highly efficient tumbling barrel of the foregoing general character.

The special objects of my invention are to provide an improved construction and arrangement whereby two barrels may be mounted upon a single support or base and operated from a common shaft; to provide an improved construction and arrangement whereby any desired metal parts or articles may be tumbled about and nicely polished at the same time that they are being electro-plated within the barrel; to provide an improved construction and arrangement whereby either barrel may be tilted or inclined at will, and maintained at any desired angle, in order that the tumbling action may be increased or diminished at any time during the operation of the machine, according to the character of the work; to provide an improved construction and arrangement for starting and stopping the two barrels thus operated on a common shaft and for controlling the operation generally; to provide an improved construction and arrangement whereby the electro-plating apparatus may be arranged in and combined with a tumbling barrel adapted to rotate upon an axis which can be tilted or inclined about an axis extending at right angles to the said axis about which the barrel rotates; and to provide certain details of construction and features of improvement tending to increase the general efficiency and serviceability of a combined tumbling barrel and electro-plating apparatus of this particular character.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a front elevation of a combined tumbling barrel and electro-plating apparatus embodying the principles of my invention, showing one of the barrels removed for the purpose of illustrating the centrally and axially arranged anode, and showing a portion of said anode broken away for the purpose of bringing into view the insulation by which the three rods constituting the anode are insulated from the tubular frame member at the center of the barrel. Fig. 2 is a side elevation of the machine shown in Fig. 1. Fig. 3 is an enlarged vertical section on line 3—3 in Fig. 1. Fig. 4 is a cross-section of the barrel on line 4—4 in Fig. 3. Fig. 5 is a cross-section of the anode structure on line 5—5 in Fig. 3. Fig. 6 is an enlarged longitudinal section of the pulley and clutch mechanism, showing the divided shaft in elevation. Fig. 7 is a side elevation of the pulley shown in Fig. 6, showing the shaft in cross-section. Fig. 8 is a detail plan view of one of the clutch devices for controlling the transmission of power from one of the said pulleys to one of the tumbling barrels. Fig. 9 is a detail cross-section on line 9—9 in Fig. 8. Fig. 10 is a view of the right-hand end of the parts shown in Fig. 8.

As thus illustrated my invention comprises a base or pedestal 2 which supports the bearings 3, 3′, 5 and 5′ through the medium of its horizontal and laterally-extending arms or limbs 7 and 7′. Midway between the first two bearings the loose pulley 9 is supported upon the adjacent end portions of the shafts 10 and 10′, it being seen that these two shafts constitute what may be termed a divided shaft, the pulley being mounted at the junction of the two shafts or shaft sections. At one side of the said pulley there is a clutch 12, and at the other side thereof a second and similar clutch 12′. The former of said clutches is provided with an operating-lever 14, and the latter with a lever 14′. With this arrangement, the said clutches may be thrown into and out of engagement with the said loose pulley, it being understood that the latter may be rotated constantly without driving either shaft or shaft-section. In this way, the said pulley may be locked with either shaft or shaft-section, or may be connected up for rotating the said shafts or shaft-sections in unison. This is shown more clearly in Fig. 6 of the drawings. It will be seen that the abutting end portions of the shafts 10 and 10′ support the loose pulley 9. At each side of said pulley, the clutches 12 and 12′ may be moved back and forth along the keys 16 and 17, 16′ and 17′, respectively, by the hand-levers alloted to said clutches, it being observed that said levers have bifurcated end portions adapted to engage the usual grooves in the slidable clutch members. Referring more particularly to Fig. 8, it will be seen that the shaft or shaft-section 10 extends through the supporting-bearing 3, and that the clutch 12 is located to the right of the latter. As illustrated, the operating-lever 14 is pivoted upon a lug 20 by means of a pin 21, said lug being formed on the upper part of the bearing 3. By swinging the said lever upon

its pivotal point or axis, the clutch 12 may be moved back and forth along the keys 16 and 17, the movement of the clutch in this manner being limited by the hub of the pulley 9 on one side, and by the bearing 3 on the other side. Referring to Fig. 10, it will be seen that the said clutch is provided with teeth 22 adapted to engage the depressions 23 formed in the hub of the pulley. In a similar manner, the teeth 24 on the pulley are adapted to enter the notches or depressions 25 between the teeth 22. As the said keys or splines are secured to the shaft, it is evident that the sliding or slidable clutch members must rotate the shafts or shaft-sections whenever the teeth carried by the loose pulley are thrown into engagement with the teeth of the sliding clutch member. Of course, one shaft can be caused to rotate while the other is allowed to remain idle. With this arrangement, the rotation of the said shafts or shaft-sections is easily and perfectly controlled. At its left-hand end, the shaft or shaft-section 10 is provided with a bevel-pinion 26. Between said bevel-pinion and the bearing 3, the shaft 10 supports one end of a yoke 27, the other end of which latter is supported in the bearing 5 by means of a trunnion 28. This trunnion is, of course, rigid with the said yoke. Normally, the yoke is at an angle and in a plane passing through the axis of the shafting, whereby the said yoke may be tilted or inclined about an axis which is coincident with the axis of the shafting. It will also be seen that the worm 29 and the worm-gear or curved rack 30, the latter being attached to the outer side of the yoke in a plane at right angles to the plane of rotation, constitute the mechanical expedient for manually and at will varying the angle of inclination of the said yoke. Preferably, and for such purpose, the said worm is fitted to a short shaft 4, and held in position by the nut 6. Also, as illustrated, the bearing 5 carries a small socket-bearing 8 through which extends the shaft 4, while to the other end of such shaft there is attached a crank 11, the latter being held in place by a nut 13. At a point between the said crank and the bearing 8 there is a split collar 15 which is clamped tightly to the shaft 4 by means of the bolt and nut 18. In addition, there is a shoulder 19 located between the bearing 8 and the worm 29 adapted for holding the worm in position. With this arrangement, said worm can be rotated by means of the said crank 11; and when the said worm is thus rotated, one way or the other, the worm-gear or curved rack 30 will revolve about its axis, and will cause the yoke to tilt up or down, as the case may be. The tube 31 passes through the yoke and is supported by the same, and extends at right angles to the axis about which the yoke is adapted to tilt. At its upper portion, this tube is provided with a bevel-gear 32 adapted to engage the bevel-pinion 26. It will be seen that this tube also passes through the upper bearing 33 of the said yoke, and that at this point the yoke expands or broadens into a disk that carries a groove for the anti-friction rollers or balls 34. The nut 35, screwed upon the upper end of said tube, holds the spider 36 against a shoulder on the said tube, and against the said anti-friction rollers or balls. At its lower end, the said tube 31 fits in the bearing 37 carried by the lower end of the yoke. A conducting-rod 38 extends through the bore of said tube, to a considerable distance beyond, and has secured to its upper end the anode-electrode, which latter is in the form of three rods 39 that hang or depend from a tripod-piece or head 40. The said anode-head is, of course, electrically connected with the supporting-rod 38, being secured thereto by the screw 57; and it will also be seen that the said rod is insulated from the frame by suitable insulating washers 41. It will be understood that the depending rods 39, constituting the anode-electrode, are electrically connected with the anode-head 40 through the medium of screw-threaded connections and nuts 56.

The bottom of the barrel 50 is provided with radiating ribs 42 which extend from a concentric ring 43, these ribs being bent upwardly at the line where the bottom of the barrel joins the sides thereof. These ribs are V-shaped in cross-section, and have their backs or sharp edges turned inward, so as to point toward the axis about which the barrel rotates. In this way, the said ribs constitute obstructions or ridges that are designed to increase the tumbling motion of the articles or parts placed within the barrel, when the machine is in operation. Furthermore, it will be seen that these ribs constitute the cathode terminal of the generator G, the connection being made by a brush 44 which is in constant contact with the insulated ring 45. It will be seen that this ring is connected by bolts 46 with the ring 43, and therefore with the ribs 42.

The angle or inclination of the barrel is, of course, controlled by the crank 11 through the medium of the worm 29 and gear or curved rack 30, as previously stated. Also, the anode-rods or portions 39 are protected from the frame by an insulating-tube 48 which fits over a second tube 49, the latter being secured to the bottom of the barrel 50 and serving as a hollow frame member or inclosure for the rod 38. The lower end of the tube 49 has a threaded portion 51, preferably smaller in diameter than the body portion of the tube, and adapted to extend through the bottom of the barrel and be secured thereto by the nut 52. With this construction, a tight joint is provided at the bottom of the barrel for the purpose of preventing the solution from leaking out between the insulating-tube 48 and the opening through which the tube 49 passes to the bottom of the barrel. In addition, it will be seen that the spider 36 is provided with a number of arms 53 to which are bolted a number of rods 54. The upper ends of these rods are made hook-shaped in order that they may grasp and hold the annular upper edge portion of the barrel, thus clamping the barrel as a whole firmly upon the said spider. As illustrated, the two spiders of the machine are designed to support round barrels. It will be understood, however, that the said barrels may be of any suitable or desired shape, and that the formation of the supporting spiders may be varied accordingly. In Fig. 1, the spider 36′ is similar to the spider 36, and the arms 53′ are similar to the arms 53 of the other spider, each arm being provided with a round opening at its extremity. The lower ends of these rods 54 are threaded and adapted to pass through the said openings in the spider-arms 53 and to be secured thereto by nuts 55.

The foregoing description of the left-hand section of my improved machine will be sufficient, inasmuch as the right-hand section—that is to say, the other

barrel and its operating devices—are similar to those at the other side. It will be seen that the shafts or shaft-sections 10 and 10′ are held against endwise displacement by the pinions 26 and 26′ which engage the corresponding bevel-gear-wheels 32 and 32′, as explained. In order to operate the machine, the clutches 14 and 14′ are thrown into engagement with the loose pulley 9, said pulley being rotated by a suitable belt. The rotation of the pulley sets the shafting in motion, and each shaft or shaft-section then rotates its allotted barrel through the medium of the bevel gearing. Obviously, the barrels may, at any time, be disconnected from the driving-pulley, and thereby brought to a position of rest while the pulley is permitted to continue in motion. With my improved arrangement, one barrel may carry a copper plating solution, for example, and as fast as the articles in said copper solution receive their plating they may then be transferred to another plating solution in the other barrel, as, for example, a nickel plating solution; and this can be done without stopping the machine, thus reducing the time necessary for completing the desired plating and polishing operations. With my improved arrangement, no buffing or polishing is necessary after the articles are removed from the barrel, inasmuch as my improved electro-plating tumbling barrel combines the polishing operation with the electro-plating process—that is, the two operations are combined in one general operation. In other words, I find that by properly regulating the agitation or activity of the material while being electro-plated, they are found, at the end of the operation, to have smoothly and brightly finished surfaces.

The current employed and furnished by the generator G is, it will be understood, preferably direct in character, rather than alternating. The lower end of the rod 38 fits in a socket-piece 60, which latter is supported upon a yoke 27 by means of the pins 61 and 62, these pins constituting a part of the frame. The circuit of the electro-plating-current passes from one terminal of the generator G through a socket 60, through the rod 38, through the anode-terminals 39, and thence through the solution to the cathode-terminals or electrode 42, through the ring 43, through the bolts 46, thence through the insulated ring 45 to the brush 44 and back to the other pole of the generator G.

Since the two sections of the machine are identical, it will be understood that the gear 30′ at the right-hand side is similar to the gear 30, and that the worm 29 is similar to the worm 29. Also, the crank 11′ is similar to the previously described crank 11. Again, the anode-terminals 39′ correspond to the anode-terminals 39 of the structure already described. The insulating-tube 48 is similar to the insulating-tube 48, the former being pressed against the bottom of the barrel 50′ by means similar to the means employed for pressing the other tube against the bottom of the barrel 50, as, for example, by the nut 52′ similar to the nut 52 at the other side of the machine. Also, the insulated ring 45′ and the bolts 46′ correspond to the previously described insulated ring 45 and bolts 46. The rod 38′, the pins 62′ and 61′, the socket 60′ and yoke 27′ are similar to the corresponding elements at the other side of the machine, and will not require further description.

It will be understood that the bodies and bottoms of the tumbling barrels can be made of any suitable or desired material. In the drawings, these parts are represented as being made of wood and held together by suitable hoops.

Thus constructed, my invention contemplates a combined tumbling barrel and electro-plating apparatus, and it also contemplates a multiple-barrel tumbling arrangement, the two barrels being preferably operated from a common shaft made in sections, whereby either barrel can be operated without operating the other.

From the foregoing it will be seen that all electrical connections are established through the bottom of the barrel. The stem or arbor 31 is hollow and affords a bore or passage for establishing electrical connection with an electrode or element within the barrel, preferably the anode element. As stated, the cathode elements are insulated from the barrel and electrically connected with a ring or circular plate on the bottom of the barrel, which ring or plate is engaged by a brush connected with the other pole of the source of plating current.

What I claim as my invention is:—

1. A tumbling machine comprising a rotatable tumbling barrel provided internally with electro-plating apparatus all within and projecting upwardly from the bottom thereof.

2. A tumbling machine comprising a rotatable tumbling barrel provided internally with an axially or centrally arranged anode-terminal or electrode extending upwardly from the bottom of the barrel, and with side ribs or portions constituting the cathode-terminal or electrode, together with means for rotating said barrel and supplying a suitable electro-plating-current through a circuit including said anode and cathode when a suitable solution is held within the barrel.

3. A tumbling machine comprising a rotatable barrel having one end left open and its bottom or lower end mounted on an axis, means for tilting or inclining said axis to various angles, a centrally arranged anode-terminal or electrode extending axially of the barrel and insulated therefrom, projecting upwardly from the bottom of the barrel, a cathode-element suitably disposed in the barrel, secured thereto, means for rotating the barrel, and means for supplying the necessary current when a suitable solution is held within the barrel.

4. In a machine of the class described, the combination of a rotatable tumbling barrel, means for changing the angle of said barrel, means for rotating said barrel at any of the different possible angles or positions thereof, an insulated support extending axially from the bottom of said barrel, anode elements mounted on said support, a conductor extending axially through the bottom of the barrel and connected with said anode elements, cathode elements disposed within the barrel and electrically connected therewith, a ring at the bottom of the barrel, electrical connections between said ring and said cathode elements, a source of plating current having its positive pole connected with the said conductor leading to the anode elements, and a brush bearing against the said ring and connected with the negative pole of said source of current.

5. In a machine of the class described, the combination of a rotatable tumbling barrel, means for rotating the barrel, means for varying the angle or inclination of the barrel, a stem or arbor for the barrel, anode elements within the barrel and insulated therefrom, a conductor extending axially through the arbor and the barrel and insulated therefrom, means for electrically connecting the anode elements with the said conductor, a metal bottom member for the barrel, cathode elements within the barrel, electrically connected with said metal member, a source of plating current having its positive pole connected with said conductor, and a brush bearing upon said metal mem-

ber and electrically connected with the negative pole of the said source of current.

6. An electro-plating machine comprising a rotatable tumbling barrel, means for changing the angle or inclination of the barrel while the same is in motion, a hollow and axially disposed support extending upwardly from the bottom of the barrel and insulated therefrom, a hollow stem or arbor for the barrel, a rod extending longitudinally through the said support and stem or arbor and insulated therefrom, a mounting upon the upper and outer end of said rod, anode elements having their upper and outer ends secured to said mounting, said anode elements extending downwardly within the barrel to a point at or near the bottom thereof, cathode elements within the barrel, a base or body for the machine, means for insulating the cathode elements from the said base or body, a source of plating current, and a circuit including the said source of current and the anode and cathode elements in series, said circuit also including the plating solution held within the barrel.

7. In a machine of the class described, the combination of a rotatable tumbling barrel, cathode elements secured around the inner side walls of the barrel, an inner metal ring secured to the bottom of the barrel, metal strips connecting the cathode elements with the said ring, an outer metal ring for the bottom of the barrel, bolts connecting the two rings together, a spider for the bottom of the barrel, said spider insulated from the cathode elements, a thrust bearing for the bottom of the spider, means for removably securing the barrel to the spider, an anode element disposed centrally within the barrel, means for mounting the anode element upon the bottom of the barrel and insulating same therefrom, means for making electrical connections through the bottom of the barrel with both the anode and cathode elements, and means for rotating the barrel.

8. In a machine of the class described, the combination of a rotatable tumbling barrel, a hollow support disposed axially therein and secured to the bottom thereof, anode elements parallel with and disposed around said hollow support, a rod extending axially through the bottom of the barrel, and extending also longitudinally through the said hollow support, a mounting on the upper or outer end of said rod, means for securing the ends of the anode elements to the said mounting, means for insulating the rod from the balance of the machine, and means at the lower end of the rod for establishing an electrical connection therewith.

9. In a machine of the class described, the combination of a rotatable tumbling barrel, a spider for the bottom of the barrel, a rotatable stem or arbor for the spider, bearings in which the said stem or arbor is mounted for rotation, and tie-rods hooked over the upper edge of the barrel and secured at their lower ends to the outer ends of the spider-arms.

10. In a machine of the class described, the combination of a rotatable tumbling barrel, a hollow stem or arbor for the bottom of the barrel, an electrode or element within the barrel, and an insulated electrical connection extending longitudinally through the said stem or arbor and suitably connected with the said electrode or element.

Signed by me at Chicago, Cook county, Illinois, this 22nd day of July, 1905.

HARRY J. GUTTMAN.

Witnesses:
E. D. FALES,
R. C. GIFFORD.