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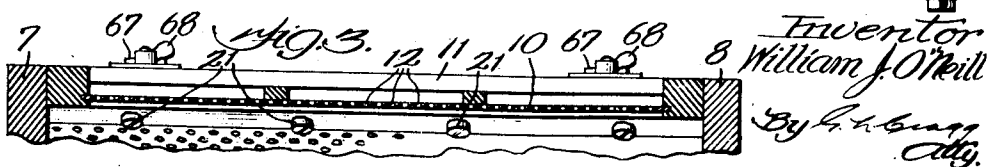
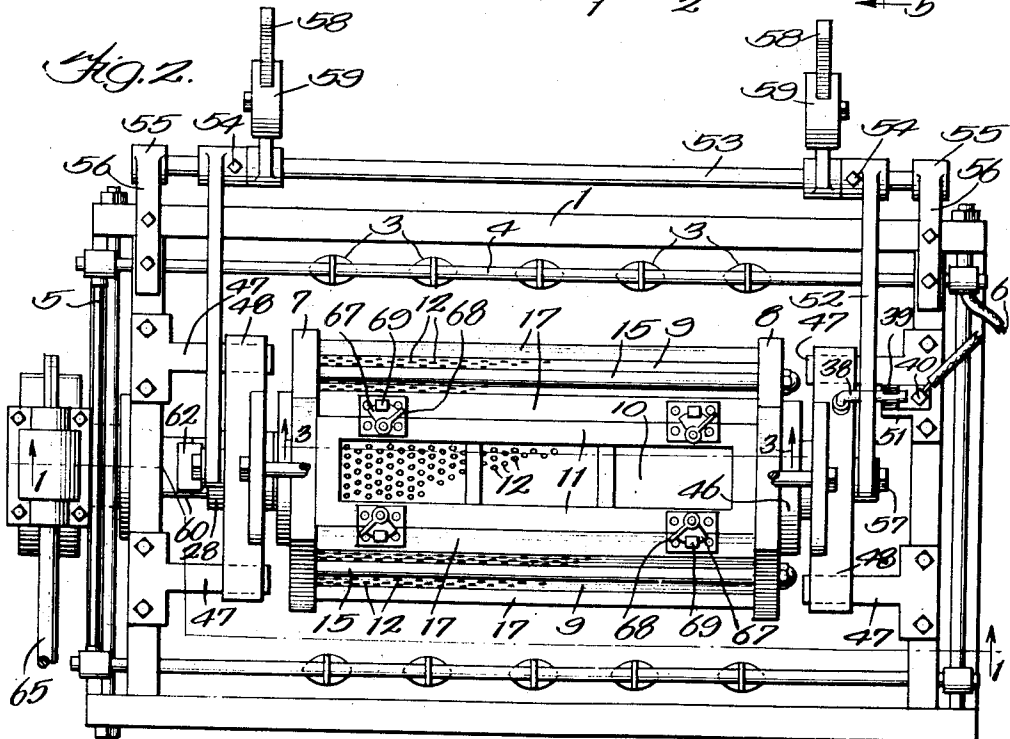
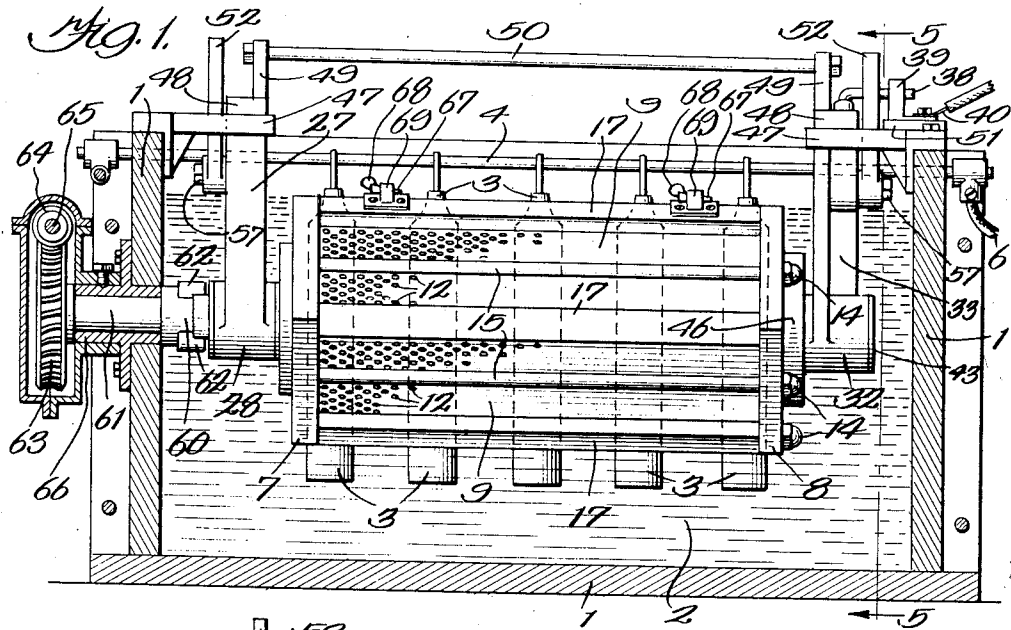
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1,726,308

ELECTROPLATING APPARATUS

Filed March 7, 1927

3 Sheets-Sheet 1



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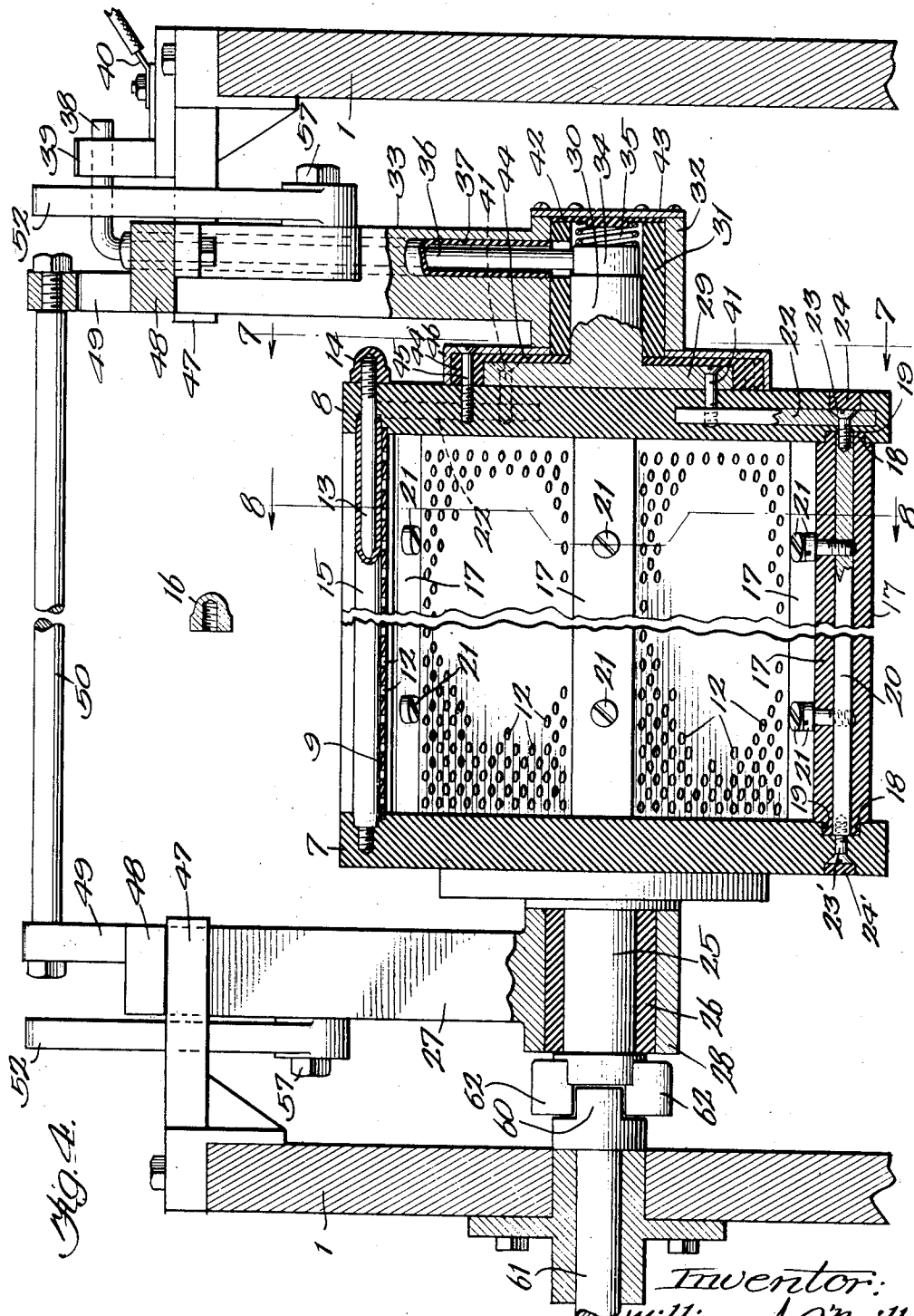
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ELECTROPLATING APPARATUS

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3 Sheets-Sheet 2



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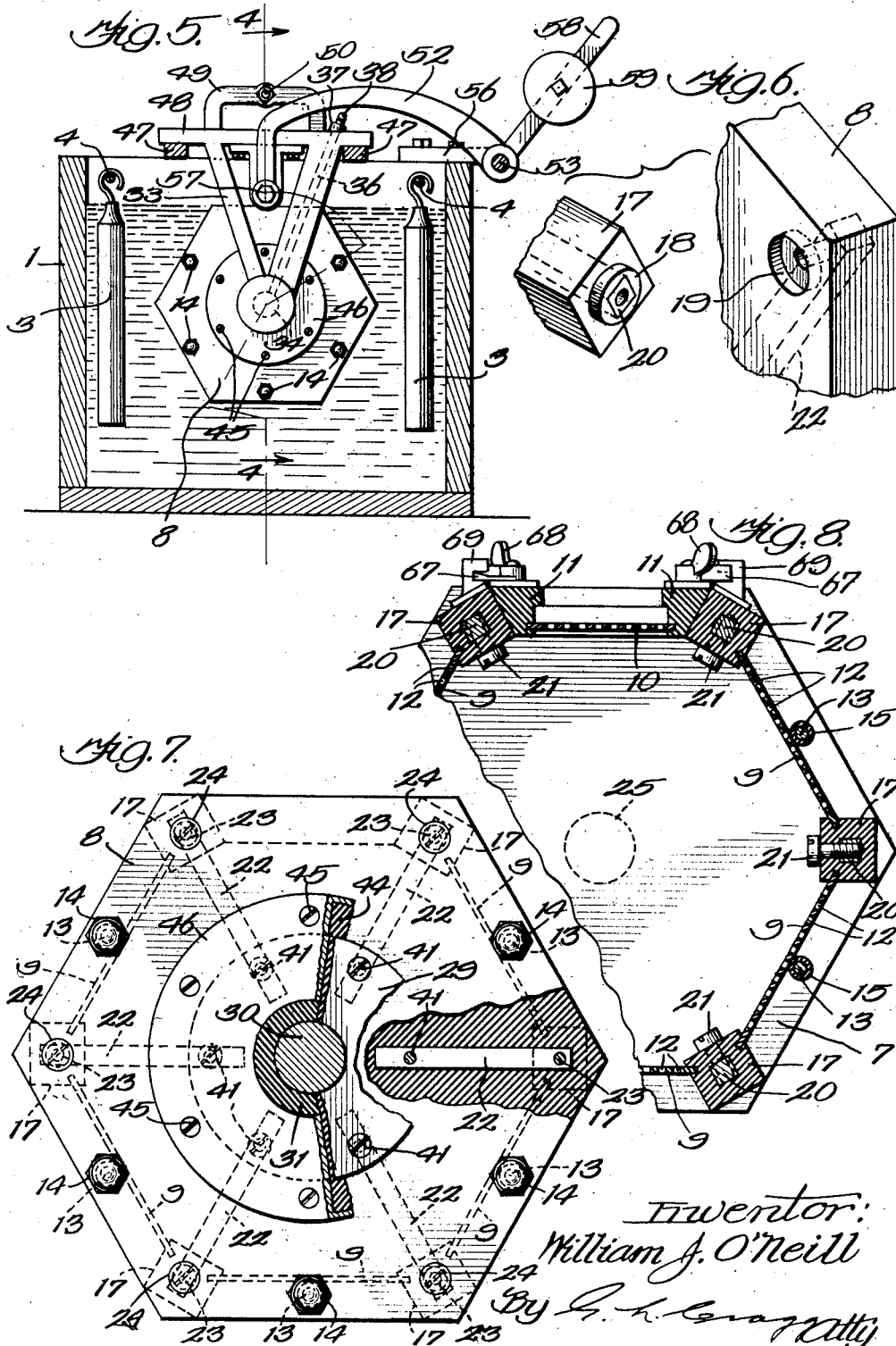
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ELECTROPLATING APPARATUS

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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE.

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ELECTROPLATING APPARATUS.

Application filed March 7, 1927. Serial No. 173,487.

My invention relates to electroplating apparatus and, particularly, to receptacles thereof having electrolyte therein and has for one of its objects the provision of an improved structure whereby the cathode conductors are insulated from the electrolyte except at terminal parts thereof that are to have contact with the electrolyte.

In carrying out this object of my invention, the receptacle comprises end walls and an intervening wall of insulation, the cathode conductor or conductors being encased by said intervening wall and provided with a terminal or terminals projecting laterally through the intervening wall to the interior of the receptacle to contact with the electrolyte within the receptacle. This feature of my invention finds particular utility in the construction of electroplating barrels, which comprise end walls of insulation and intervening perforated panels of insulation which have assembling bars between their adjacent longitudinal edges which extend between the end walls. These assembling bars are of insulation and encase the cathode conductors which have terminals projecting laterally through the bars to the interior of the barrel for contact with the electrolyte within the barrel. The perforated panels are preferably thin and the perforations therethrough are numerous. In order to strengthen the panels, and to effect firm assembly of the end walls, I employ tie rods which connect the end walls and which are located between the longitudinal edges and engage the outer faces of the panels so that when any of the contents of the barrel that are to be plated rest upon the panels, the latter will be aided by the rods in supporting the weight of said contents.

In accordance with another feature of the invention, one of the panels of the barrel is movable to afford access to the barrel. I reinforce this panel by means of a brace or braces intermediately placed between opposite sides of the frame that carries this panel and engaging the outer face of the panel, for the same purpose.

The apparatus of my invention has other features and advantages and will be more fully explained in connection with the accompanying drawings in which Fig. 1 is a longitudinal sectional elevation taken generally on line 1—1 of Fig. 2; Fig. 2 is a plan view; Fig. 3 is a sectional view on line 3—3 of

Fig. 2; Fig. 4 is a longitudinal sectional view generally on line 4—4 of Fig. 5 with parts broken away; Fig. 5 is a sectional view on line 5—5 of Fig. 1; Fig. 6 is a perspective view of a portion of one end wall and the contiguous end of one of the panel holding bars, these parts being shown in separated relation; Fig. 7 is a sectional view on line 7—7 of Fig. 4; and Fig. 8 is a sectional view on line 8—8 of Fig. 4.

The electroplating tank 1 includes any suitable form of liquid electrolyte 2. The anodes 3 which are to supply the metal or material to the objects to be plated are hung upon metallic bus rods 4 which are supported upon the tank in position to permit these anodes to be sufficiently inserted within the electrolyte. These bus rods are connected in series by another metallic rod 5, the three metallic rods being connected by a conductor 6 with the positive pole of the electroplating generator or other source of current, this source furnishing direct current unless the electrolytic cell itself is capable of rectifying alternating current.

An electroplating or tumbling barrel is movable and preferably rotatable within the electrolyte in the tank. This electroplating barrel includes end walls 7 and 8 formed of suitable insulating material and five thin wall portions or panels 9 also formed of suitable insulating material that are received at their ends within grooves formed upon the inner faces of said end walls and a thin wall portion or panel board 10 of suitable insulating material which is held by a removable frame 11 made of insulating material which is normally fixed in position, as will appear. The end walls are of hexagonal contour, the panels being arranged to enclose a hexagonal figure, these panels being arranged within the hexagonal contour of the end walls. It is obvious that the barrel is not to be limited to the hexagonal shape described. The various panels are provided with numerous perforations 12 therethrough which afford free passage between the interior of the barrel and the exterior thereof for the passage of electrolyte between the interior of the barrel and the surrounding portion of the tank.

The end walls are assembled by means of metallic rods 13, each threaded at one end and there screwed into the end wall 7 and each threaded at its other end and there receiv-

ing a clamping nut 14 of insulation or at least with its exposed surface upon insulating material. Said rods are surrounded by sleeves or hollow rods 15 of insulating material which extend slightly into the end walls from the inner faces thereof, the ends of the sleeves constituting shoulders upon the rods 13 to limit the extent to which the end walls may be drawn together, a function which is also performed by the panels. The ends of the sleeves 15 desirably taper as do the recesses in the end walls that receive the same so as to insure fluid-tight connection between the end walls and the sleeves. The sleeves 15 and the rods 13 thus constitute unitary rod structures. These rod structures are desirably located midway between the corners of the end walls and midway between the sides of the panels, the rod structures engaging the exterior surfaces of the panels so as to aid the same in supporting the weight of the contents of the barrel that are being plated when the panels underlie such contents in the rotation of the barrel.

The nuts 14 are desirably composed of insulation and do not of themselves have sufficient strength to enable them to force the end walls toward each other to the desired extent. I, therefore, initially employ metal nuts 16 upon the ends of the rods 13, these nuts being turned with sufficient force to bring the end walls into position. After the metal nuts 16 have performed this function, they are removed, one at a time, and replaced, one at a time, by the insulating nuts 14. The longitudinal edges of the panels 12 are received in grooves formed in bars 17 of insulating material, these bars being desirably square in cross-section and extending between the end walls 7 and 8 and having reduced circular ends 18 which enter correspondingly shaped recesses 19 in the end walls. There are six of the insulating bars 17, each bar encasing a cathode conductor 20 which is thus thoroughly protected from the electrolyte excepting at its terminals 21 which project laterally through the bars 17 to have contact with the electrolyte within the barrel. These terminals may be in the form of metal screws whose stems are threaded into the conductors 20 and whose heads seal the openings in the bars 17 through which the stems pass. The cathode conductors 20 are included in circuit by means of other cathode conductors 22, six in number, which are encased by the insulating end wall 8 and radiate from the central region thereof toward the corners of said end wall. The connections between the conductors 20 and 22 are effected by means of the metallic screws 23 which are passed through the conductors 22 into the adjacent ends of the conductors 20, said conductors being in the form of bars in the embodiment of the invention illustrated, the conductors 20 being at right angles to the conductors 22.

The screws 23 are passed through openings formed through the end wall 8, the outer ends of these openings being plugged with insulation, as indicated at 24, to protect the screws from the electrolyte. Screws 23' are passed through the end wall 7 into the other ends of the conductors 20, the screws 23 and 23' co-operating to place the end walls of the barrel in proper relation to each other and to the bars 17 and the cathode conductors encased by these bars. The outer ends of the screws 23' are protected by plugs of insulation 24'.

The electroplating barrel is desirably rotated, when the apparatus is in use, and to this end the barrel is provided with a hub upon each end wall. The hub upon the wall 7 is inclusive of a shaft portion 25 which is mounted to turn within a bearing 26 formed of insulation, this bearing being carried by the lower end of a hanger 27 which is formed with a sleeve 28 at its bottom end in which the bearing 26 is disposed. The hub upon the end wall 8 is inclusive of a circular metallic plate 29 having a metallic shaft 30 integrally formed therewith, this shaft being mounted to turn within a bearing 31 formed of insulation and which is carried by the sleeve 32 formed upon the lower end of a hanger 33. A contacting metallic disc 34 is pressed against the outer end of the shaft 30 by means of a spring 35, an upright metallic rod 36 being joined, at its lower end, with the metallic disc 34, the rod 36 passing through an insulating sleeve 37 which is encased by the hanger 33. The upper end of the rod 36 is horizontally bent, as indicated at 38, and is receivable between the contacting spring clips 39 that are carried upon the top of the tank 1, this tank being of insulating material, these clips being connected with the source of current by the conductors 40. The metallic hub 29, 30 is electrically connected with the cathode conductors 22 by means of the metallic screws 41 which are passed through the hub portion 29 and are screwed into said conductors 22. The hub structure 29 and 30 is not only protected by the bearing 31 of insulation but is also protected by the insulating sleeve 37, the insulating disc 43 closing the outer end of the bearing 31 and held in place by the cap plate 43 that is screwed upon the outer end of the sleeve 32 and the cap of insulation 44 held in place by screws 45 which are passed through the rim of the cap into the end wall 8. These screws desirably also serve to hold the metallic cap 4 about the cap 44. The central portion of the cap 44 is held between the inner end of the sleeve 32 and the central portion of the cap 46.

The end walls of the tank carry brackets 47 that extend inwardly over the electrolyte within the tank, the hangers 33 terminating in angular heads 48 which rest upon these brackets. The hangers have upward inverted U-shaped extensions 49 which are con-

5 nected by the distance preserving rod 50, as illustrated most clearly in Fig. 4. The spring clips 39 are carried upon the enlargement 51 of one of the right hand brackets 47. Levers 52 are secured to the rod 53 by means of the set screws 54, these rods being journaled, at their ends, within bearings 55 carried upon the outer ends of brackets 56 which are secured to the end walls of the tank. The other ends of the levers 52 are in pivotal connection with the hangers, as indicated at 57. Operating levers 58 are also secured to the rod 53, these levers being desirably provided with counterweights 59. When the levers 58 are pressed downwardly upon, the barrel is lifted, the circuit connection of the cathode conductors upon the barrels being broken by the consequent upward movement of the rod end 38 out of engagement with the spring contacting clips 39. When the barrel is in its lower and operating position illustrated, the oblong end 60 of the driving shaft 61 is closely received between the flat sides of the wings 62 upon the outer end of the shaft 25 whereby the barrel may be turned. The shaft 61 carries a worm wheel 63 in mesh with a worm pinion 64 upon a suitably driven shaft 65. The journal 66 for the shaft 61 passes through and has fluid-tight connection with the adjacent end wall of the tank.

Access is had to the barrel by the removal of the frame 11, hitherto described, the outer longitudinal sides of the frame being inwardly tapered, as illustrated in Fig. 8, to have snug fit with the adjacent bars 17. Fastening cams 67 are journaled upon the frame 11 and are provided with thumb pieces 68

by which they may be turned. These cams are engageable with cam grooves within the blocks 69 that are carried upon the bars 17 that are adjacent the frame 11. This frame is of a length to be snugly received between the end walls 7 and 8 of the barrel.

The advantages of the construction herein disclosed are readily apparent to those skilled in the art. The construction made in accordance with the preferred embodiment of the invention has many features in common with the structure disclosed in Patent 1,529,747, dated March 17, 1925.

Changes may be made without departing from the invention.

Having thus described my invention, I claim:

An electroplating barrel including end walls of insulation; perforated panels between the end walls; bars of insulating material extending between said end walls and with which the adjacent sides of adjacent panels are assembled; conductors encased by said bars of insulation and provided with terminals projecting laterally through the bars to the interior of the barrel to contact with the electrolyte within the barrel; additional conductors connecting the aforesaid conductors in circuit and each encased by one of said end walls of insulation; and screws effecting the mechanical assembly of said end walls with the adjacent ends of said bars and establishing electrical connection between the first aforesaid and said additional conductors.

In witness whereof, I hereunto subscribe my name.

WILLIAM J. O'NEILL.