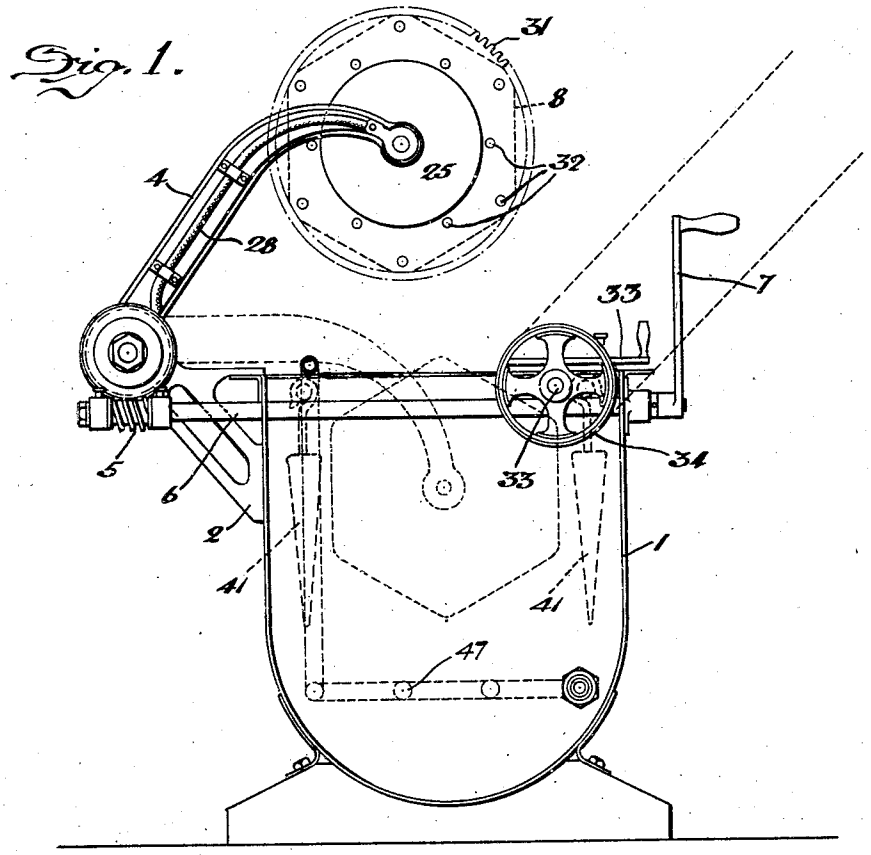
Jan. 17, 1933. T. M. HIESTER 1,894,609

PLATING BARREL

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Fig. 1.



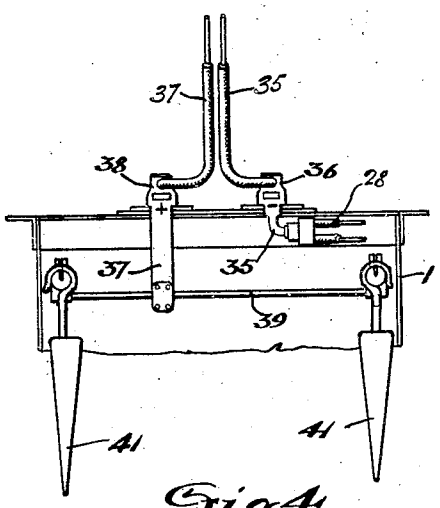


Fig. 4.

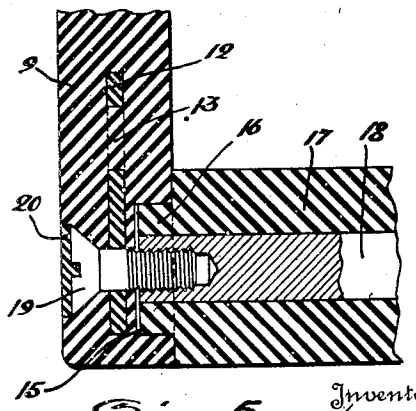


Fig. 5.

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PLATING BARREL

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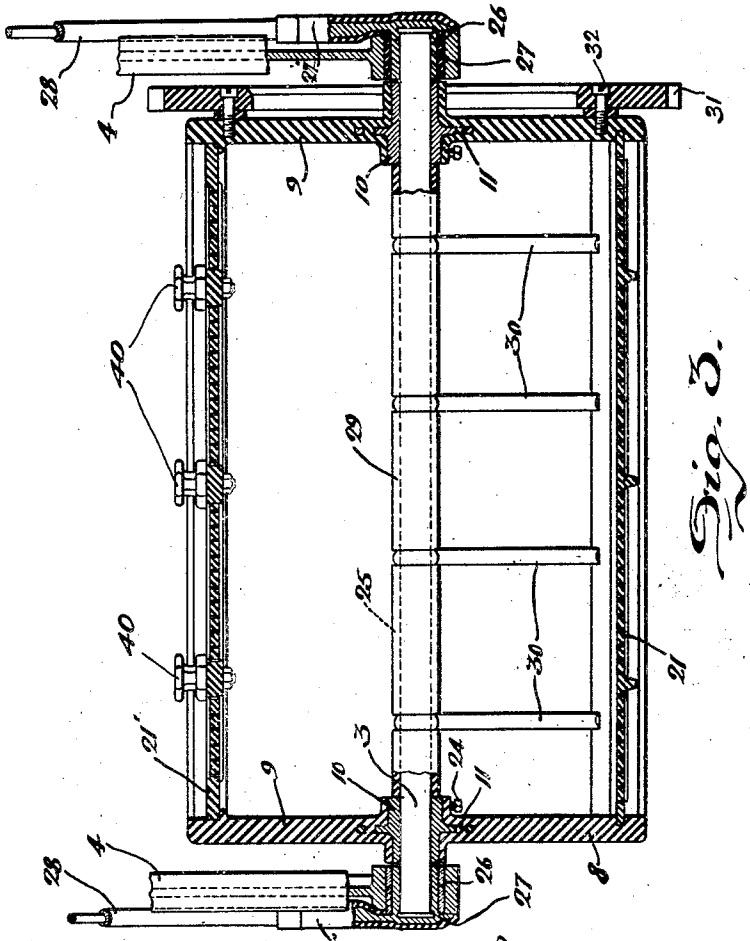


Fig. 3.

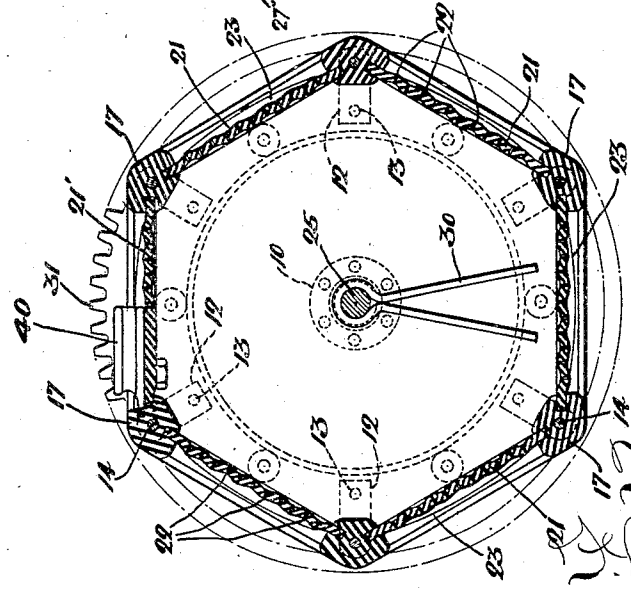


Fig. 2.

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PLATING BARREL

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Fig. 6.

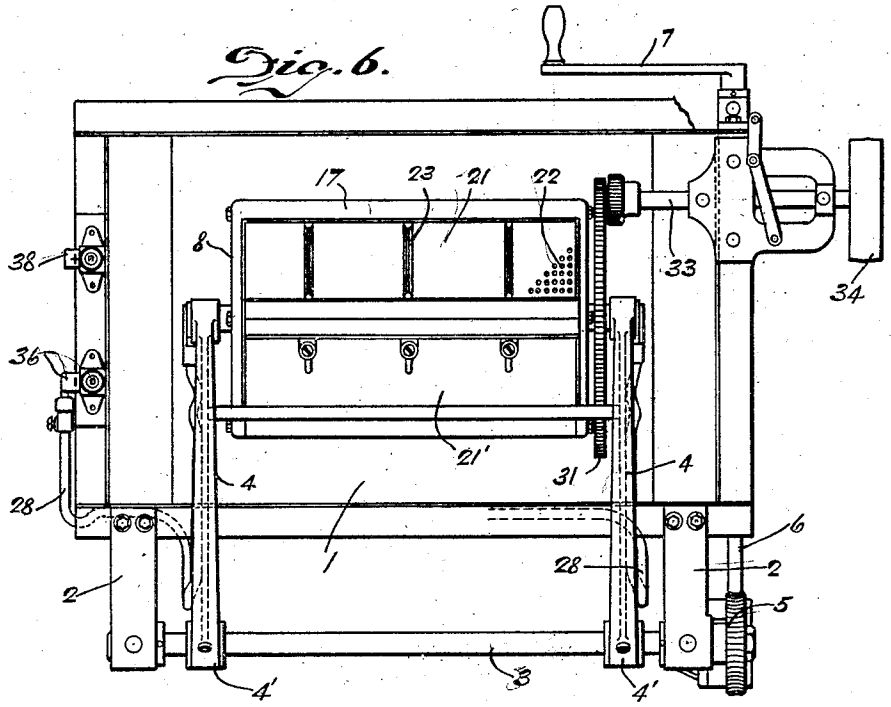
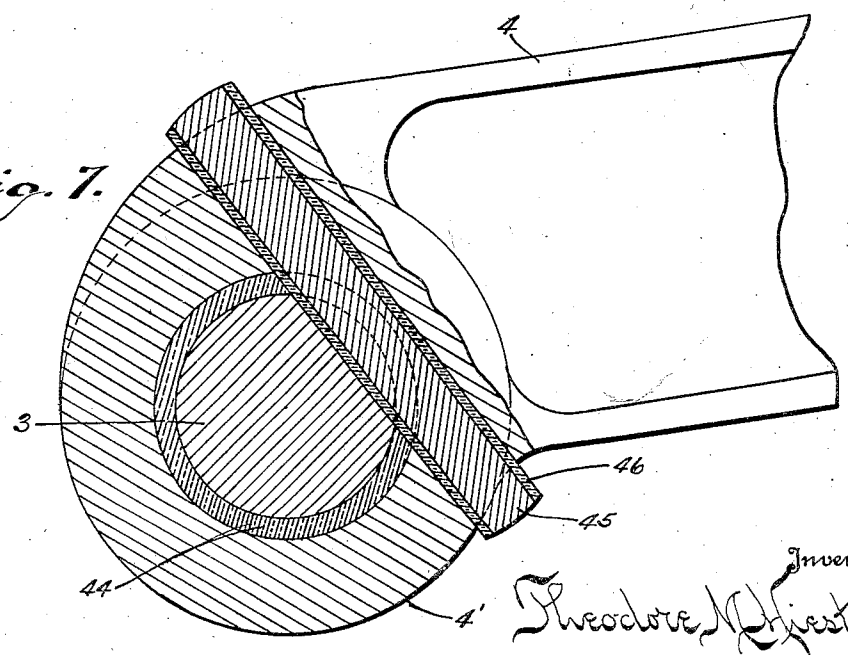


Fig. 7.



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Patented Jan. 17, 1933 1,894,609

UNITED STATES PATENT OFFICE

THEODORE M. HIESTER, OF DAYTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AERO SUPPLY MANUFACTURING CORPORATION, OF CORRY, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

PLATING BARREL

Application filed June 15, 1928. Serial No. 285,571.

My invention relates to electro-plating apparatus, and more particularly to a plating barrel and means for adjustably supporting the barrel relative to the tank or vat.

In the electro-plating industry it has been customary to employ drums or barrels having wooden heads and mullions or space bars with perforated panels of celluloid or of phenolic condensation material, wicker, or the like. For certain processes of plating such barrels possess a reasonably long life and are eminently satisfactory. However, since the advent of new processes of plating and the commercial development of plating with cadmium, chromium and other metals formerly little used, necessitating the employment of baths of strong acid or strong alkaline character, and the use of baths of high temperature including hot cyanide baths, it has been found that such plating barrel or drum will not withstand the treatment to which they are subjected under the present development of the plating industry and that the life of such barrels or drums is quite short, thus adding a quite high item of replacement expense.

Hard rubber is one material which will withstand for long periods of time the deteriorating effect of the plating solutions employed in the more recent and highly developed processes. In the present construction, hard rubber is preferably employed as the material from which the barrel or drum is constructed, such material being reinforced to provide the requisite strength. In the present instance the several parts are molded from hard rubber, the heads having embedded therein metallic flanged hubs which are securely anchored in the hard rubber material, and being further reinforced by embedded metallic inserts coincident with the point of connection of the intermediate mullion or space bars. These mullions are also molded from hard rubber materials and are reinforced with longitudinally disposed metallic bars or rods. The heads are recessed or mortised to receive terminal bosses or tenons on the ends of the mullions, while screws or studs extending through the heads in engagement with the reinforcement members are screw-threaded into the ends of the reinforcement members. The heads as well as the mullion bars are grooved or mortised to receive the margin of the perforated panels, one of which however is removable to afford access to the interior of the drum or barrel. The panels which are also molded from hard rubber or similar material are corrugated or possess a crenate or wavy suface to avoid the adhesion of small parts to such panels by capillary attraction. The barrel is mounted on a shaft supported on swinging arms by which the barrel is raised or lowered relative to a solution vat or tank. Electrical connection is made direct with the bearing bushing of the drum shaft in such swinging arms.

The object of the invention is to simplify the structure as well as the means and mode of operation of plating apparatus, whereby it will not only be cheapened in construction, but will be more efficient in use, positive in operation, uniform in action, and unlikely to get out of repair.

A further and important object of the invention is to provide a plating barrel or drum capable of withstanding the deteriorating effect of acid and alkaline baths and solutions of high temperature, thereby materially increasing the longevity and period of usefulness of such barrel or drum.

A further object of the invention is to provide improved means for plating drum or barrel assembly, whereby the several parts may be more securely and firmly attached and whereby the resulting barrel or drum will be more rigid and possess greater strength.

A further object of the invention is to provide improved electrical connections for the plating drum or barrel and to provide an improved mounting therefor, by which the barrel may be easily and conveniently lowered and raised into and out of the vat or tank.

A further object of the invention is to provide an improved form of panel for such drums or barrels to prevent adhesion of small parts through capillary attraction.

A further, but none the less important

object of the invention, is to provide a plating drum, the parts of which may be molded from plastic material, thereby facilitating the process of manufacture and securing accuracy and interchangeability of the parts.

With the above primary and other incidental objects in view, as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of assembly and operation, or their equivalents, as hereinafter described and set forth in the claims.

Referring to the accompanying drawings, wherein is shown the preferred, but obviously not necessarily the only form of embodiment of the invention, Fig. 1 is an end elevation of the assembled electro-plating apparatus embodying the present invention. Fig. 2 is a transverse sectional view of the plating drum or barrel. Fig. 3 is a longitudinal sectional view thereof. Fig. 4 is an end elevation of a portion of the vat or tank viewed from the end opposite that shown in Fig. 1. Fig. 5 is an enlarged detail sectional view of the connection between the molded mullion strip and molded head of the barrel. Fig. 6 is a top plan view of the assembled apparatus. Fig. 7 is a detail view illustrating the mounting of the swinging arm.

Like parts are indicated by similar characters of reference throughout the several views.

In the accompanying drawings, 1 is the vat or tank in which is contained the plating solution. Mounted in brackets 2, secured to the side wall of the tank 1 is a rock shaft 3, carrying swinging arms 4. There is an arm 4 located at each end of the tank 1. The swinging arms 4 are oscillated to raise and lower the plating drum or tank 1 by means of a worm gear 5 actuated by the shaft 6 which carries a crank 7 at its forward end.

Journalled in the extremities of the swinging arm 4 is a rotary plating barrel or drum 8. The barrel illustrated in the drawings is of hexagonal form although obviously it may be of other polygonal shape or may be circular if so desired.

The drum or barrel 8 comprises spaced polygonal heads 9 which are molded from plastic deterioration resisting material of which hard rubber is a suitable example. At the time of molding of the head 9, flanged hubs 10 are embedded in the plastic material, the flanges of which are provided with spaced holes 11 through which the material extends to afford the necessary anchorage. At the same time spaced metallic reinforcement members 12 are embedded in the plastic material at points coincident with the places of subsequent connection of the intermediate mullion or space bars. These reinforcement members 12 are also perforated at 13 for anchorage purposes and are provided with holes 14 through which the mullions or space bars are subsequently connected. Coincident with the location of these reinforcement members 12 the inner or adjacent faces of the heads 9 are recessed or mortised as at 15 to receive bosses or tenons 16 projecting from the ends of the molded mullions or space bars. The mullions 17 are likewise molded from deterioration resisting material, preferably, though not necessarily, hard rubber and are reinforced by longitudinally disposed metallic rods 18, the ends of which are bored and threaded to receive screw studs 19. These attachment screws 19 are introduced through the heads 9 passing through the openings 14 of the reinforcement members 12 and engaging the rods 18 of the mullions 17. The heads of the screws 19 are then preferably, though not necessarily, covered and concealed with a deposit of plastic material 20. The mullions or space bars 17 are grooved or splined on their opposite sides to receive the margins of a series of perforated panels except one of such mullions which is rabbeted to permit the removal of the panel to afford access to the drum or barrel. The panels 21 are corrugated or formed of arcuating surface conformation and are perforated at more or less closely spaced intervals. Such perforations are preferably located at the crowns or apices of the corrugations on the inner sides of the panels 21. This admits air to the under side of articles which may otherwise adhere to the panels, thus preventing adherence of small parts by capillary attraction. The spacing of the perforations 22 and also the size of such perforations will vary according to the character of the work to be plated in the drum and the size of such parts. These perforated panels 21 are reinforced by transverse ribs 23 upon their exterior sides. The removable panel 21′ is provided with pivotally mounted locking members 40 having oscillatory movement into engagement with shoulders formed upon the adjacent mullions 17. By releasing such fastening members 40 the panel 21′ may be removed to permit the insertion and removal of articles into and from the drum or barrel.

Secured in the hubs 10 of the terminal heads 9 by means of set screws 24 is a shaft 25 upon which the drum is carried. The shaft 25 is journalled in the ends of the swinging arms 4. These arms are provided with bushings 26, preferably though not necessarily of brass which are insulated from the arms 4 by concentric bushings 27 of insulating material. Electrical conductors 28 lead to and make direct connections with the bushings 26 and thereby electrically connect the shaft 25 into the circuit independent of the swinging arms 4. Located upon the shaft 25 within the drum or barrel and maintained at spaced intervals by interposed

sleeves 29 of insulating material are contact hangers or distributing fingers 30. These distributor fingers 30 comprise copper rods bent substantially to a cotter pin formation and are suspended from the shaft 25 to make contact with metallic articles being tumbled within the barrel or drum to carry current thereto during the plating operation.

Secured to one end of the drum or barrel is a gear ring 31 which may be of metal, but is preferably of molded plastic material. This gear ring is secured by screws 32 engaging the head of the barrel and is adapted to mesh with a gear pinion upon the drive shaft 33 which at its outer end carries a pulley 34 as illustrated in Fig. 1. The shaft 33 is capable of a limited longitudinal reciprocatory motion in addition to its rotary motion. This longitudinal movement effected by means of the shift lever 33′ serves to engage and disengage the driving gear pinion with the ring gear 31. These gears are shown in Fig. 6 in their disengaged position. In Fig. 4 are shown the electrical connections in which the negative supply conductor 35 leads to a connection 36 mounted upon the tank 1 from which extends the two conductors 28 extending along the oscillatory arms 4 to the shaft carrying bushing 26. The positive conductor 37 leads to a fixture 38 upon the tank connected through the bus bar 39 with rods extending longitudinally of the tank and supporting the anodes 41.

While hard rubber has been found to be a suitable material for the present purpose it is to be understood that the invention is not limited to the use of hard rubber, but other plastic material possessing the necessary resistance to the effect of the present character of plating solution, may be employed in lieu thereof, reference being made to hard rubber merely as illustrative of a suitable material and one which at the present time is preferred.

While the insulation bushings 27 electrically isolating the drum shaft from the supporting arms 4 will be found amply sufficient in those cases where the vat 1 is of wood or where the plating drum is only partially submerged in the solution so that the solution does not reach to the shaft. However, to provide for operation of the drum at a deep level and for the use of a metal tank 1 which may be rubber lined, the arms 4 are insulated from the tank to avoid short circuiting.

The arms 4 are provided with hubs 4′ through which extends the rock shaft 3 common to both the arms and oscillated by the worm gear drive 5—6—7 to raise and lower the arms 4 and with them the tank. Located within the hubs 4′ of the arms and surrounding the shaft 3 are bushings 44 of insulating material which electrically isolates the arms 4 from the shaft 3. Transverse locking pins or keys 45 are positioned in the hubs 4′ and intersect the rock shaft 3. These locking pins or keys 45 are formed with an insulating jacket 46 which insures complete electrical isolation of the arms and shaft. As a further precaution the exposed surfaces of the shaft bushings 27 and their connector arms 27′ with which the conductors 28 engage are also rubber coated or insulated to better insure against the current leakage from such bushing members to the supporting arms.

Heater coils 47 are preferably provided within the tank 1 through which live steam is circulated for the purpose of keeping the plating bath or solution at a required high temperature. The insulation of the plating barrel parts and its contents from the supporting arms 4 and the further insulation of these arms 4 from their supporting shaft 3 and from the tank connections leaves only the prescribed course for the flow of current which necessarily includes the articles to be plated and prevents short circuiting and elimination of the articles from the series.

From the above description it will be apparent that there is thus provided a device of the character described, possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific details shown, but that the means and construction herein disclosed comprises the preferred form of several modes of putting the invention into effect and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. In a plating machine, a vat, a pair of vertically swinging arms mounted thereon, a revoluble plating drum carried by the arms, said arms being interconnected for unison oscillation, a worm gear operating mechanism for said arms to effect the lowering of the drum into said vat and its elevation therefrom, a revoluble shaft for said drum journalled in said arms for rotation in unison with said drum, insulating means for electrically isolating the shaft from said arms and an electrical conductor mounted upon one of the arms and moving therewith making electrical connection with the drum shaft independent of said arm.

2. In an electro-plating apparatus, a plating drum the heads of which are formed from plastic material, flanged hubs embedded in said heads, perforated reinforcement mem-

bers embedded in the molded heads at spaced intervals, mullions molded from plastic material connecting the heads at spaced intervals, reinforcement rods embedded in said mullions and attachment members extending through the perforations of the reinforcement members of the molded heads and engaging with the reinforcement rods of the mullions and perforated corrugated panels interposed between the mullions and supported thereby.

3. As an article of manufacture, a head for a plating drum formed from hard rubber and having mortises therein to receive tenons on the ends of mullions to be connected with the head, perforated metallic reinforcement members embedded in the hard rubber heads coincident with said mortises, and a metallic flanged hub embedded centrally in said head, the flange of which is perforated and enclosed within the body of material forming the head which extends through the perforations of the flange to anchor said hub.

4. As an article of manufacture, a plating machine drum comprising spaced heads formed from hard rubber reinforcement inserts embedded therein, intermediate spaced mullions also formed from hard rubber reinforcement inserts embedded in said mullion and interconnecting the reinforcement inserts of the spaced heads, and perforated panels interposed between the spaced mullions to form an enclosed chamber.

5. As an article of manufacture, a plating machine drum comprising spaced heads formed from hard rubber, metallic hubs embedded centrally in the molded heads, and reinforcement members disposed in different radial positions about said hub and also embedded in the material of the head, mullions connecting the heads at spaced intervals coincident with the location of said reinforcement members, and perforated panels supported by said mullions.

6. As an article of manufacture, a plating machine drum including spaced heads, mullion bars formed from hard rubber interposed between the heads and connecting the heads at spaced intervals, metallic reinforcement rods embedded in said hard rubber mullions, attachment members connecting the reinforcement rods with the heads, and perforated panels carried by the mullion bars.

7. As an article of manufacture, a mullion bar for a plating machine drum molded from hard rubber, terminal tenons formed on the formed mullion bar for engagement in mortises formed in spaced heads of the drum, said mullion bar having marginal rabbets molded therein, and a metallic reinforcement rod embedded in said molded bar extending from one end to the other thereof, and screw threaded for engagement of attachment means for connecting the mullion with the heads of the drum.

8. A drum for a plating machine including spaced heads, mullion bars connecting the heads, and perforated panels interposed between and supported by the mullion bars, said panels being corrugated to prevent the adherence of small parts being plated through capillary attraction.

9. As an article of manufacture, a panel for a plating machine drum comprising a sheet like body of non-metallic material perforated at spaced intervals, the face of the panel being undulating, whereby small articles being plated may not conform to the surface of the panel and adhere by capillary attraction.

10. As an article of manufacture, a panel for a plating machine drum comprising a corrugated sheet of material perforated substantially at the crowns of the corrugations, whereby adherence of small parts by capillary attraction will be prevented.

11. In a plating machine of the character described, a vat, a pair of vertically swinging arms, a drum revolubly carried by said arms, a shaft for said drum bearings for said shaft mounted in said arms but electrically insulated therefrom, and electrical conductors supported upon the arms and electrically connecting with said shaft bearings independent of electrical connection with said arms.

12. A plating barrel including heads molded from plastic material, flanged metallic hubs embedded therein by forming the heads thereabout, reinforcement members embedded likewise in the heads at spaced intervals, transverse spaced bars formed from plastic material connecting the heads in spaced relation, reinforcement rods embedded in said bars and connected with the reinforcement members, and perforated wall panels of undulating form also molded from plastic material connected intermediate the bars and heads.

13. In a plating machine, a vat, a pair of vertically swinging arms mounted thereon, a revoluble plating drum carried by the arms, a shaft, hubs on said arms through which the shaft extends, means for oscillating the shaft, bushings of insulating material within said hubs and surrounding the shaft electrically isolating the arms from the shaft, locking pins extending transversely through the hubs and intersecting the shaft, and insulating jackets upon said locking pins.

14. In a plating machine, a vat, a pair of vertically swinging arms mounted thereon, a revoluble plating drum carried by the arms, a shaft, hubs on said arms through which the shaft extends, means for oscillating the shaft, and electro insulating material isolating said arms from the vat.

15. A plating barrel including heads mold-

ed from plastic material, a metallic hub embedded therein, reinforcement members likewise embedded in the heads at spaced intervals, transverse spaced bars molded from plastic material connecting the heads in spaced relation, and reinforcement members embedded in said bars and interconnected with the reinforcement members of said heads.

16. In a device of the class described, a shaft, a member mounted upon said shaft, said member having an aperture for receiving said shaft, an insulating bushing carried by said member surrounding said shaft, said member having a second aperture and said shaft having a recess aligned with said second aperture, a key member extending through said second aperture and said recess for preventing rotation of said member with respect to said shaft, said key member including a core of metallic material and a sleeve surrounding said core of insulating material whereby said member is insulated from said shaft.

In testimony whereof, I have hereunto set my hand this 6th day of June A. D. 1928.

THEODORE M. HIESTER.