F. H. HARTZELL.

ELECTROPLATING BARREL.

APPLICATION FILED APR. 22, 1919.

1,377,155. Patented May 3, 1921.

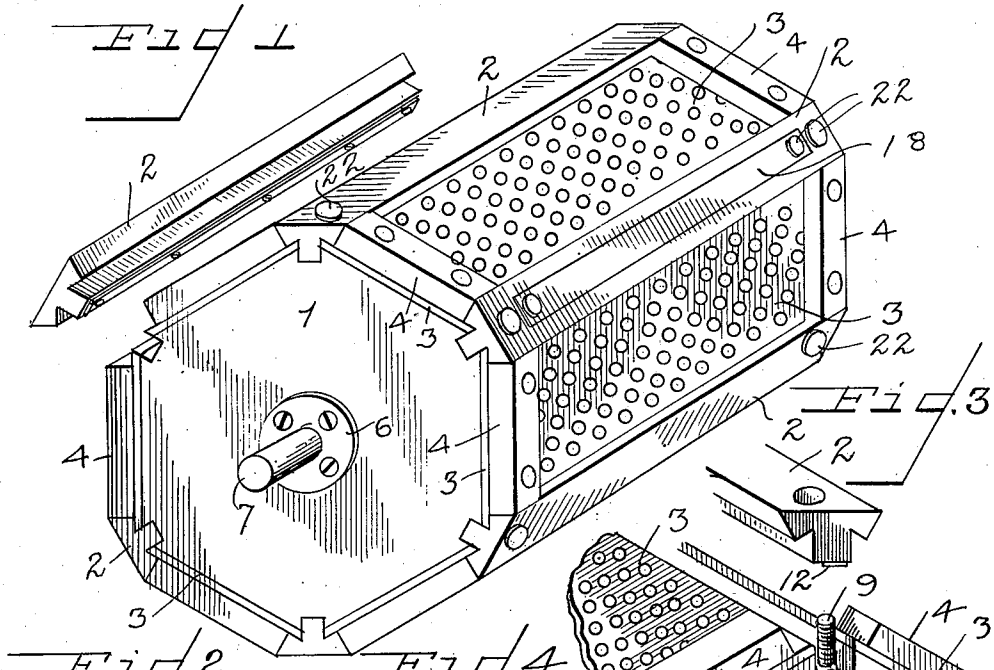


FIG. 1.

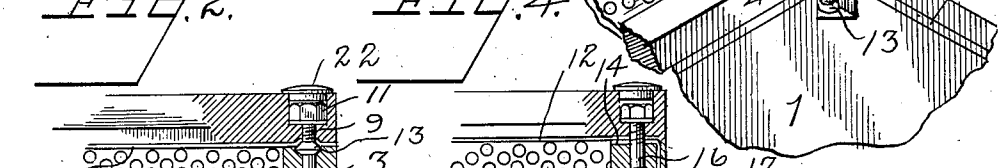


FIG. 2.

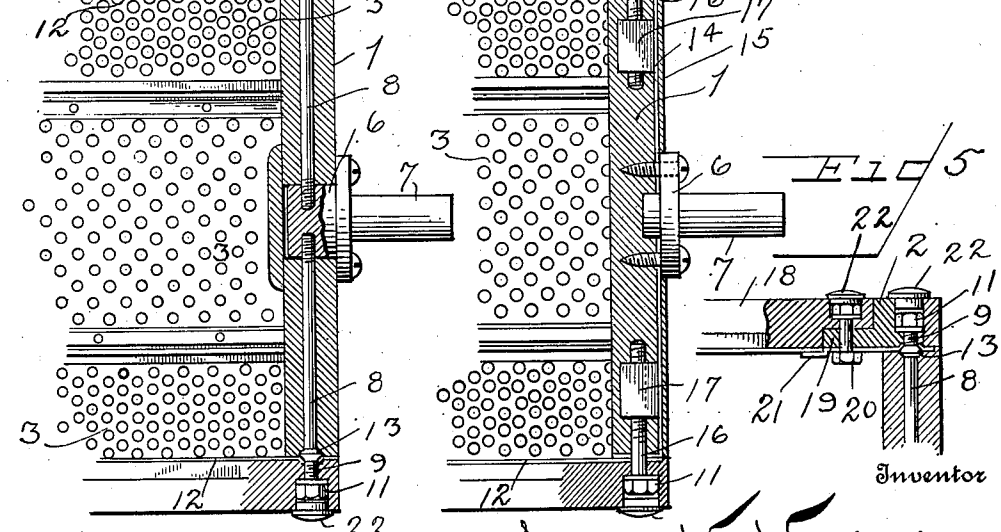


FIG. 3.

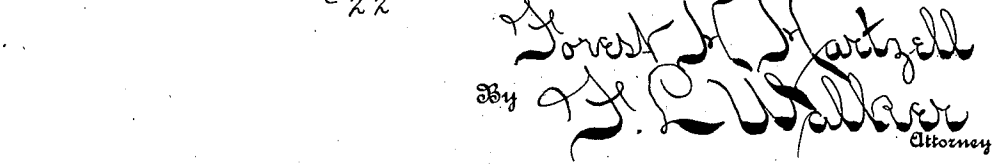


FIG. 4.



FIG. 5.

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# UNITED STATES PATENT OFFICE.

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## ELECTROPLATING-BARREL.

1,377,155. Specification of Letters Patent. Patented May 3, 1921.

Application filed April 22, 1919. Serial No. 291,894.

*To all whom it may concern:*

Be it known that I, FOREST H. HARTZELL, citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful improvements in Electroplating-Barrels, (Case D,) of which the following is a specification.

My invention relates to electroplating apparatus and more particularly to that type of apparatus employing a revolving barrel or drum in which the articles to be plated are tumbled and which is suspended in a tank or vat of electrolytic solution.

The object of the invention is to improve the structure as well as the means and mode of operation of such devices whereby they will not only be cheapened in construction, but will be more efficient in use, positive in operation, economical, and unlikely to get out of repair.

A further object of the invention is to provide removable contact bars or cathodes which may be readily and quickly removed for cleaning and replacement without the necessity of destroying or disassembling the entire barrel or drum.

A further object of the invention is to provide an economical method of electroplating in which the cathodes or contact bars after receiving plating deposits of such extent as to impair their efficiency as negative terminals, may be employed as electrolytic anodes thus affording a purified supply of plating metal and obviating losses of metallic deposits.

A further object is to provide a solution proof barrel capable of withstanding the heated alkaline solution commonly used in modern electroplating processes.

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 operation or their equivalents, as hereinafter described and set forth in the claims.

Referring to the drawings, Figure 1 is a perspective view of an electroplating barrel embodying the invention forming the subject matter hereof. Fig. 2 is a detail longitudinal sectional view thereof. Fig. 3 is a detail perspective view. Fig. 4 is a longitudinal sectional view of a modification. Fig. 5 is a detail view of a further modification.

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

An electroplating apparatus as usually constructed embodies a tank or vat adapted to contain the electrolytic solution or electrolyte, in which is suspended the revoluble drum shown in Fig. 1 of the drawings. Driving means of suitable character is provided for rotating the drum or barrel within the tank, as well as hoisting means for lifting the barrel out of the solution and for lowering it thereinto. Such apparatus forms no part of the present invention and has not therefore been shown nor described in detail. Reference may be had, however, to my copending application Serial No. 291893 in which a suitable type of apparatus of this character is disclosed. It is to be understood, however, that the barrel or drum forming the subject matter hereof is not limited to use with such apparatus, but may be employed in conjunction with any form of driving mechanism or hoisting means and any style of tank or vat, and may further be used as a burnishing or tumbling barrel, as described in the copending application referred to.

Referring to the drawing, the drum or barrel forming the subject matter hereof is shown as of polygonal form, the disclosure of the drawing being a hexagonal drum or barrel. It is to be understood, however, that the drum may be formed with any number of sides, or may be cylindrical if desired. As disclosed in the drawing, the drum or barrel comprises two polygonal heads 1 spaced one from the other and interconnected by longitudinally disposed bars or mullions 2 located coincident with the angles of the polygonal heads. The bars or mullions 2 are preferably, though not necessarily, formed somewhat T-shape in cross section as shown in Figs. 2 and 4, the lateral ledges of which overhang perforated wall plates 3. These perforated plates 3 may be of any suitable material such as wood, celluloid, bakelite, porcelain, or other non-metallic material. The perforated wall plates 3 are secured to the heads 1 by means of overlying cap strips 4 at each end of the perforated wall plates coincident with the heads

1, which strips are secured in position by attachment screws, or other attaching means. One of the perforated wall plates 3 is made removable or is detachably connected in order to afford access to the interior of the drum or barrel. Each of the heads 1 is provided with a concentric supporting head 6 from which projects a trunnion 7 upon which the barrel is rotated.

Embedded in one of the heads 1 are a plurality of radially disposed electrical conductors comprising rods 8 connected at inner or adjacent ends with the supporting head 6 and trunnion 7 and extending outwardly to the angles of the polygonal head or to points coincident with the mullions or longitudinal strips whether said head be polygonal or circular. At their outer ends the electrical conductors 8 are screw threaded as indicated at 9.

The longitudinal mullions or bars 2 are detachably connected upon the rods 8 by means of the screw threaded ends extending through the extremities of the bars or mullions and engaging with nuts 11 embedded in the mullions. This construction enables the mullions or bars 2 to be quickly and readily disengaged from the heads 1 and from the perforated wall plates 3 which they overhang.

Secured to the inner side of the bars or mullions 2, that is to say upon the face of the inward projecting medial tongues thereof, are metallic contact bars 12 which constitute the cathodes of the plating apparatus. These contact bars 12 make electrical connection at their extremities with the ends 9 of the electrical conductors 8. The electrical contact is insured by the clamping action of the attachment nuts 11 which cause the extremities of the contact bars 12 to bear heavily upon the collars or swells 13 formed on the conductors 8. These collars 13 are preferably somewhat tapered and by the clamping action of the nuts 11, are forced into the engagement holes in the contact bars. The construction is such that by disengaging the attachment nuts 11 the mullions or longitudinal bars 2 may be readily removed to permit the cleaning or clearing of the contact bars 12 of metallic deposits and to permit the replacement of said bars.

It has been found in practice that a gradually increasing volume of the plating metal is deposited upon the contact bars or cathodes of the plating barrel. This electro deposit gradually increases the effective extent or area of the contact bars or cathodes thereby consuming more current and impairing and diminishing the efficiency of the plating apparatus. It is found that as the contact bars or cathodes increase in extent the current passes more quickly and easily between the anodes and such contact bars or cathodes without sufficiently affecting the articles to be plated within the barrel or drum. It is therefore desirable that the contact bars or cathodes be kept reasonably clean and clear of metallic deposit. Heretofore it has been customary to construct such cylinders or drums with the contact bars or cathodes integrally embodied in such manner as to prevent easy access or removal. One of the primary objects of the present invention is to provide means whereby the contact bars are readily and quickly accessible.

It has heretofore been the common practice to discard the cylinders or drums when they have become impregnated with the metallic deposit or when the contact bars or cathodes have collected an excessive amount of metallic deposit and have therefore destroyed the efficiency of the cylinder or drum. This resulted in a considerable loss of plating material. The metallic deposit so collected is of a highly refined and pure nature but because of the necessity of disassembling or destroying the drum or cylinder to recover such deposit the reuse of such metallic bodies has heretofore been uneconomical. A further object of the present invention is to enable the recovery of such electro deposits of metal by the removal of the mullions or longitudinal bars 2 and the subsequent detachment of the contact bars 12 upon which such deposits are collected. These deposits of pure metal may then be suspended in the plating solution and employed as electrolytic anodes, thereby returning the metal to the solution for redeposit upon other articles. Applicant's cylinder or drum constructed as described with detachable or removable mullions or contact bars thus enables the transference of the cathodes to use as anodes and results in the recovery and saving of every particle of the plating material. The recovery thus effected is no small item in the plating industry. The ease with which applicant's construction enables such recovery and the increased efficiency resulting from the constant use of clean or renewed contact bars or cathodes all of which is due to applicant's particular construction embodying removable mullions or cathode supports constitutes a marked and important advance in the electroplating art. It is obvious that the replaced mullions with the contact bars attached, may if desired, be suspended in the tank and used as anodes until the deposit of metal is reduced.

In Fig. 4 there is shown a modification in which electrical conductors 14 are either mounted on the face of the head 1 or inlaid therein and covered by a protective mask or cover 15. These conductor strips 14 are radially disposed as are the conductors 8 and are electrically connected at their

inner ends with the trunnion head 6. At their outer ends they are bent laterally over the peripheral edge of the head 1. The contact bars 12 carried by the mullions 2 rest upon these inturned ends, making electrical contact therewith as shown in Fig. 4. In this form of construction the removable mullions are shown as held by studs 16 extending through the mullion and contact strip and engaging in a screw threaded nut or sleeve 17 embedded in the head 1. These studs serve to hold the mullions in place and to draw the contact bars 12 tightly into engagement with the conductors 14.

In Fig. 5 there is shown a modification in which in lieu of removing the entire mullion in order to renew or examine the contact bar 12, each mullion is provided with a removable insert 18, shown in Fig. 1 on which the contact bar 12 is carried. Each mullion bar is mortised to receive the removable insert, the ends of which are rabbeted and overhang the ends of the mortise as shown at 19 Fig. 5. The insert is removably secured by bolts 20. In this construction contact fingers 21 extend from the conductors 8, or in event the construction of Fig. 4 is used the laterally bent terminals may be extended in like manner upon which the ends of the contact bar 12 rest in electrical engagement.

In all of these forms of construction protective insulating buttons 22 are inserted over the attachment members 11, 16 and 20 to minimize the deposit of metal thereon.

While as before stated the heads and mullions may be of wood and the perforated plates 3 may be of wood, celluloid, bakelite, or other material, one of the objects of my invention is to provide a barrel suitable for use with hot solutions. The use of hot plating solutions has recently become quite general. While the wooden drums or barrels will ordinarily withstand cold solutions for a reasonably long time, they deteriorate very rapidly under the influence of hot solution. Moreover the wood being porous becomes highly impregnated with the plating metal. To overcome these difficulties an important feature of my invention consists in forming the heads 1 the mullions 2 and plates 3 from vitreous or ceramic materials whereby they will be nonporous and will be unaffected by the plating solutions, either hot or cold. Such parts are readily molded to the desired shapes by the methods now in use. This is an application of vitreous or ceramic products to a new use whereby there are produced improved results entirely overcoming the difficulties heretofore experienced and making practical the use of hot plating solutions whereby the time of plating operations is very much reduced, whereas heretofore the gain of time in plating was to a very great extent offset by the deterioration and rapid destruction of the containers.

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, proportion, detail construction or arrangement of parts, without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statutes, the invention has been described in language more or less specific as to certain structural features, it is to be understood that the invention is not limited to any specific details, but that the means and construction herein described comprise but one mode of putting the invention into effect, and the invention is therefore claimed in any of its possible forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:—

1. In an electroplating apparatus, a revoluble drum, an electrically connected trunnion for said drum, a plurality of radially disposed electrical conductors connected with said trunnion, and a plurality of removable contact bars or cathodes longitudinally disposed about the periphery of the drum and detachably engaged in electrical contact with said radially disposed electrical conductors.

2. In an electroplating apparatus, a revoluble drum, a plurality of removable contact bars or cathodes carried by the drum, and means for detachably connecting said removable bars with a source of electrical energy.

3. In an electroplating apparatus, a revoluble drum, comprising spaced heads, perforated peripheral walls extending between said heads, longitudinally disposed removable mullions connecting the heads, contact bars carried by the removable mullions, and electrical connections connecting the contact bars with a source of electrical energy.

4. In an electroplating apparatus, a revoluble drum comprising spaced heads, longitudinally disposed mullions connecting the heads, detachable connections for said mullions, cathode contact bars carried by said detachable mullions, perforated wall plates about the periphery of the drum intermediate the mullions, and electrical connections between said cathode contact bars and a source of electrical energy.

5. In an electroplating apparatus, a revoluble drum, a plurality of longitudinally disposed contact bars arranged about the periphery of the drum, a detachable support for each cathode bar, means for detachably

retaining the bars in adjusted position and electrical connections between each bar and a source of electrical energy.

6. In an electroplating apparatus, a revoluble drum, a plurality of radially disposed electrical connections carried upon the head of said drum, the extremities of said connections being extended laterally, a series of longitudinally disposed contact bars normally making electrical engagement with the laterally projecting portions of the said electrical connections, and detachable supports for said contact bars.

7. The herein described process consisting of electroplating metal from an anode upon an article or articles to be plated by bringing them into contact with contact bars of the plating metal employed as cathodes upon which are deposited accumulations of surplus plating metal, removing said cathode bars with their metallic accumulations, and subsequently employing such bars and adhering metallic deposits as electrolytic anodes whereby the deposit of metal is returned to the plating solution for redeposit upon other articles to be plated with minimum losses.

8. In an electroplating apparatus, a revoluble drum having heads constructed of vitreous materials whereby it will withstand the penetration of the plating solutions, contacts of metal carried upon the periphery of said drum and radially disposed electrical conductors embedded in these vitreous heads of said drum for electrically connecting the contacts with a source of electrical energy.

9. In an electrode plating apparatus, a revoluble drum having heads constructed of vitreous materials, detachable mullions also of vitreous material connecting said heads one to the other, metallic contact bars carried by said mullions, and non-metallic perforated plate supported upon said mullions intermediate said heads and means for electrically connecting the contact bars with source of electrical energy, substantially as specified.

10. The herein described process consisting of electroplating metal from an anode upon an article or articles to be plated, accumulating a deposit of surplus plating metal upon a series of contact bars forming cathodes, replacing at intervals said bars, or a portion thereof, having metallic accumulations thereon with similar bars devoid of accumulations of metal employing the replaced bars as anodes whereby the deposited accumulations of metal are returned to the plating solution for redeposit upon articles to be plated with minimum losses.

11. The herein described process consisting of electroplating metal from an anode upon an article or articles to be plated and subsequently employing the anode when reduced in size by the disbursement of metal therefrom for plating purposes as a cathode in the plating operation whereby said reduced anode while being used as a cathode will accumulate a deposit of surplus plating metal to enable its subsequent reuse as an anode.

12. The herein described process consisting of electroplating metal from an anode upon an article or articles to be plated accumulating a deposit of surplus plating metal upon a cathode and subsequently employing the cathode and its metallic accumulation as an anode in the plating operation whereby its metallic accumulation will be disbursed to enable its subsequent reuse as a cathode.

In testimony whereof, I have hereunto set my hand this 31st day of March, A. D. 1919.

FOREST H. HARTZELL.

Witnesses:
E. E. DUNCAN,
ADELLA SHANNON.