C. G. BACKUS.

ELECTROPLATING APPARATUS.

APPLICATION FILED APR. 13, 1908.

908,439.

Patented Jan. 5, 1909.

4 SHEETS—SHEET 1.

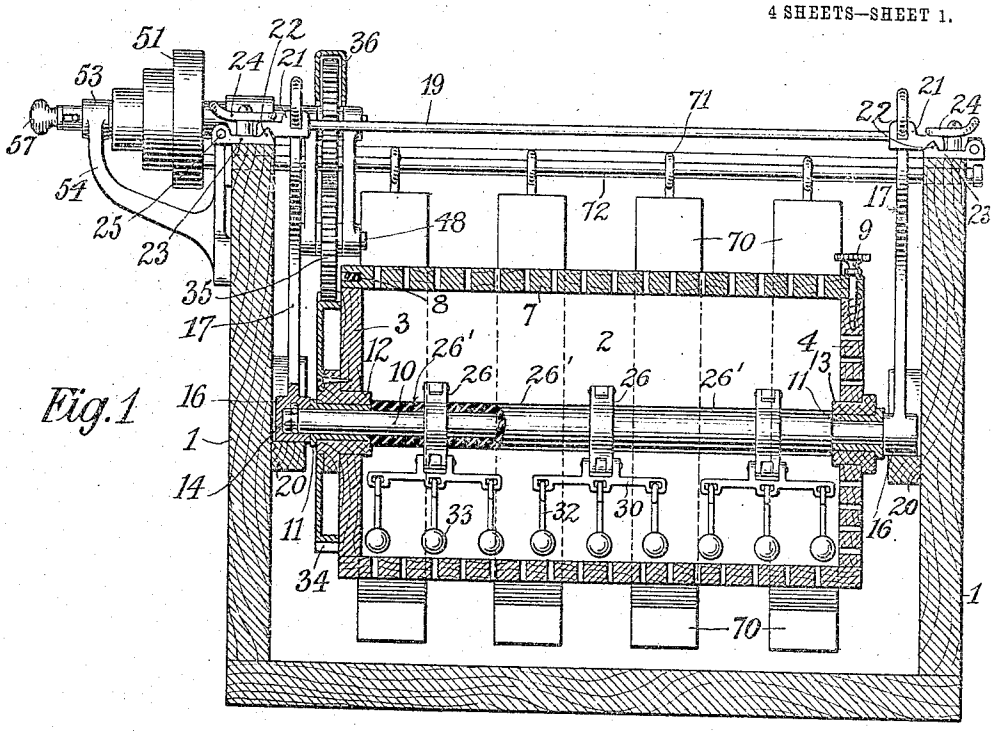


Fig. 1

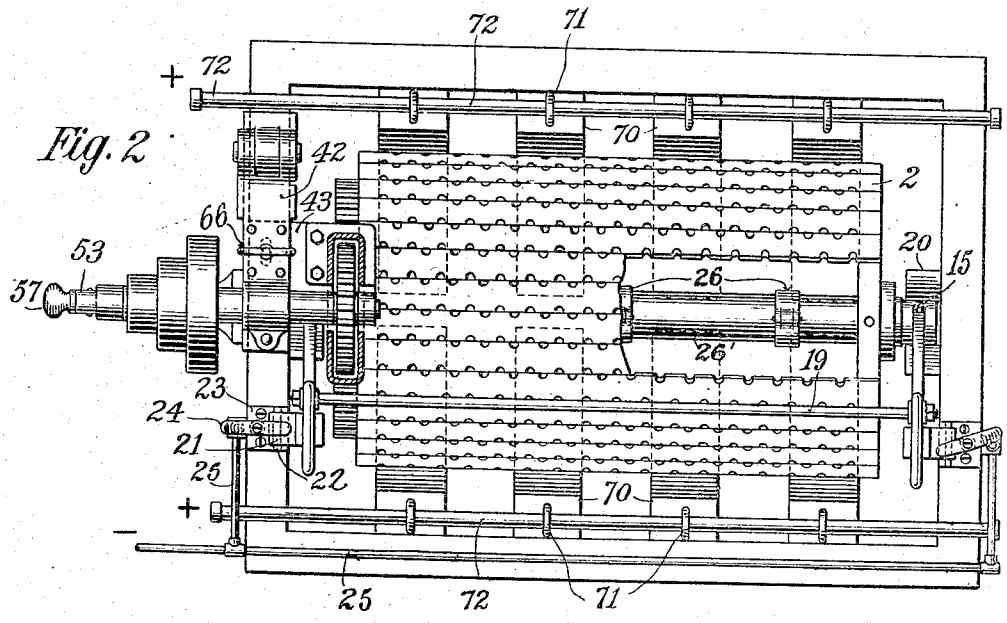


Fig. 2

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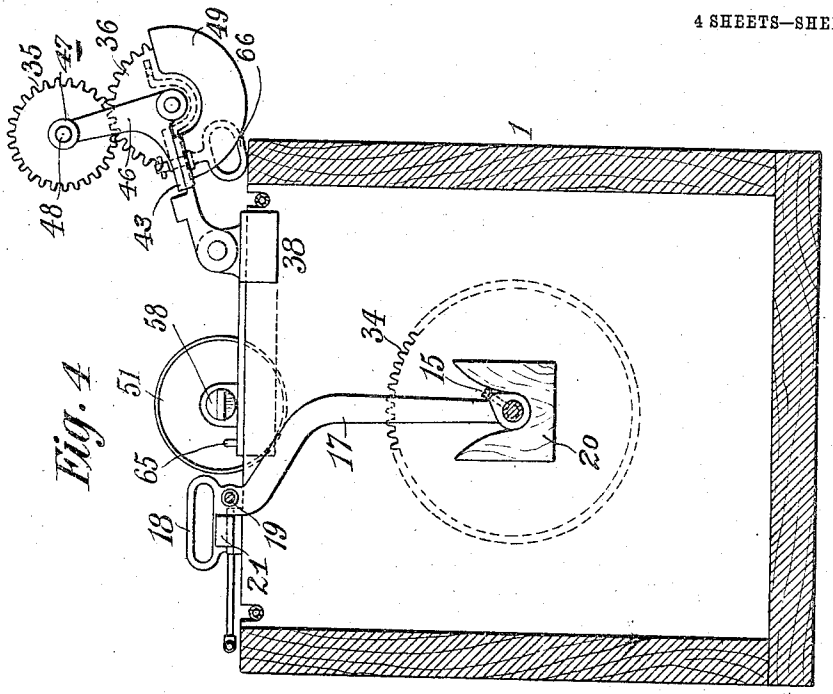


Fig. 4

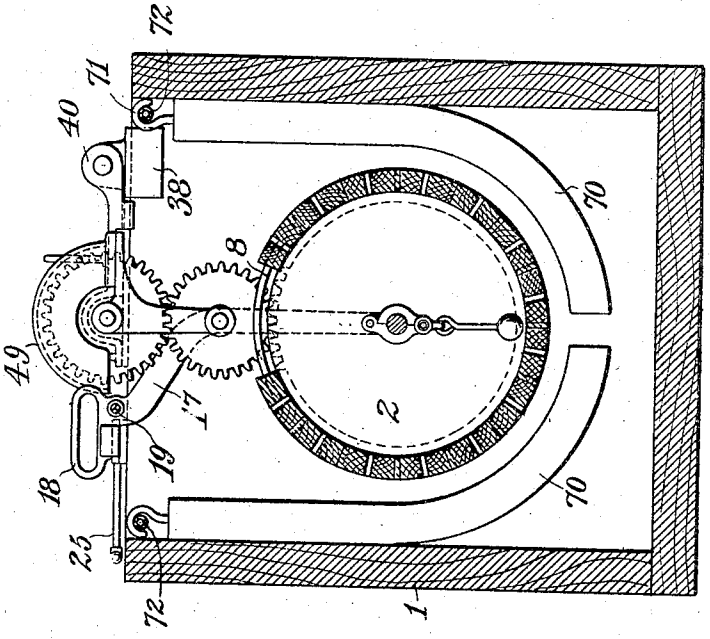


Fig. 3

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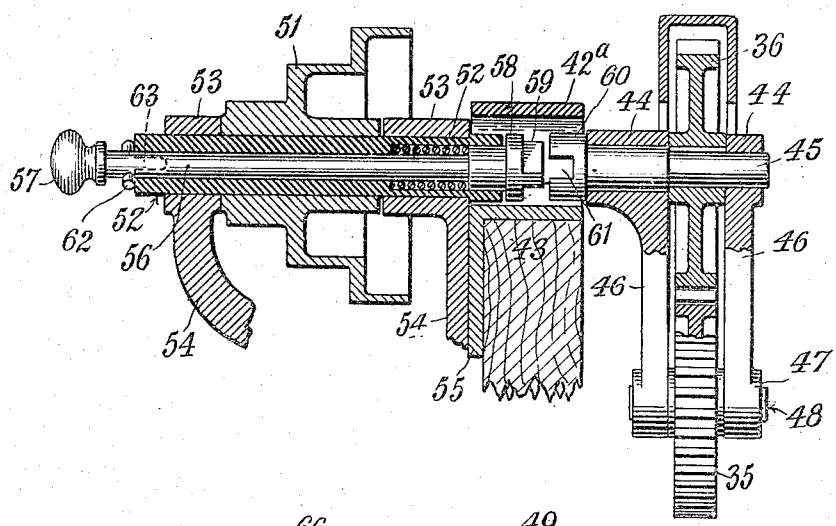
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4 SHEETS—SHEET 3.

Fig. 5



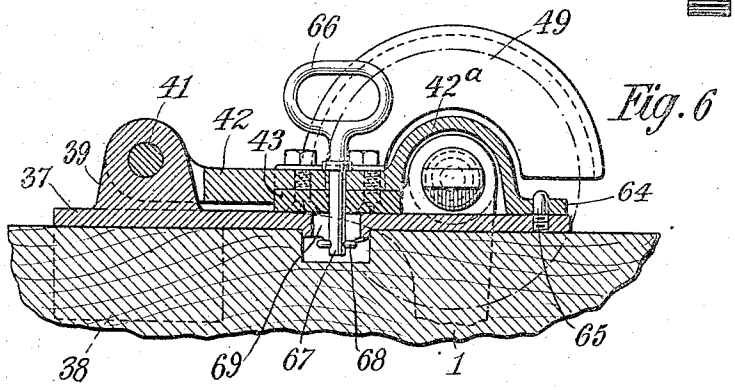


Fig. 6

Fig. 7

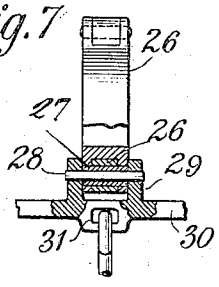
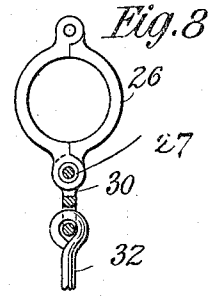


Fig. 8



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ELECTROPLATING APPARATUS.

APPLICATION FILED APR. 13, 1908.

908,439.

Patented Jan. 5, 1909.

4 SHEETS—SHEET 4.

Fig. 9

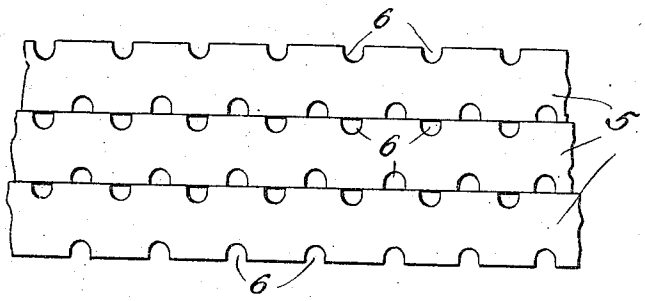


Fig. 10

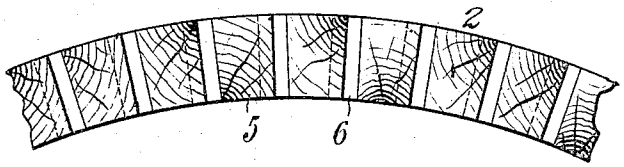


Fig. 11

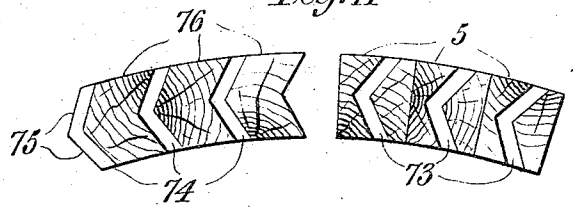
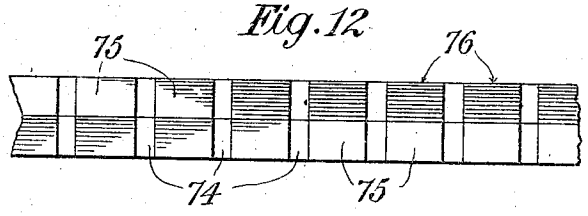


Fig. 12



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UNITED STATES PATENT OFFICE.

CLARENCE G. BACKUS, OF NEW YORK, N. Y., ASSIGNOR TO ZUCKER & LEVETT & LOEB COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTROPLATING APPARATUS.

No. 908,439. Specification of Letters Patent. Patented Jan. 5, 1909.

Application filed April 13, 1908. Serial No. 426,656.

To all whom it may concern:

Be it known that I, CLARENCE G. BACKUS, a citizen of the United States, and a resident of the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Electroplating Apparatus, of which the following is a full, clear, and complete description.

The object of my invention is to provide an electroplating apparatus or tank which is efficient in use, convenient in operation, simple in construction, and in which the electroplating cylinder or drum may be easily inserted in or removed from the tank.

A further object of my invention is to provide a drum for such electroplating apparatus in which a good electrical contact is maintained with articles being plated without the use of connecting wires or other devices for conveying the electric current to such articles, and whereby the electroplating fluid at all times has a free and full access to the articles being treated.

A further object of my invention is to provide a system of transmission mechanism for rotating the cylinder or drum that is easy of access, not liable to get out of order, and which is not liable to be attacked by the electroplating fluid or covered with the deposit produced thereby.

Other objects and advantages of the improved apparatus will be apparent hereafter.

For a full, clear and complete disclosure of one form of my improved electroplating apparatus which I at present deem preferable, reference may be had to the following specification and to the accompanying drawings forming a part thereof, in which—

Figure 1 is a vertical longitudinal sectional view showing the parts in position within the tank, such as when the tank is in operation; Fig. 2 is a plan view thereof, the drum or cylinder being shown partly broken away; Fig. 3 is a vertical transverse sectional view of the apparatus taken substantially through its central portion; Fig. 4 is a transverse sectional view showing one end of the tank in elevation, the gearing for driving the drum being shown disconnected; Fig. 5 is a vertical sectional view of the driving shaft which operates the gearing connected with the drum or cylinder and taken substantially on the axis of said shaft; Fig. 6 is a vertical sectional view of the pivoted support for the gearing for driving the drum; Figs. 7 and 8 are sectional and elevational views, respectively, of the means for supporting the contacts mounted upon the shaft within the drum; Fig. 9 is a plan view of the parts of which the surface of the drum is made up; Fig. 10 is a sectional view of a portion of the electroplating drum or cylinder; Figs. 11 and 12 are sections and elevations, respectively, of a modified form of the manner of constructing the electroplating drum.

Referring to the drawings, the numeral 1 indicates the tank or receptacle for the electroplating fluid, and is made of suitable liquid-proof and non-conducting material, such as wood in the well-known form. The electroplating drum or cylinder 2, which is adapted to be placed in and removed from the tank 1, consists of two ends or heads 3 and 4, the peripheries of which are connected by a series of longitudinal strips 5 of a substance which will resist the electroplating fluid, and which also will not conduct the electric current, such as wood. The sides of these strips 5, of course, taper toward the axis of the drum, and are provided with series of grooves 6, which are staggered on the adjacent strips and form openings through which the electroplating fluid may pass to the interior of the drum as the same revolves in the tank. These strips 5 may be fastened to the heads 3 and 4 by means of screws or other fastening devices, and when screws are used their heads are countersunk and the recesses thereby formed are then plugged up or filled with suitable fluid-proof plugs, to prevent injury to the said screws. A portion of the wall of the drum is removable for the purpose of inserting and withdrawing the articles to be plated. The removable section is composed of a series of strips 7, made in a manner similar to the strips 5, but are fastened together in any suitable way so as to form a unitary curved plate or door. One end of this door is provided with a transverse groove 7′, passing through all of the strips, and this groove is adapted to receive a strap 8, which connects to and is supported by the adjacent strips forming the periphery of the drum. The other end of the door, composing the strip 7, is provided with a hole through which passes a thumb screw 9.

It will be seen by this construction that the door or removable section of the drum may be placed in position by first inserting one end under the strip 8 and then securing the other end in position by means of the thumb screw 9. The central shaft 10, for supporting the drum, is provided with bearing sleeves 11 adjacent each end, which are carried within hollow bosses 12 and 13, projecting through holes in the heads 3 and 4. The shaft 10 is grooved at each end as indicated at 14, and is adapted to receive the ends of screws or pins 15 (see Fig. 4) carried by the bearing caps 16, for the purpose of retaining the ends of the shaft within said caps at all times. The bearing caps 16 are carried on the ends of suitable supporting arms 17, the upper ends of which are provided with suitable grips or handles 18, and are also connected by a suitable spacing rod 19. The bearing caps 15 on the ends of shafts 10 are adapted to fit within V-shaped recesses in the blocks 20, fastened centrally in position on the ends of the tank 1. These blocks form supports for holding the drum in position during the electroplating process. The upper ends of the arms 17 carry laterally extending blocks 21, which are provided on their under surfaces with V-shaped grooves adapted to fit over in contact with the correspondingly shaped projections 22 carried by the contact plates 23, as clearly shown in Fig. 1. The contact plates 23 are provided with small vertically pivoted hand levers 24, which are adapted to bear upon the surfaces of the blocks 21 and hold the same in good electrical contact with the contact plates 23. Said contact plates 23 are provided with holes, in which the conductors 25 may be secured. It will thus be seen that a continuous electric connection is made with the axle of the drum through the conductor 25, the contact-plate 22, the blocks 21, the arms 17, the bearing caps 16 and the shaft 10.

In order to convey the current to the articles being plated, I mount upon the shaft a series of split collars 26, the semi-circular portions of which are pivoted as indicated in Figs. 7 and 8, so as to be removable from the shaft. The lower ends of the halves of these collars are held together by means of a tube or a sleeve 27, through which is adapted to pass a pin 28. The pin 28 is also adapted to engage a pair of ears 29, carried by a yoke-piece 30. This yoke-piece 30 is provided with a number of holes or slots 31, adapted to receive the upper looped ends or eyes of a number of pendants 32, having knobs or balls 33 at their lower ends. These pendants are similar in shape to the tongue of a bell, and the knobs at their lower ends are adapted to hang a slight distance above the inner lower surface of the cylinder, so as to come in contact with any small articles which are being electroplated, and which fall to the lower portion of the cylinder. The collars 26 are held apart at suitable distances on the shaft 10 by means of insulating sleeves 26', which also prevent the electroplating fluid from coming into contact with the said shaft 10.

The mechanism for driving the drum is constructed as follows: A gear 34 is carried upon the head 3 of the drum 1 and is preferably rigidly attached to the hollow boss 12. The gear 34 is adapted to mesh with the gear 35, which in turn meshes with a gear 36. The gears 35 and 36 are carried upon a unitary supporting frame, and are so pivoted that they may be raised and thrown back out of the tank to allow the unobstructed removal of the drum, as indicated in Fig. 4. This gear-supporting frame comprises a plate 37, having downwardly extending flanges 38 adapted to hold the said plate 37 upon the upper edge of one end of the tank. Said plate is also provided with outwardly extending ears 39, between which is placed a bearing 40. A transverse pin 41 passes through the ears 39 and the bearing 40, in order to form a pivot for the bar 42, which forms the removable support for the gears 35 and 36. Attached to the bar 42 is a laterally extending plate 43 provided with bearings 44 for the gear shaft 45, the gear 36 being mounted upon said gear-shaft 45. The plate 43 also carries a pair of parallel arms 46, which are provided at their outer ends with bearings 47, adapted to receive the shaft 48 of the gear 35. The plate 43 is also adapted to carry the gear-case 49, which incloses the upper half of the gear 36 when the gears are in operative position for driving the drum. A suitable support, such as the handle 66, limits the movement of the frame carrying the gears 35 and 36, when the same are in inoperative position.

The gearing for driving the drum may be operated in any suitable manner, but I prefer to drive the same through the medium of a cone pulley 51 fixed to the hollow shaft 52 supported in suitable bearings 53 on the frame 54 attached to one end of the tank. In order to make the frame 54 rigid with the supporting frame for the gears 35 and 36, the plate 43 is provided with a downwardly extending apron 55, to which the frame 54 is attached. In order to allow the sleeve 52, driven by the cone pulley 51, to be disconnected from the gear-shaft 45, I place within the sleeve 52 a longitudinally sliding pin 56, having at one end a suitable handle 57 and at its other end a disk 58 provided with a tongue 59. The gear shaft 45 is also provided with a disk 60, in which is formed the groove 61, adapted to receive the tongue 59. In order to hold the tongue 59 within the groove 61 when the electroplating drum is being driven, a helical compression spring 62 is provided, which is seated within a cylin-

drical recess 53 in the sleeve 52. It will be seen that this arrangement constitutes a clutch, which may operatively connect the gear-shaft 45 with the sleeve 52 so as to drive the gears 35 and 36. In order to cause the pin 56 to rotate with the sleeve 52, I provide the latter with transverse lugs 62, which are adapted to become seated within notches or grooves 63 in the end of the sleeve 52. When the lugs 62 are so seated, the driving connection with the gears will be complete, but when the pin 56 is withdrawn and slightly rotated independently of the sleeve 52, the lugs 62 will rest upon the end of said sleeve and maintain the pin in its withdrawn position, thereby keeping the tongue 59 and the groove 61 disengaged.

In order to protect the clutch formed by the disks 58 and 60, the bar 42 is extended and curved upwardly, as indicated at 42^a, to form a semi-circular casing above said clutch. The bar then extends outwardly and forms a lug 64, provided with a recess or opening to receive the pin 65 for holding the bar 42 laterally in position on the plate 37. A handle 66 is preferably provided for lifting the bar 42 and its attached parts, including the gears 35 and 36. The handle 66 is carried upon the upper end of a stem 67, which is carried in holes in the bar 42 and the plate 43. The lower end of the stem 67 is provided with a transverse pin 68 and passes through a slotted opening 69 in the plate 37 fixed upon the edge of the tank 1. When the pin 68 is passed through the slot 69 in the plate 37 and is rotated, the bar 42 is locked in position on the plate 37, and by reason of the fact that the gears 35 and 36 are supported by this bar 42, the gear 35 is held in mesh with the gear 34 when the drum 2 is in its operative position within the tank.

The pendants formed by the parts 32 and 33 obviously form the negative electrodes of the electroplating apparatus. The positive electrodes or anodes consist of the curved bars 70, provided with hooks 71 at their upper ends, which are adapted to engage with the supporting bars or conductors 72 that are connected with the positive terminal of the generator or other source of electric current.

By the construction and arrangement above described, it will be seen that the electroplating drum 2 and the arms 17 may be easily withdrawn from the tank by simply taking hold of the handles 18 and lifting the same upward, after the gears 35 and 36 have been thrown back out of the way. In electroplating tanks of large size, and where a large number of articles are electroplated within the drum, the drum may be removed by simply attaching the falls of a crane or a block and tackle to the handles 18, after which the drum may be transported to any other part of the electroplating plant or room and its contents deposited in any convenient receptacle. Great economy in time and expense of handling the articles being electroplated is thereby obtained.

In Figs. 11 and 12 I have shown a modification of the manner of forming the curved wall of the cylinder, and this modification is especially adapted for use where small articles are being plated, which would be liable to pass through the straight openings in the cylinder as shown in Fig. 10. The angular openings 73 may, of course, be formed by boring intersecting holes in the strips 5, but are preferably formed by cutting grooves 74 in the angular sides 75 of the strips 76. By this construction it will be seen that although small articles may pass into the entrance of the groove 74 to a slight extent, they will be prevented from passing entirely through the grooves by the intersecting angular portions thereof.

Having thus described these forms of my invention, I do not wish to be limited to the exact details of form or arrangement set forth, but various changes may be made without departing from the spirit and scope of my invention.

Therefore, what I claim and desire to protect by Letters Patent is:

1. In an electroplating apparatus, a tank, a rotatable drum, an externally mounted driving shaft, an intermediate driving mechanism for operatively connecting said shaft and drum, and a pivoted support on which said mechanism is carried for withdrawing the same from said drum and shaft and for allowing the unobstructed removal of the drum from said tank.

2. In an electroplating apparatus, a tank, a rotatable drum, gearing for driving said drum, a removable support upon which the intermediate parts of said gearing are mounted for completely withdrawing the same from the interior of the tank.

3. In an electroplating apparatus, a tank, a rotatable drum, a gear fixed on said drum, an externally mounted driving shaft, transmission gears between the first-named gear and said shaft, and a pivoted support upon which said transmission gears are mounted for withdrawing the same to allow the unobstructed removal of the drum from said tank.

4. In an electroplating apparatus, a tank, a rotatable drum, an externally mounted driving shaft, transmission gears, a removable support for said gears, a clutch between said driving shaft and one of said gears, and a driving gear for said drum, said transmission gears being removable from engagement with said driving gear and said shaft to allow the unobstructed withdrawal of the drum from the tank.

5. In an electroplating apparatus, a tank, a rotatable drum, an externally mounted driving shaft, a longitudinally slidable mem-

ber carried thereby, a clutch member mounted thereon, transmission gears, a removable support for said gears, a clutch member connected with one of said gears, means for operatively holding said clutch members in engagement, a driving gear for said drum, one of said transmission gears being located on said support above said driving gear when the drum is operatively in place, but removable therefrom when the drum is withdrawn.

6. In driving mechanism for an electroplating drum, a driving shaft, a pivoted support adjacent the inner end of said shaft and located between said shaft and drum, transmission gearing carried by said support, and a clutch, the parts of which are carried by said shaft and said support, respectively, a spring for holding the parts of said clutch in engagement and means for withdrawing one of the parts of said clutch against the action of said spring.

7. In driving mechanism for an electroplating drum, a hollow driving shaft, a slidable pin in said shaft, lugs on said pin adjacent one end thereof and adapted to engage notches in the end of said shaft, a clutch member carried on the other end of said pin, transmission gearing, a clutch member connected with said gearing, and a spring connected with said pin for holding said clutch members in operative engagement.

8. A supporting and conducting device for electroplating drums, comprising a tank, a drum shaft, bearings at the ends of said shaft, arms which carry said bearings, contact blocks mounted upon the upper ends of said arms, and stationary contact plates fixed to said tank and adapted to engage said blocks and connected with the source of electric current.

9. A supporting and conducting device for electroplating drums, comprising a tank, recessed blocks mounted interiorly thereof, a drum shaft, bearings at the ends of said shaft and adapted to engage the recesses in said blocks, arms which carry said bearings, contact blocks mounted upon the upper ends of said arms, and stationary contact plates on said tank adapted to engage said blocks and connected with the source of electric current.

10. A cathode for electro-plating drums, comprising a drum shaft, a collar thereon, a longitudinally extending yoke pivoted on said collar, and a plurality of pendent tongues carried by said yoke and pivoted thereon, to have universal movement.

11. A cathode for electro-plating drums, comprising a drum shaft, split separable collars thereon, longitudinally extending yokes mounted on said collars, and a plurality of pendent tongues pivoted on each of said yokes.

12. A cathode for electro-plating drums, comprising a drum shaft, a split separable collar thereon, a longitudinally extending yoke pivoted on said collar, a pin forming the pivot for said yoke and locking the ends of said collar, and a plurality of pendent tongues carried by said yoke.

13. A drum for electroplating apparatus, comprising suitable heads, and contacting longitudinal strips connecting said heads, said strips having transverse grooves in their contacting edges.

14. A drum for electroplating apparatus, comprising suitable heads, and contacting longitudinal strips connecting said heads, said strips having transversely angular openings therein.

15. A drum for electroplating apparatus, comprising suitable heads, and contacting longitudinal strips connecting said heads, said strips having angular edges and angular grooves in said edges.

16. A door for electroplating drums, comprising suitable heads, a peripheral strap carried by one head, a plate engaging said strap at one end, and a removable fastening device at the other end of said plate for holding the same in position upon the opposite head.

In witness whereof I have signed my name hereto, this 25 day of January, 1908.

CLARENCE G. BACKUS

In the presence of—

J. C. ROSENBLUM,

MAX S. GUPONBERGER.