No. 889,744. PATENTED JUNE 2, 1908.

C. G. BACKUS.

PLATING APPARATUS.

APPLICATION FILED AUG. 15, 1907.

4 SHEETS—SHEET 1.

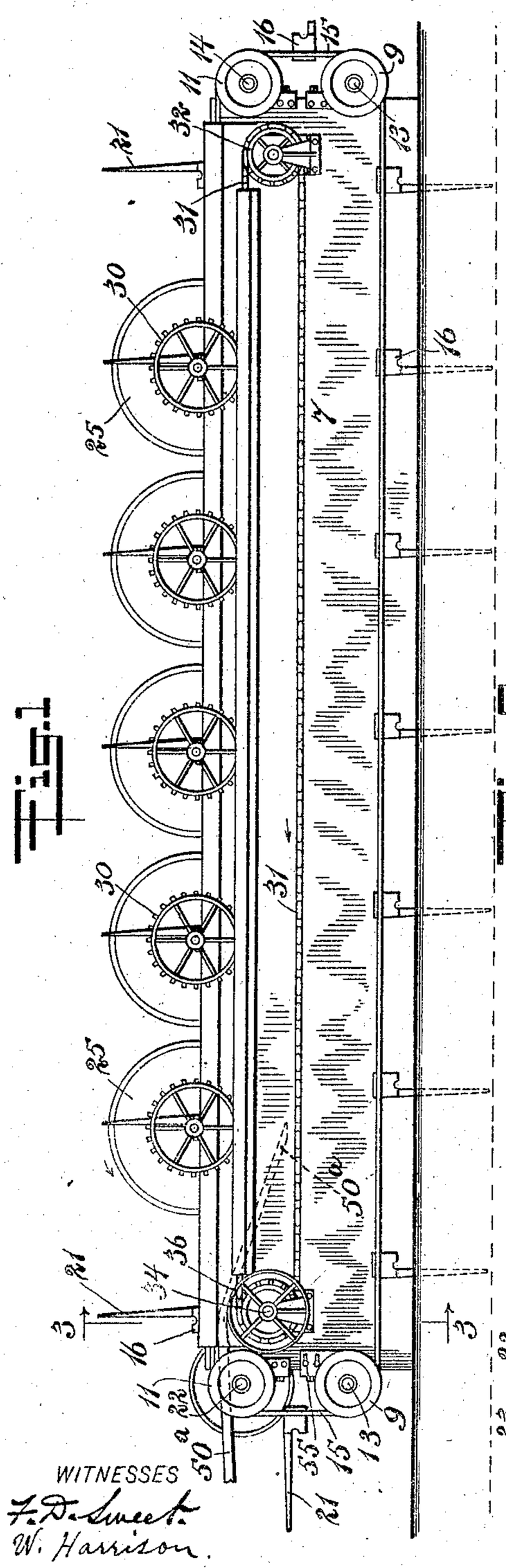


FIG. 1.

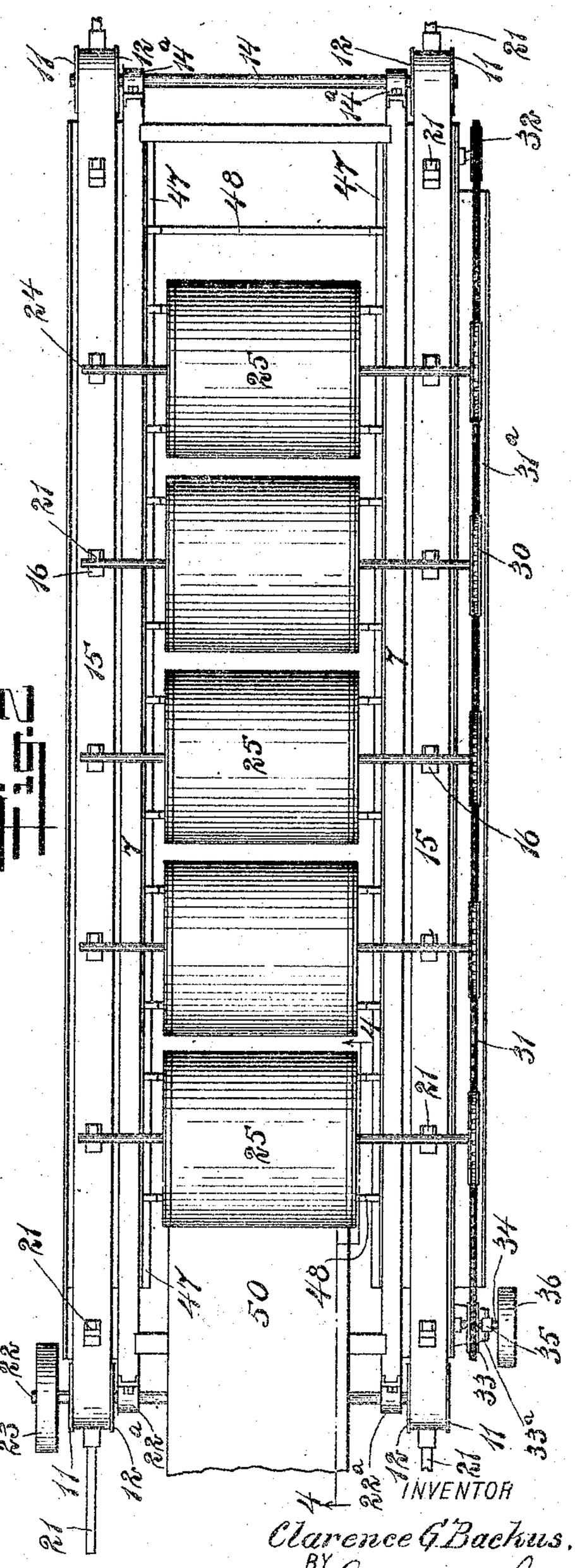


FIG. 2.

WITNESSES

F. D. Sweet.

W. Harrison.

INVENTOR

Clarence G. Backus.

BY Munn & Co

ATTORNEYS

No. 889,744. PATENTED JUNE 2, 1908.

C. G. BACKUS.

PLATING APPARATUS.

APPLICATION FILED AUG. 15, 1907.

4 SHEETS—SHEET 2.

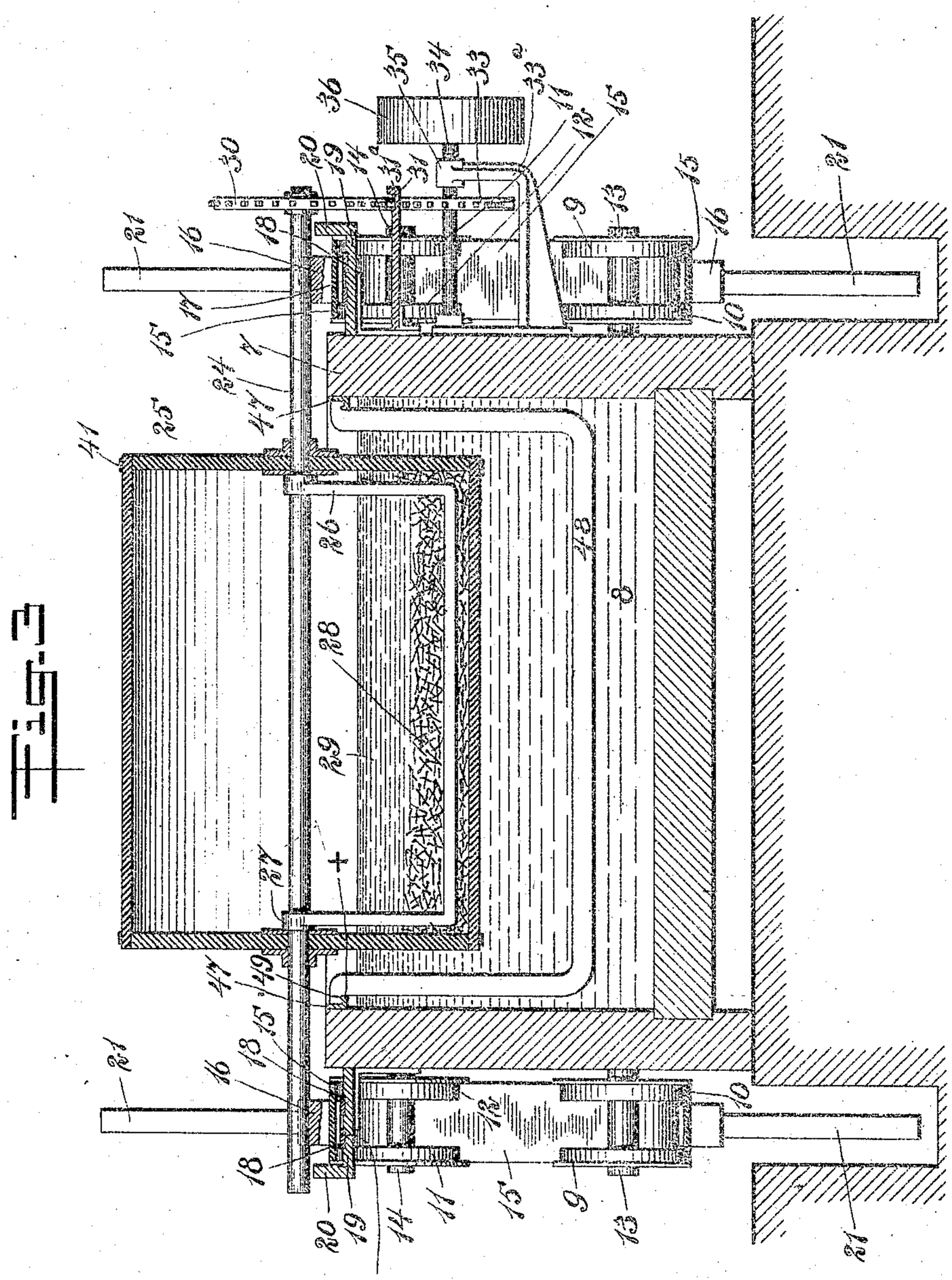


FIG. 3.

WITNESSES

F. D. Sweet
W. Harrison.

INVENTOR

Clarence G. Backus.

BY Munn & Co

ATTORNEYS

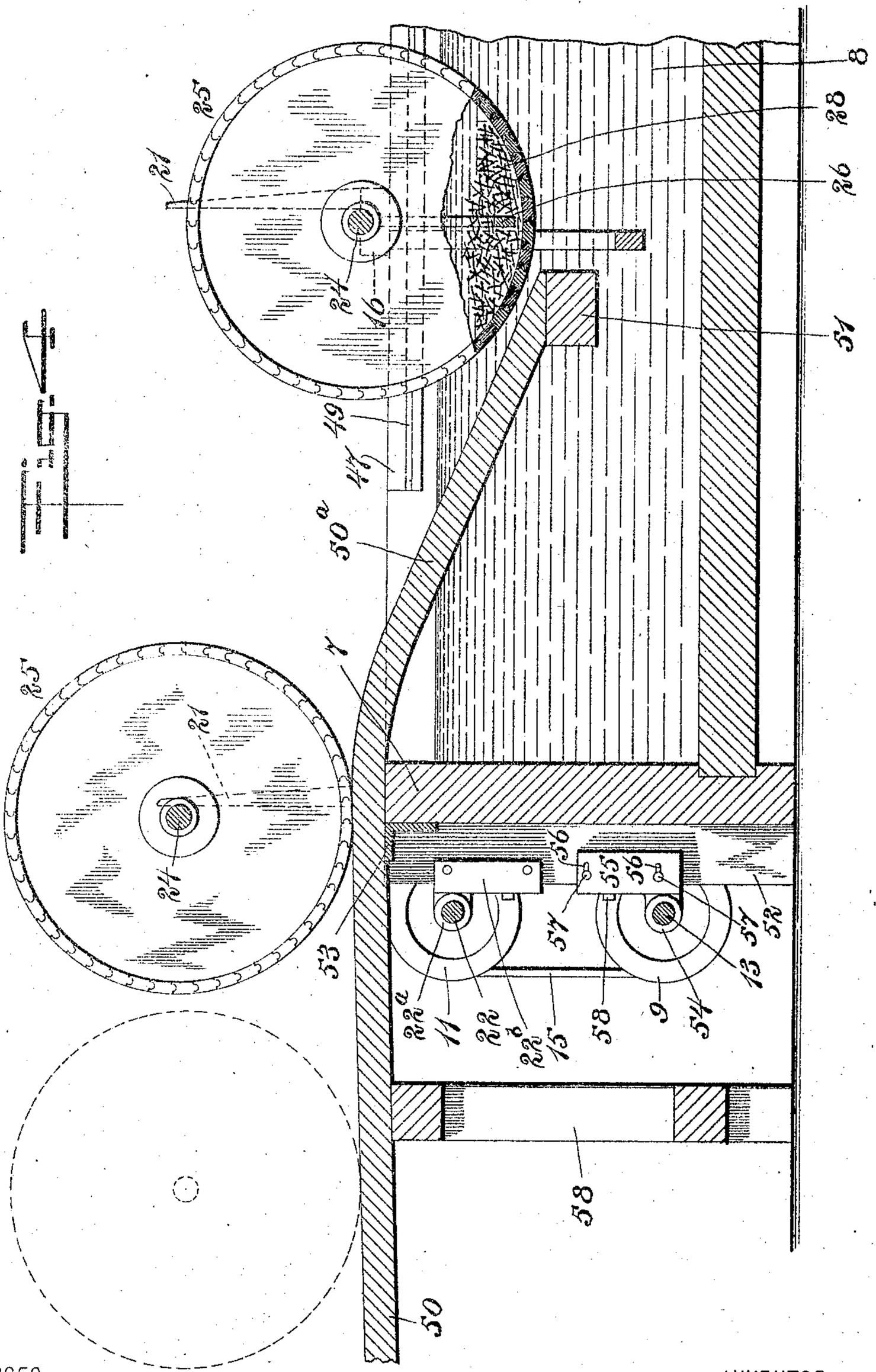
No. 889,744. PATENTED JUNE 2, 1908.

C. G. BACKUS.

PLATING APPARATUS.

APPLICATION FILED AUG. 15, 1907.

4 SHEETS—SHEET 3.



WITNESSES

F. D. Sweet.

W. Harrison.

INVENTOR

Clarence G. Backus.

BY Munn & Co

ATTORNEYS

No. 889,744. PATENTED JUNE 2, 1908.

C. G. BACKUS.

PLATING APPARATUS.

APPLICATION FILED AUG. 15, 1907.

4 SHEETS—SHEET 4.

Fig. 5

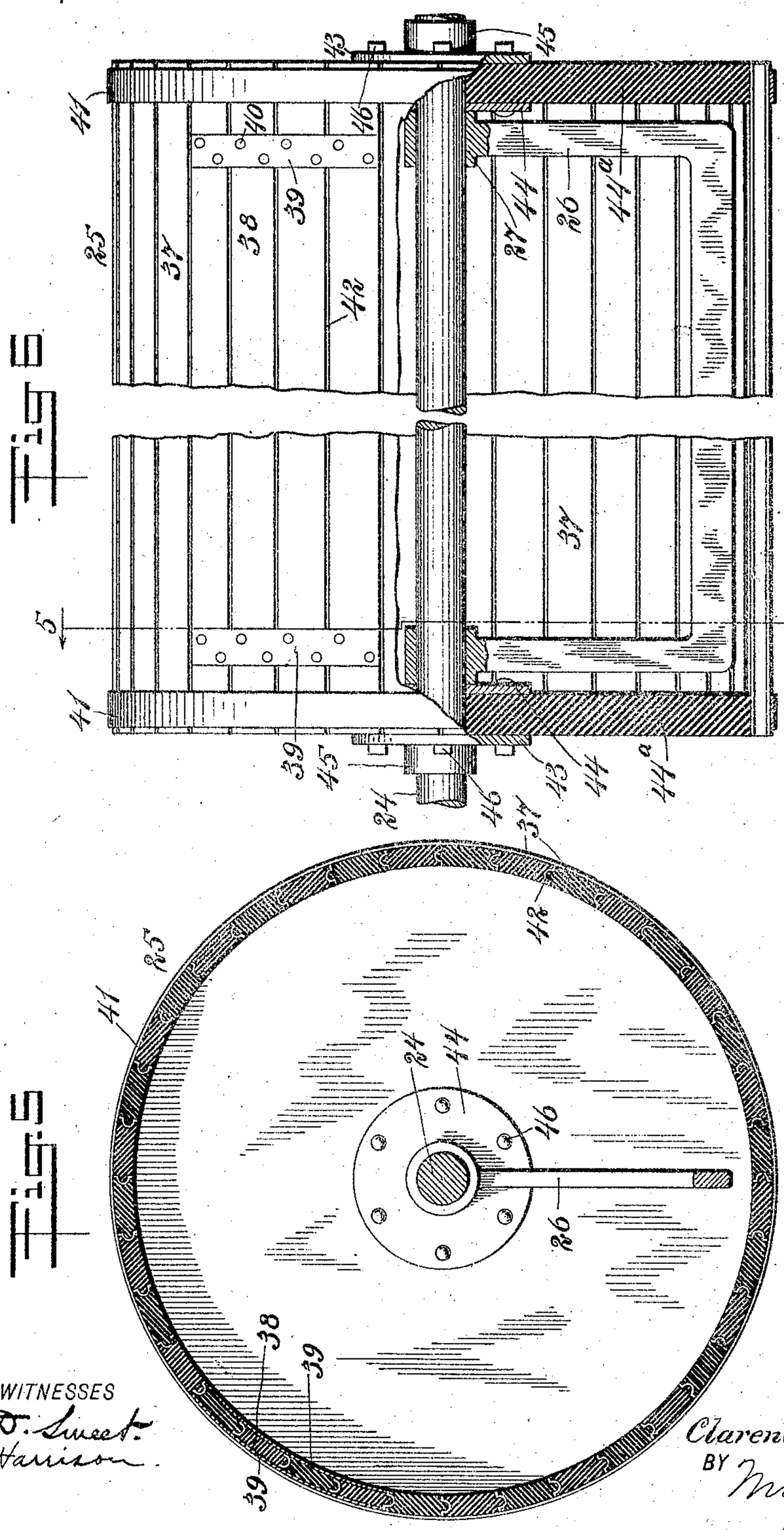


Fig. 5a

WITNESSES

F. D. Sweet

W. Harrison.

INVENTOR

Clarence G. Backus

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

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

PLATING APPARATUS.

No. 889,744. Specification of Letters Patent. Patented June 2, 1908.

Application filed August 15, 1907. Serial No. 388,641.

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, borough of Manhattan, in the county and State of New York, have invented a new and Improved Plating Apparatus, of which the following is a full, clear, and exact description.

My invention relates to apparatus used for electroplating articles and materials in large quantities.

Among the several objects of my invention are the following:

I. To enable the plating operation to be continuous in the sense that charges of such articles may be added from time to time while the mechanism is in motion, the finished charges being removed as rapidly as the plating is completed;

II. To render the apparatus automatic in its action, and especially to enable the charges to be removed from the machine without the special attention of the operator and after the charges have been exposed to the electrolytic action for an adequate length of time;

III. To improve the means for gently agitating the articles to be plated while the latter are in contact with the electrolytic fluid;

IV. To facilitate the entrance and removal of the charges of articles to be plated;

V. To increase the general efficiency of many working parts useful in electroplating.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the complete plating apparatus and showing the drums carrying charges of material to be operated upon, the drums having a rotary motion each upon its own axis, while carried along bodily through the electrolytic fluid; Fig. 2 is a plan view of the plating apparatus complete, as shown in Fig. 1, this view showing more particularly the runway for discharging the drums in succession as they arrive at one end of the machine; Fig. 3 is an enlarged cross section through one of the drums and the electrolytic bath, this view showing means for turning the drums and for carrying the same bodily along; Fig. 4 is an enlarged section taken upon the line 4—4 of Fig. 2, looking in the direction of the arrows, and showing how the drums are successively rolled up an inclined portion of the runway and discharged automatically; Fig. 5 is a vertical section through one of the drums 25 and is taken upon the line 5—5 of Fig. 6, looking in the direction of the arrow, and showing the construction of the drum and the means for supporting a swinging cathode therein; Fig. 6 is a fragmentary elevation partly broken away and showing further details of the drum and the swinging cathode mounted therein.

A longitudinal tank is shown at 7 and contains an electrolytic fluid 8. Disposed at opposite ends of this tank and arranged in pairs are pulleys 9, 10, 11, 12, mounted upon stationary shafts 13, 14 and 22 running upon these pulleys are two endless belts 15, the latter being disposed upon opposite sides of the tank. The shafts 13, 14 are revolubly mounted in bearings 14^a. The endless belts 15 carry bearing blocks 16, the latter being provided with faces 17 resting upon rails 18. The rails are supported by platforms 19 provided with guides 20. Flights 21 are mounted rigidly upon the bearing blocks 16 and project upwardly therefrom, each flight occupying approximately one-third of the upper surface of the bearing block.

A shaft 22 (see left of Fig. 2) is mounted in bearings 22^a and provided with a drive pulley 23 whereby power is applied to the endless belts 15 and pulleys supporting the same. A number of drums 25 are each provided with a shaft 24 extending therethrough, as will be understood from Fig. 3. Mounted within each drum 25 is a cathode 26 having substantially a U-shape and provided with annular bearings 27 which encircle the shaft 24. The materials to be plated are shown at 28 and are loose within the drum, being piled promiscuously over a portion of the cathode as will be understood from Fig. 3. The cathode, by being suspended from the shaft and having considerable weight, maintains a proximate vertical position and as the materials 28, because of their weight, seek the bottom of the drum, they cover a portion of the cathode and are always in metallic communication with the cathode and with each other.

Each shaft 24 is rigid relatively to the drum 25 through which it passes. Mounted upon each shaft 24 is a sprocket wheel 30, also rigid in relation thereto. A sprocket chain is shown at 31 and engages a number of the sprocket-wheels 30. This sprocket

chain is supported upon a platform 31ª which is grooved slightly for the purpose (see Fig. 3).

The sprocket chain 31 passes over two sprocket wheels 32, 33 located at opposite ends of the machine. A bracket 33ª supports a shaft 34 upon which the sprocket wheel 33 is rigidly mounted. For this purpose the bracket 33ª is provided with a bearing 35. A drive pulley 36 is mounted rigidly upon the shaft 34 for the purpose of applying power to the shaft 34, pulley 33 and chain 31. Each drum 25 is composed in part of a number of staves 37 arranged substantially in the form of a cylinder, as will be understood from Fig. 5.

A number of staves 38 are connected together by tie straps 39 sunken thereinto and secured in position relatively thereto by rivets 40. The several staves 38 thus connected together constitute a sliding door, as will be understood from Figs. 5 and 6. This sliding door is of a general arcuate form and is moved endwise in order to open or close the drum.

The staves 37 are held in position by hoops 41 encircling the same, together with the door just described. The staves 37, 38 are spaced apart slightly at 42, and in order to prevent the escape of loose articles in consequence of this spacing, the staves are tongued and grooved as indicated in Fig. 5. This construction permits a free circulation of the electrolytic fluid through the bottom portion of the drum, and yet retains securely within the drum all of the loose articles placed therein to be plated.

Each drum is provided with disks 43, 44, and with heads 44ª all of insulating material. The disks 43 are provided with necks 45, also of insulating material, these necks 45 serving to hold the drum securely upon the shaft 24. Bolts 46 extend through the disks 43, 44 and through the drum heads, thus holding these parts rigidly together.

Supporting rails 47 are secured rigidly within the top of the tank and resting upon these are anodes 48. These are of substantially U-shape and are hooked over sharp edges 49 with which the rails 47 are provided. In this manner the several anodes are connected electrically together.

A runway 50 (see Fig. 4) inclines slightly downward toward the left from the end of the tank 7. This runway is provided with a portion 50ª extending downwardly into the tank and being inclined so as to rest upon a beam 51 extending directly across the tank. At one end of the tank 7 (see Fig. 4) is a support 52 having the form of a vertically disposed beam and connected with the framework of the tank 7 by a fastening 53.

The bearings 22ª which support the shaft 22 are mounted upon plates 22ᵇ. Similarly the shaft 13 which supports the pulleys 9 and 10 is mounted within bearings 54, these bearings being connected with a plate 55 provided with slots 56 through which bolts 57 extend into the support 52. By adjusting the plate 55 by aid of the bolts 57 and slots 56, the tension of the endless belts 15 may be regulated at will. A framework 58 supports the runway 50, and the latter may be extended to any convenient distance necessary for temporarily storing a number of the drums.

The operation of my machine is as follows: Power is applied to the pulleys 23 and 36 in such manner that the upper portions of the belts 15, according to the view shown in Fig. 2, move toward the left. The pulley 36 is turned in a clockwise direction according to this view so that the sprocket wheels 30 and drums 35 turn to the left or in a contraclockwise direction. The relative speed of rotation of the drums 25, as compared with the speed of their translation bodily along the machine, may be controlled at will by governing the relative speeds of the two driving pulleys 23, 36. Such being the case, it is evident that the rotation of the drums can be made sufficiently slow to allow thorough plating of articles placed therein, no matter if the nature of the articles to be plated or the condition of the plating fluid may require considerable exposure of the articles to the liquid in order for the plating to have the desired thickness. Where the articles are small, the electric current strong and the plating fluid in good condition, it may be desirable to pass the articles through in much less time than would otherwise be the case. This is done by simply quickening the speed of the driving pulley 36 as compared with that of the driving pulley 23. The articles 28 to be plated are simply dumped into the drums so as to cover the cathode as above described. The sliding doors being closed and the moving parts being in operation, as above described, the articles to be plated are subjected continuously to the action of the current and of the electrolytic fluid. In doing this the articles are turned over and over, being sometimes in contact with the cathode, at other times out of contact with it but in contact with other articles which engage it, or at least are in metallic communication with it. The speeds of the moving parts are so apportioned that the plating of the articles in any particular drum will be finished by the time the drum in question arrives in the position indicated in Fig. 4. At this point the drums reach the incline 50ª, and as the pressure of the flights 21 against the shaft 24 is continued, the drum rolls bodily along the incline and thence rolls away, as indicated by dotted lines at the left of Fig. 4. Other drums are added at the other end of the machine and from time to time at the will of the operator, who merely places within the drum

a charge of the article to be plated, closes the drum and places it in the machine by resting the shaft of the drum upon the bearing blocks 16.

It will thus be noted that the operation of my machine is continuous, and further that the machine may be used for electroplating articles in large quantities at comparatively small expense.

I do not limit myself to the particular construction of door employed in the drum, nor to the precise form of cathode used; neither do I limit myself to the particular shape or form of any other part.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a plating apparatus, the combination of an electrolytic bath, a plurality of receptacles adapted to be partially submerged within said bath, mechanism for moving said receptacles relatively to said bath, and means controllable at will for removing some of said receptacles and replacing them by others while said mechanism is in motion.

2. A plating apparatus comprising an electrolytic fluid, a receptacle to be loaded with articles to be plated, mechanism for moving said receptacle continuously so as to thoroughly expose articles contained within said receptacle to the action of said electrolytic bath, and mechanism controllable by movements of said receptacle for disengaging the latter from said mechanism whereby it is carried.

3. The combination of an electrolytic bath, endless members disposed adjacent thereto, means for propelling said endless members, revoluble drums to be connected with said endless members, and mechanism controllable by movements of said revoluble drum for disengaging said revoluble drums from said endless members.

4. The combination of an electrolytic bath, an endless member movable relatively thereto, means for adjusting the tension of said endless member, and a receptacle to be connected with said endless member and partially submerged within said bath.

5. The combination of an electrolytic bath, an incline disposed partially therein, a receptacle for containing articles to be plated, endless members disposed adjacent to said bath, and flights connected with said endless members for the purpose of forcing said receptacles up said incline.

6. The combination of an electrolytic bath, a drum provided with apertures for permitting the circulation therethrough of the fluid of said bath, means for causing said drum to rotate bodily upon its own axis, and mechanism independent of the means last mentioned for carrying said drum along through the electrolytic fluid.

7. A plating apparatus, comprising an electrolytic bath, a run-way provided with an inclined portion extending into said bath, a drum adapted to hold articles to be plated, mechanism for moving said drum bodily along in relation to said bath and to said inclined portion for the purpose of removing said drum from said bath, and mechanism controllable by movements of said drum for disengaging said drum from the mechanism for moving the same.

8. The combination of a revoluble drum, a cathode hanging freely therein so as to maintain by its own weight a proximate predetermined position independently of the rotation of said drum, said cathode extending to a point close to the inner wall of said drum for the purpose of engaging articles resting thereupon, an electrolytic bath, means for moving said drum bodily through said bath, and an anode engaging said bath for sending a current therethrough to said cathode.

9. The combination of a revoluble drum provided with apertures through which an electrolytic fluid may circulate, means for propelling said drum bodily along through said fluid, a cathode mounted within said drum and hanging loosely for the purpose of maintaining a predetermined position independently of any position assumed by said drum, said cathode extending to a point near the inner wall of said drum in order to engage articles resting thereupon, an electrolytic bath through which said drum is adapted to pass, and an anode engaging said electrolytic bath for sending a current through the latter to said cathode.

10. In an electro-plating apparatus, the combination of an electrolytic bath, a hollow member provided with apertures for permitting the flow therethrough of portions of electrolytic fluid, means for moving said drum bodily through said bath, a swinging cathode mounted within said drum and extending into close proximity to the inner surface thereof so as to engage articles resting loosely thereupon, and an anode located outside of said drum and within said electrolytic bath.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLARENCE G. BACKUS.

Witnesses:

WALTON HARRISON,

EVERARD B. MARSHALL.