No. 843,321. PATENTED FEB. 5, 1907.

H. R. BOISSIER.

ELECTROPLATING APPARATUS.

APPLICATION FILED NOV. 25, 1905.

2 SHEETS—SHEET 1.

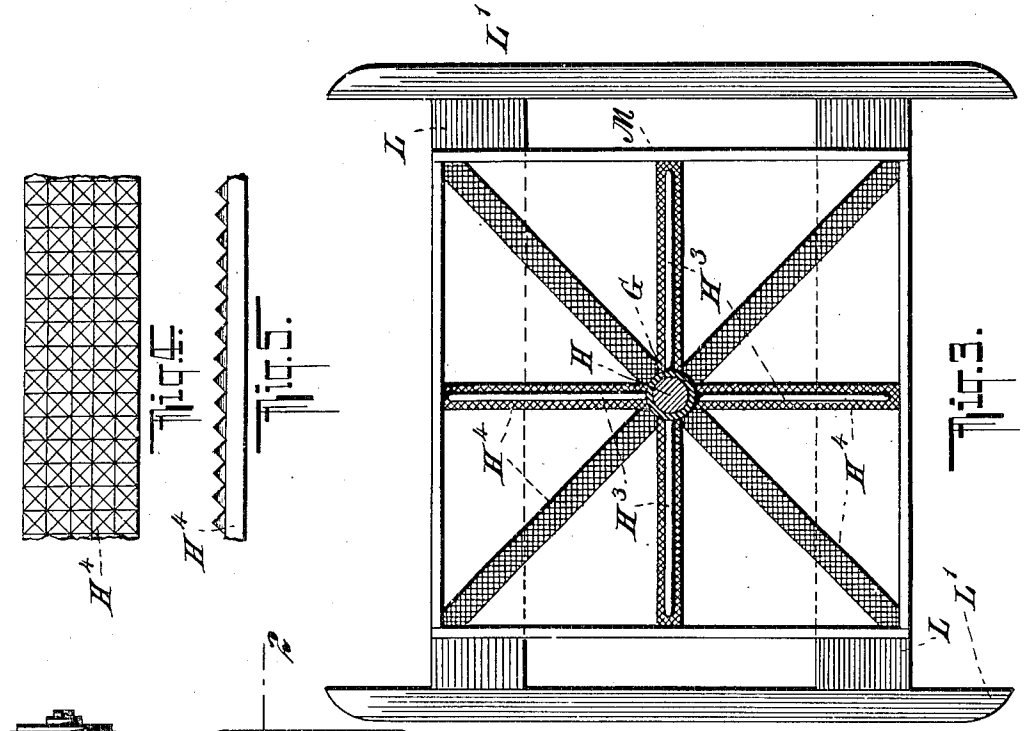


Fig. 3.

Fig. 4.

Fig. 5.

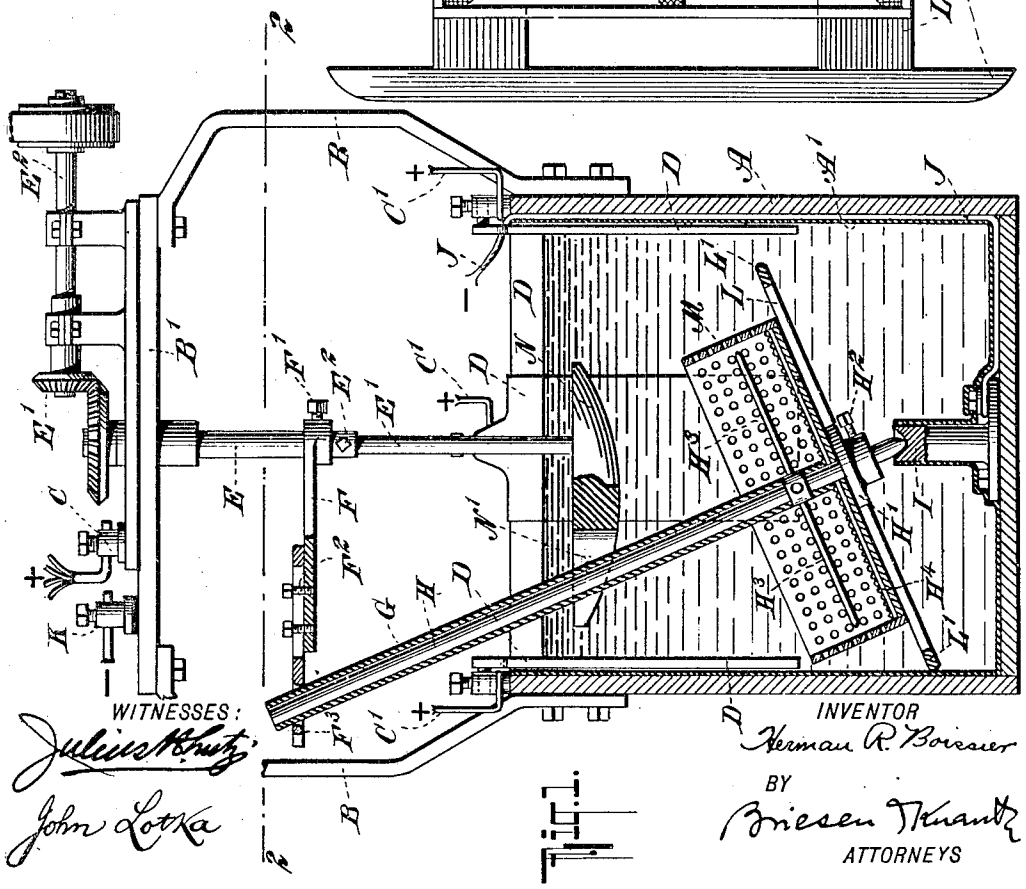


Fig. 1.

WITNESSES:

Julius Kantz

John Lotka

INVENTOR

Herman R. Boissier

BY

Briesen & Knauth

ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 6.

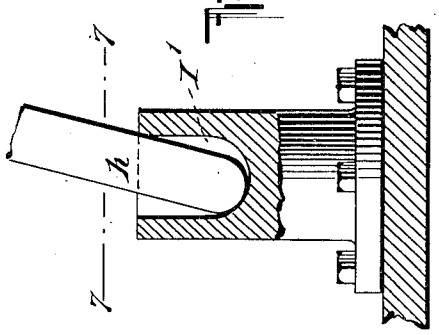


Fig. 7.

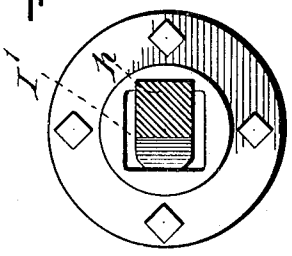
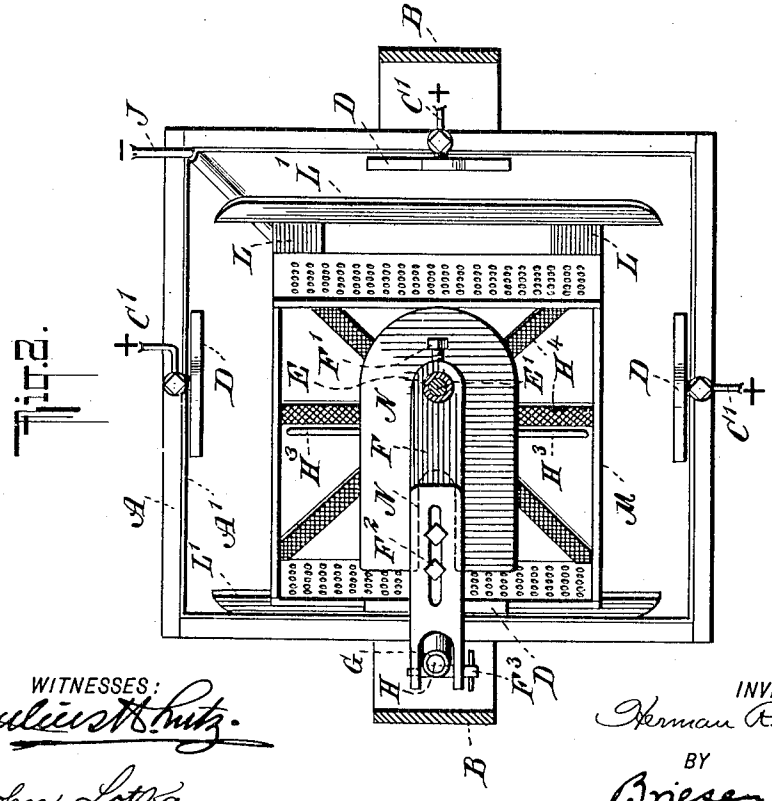


Fig. 2.



WITNESSES:

Julius A. Katz.

John Lotka

INVENTOR

Herman R. Boissier

BY

Briesen & Knauth

ATTORNEYS

UNITED STATES PATENT OFFICE.

HERMAN R. BOISSIER, OF GREAT NECK, NEW YORK.

ELECTROPLATING APPARATUS.

No. 843,321. Specification of Letters Patent. Patented Feb. 5, 1907.

Application filed November 25, 1905. Serial No. 289,043.

To all whom it may concern:

Be it known that I, HERMAN R. BOISSIER, a citizen of the United States, and a resident of Great Neck, Nassau county, State of New York, have invented certain new and useful Improvements in Electroplating Apparatus, of which the following is a specification.

My invention relates to apparatus for depositing metals by electricity, and has for its object to provide a device for producing a uniform deposit or plating. For this purpose I employ a receptacle for the articles to be plated and give a peculiar motion to such receptacle, and I also provide other features of novelty, as will be fully described hereinafter, and particularly pointed out in the appended claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a sectional elevation of one form of my improved apparatus. Fig. 2 is a horizontal section thereof on line 2 2 of Fig. 1. Fig. 3 is a horizontal section of the receptacle proper, drawn upon an enlarged scale. Figs. 4 and 5 are respectively a top view and a side elevation of a portion of a support forming part of said receptacle. Fig. 6 is an elevation with parts in section, illustrating another form of my invention; and Fig. 7 is a cross-section on line 7 7 of Fig. 6.

As shown in Figs. 1 to 5, I employ a suitable box or tank A, the interior of which is preferably lined with an insulating material, as indicated at A'. Brackets B, secured to said tank, extend upward and carry a table B', to which are secured the binding-posts and certain other mechanism, to be referred to hereinafter. The positive binding-post C is connected by wires C' with four anodes D, which are located in the upper part of the tank A, said tank being polygonal and preferably rectangular, as shown. In the table B' is journaled a shaft E, which is also in electrical connection with the binding-post C through suitable metallic parts and which may be driven by means of gearing E' from a suitable operating-shaft E^2. Upon the shaft E is secured an arm F, preferably in such a manner as to be adjustable up and down, as by means of a set-screw F'. I consider it advisable to make said arm extensible, as by means of the pin-and-slot connection F^2, so that certain adjustments may be made, as more fully explained hereinafter. The free end of the arm F is forked and provided with a removable pin F^3, which serves to hold in position normally the upper end of an inclined sleeve G, made of insulating material. This sleeve surrounds a shaft H, the lower end of which rests in a step-bearing I, which is preferably covered by the insulating-lining A', except where the shaft H engages such bearing. I prefer to arrange the shaft H loosely within the sleeve G, and at the lower portion of the shaft a collar H' is secured, as by means of a set-screw H^2, so as to be adjustable up and down. This collar carries a perforated box or receptacle M and may form part of said receptacle, if desired.

The shaft H has rigidly secured thereto a number of conducting arms or points H^3, which extend within the receptacle M at a distance above the bottom thereof. On the said bottom I prefer to arrange a series of conducting-strips H^4, radiating from the center, and preferably provided with teeth as shown best in Figs. 4 and 5. The articles to be plated are adapted to rest on the bottom of the receptacle M and on the toothed strips H^4, as well as against the side walls of the receptacle M.

The shaft E is provided with an adjustable lower portion E', which may be secured in various positions by means of the set-screw E^2. The lower end of the extension E' carries a central anode N, and if said anode is made of the size shown in the drawings it is provided with a slot N' to receive the sleeve G. This electrode N is preferably journaled eccentrically, so that it may have a churning or agitating action upon the liquid. To the bottom of the receptacle M are secured two bars L, provided at their ends with cross-bars L', extending beyond the ends of the receptacle M, as shown in Figs. 2 and 3.

The current will pass from the binding-post C to the four lateral anodes D and to the central anode N. Then the current is passed through the liquid or electrolyte, and will cause the metal to be deposited on the articles to be plated, which articles are contained in the receptacle M. The said articles are in contact with the strips H^4 and pins H^3, and through the said metallic parts the current passes to the shaft H, the step-bearing I, the wire J, and the negative binding-post K. The shaft E^2 being rotated, a peculiar motion will be imparted to the receptacle M. The shaft H will obviously describe a conical path, the apex of the cone being at the step-bearing and the base of the

cone at the arm F. The receptacle M will first slide along one of the side walls of the tank A—for instance, the left-hand side wall. (Shown in Fig. 2.) Then when the ends of the two cross-bars L′ strike the adjacent side wall the receptacle M will slide along such adjacent side wall until the cross-bar L′ (shown at the right hand in Fig. 2) abuts against the right-hand side wall of the tank A. The operation will thus be repeated four times during each revolution of the shaft E, the receptacle M moving first toward one corner of the tank A and then toward the next, along the side walls thereof. Of course at the same time the inclination of the receptacle M will be varied, and that part which is lowest in Fig. 1 will become the highest part of the receptacle after the shaft E has performed a half-revolution. Thus at certain times the receptacle M will be inclined from side to side, as in Fig. 1, and at other times from front to rear. This change of inclination will naturally cause the articles contained in the receptacle to shift therein, and by this arrangement I secure an even deposit of the metal on the articles to be plated and prevent any spots of the articles from escaping the electroplating action.

The upward-and-downward adjustment of the receptacle M on the shaft H and the up-and-down adjustment of the central electrode N allow the distance between said electrode and the articles to be plated to be varied readily. The extent of inclination which the receptacle M receives may be varied by adjusting either the length of the arm F at F^2 or the level of said arm at F′, or both expedients may be used.

Instead of having a round step-bearing I, as shown in Fig. 1, and providing the receptacle M with the cross-bars L′ to guide it along the side walls of the tank A, I may give the step-bearing a polygonal and particularly a square shape, as indicated at I′ in Figs. 6 and 7, the lower end of the shaft H being likewise squared in this instance. With this construction it is not necessary to apply the bars L and L′ to the receptacle M, but the latter will perform the same peculiar motion as described with reference to Figs. 1 to 5. However, the construction first described is believed to be preferable.

My improved apparatus not only insures the uniform deposit of the metal on the articles to be plated, but also prevents or minimizes the deposit of the metal on other surfaces.

Where I have spoken of the motion of shaft H as being in a "conical" path I have used the word "conical" in the broad mathematical sense, in which a conical surface is defined as one generated by the movement of a straight line, one point of which, the apex, remains at the same place, while the other points of said line move in curves or paths similar to each other, but varying in extent, according to the distance of said points from the apex.

I claim—

1. An electroplating apparatus comprising a suitable tank provided with an electrode, a shaft extending into said tank and movable in a conical path, means for operating said shaft, and a receptacle connected with said shaft, and adapted to contain the articles to be plated, and provided with means for conducting the current to such articles.

2. The combination with a tank having means for conducting an electric current thereto, of a step-bearing in said tank, a shaft in alinement with said step-bearing, another shaft, one end of which rests in said step-bearing, while its other end is connected eccentrically with the first-named shaft, and a receptacle or holder for the articles to be plated, carried by the second-named shaft.

3. The combination with a tank and means for supplying current thereto, of a shaft movable in a conical path within said tank, and a receptacle for the articles to be plated carried by said shaft.

4. The combination with a tank having means for conducting a current thereto, of a shaft or support movable in said tank in a conical path, a receptacle for the articles to be plated, carried by said support, and means for preserving the direction of the receptacle's inclination up to a certain point of its travel, and then changing the direction of said inclination.

5. The combination with a tank having means for conducting an electric current thereto, of a shaft or support movable in a conical path, and having conducting-pins or rods rigidly secured thereto, and a receptacle for the articles to be plated, carried by said support.

6. The combination with a tank having means for conducting an electric current thereto, of a support arranged within said tank, a receptacle for the articles to be plated carried by said support and surrounding the same, and conducting pins or rods radiating from said support within said receptacle, and rigidly secured to said support.

7. The combination with a tank having means for conducting a current thereto, of a receptacle for the articles to be plated, located within said tank, and toothed strips located at the bottom of said receptacle.

8. The combination with a tank having means for conducting a current thereto, of a step-bearing within said tank, a shaft alining with said step-bearing, a central electrode carried by said shaft, an extensible arm rigidly secured to said shaft, a shaft or support, one end of which rests in said step-bearing, while the other end is connected with said arm, said shaft being thus adapted to move in a conical path, a receptacle for the articles to be plated secured to the lower part of said

shaft or support, pins or rods projecting from said support within the receptacle, and means for causing the direction in which the receptacle is inclined to change periodically.

9. The combination with a tank having means for conducting a current thereto, of a step-bearing within said tank, a shaft alining with said bearing, and having an electrode secured thereto, a support resting in said step-bearing and connected with said shaft eccentrically, and a receptacle for the articles to be plated, connected with said support.

10. The combination with a tank having means for conducting a current thereto, of a shaft, an extensible arm carried by said shaft, a step-bearing, a support resting in said step-bearing, and connected with said arm, and a receptacle for the articles to be plated, carried by said support.

11. The combination with a tank having means for conducting a current thereto, of a movable receptacle for the articles to be plated, located within said tank, and an eccentrically-journaled rotary electrode located adjacent to said receptacle but exteriorly thereof.

12. The combination with a tank having means for conducting a current thereto, of a step-bearing within said tank, a support or shaft resting in said step-bearing, means for moving said support in a conical path, a receptacle for the articles to be plated, carried by said support, and guide members connected with said receptacle, and adapted to engage a stationary part of the tank, to cause the direction in which the receptacle is inclined to change, according as said guide members engage different surfaces of the tank.

13. The combination with a tank having means for conducting a current thereto, of a shaft or support, means for imparting movement to said support in a conical path, a polygonal step-bearing for the squared lower end of said shaft or support, and a receptacle carried by said support and adapted to receive the articles to be plated.

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

HERMAN R. BOISSIER.

Witnesses:

JOHN LOTKA,

JOHN A. KEHLENBECK.