

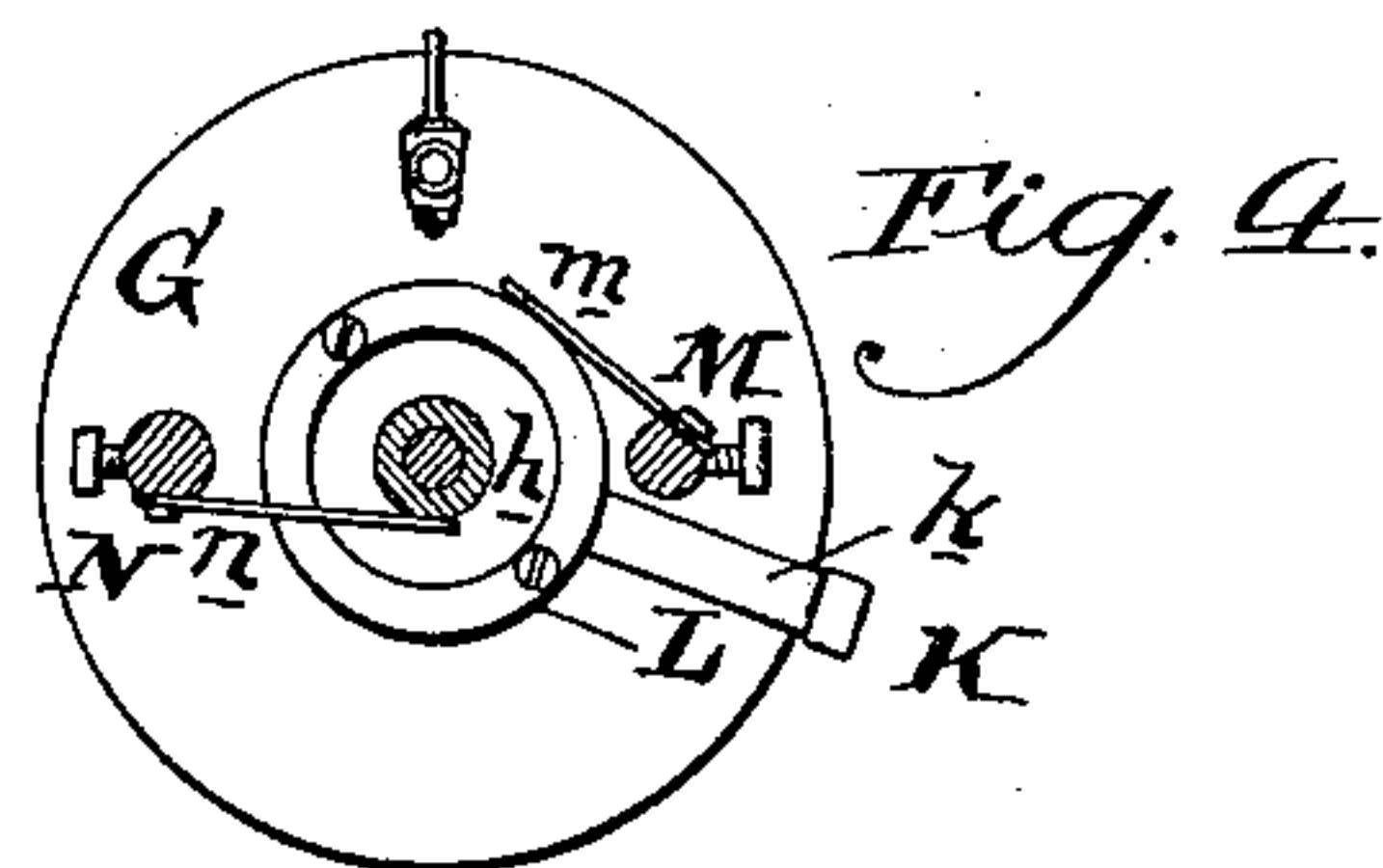
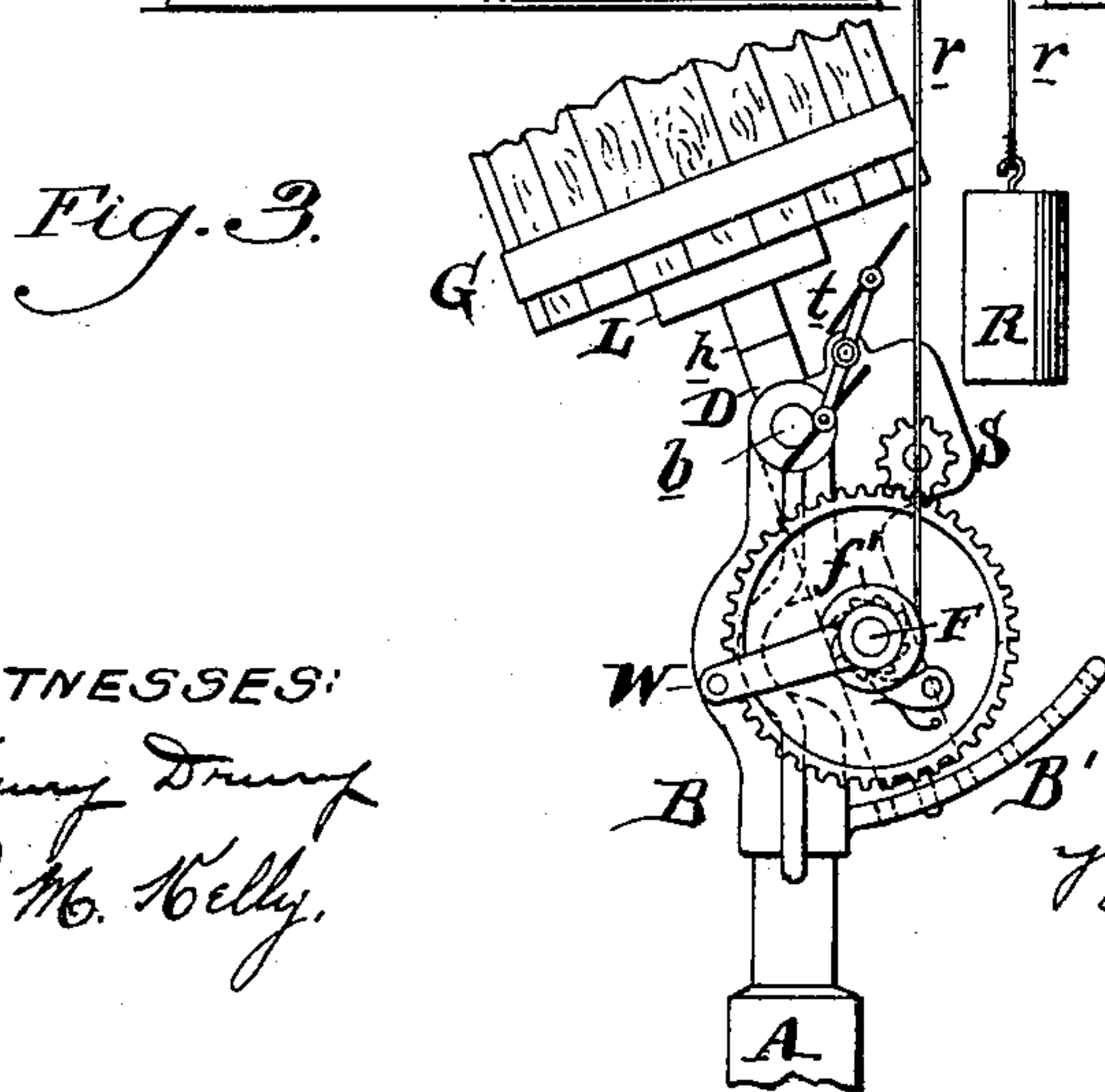
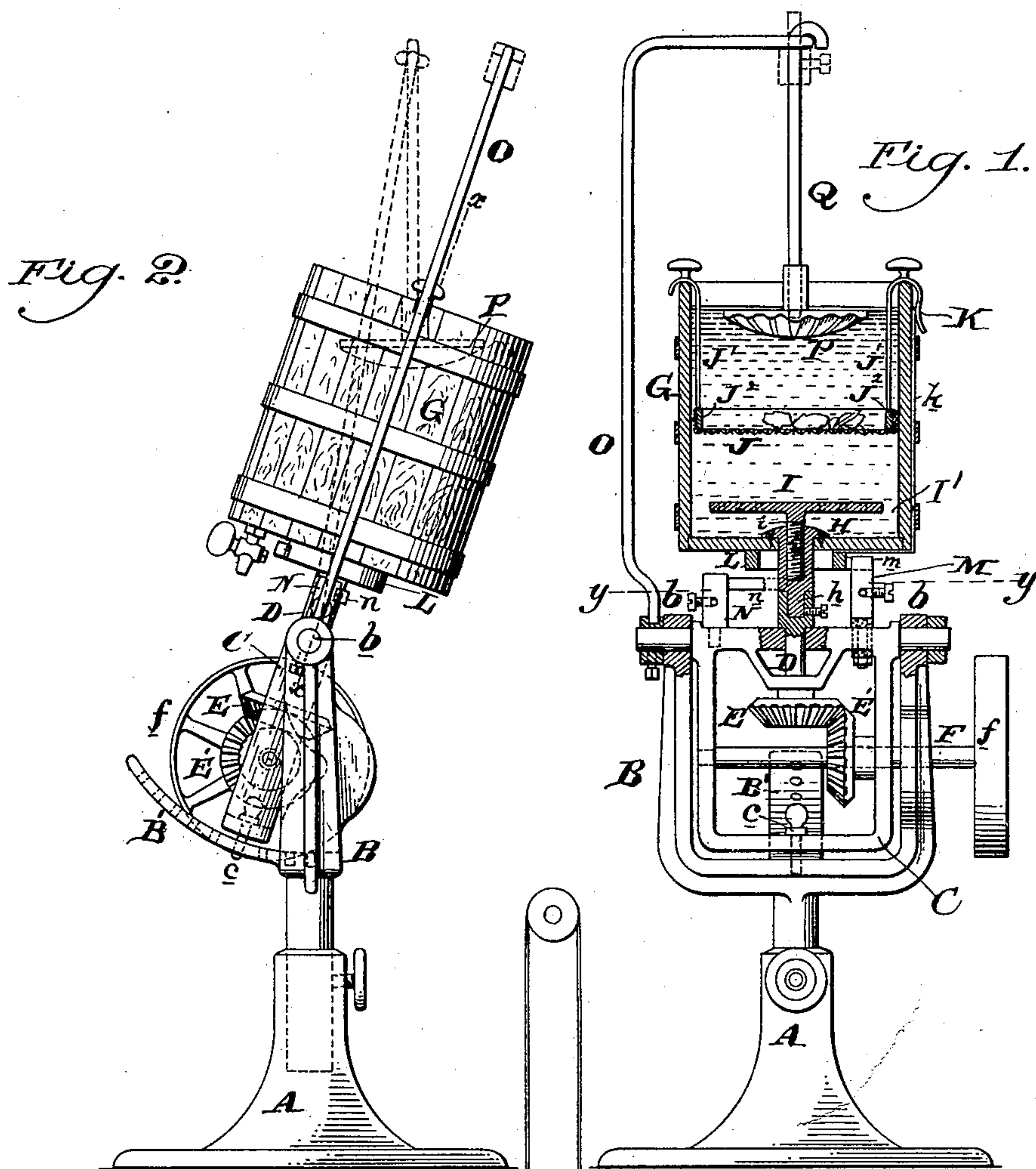
No. 611,100.

Patented Sept. 20, 1898.

H. R. BOISSIER.
ELECTROPLATING APPARATUS.

(Application filed Jan. 14, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

HERMANN R. BOISSIER, OF NEW YORK, N. Y.

ELECTROPLATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 611,100, dated September 20, 1898.

Application filed January 14, 1898. Serial No. 666,595. (No model.)

To all whom it may concern:

Be it known that I, HERMANN R. BOISSIER, of the city, county, and State of New York, have invented an Improvement in Electroplating Apparatus, of which the following is a specification.

My invention has reference to apparatus for electroplating; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

Heretofore it has been customary in plating small articles to string them upon a wire or rod and hang them in a solution at a distance from an anode and complete an electric circuit through the anode and wire or rod upon which the articles are strung. Considerable inconvenience arises from this method, and the coating is not uniform, as there is a greater deposition upon those portions of the article directly presented to the anode than upon the side farthest from it. Many articles are also without apertures by which to suspend them, and in such cases there is a great deal of loss of time in properly attaching them to the rod or bar. Furthermore, when a wire is twisted or bent upon or around an article for the purpose of suspending it those portions where the wire touches necessarily are coated to a less degree, and consequently the work is not perfect; also, the attachment of small articles in large numbers necessitates the use of a great deal of copper wire, which is quickly destroyed and by constant bending becomes unsuitable for use, resulting in a waste product. This cause of loss is considerable in a large factory, and any means which will avoid it is to be desired.

The object of my invention is to provide a means adapted for electroplating small articles of every description, and by certain operations hereinafter described the articles may be coated upon one side or may be uniformly plated throughout without the necessity of stringing the articles to be plated.

In carrying out my invention I provide a tub or tank containing at or about an intermediate position a screen upon which the articles to be plated are placed and by which they are held in an intermediate position between an upper and lower anode. The an-

odes are connected with one terminal of a source of electrical energy, and the screen is connected with the other terminal, so that the current divides through the anodes and unites in the screen and circuit. In this manner the deposition takes place from above and below simultaneously, and by setting the tub at an angle and rotating it the work is caused to move and shift its position in a manner known in the mechanical arts as "tumbling," so that every portion of the article to be coated is subjected to the same character of treatment. In this manner very small articles can be quickly and positively coated without the least danger of burning or defective work resulting and without the expensive hand manipulations which have been heretofore necessary in the manner of plating as usually carried on. The tub is supported in any position, as desired, and in those cases where flat articles, such as handle-plates for coffins, are to be plated on one side only, the article is laid flat upon the screen and the upper anode alone is maintained in electrical circuit. In this manner the deposition covers one side only to a material thickness, and there is therefore considerable saving in material where the precious metals are employed. Where the tumbling action is to be resorted to, such as in small irregular-shaped work, the rotary motion about the oblique axis is imparted by means of gearing and a power device which may be a hand-wheel connecting with a suitable shaft or small electric motor; or a suitable clockwork may be employed in connection with a counterweight, the latter producing the motive power while the former controls the speed of application, and hence the rotation of the tub. Of course in cases where the tumbling action is required the rotary action of the tub is necessarily slow, as there would be no object whatever in a rapid movement. Consequently very little power is required.

My invention also comprehends the use of the tub with the screen to support the work and one or more anodes arranged above or below, or both above and below the work, combined with means to cause a motion or vibration of the fluid relatively to the work, which has the effect of preventing burning of the work while permitting of the employment of

currents of electricity of much higher voltage than possible to employ in the usual forms of apparatus.

My invention further comprehends details of construction of the apparatus, as well as the process or operation, and these will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation of a plating-machine embodying my improvements on line xx of Fig. 2, but with the tub in an upright position. Fig. 2 is an elevation of same. Fig. 3 is a side elevation of a portion of same, showing the application of the counterweight and clock mechanism for controlling the speed of rotation of the tub, and Fig. 4 is a cross-section on line yy of Fig. 1.

A is a base-plate or pedestal in which is supported, preferably with provision for vertical adjustment, a supporting-frame B. In this supporting-frame is pivoted at b an adjustable frame C, adapted to set at different angles or inclinations. The lower part of the frame C travels over a curved arm B', provided with a series of holes, and a pin c is inserted through a hole in the adjustable frame and one of the holes of the curved arm. In this manner the obliquity of the adjustable frame C may be made anything desired from a vertical position to one of approximately forty-five degrees. The frame C has a vertical shaft D, carried in suitable bearings and provided on the bottom with a bevel gear-wheel E, which meshes with a similar gear E' on a transverse power-shaft F, also journaled in the adjustable frame. This shaft F is provided upon one end with a band-wheel f or other suitable means for imparting rotation thereto.

G is a tub, preferably of wood or other insulating material, and is provided on the bottom with a plate H, having a depending stud h , fitting into a recess or space upon the upper end of the shaft D, so that as the shaft rotates the tub or tank rotates with it. Arranged a little above the bottom of the tub upon the inside and removable therefrom is the lower anode I, which is formed of a plate-casting of the material with which the articles are to be plated. This anode may be formed like a grate, if so desired, as indicated in dotted lines in Fig. 1, and it leaves a space I' between its periphery and sides of the tub, so that any particles floating in the solution may settle in the bottom of the tub below the anode. The anode I is provided with a depending arm i , preferably screw-threaded, which fits down into the plate H, so as to form a good electrical connection therewith.

J is a screen, preferably of woven wire of copper, brass, aluminium, or any other metal, and is suspended half-way down the barrel by means of heavy copper wires or plates J', turned over at the top to form hooks to locate the position of the screen within the barrel. The upper ends of these hooks or supports are provided with knobs or handles by which

to lift the screen when it is desired to remove it or to lift out the work which has been plated. The sides of the screen are made to fit closely to the barrel and formed with an upwardly-extending edge J², of any suitable material, to prevent the article when small from working over the edge of the screen and falling upon the lower anode. One of the hook-supports is adapted to form a detachable contact with the upper end K of a strip k of copper fastened to the outside of the tub, and this strip of copper or wire k is connected with an annular contact-ring L, secured to the bottom of the tub and concentric with its axis of rotation. The frame C is also provided with two binding-posts M N, the former being insulated therefrom and furnished with a brush m , which constantly bears upon the annular contact-ring n , resting upon the extension of the plate H. This binding-post is also insulated from the frame C. The terminals from the source of electrical energy connect with these two binding-posts.

O is an upright arm firmly secured to and moving with the adjustable frame C and extending to a point above the top of the tub.

P is the upper anode and is made circular in shape and preferably curved on the bottom and formed with grooves to increase its surface area. This anode is formed of the metal of which the plating is to be made and is connected by a rod Q, leading up to and detachably supported by the upright arm O at a point concentric above the tub or substantially in the axis of its rotation or otherwise, as desired. The upper anode is preferably of a diameter almost equal to that of the tub or tank. If the connection between the arm O and the rod Q is loose and the obliquity of the tub great, the anode may rest against the side of the tub when set in such oblique position, and as the said tub rotates the anode may be rotated with it; but in this case the conductors J' should be insulated at those portions where the anode might touch them. In case the anode is rigidly or otherwise supported in a position to be held without touching the tub, which is possibly more desirable, then in that case no rotation to the anode is desirable or would result.

It will now be understood that by setting the frame C to any obliquity desired the rotation of the tub will cause the work to "tumble" upon itself during the action of the electroplating operation, and as the work is suspended upon a conducting-screen the current flows over both anodes toward the center of the tub and leaves by the screen and work, these parts acting as the cathode. In cases where rotation of the tub is not necessary, especially in flat work, the tub may be placed upright and the plating operation proceeded with. Also in those cases where articles are only to be plated on one side the lower anode is removed or disconnected and the plating operation performed only with the upper anode. However, while it is not necessary to

rotate the tub in all instances it is nevertheless desirable so to do, as the action between the solution, anode, and work prevent burning of the latter when the current voltage is increased. This permits the plating to be performed in one-half the time heretofore required.

The power-shaft F, in place of being rotated by a band-wheel *f*, may be operated by a weight R, acting through a cord *r* and a drum *f'*, attached to the power-shaft, and this shaft F may have its speed of rotation controlled by a clockwork S, carried with the frame C and provided with any suitable device, such as *t*, which prevents a too-rapid rotation of the shaft F. By a proper adjustment of the escapement the rotation of the tub or tank desired may be thus secured. A crank W may be employed to wind up the cord *r* upon the drum *f'*, the latter being connected with the power-shaft through the usual pawl-and-ratchet connection to permit the winding-up operation without turning the shaft.

I do not confine myself to any kind of power devices for operating my machine, nor do I confine myself to the minor details of construction, as these may be varied without departing from the spirit of the invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a plating apparatus, the combination of a tub or tank rotatable upon an upwardly-arranged axis and containing the plating solution, a supporting-screen of conducting material for the work constituting the cathode and arranged at a distance below the surface of the liquid, two anodes one arranged above and the other arranged below the cathode, and means for rotating the tank and cathode.

2. In a plating apparatus, the combination of a tub or tank open at the top and containing the plating solution, a supporting-screen of conducting material for the work constituting the cathode and arranged at a distance below the surface of the liquid, two anodes one arranged above and the other arranged below the cathode and in which the anode arranged above the cathode is stationary and supported independently of the tub or tank and the anode below the cathode arranged within and supported by the tub, means to rotate the tub or tank upon an upright or oblique axis, and electrical circuits for maintaining connection with the anode and cathode during the rotation of the tub or tank.

3. In a plating apparatus, the combination of a tub or tank open at the top and containing the plating solution, a supporting-screen of conducting material for the work constituting the cathode and arranged at a distance below the surface of the liquid, two anodes one arranged above and the other arranged below the cathode and in which the anode arranged above the cathode is stationary and supported independently of the tub or tank

and the anode below the cathode arranged within and supported by the tub, means to rotate the tub or tank upon an upright or oblique axis, electrical circuits for maintaining connection with the anode and cathode during the rotation of the tub or tank, and means for adjustably supporting the tub at different angles of obliquity.

4. In a plating apparatus, the combination of a tub or tank open at the top and containing the plating solution, a supporting-screen of conducting material for the work constituting the cathode and arranged at a distance below the surface of the liquid, two anodes one arranged above and the other arranged below the cathode, means to hold the tub or tank at an oblique angle, means for rotating the tub or tank while supporting the work, and electrical connections for maintaining the anodes and cathode in electrical circuit during the rotating movement.

5. In a plating apparatus, the combination of a tub or tank open at the top and containing the plating solution, a supporting-screen of conducting material for the work constituting the cathode and arranged at a distance below the surface of the liquid, two anodes one arranged above and the other arranged below the cathode, means to hold the tub or tank at an oblique angle, means for rotating the tub or tank while supporting the work, electrical connections for maintaining the anodes and cathode in electrical circuit during the rotating movement, and means to vary the angle of obliquity of the tub or tank and its supporting-screen for the work to vary the degree of "tumbling" action of the work upon itself.

6. In a plating apparatus, the combination of a tub or tank pivoted to rotate upon an oblique axis, a supporting-screen cathode for the work arranged within and electrically independent of the tub or tank below the level of the solution, one or more anodes arranged within the tub or tank out of contact with the work, means to impart rotation to the tub or tank, and electrical connections to maintain electrical circuits with the cathode and anodes during the rotation.

7. In a plating apparatus, the combination of a tub or tank pivoted to rotate upon an oblique axis, a supporting-screen cathode for the work arranged within the tub or tank below the level of the solution, one or more anodes arranged within the tub or tank, means to impart rotation to the tub or tank, electrical connections to maintain electrical circuits with the cathode and anodes during the rotation, and means for adjusting the obliquity of the axis of rotation of the tub or tank.

8. In a plating apparatus, the combination of a tub or tank movable about an upwardly-arranged axis, a cathode or supporting screen for the work arranged within the tub or tank and provided with upwardly-extending arms fitting over the upper edge thereof, a station-

ary anode arranged within the upper portion of the tub or tank, a support for holding the anode in position above the screen, means to rotate the tank and cathode, and electric circuits connecting with the cathode or screen and anode.

9. In a plating apparatus, the combination of a tub or tank, a supporting-screen cathode for the work arranged within the tub or tank adapted to be rotated about an upwardly-arranged axis, a stationary anode arranged within the upper portion of the tub or tank and under which the cathode rotates, a support for holding the anode in position above the screen, a second anode arranged in the lower part of the tub or tank below the screen, and electric circuits connecting the cathode-screen and anodes with a source of electrical energy.

10. In a plating apparatus, the combination of a tub or tank, a supporting-screen cathode for the work arranged within the tub or tank and provided with upwardly-extending arms fitting over the upper edge thereof, an anode

arranged within the upper portion of the tub or tank, a support for holding the anode in position above the screen, a second anode arranged in the lower part of the tub or tank below the screen at a distance above the bottom of the tank and of less surface area than the cross-sectional area of the tank so as to leave access from above to a position under it, means to rotate the screen about an oblique axis and electric circuits connecting with the cathode-screen and anodes.

11. In a plating apparatus, a tub or tank containing a work-supporting cathode and movable about an upwardly-arranged axis, an anode above the cathode and supported independently of the tub or tank and cathode, and power devices to rotate the tub or tank.

In testimony of which invention I hereunto set my hand.

HERMANN R. BOISSIER.

Witnesses:

R. M. HUNTER,

J. W. KENWORTHY.