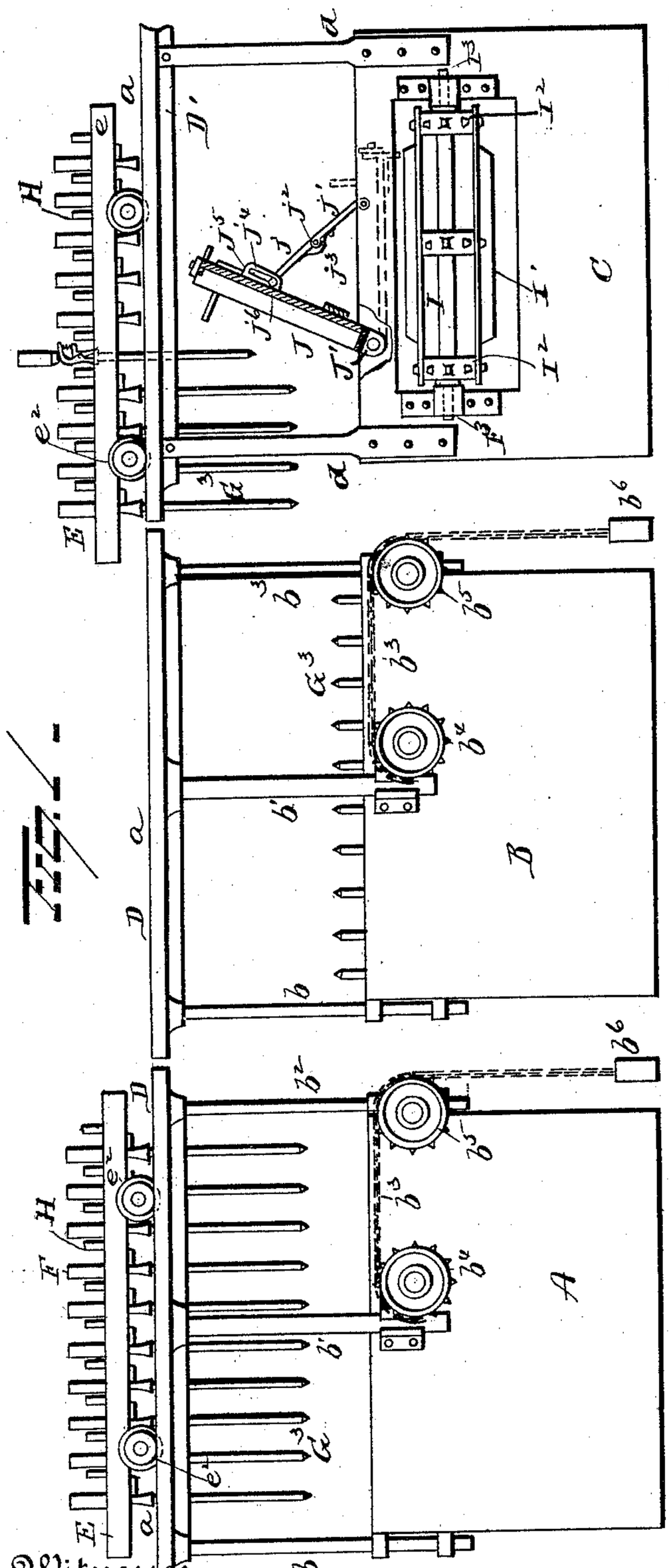
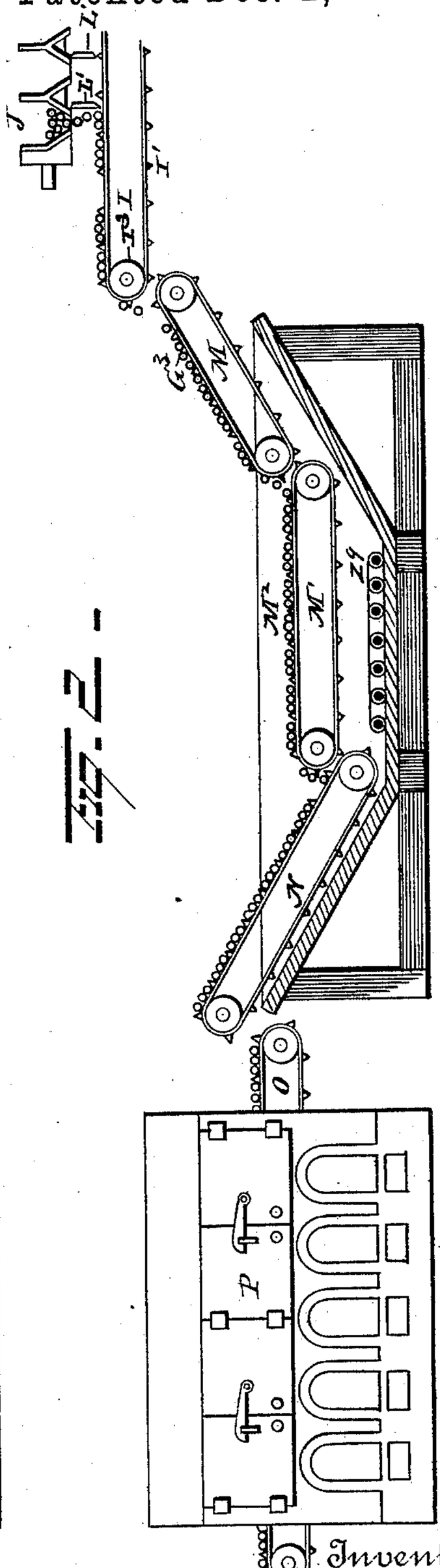
(No Model.) 5 Sheets—Sheet 1.

W. J. POSSONS.

APPARATUS FOR ELECTROPLATING.

No. 441,893. Patented Dec. 2, 1890.





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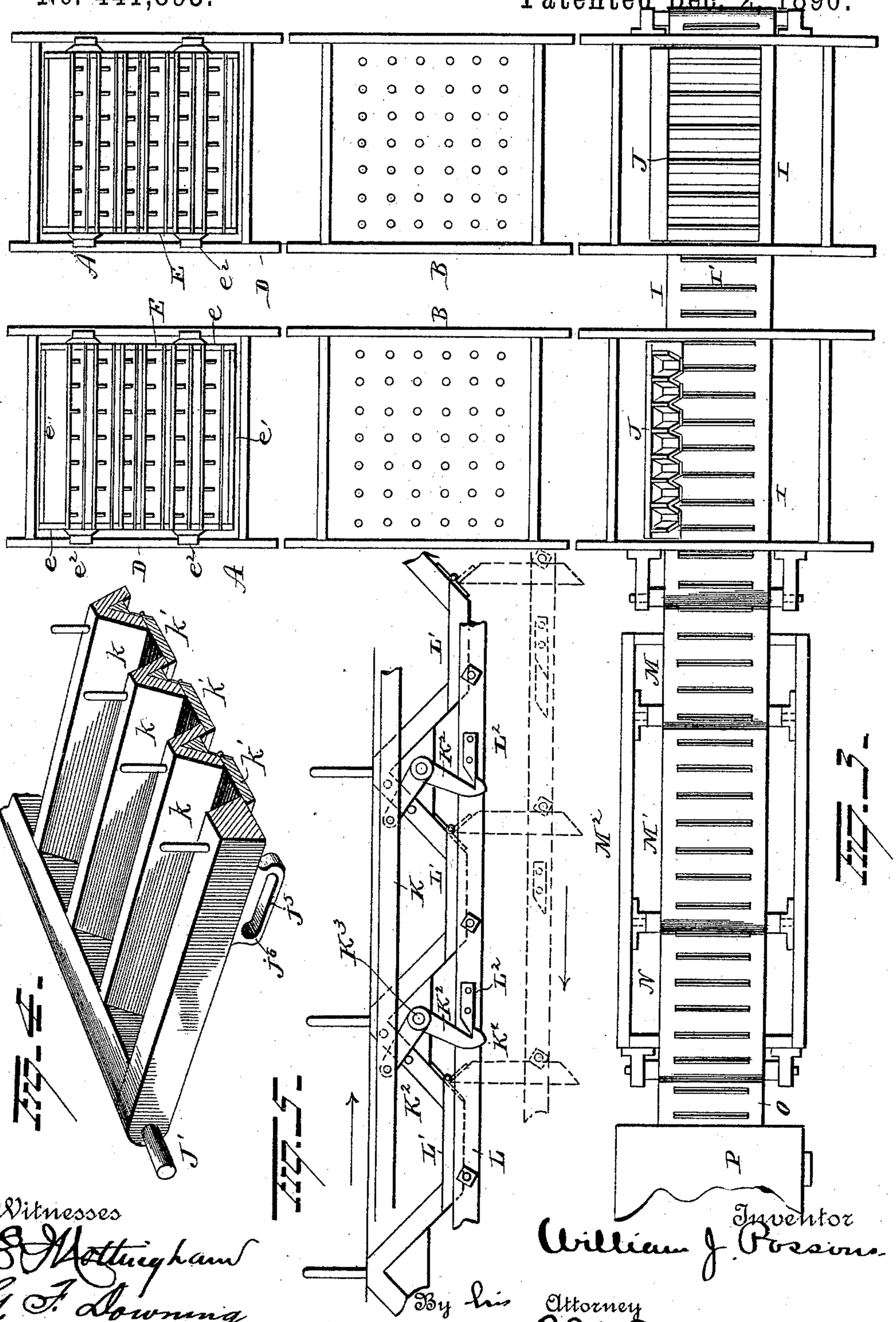

FIG. 1.

FIG. 2.

FIG. 3.

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APPARATUS FOR ELECTROPLATING.

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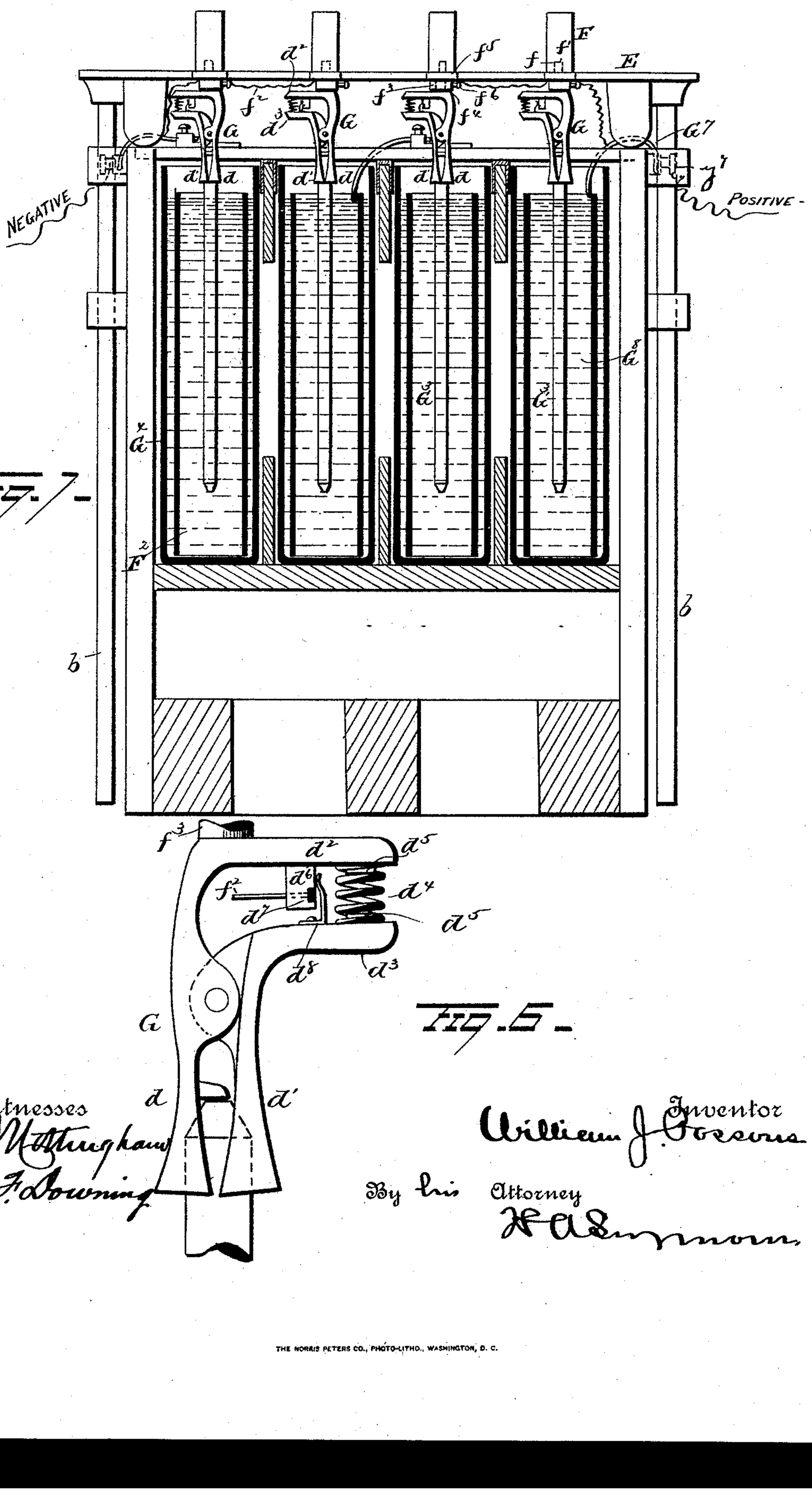

FIG. 1.

FIG. 6.

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APPARATUS FOR ELECTROPLATING.

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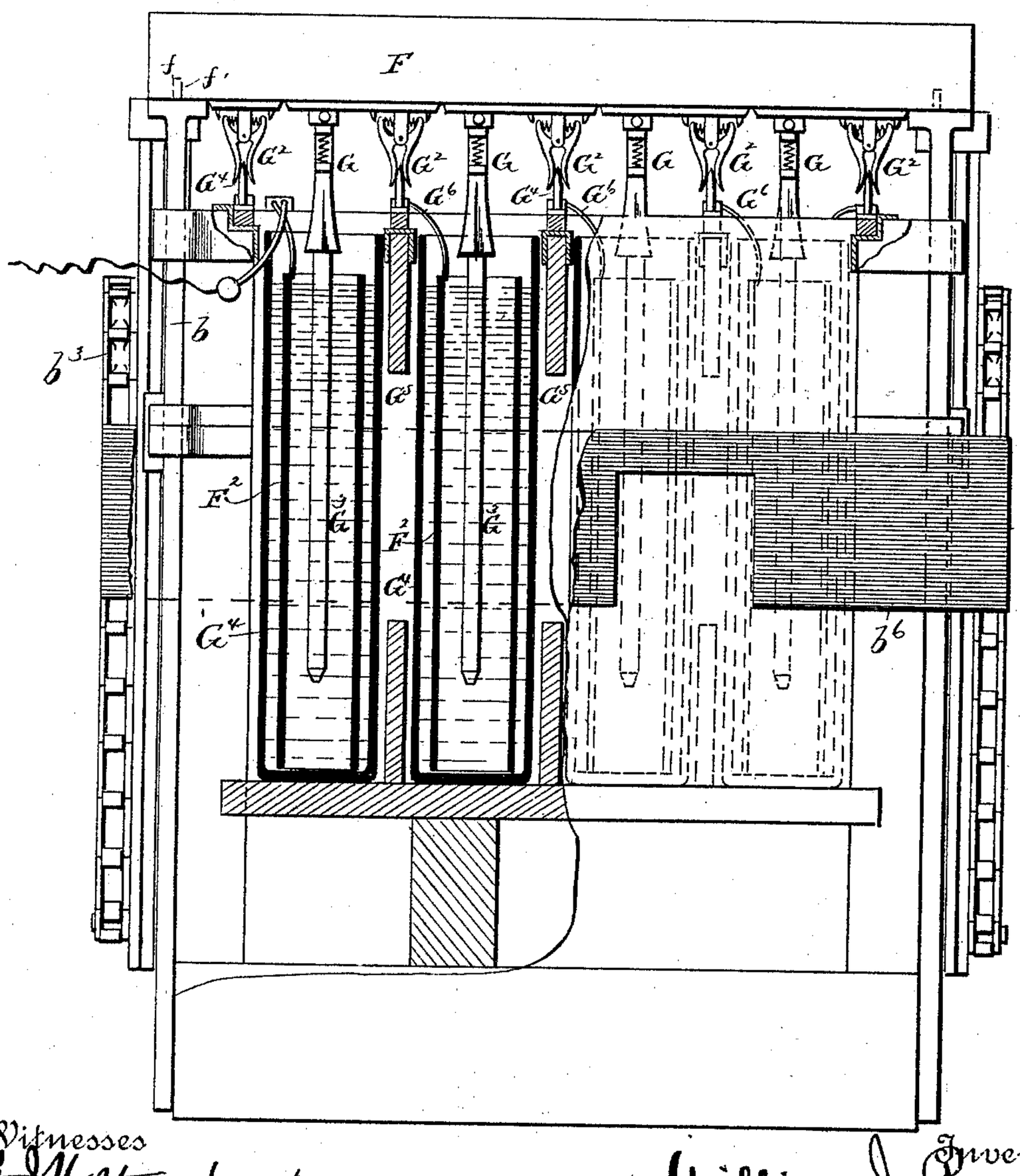
Fig. 8.



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APPARATUS FOR ELECTROPLATING.

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Fig. 9.

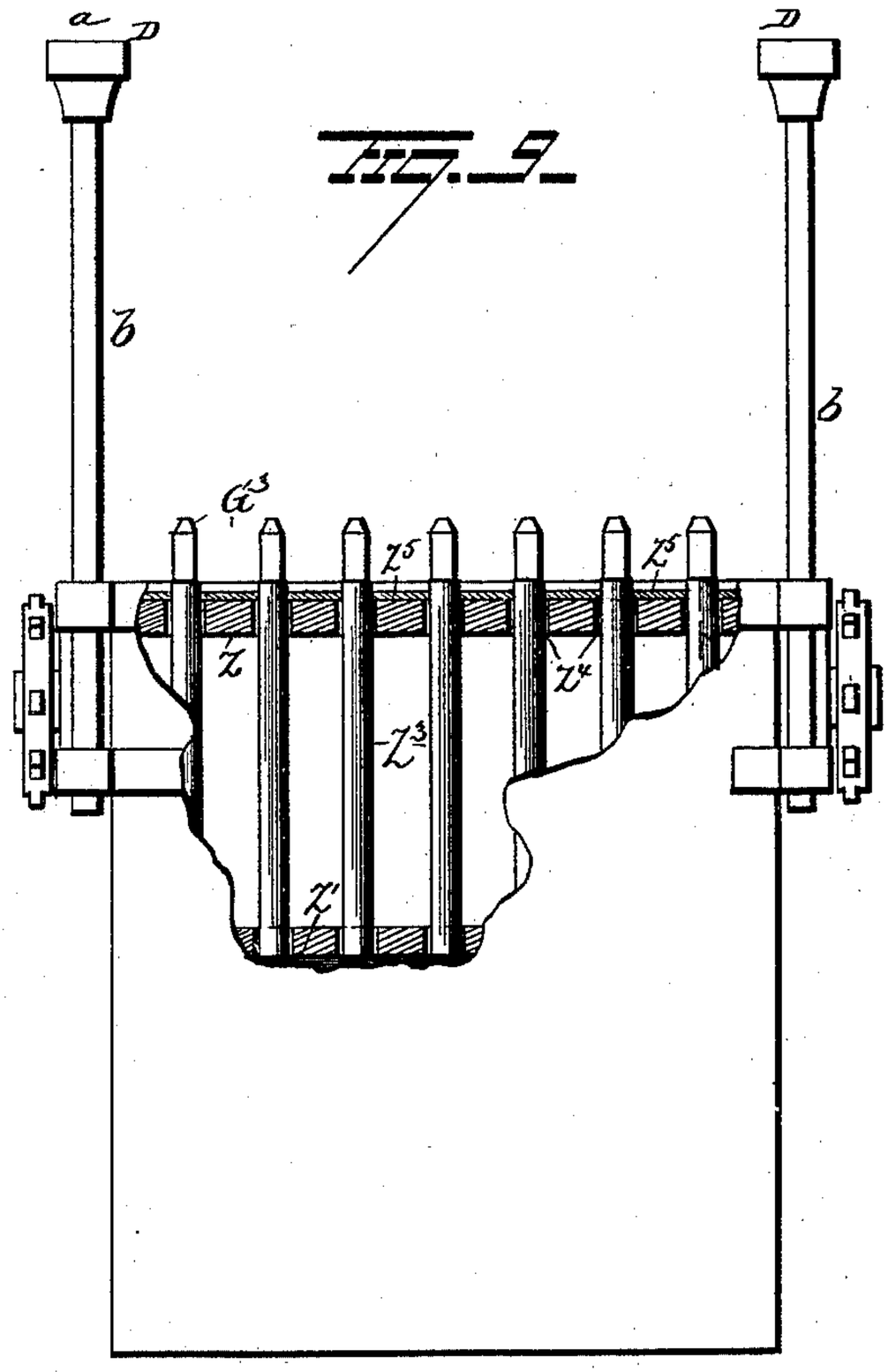
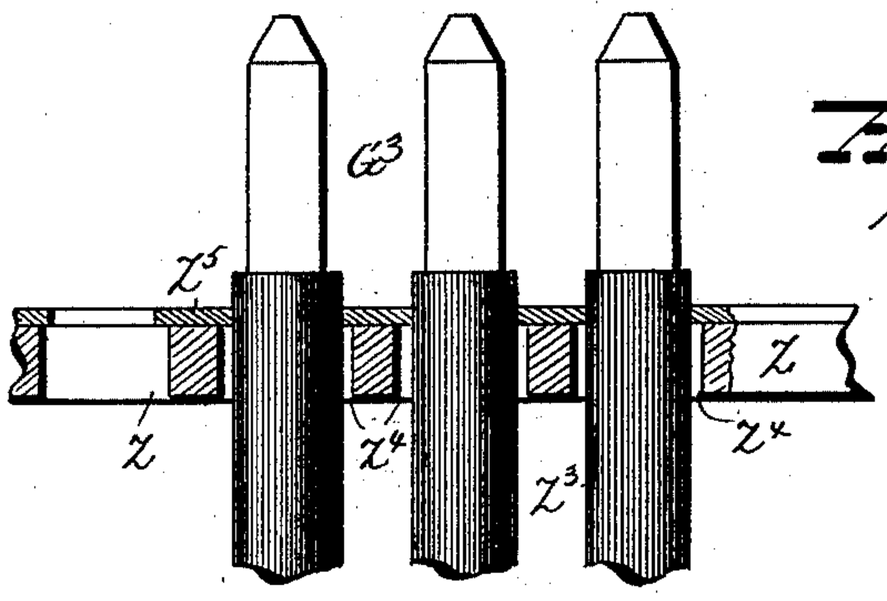


Fig. 10.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ELECTROPLATING.

SPECIFICATION forming part of Letters Patent No. 441,893, dated December 2, 1890.

Application filed October 21, 1889. Serial No. 327,699. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. POSSONS, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Apparatus for Electroplating; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved apparatus for electroplating, the object of the invention being to reduce the cost of electroplating electric-light carbons and other articles by providing a plating apparatus of such construction that the carbons or other articles will be transferred from one point to another by machinery, and thus greatly facilitate the charging, plating, discharging, washing, and drying processes to which the articles are subjected, and thereby materially increase the capacity of a plant and reduce the expense of electroplating.

With this end in view the invention consists in certain features of improvement in an apparatus for electroplating, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view, partly in side elevation and partly in vertical section, of the plating-tank and the charging and discharging apparatus. Fig. 2 is a view, partly in side elevation and partly in vertical section, of the drying-furnace, the washing-tank, endless carriers, and discharging-troughs. Fig. 3 is a plan view of two plants for electroplating, and a drying-furnace, washing-tank, and endless carrier combined therewith. Fig. 4 is a view in perspective of the body portion of the discharging-trough. Fig. 5 is a view in front elevation of the devices for locking and releasing the hinged bottoms of the discharging-troughs. Fig. 6 is a detached view of one of the clamps for holding the carbon or article to be electroplated. Fig. 7 is a view in side elevation of one of the clamp-bars and a series of clamps attached thereto and a portion of the plating apparatus. Fig. 8 is a section of a portion of the plating apparatus, showing the connections of the circuits Fig. 9 is a view in side elevation of one row of the tubular holders of the charging apparatus. Fig. 10 is a detailed view of the upper ends of two of the tubular holders, the top board and the rubber cloth forming a laterally-yielding support.

A represents the plating-tank, B the charging apparatus, and C the discharging apparatus, all of which are arranged in close proximity to and in line with each other. The plating-tank and the charging apparatus are each provided with a vertically-adjustable frame D, each consisting of the side tracks *a a* and the guides *b b′ b²*. To the central vertical guide *b′* of each frame D is secured at its lower end a chain *b³*, which passes over sprocket-wheels *b⁴ b⁵*, and has a counterweight *b⁶* attached to its outer and free end. By this construction and arrangement of parts each frame D may be very readily raised and lowered.

The discharging apparatus is provided with a stationary raised frame D′, consisting of the uprights *d d* and the tracks *a a*. The plating, charging, and discharging tanks or devices are arranged in line with each other, so that when the adjustable frames D are raised the tracks *a a* of the three frames will be in alignment and form a continuous trackway for the truck E to run upon. Truck E consists of the side bars *e e*, end bars *e′ e′*, and flanged track-wheels *e²*.

F are clamp-bars, which are mounted on truck E transversely to its length, and are retained against lateral displacement by means of short vertical pins or studs *f*, inserted in the upper face of the side bars of the truck, which enter sockets *f′* in the lower edges of the clamp-bars. By these means the clamp-bars by being slightly raised from the truck are disengaged therefrom, and when secured by the studs *f* are held in place on the truck. To the under side of each one of the clamp-bars are fastened the clamps G, as shown in Fig. 7. Each clamp consists of a fixed jaw *d* and a pivoted jaw *d′*, the lower ends of which are formed to receive and grasp the article to be electroplated. The upper ends of the jaws *d d′* are provided with laterally-projecting arms *d² d³*, between which

is placed a spiral spring d^4, the latter being held in place by the lugs d^5 entering the ends of the spring. The expansion force of the spring serves to retain the carbon firmly grasped between the lower ends of the jaws. To the arms d^2 is secured a block d^6 of insulating material, in one face of which is inserted a metal contact-plate d^7, which latter has a conductor f^2 attached to it. To the other jaw is secured a yielding contact d^8, which engages contact d^7 when the clamp is empty and is disengaged therefrom when the clamp is charged with an article to be plated. The clamp is provided with a stud f^3, which is received within a socket f^4 on the base-plate f^5, and is secured therein by a set-screw f^6. At one end of the base-plate is secured the pivoted contact-jaws G^2. As illustrated in Fig. 7, the conductor f^2 electrically connects one clamp with the contact-plate d^7 of the next succeeding clamp. The object of these contacts and connections will be hereinafter explained.

I will now describe the method of charging or filling the clamps G with carbons G^3. The truck, with its series of clamp-bars mounted thereon, is run onto the track of the frame over the charging apparatus B and the frame lowered so that each clamp will engage and grasp the upper and projecting end of one of the carbons G^3. The charging apparatus is of such construction that it will hold in position any desired number of parallel rows of carbons or other articles to be plated. While I do not restrict myself to any particular construction of charging apparatus, the construction described and claimed in my pending application, Serial No. 327,294, filed October 17, 1889, I have found a most efficient one and could be used to advantage in this improvement.

Figs. 9 and 10 of the drawings illustrate the construction of the charging apparatus. Z and Z′ represent the top and bottom boards of the apparatus, and Z^3 are tubular holders which are made of straight brass tubes and are supported on the bottom board Z′. The upper ends of the tubular holders project through holes Z^4, formed in the top board Z. Holes Z^4 are of sufficiently greater diameter than that of the tubular holders so that the latter are allowed a certain amount of free lateral movement in all directions. Z^5 is a rubber cloth or sheet of rubber placed on the top board and is perforated for the reception of the upper ends of the tubular holders. The rubber cloth fits snugly around the upper end of each one of the tubular holders, and while serving to retain each one of the holders centrally or substantially centrally within one of the holes in the top board allows the upper end of each holder a certain amount of lateral movement or adjustment. These holders are arranged in parallel rows consisting of any desired number, the space between the holders of each row and the space between each row being sufficient, simply, to allow of the desired lateral adjustment or movement of the upper ends of the holders. The holders are two or three inches shorter than the carbon sticks or rods, so that the latter project above the upper ends of the tubes, as shown in the drawings, in order that they may be readily grasped by the clamps on the bars of the plating apparatus. The clamps are charged with carbon rods or sticks in the following manner: The frame supporting the clamp-bars is lowered, and as the jaws of each clamp register with one of the carbon sticks each clamp will engage one of the carbon rods, which will be retained in place by the action of the springs, tending to force the clamping-jaws together. Hence as the frame carrying the clamp-bars is raised each one of the clamps will be charged with a carbon stick. In forcing the clamps onto the projecting ends of the carbons and in extracting the carbons from their holders the carbons will not always register exactly with the clamps, and hence if the tubular holders were held rigidly in place the carbons would often break off by their binding in the holders. To obviate this, I mount the upper end of each one of the tubular holders in a yielding bearing, so that when the clamp engages the carbon the latter will yield laterally in any direction and adjust itself to the clamp, and in the withdrawal of the carbons from their holders the latter will adjust themselves so as to be in alignment with the direction of movement of the clamps when raised, and thus insure the ready removal of the carbons without danger of their binding or breaking. The clamps having been filled, the frame and truck are raised, and the truck is then run onto the track of the plating apparatus. The frame of the latter is then lowered, and each carbon is lowered into its plating-jar G^4, as illustrated in Fig. 8. Upon lowering the truck and clamps the contact-jaws G^2 will engage the contacts G^4, fastened to but insulated from the upper edges of the partitions G^5, between the jars. Each contact G^4 is electrically connected by a conductor G^6 with the copper anode F^2 of the adjacent jar. The current flows through the conductor G^7, connected with a binding-post y^7 into the copper anode and from thence through the bath G^8 to the carbon, depositing a film or coating of copper thereon, and from the carbon to the clamp, by which it is held to the contacts G^2 G^4, to the conductor connected with the latter, and from thence to the anode of the next jar, and so on through the entire series of jars. In the event any of the clamps are empty, owing to their failure to grasp a carbon in the charging apparatus, or because of the accidental disengagement of a carbon from the clamp, such clamp (one or more) is shunted out of the circuit and the latter maintained intact through the charged clamps of the series. When the carbon is forced into the clamp, it operates to break the contact formed by the

yielding and fixed contacts connected with each clamp, and hence with respect to the filled clamps the current will take the path above described. In the event that the clamp is not filled the contacts of the clamp remain in engagement with each other, and hence the current instead of flowing from the clamp through the contacts to the anode will flow from the clamp through the conductor f^2, (and around the contacts electrically connected with the anode,) through the contacts d^7 d^8 to the contacts G^2 G^4, to the anode of the next succeeding jar, and from thence through the remaining jars in succession. I have described the improvement for automatically shunting the current around an empty clamp for the purpose of showing that it is unnecessary for a workman to stop the plant and manually fill an empty clamp; but I make no claim in this patent to such feature of improvement, as it forms the subject-matter of a separate application, filed October 18, 1889, Serial No. 327,411. After the carbons have remained in the plating-tank a sufficient length of time to be electroplated the frame and its truck are raised, thereby withdrawing all of the carbons from their plating-jars. The truck is then run upon the elevated trackway onto the track over the discharging apparatus C.

I will now describe the method of simultaneously discharging all of the carbons of the series of clamps attached to a single clamp-bar. The truck-frame is provided with a series of transverse bars H, which are located adjacent to each one of the clamp-bars and parallel therewith. In discharging the carbons the clamp-bar is raised, so as to disengage its ends from the vertical studs on the truck-frame, and the bar moved laterally until the movable laterally-projecting arm d^3 of each one of the clamps rests upon the bar H, when a workman at each end of the clamp-bar forces the latter downwardly, and thereby opens the entire series of clamps and discharges the carbons therefrom simultaneously.

The discharging apparatus is provided with an endless belt or carrier I, which is provided with cleats I′, and runs upon sprocket-wheels I^2, mounted on shafts I^3, journaled in the frame of the discharging apparatus.

The following means may be used for guiding the carbons as they are discharged from their clamps onto the endless carrier and depositing them thereon parallel to each other and transversely to the carrier: J is a conveyer provided at one end with trunnions J′, by which it is pivotally connected to the supporting-frame of the discharging apparatus. The conveyer is retained at the desired angle of inclination by the hinged brace $j\,j'$, which is formed with a knuckle-joint j^2, and provided with a spring j^3 for retaining the joint at one side of a straight line intersecting the opposite ends of the brace. The upper end of the brace engages in a slot j^4, formed in a plate j^5, secured to the under side of the conveyer. Slot j^4 terminates at one of its ends in a notch j^6, within which the upper end of the brace engages and locks the conveyer in its inclined adjustment. By pressing on the center of the hinged brace the latter can be folded like a measuring-rule and the conveyer lowered to a horizontal position. The conveyer consists of a series of parallel hoppers or troughs k, each of which is provided with a hinged bottom k'. The carbons are dropped from their clamps into these troughs, which, being adjusted at an angle of inclination to the carbons, break the fall of the latter and prevent them from breaking. After the carbons have been discharged into the conveyer the latter is lowered to a horizontal position, when the carbons are discharged onto the endless belts in the following manner: To the free end of the conveyer is connected a laterally-movable bar K, which may be mounted at its ends on the crank-arms (not shown) so that by turning one of the cranks the bar K will be moved endwise and also vertically. K^2 are bell-crank levers pivoted at K^3 to the end of the conveyer. The upper ends of the bell-crank levers are pivoted to the bar K, while their lower ends are provided with beveled hooks K^4. The free ends of each one of the hinged bottoms L′ is pivoted to a bar L, which is furnished with beveled lugs L^2, with which engages the hooks K^4. By moving the bar K in the direction indicated by the arrow the series hooks K^4 are disengaged from the series of lugs L^2, thereby allowing the bar L and the hinged bottoms L′ to drop to the position indicated by dotted lines in Fig. 5 and discharge the carbons onto the endless carrier J. The bar K is then allowed to drop back again into its former position, and on raising the bar L, by moving it in the direction indicated by the arrow marked thereon, the beveled ends of the lugs L^2 will engage the beveled hooks K^4, and cause the latter to again engage the lugs and lock the bottom again. The weight of the bar K, acting through the bell-crank levers, serves to prevent the accidental disengagement of the hooks from the lugs. The carbons deposited on the endless belt or conveyer I′ are carried along by the transverse cleats thereon and deposited onto an inclined conveyer M, by which they are conveyed to an endless conveyer M′, located in the washing-tank M^2. The water in the washing-tank is heated by steam-pipes Z^9 to the desired temperature to thoroughly cleanse the carbons of the solution of the plating-baths, and also serves to expel the air from the carbons. The carbons after being washed are conveyed to and deposited upon the inclined carrier N, by which they are carried upwardly out of the tank M^2 and deposited upon a carrier O, by which they are conveyed through a drying-furnace P and thoroughly dried, and are then in a finished condition for shipment and use.

In a plant embodying my invention a single furnace and a series of conveyers will suffice for two or more plating-tanks. In Fig. 3 I have represented two plating-tanks with charging and discharging apparatus and a conveyer common to the discharging apparatus of both plating-tanks.

It is evident that the details of construction and the arrangements may be very widely varied without departing from my invention; and hence I would have it understood that I do not restrict myself to the particular construction and arrangement of parts shown and described; but,

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

1. The combination, with a plating-tank having a vertically-adjustable trackway, of a truck mounted on the trackway and clamps suspended from bars supported by the truck, substantially as set forth.

2. In an electroplating apparatus, the combination, with a truck, of a series of detachable bars mounted on the truck and clamps secured to said bars, substantially as set forth.

3. The combination, with a plating-tank and a charging apparatus, each provided with a trackway, of a truck for transferring the article to be plated, substantially as set forth.

4. The combination, with a plating-tank and a charging apparatus, each provided with a vertically-adjustable track, of a truck adapted to run on said tracks and clamps supported by the track for grasping the articles to be plated, substantially as set forth.

5. The combination, with a plating-tank, a charging and a discharging apparatus, each provided with a track, of a truck adapted to run upon the track and clamps supported by the truck for carrying the articles to be electroplated, substantially as set forth.

6. The combination, with the truck and clamp-bars mounted thereon, of bars secured to the truck for effecting the simultaneous discharge of the articles retained in a series of the clamps, substantially as set forth.

7. In an electroplating plant or apparatus, the combination, with an endless conveyer, of an adjustable receiver provided with hopper-shaped bottoms, substantially as set forth.

8. The combination, with the adjustable receiver and hinged bottoms, of devices for simultaneously opening and closing said hinged bottoms, substantially as set forth.

9. The combination, with an endless carrier and a truck provided with a series of bars having clamps connected therewith, of an intermediate hinged conveyer for depositing the articles upon the belt, substantially as set forth.

10. In an electroplating plant, a charging apparatus for simultaneously charging any desired number of clamps, a plating-tank provided with means for simultaneously lowering and raising any desired number of articles to be plated, a discharging apparatus for simultaneously discharging any desired number of the articles after they have been plated, and a truck for transferring the articles from the charging apparatus to the plating-tank and from thence to the discharging apparatus, substantially as set forth.

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

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