No. 650,051. Patented May 22, 1900.

L. POTTHOFF.

ELECTROPLATING APPARATUS.

(Application filed Aug. 2, 1899.)

(No Model.) 2 Sheets—Sheet 1.

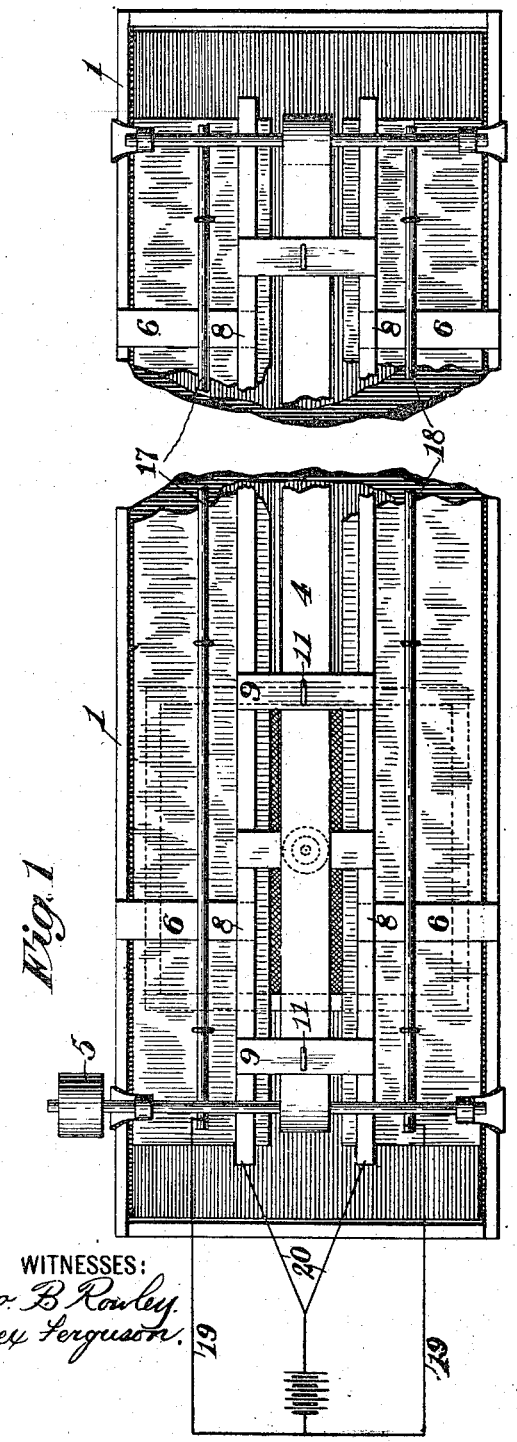

Fig. 1

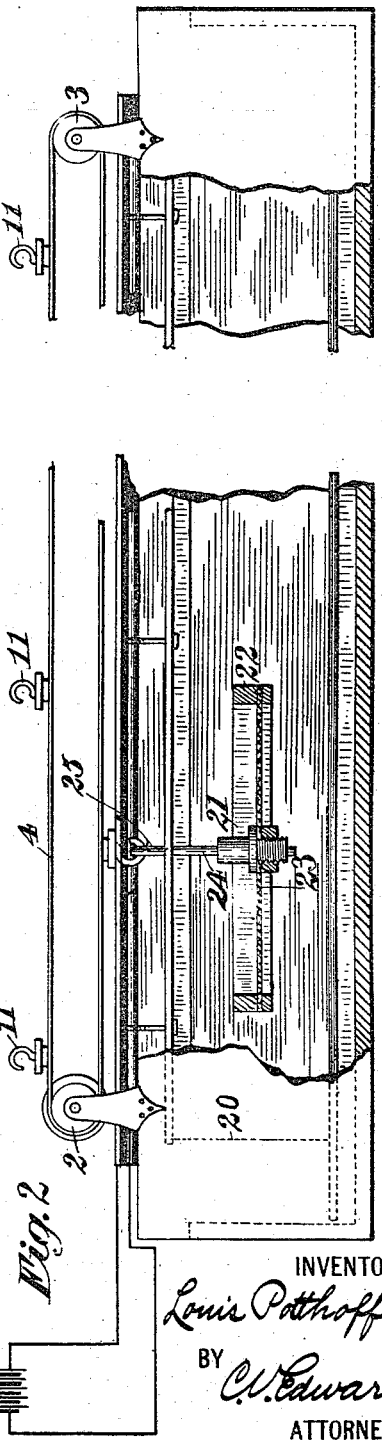

Fig. 2

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Fig. 3

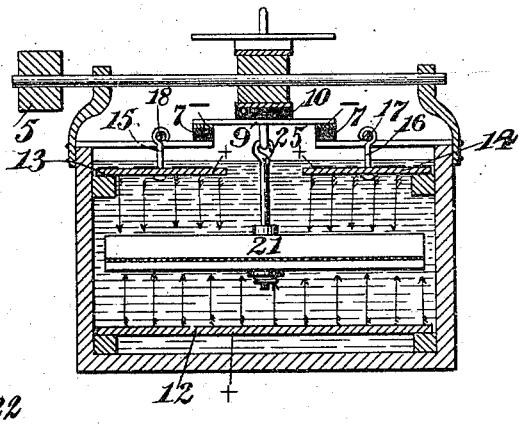


Fig. 4

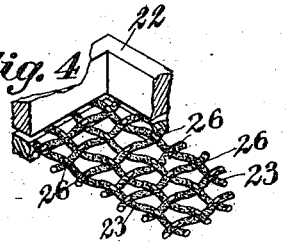


Fig. 5

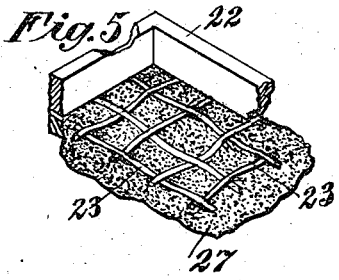
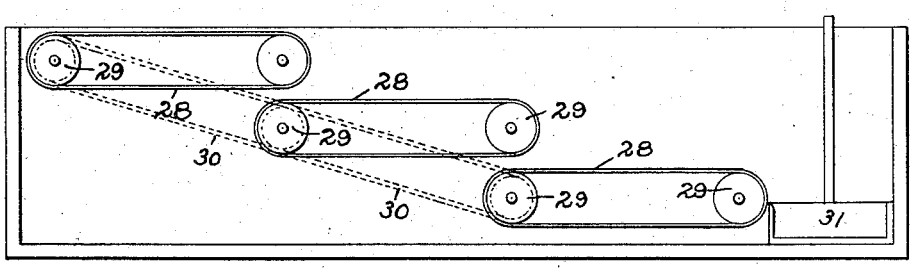


Fig. 6



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UNITED STATES PATENT OFFICE.

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ELECTROPLATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 650,051, dated May 22, 1900.

Application filed August 2, 1899. Serial No. 725,853. (No model.)

To all whom it may concern:

Be it known that I, LOUIS POTTHOFF, a citizen of the United States, residing at New York, (Brooklyn,) in the county of Queens and State of New York, have invented certain new and useful Improvements in Electroplating Apparatus, of which the following is a full, clear, and exact specification.

My invention relates to electroplating apparatus, and has particular reference to apparatus of this character used for electroplating nails or other small articles.

One object of the invention is to construct an apparatus by which the articles will be evenly and uniformly coated.

A further object of the invention is to improve the general construction of apparatus of this character, whereby a uniform and perfect contact may be effected between the articles to be plated and that part of the apparatus upon which the same are supported while being plated, and at the same time render the parts of the apparatus less liable to deterioration from use.

A still further object is to devise a system and apparatus whereby small articles may be evenly and uniformly electroplated at a moderate cost.

To this end my invention generally comprises one or more tanks containing the electrolytic solution and a number of removable carriers or baskets adapted to be moved through said solution, whereby the contents of the carrier may be shaken up and again run through the same or another tank, or, if preferred, dumped therefrom into another carrier, also adapted to be moved through the same or another solution in another tank.

The invention also comprehends the use of a basket or carrier having exposed contact points or surfaces upon which the articles to be plated are adapted to rest and connections between said contact-surfaces and one of the poles of the electric circuit, the said carrier, with the exception of said contact-surfaces, being coated with non-conducting material, whereby the parts of the basket or carrier exposed to the solution will be rendered non-conductive and deposition thereupon will be prevented.

The invention will be more fully described hereinafter with reference to the forms thereof illustrated in the accompanying drawings, in which—

Figure 1 is a plan view, parts being broken away, of an apparatus embodying my invention. Fig. 2 is a side view, partly in section, of the structure shown in Fig. 1. Fig. 3 is a sectional view of the tank shown in Figs. 1 and 2. Figs. 4 and 5 are detail views of portions of the bottom of the carrying basket, illustrating two different modifications thereof; and Fig. 6 is a sectional view of an apparatus employing a still further modified form of carrier.

Referring more particularly to the drawings, 1 represents a tank adapted to contain the electrolytic solution or bath, the same being of any suitable size and shape, preferably, however, of greater length than breadth. The system may employ one or more tanks, but under ordinary conditions where the carriers are to be supported by the endless belts, as hereinafter described, I prefer to employ two or three separate tanks. At each end of each tank and immediately above the same are located a pulley 2 and a pulley 3, upon which is mounted an endless belt or chain 4. A driving-pulley 5 is connected with a suitable source of power and also with one of the pulleys 2 or 3 in order to operate the endless belt or chain 4. Where more than one tank is employed, the band or chain 4 may extend along the entire length of all the tanks if the same be placed end to end, or separate bands may be used for each tank and the bands may be arranged to be operated in any suitable manner. From the top of the tank a suitable number of supports 6 6 6 6 extend inward toward the endless belt 4, and upon each support 6 is carried a block of insulating material 7, to which is affixed a track 8, extending substantially the length of the tank, immediately adjacent to and parallel with the endless belt 4, the two tracks 8 8 being disposed one on each side of the belt. At intervals along the belt 4 are carried transverse strips 9 9 of conducting material, a block of insulating material 10 being interposed between the strips and the belt. The strips 9 are of such length and are so adjusted with relation to the parts of the apparatus that the ends of the strips carried by that part of the belt below the pulleys will slide upon and make electric con-

tact with the longitudinal strips 8 8, as illustrated in Figs. 1, 2, and 3. Upon the strips 9 are fixed hooks 11 of electrical conducting material, from which the carriers or baskets may be adapted to be suspended, as hereinafter described.

The anodes of the apparatus are disposed in any suitable manner; but I prefer to arrange one large anode 12 at the bottom of the tank and the anodes 13 and 14 at the top, as shown, the latter projecting inward toward each other, but leaving a longitudinal path between the same, through which the hook suspending the carrier may be permitted to travel. The anodes 13 and 14 may be suspended from hangers 15 and 16, connected to the conducting-bars 17 and 18. The bars 17 and 18 are connected with the positive end of the battery by means of wires 19, and the strips 8 are connected with the negative end of the battery by wires 20. The carriers or baskets 21 may be of suitable size and shape, but when used in connection with an apparatus employing the endless band above described will ordinarily comprise a side rim 22 and a bottom 23, the latter being of metallic gauze, wire screening, open-work metal, or other similar material, and a rod 24 of conducting material attached to the center of the bottom 23 and electrically connected therewith. The rod 24 is provided with a hook or other suitable means 25 for engaging with the hooks 11, carried by the endless band or chain 4.

If preferred, the endless band or chain 4 may be dispensed with; but if so some suitable means should be provided for moving the articles through the solution and for changing the relative position of the articles with respect to each other and with respect to the carrier at intervals in order that the entire surface of the article may be presented to the solution while the article is in the tank. This may be accomplished by the means shown in Fig. 6, wherein the carriers are represented as comprising endless bands 28, corresponding with the bottoms 23 of the carriers, heretofore described, mounted upon rolls 29, the bands being located substantially end to end and one below the other. By means of shafting 30 the bands are made to operate together, so that the articles may be placed upon one end of the upper band, by which they will be carried to the end of that band and then dropped down upon the end of the band below, by which they will be carried to the next succeeding band, until the articles are finally dropped into a receptacle 31 at the end of the tank, which receptacle is adapted to be withdrawn to empty the articles.

As the bottoms 23 and the bands 28 will form a part of the electric circuit to which the articles to be plated are electrically connected, so that the articles and the bottom form one electrode of the electric circuit, it is desirable that as small a part of the bottom or band as possible shall be exposed to the solution in order that deposition may not take place upon the bottom and cause the open spaces between the wires to become clogged, and thus interfere with the deposition upon the under side of the articles. I therefore propose to employ bands or carriers of metallic screening or other similar construction comprising a number of independent wires crossing each other, so as to make electric contact with each other, and to coat the wires of the bands or carriers after the rod 24 is clamped thereto, and also preferably the exterior of the rod 24, with a coating of a suitable non-conductor of electricity—such, for instance, as paint, enamel, &c.—the non-conductor, however, not covering the parts of the wires which touch each other and therefore not preventing contact with each other. The upper side of the bottom or of the endless band of open-work metal 28 is then scraped or rubbed until the projecting portions of the same are cleared of the non-conducting material, so that numerous small surfaces of the metal will be uncovered along the top of the carrier or basket. This construction is shown in detail in Fig. 4, wherein the bottom 23 is shown covered with non-conducting material and the surfaces 26 of the metal are uncovered along the top of the carrier. The unprotected surfaces serve as points where contact is made between the article and the bottom of the carrier. It is obvious that this feature may be applied to either the basket carriers shown in Figs. 4 and 5 or to the endless-band carriers shown in Fig. 6, or to any other construction of carriers.

If preferred, the bottoms 23 of the endless-band carriers 28 may be of much larger mesh or but a few scattered wires and a supporting-cloth 27 of any suitable porous non-conducting material stretched across the bottom of the rim below the gauze or formed into an endless band between the rollers 29 and the band 28. In this instance the cloth will serve as a support upon which the articles to be plated may rest, and electrical contact is secured by a few of the articles resting upon or making contact with some of the wires, this contact extending through the articles by reason of their contact with each other.

In the operation of the apparatus above described the nails or other articles to be plated are poured into the basket-carrier 21 or onto the endless band 28 and will rest upon the cloth, if cloth be employed, or upon the non-conductive part of the bottom 23 or the endless band, and some of the articles will make contact with the exposed contact-points 26 or with the exposed wires of the bottom, and this contact will extend to all the articles by reason of their proximity to each other. The endless bands 4 or 28 are then set in motion, and in the case of the endless bands the operation will be substantially as above described. If the bands 4 are employed, the hook 25 of one of the baskets filled with articles to be plated is fastened to one of the

hooks 11 as the same passes to the under side of the the pulley 2, for instance, and travels therewith on the under side of the band, so that the basket is suspended in the solution intermediate the anodes and travels the length of the tank. An electrical circuit is established from the battery through wires 19 to the bar 17, through rods 15 and 16 to anodes 13 and 14, and through wire 28, which connects the upper and lower anodes, to anode 12, thence through the solution to the articles in the basket, and thence through bottom 23, rod 24, strip 9, strips 8, and wires 20 to the battery. At intervals along the tank, or, if preferred, at the end of the tank, the basket is unhooked and its contents shaken up, so that the articles will make contact with each other and with the bottom in different places and the basket is then again hung onto the belt in the same or a different tank. This process is continued until deposition of the desired thickness is obtained.

It will be observed that by reason of the frequent changes of position of the articles with respect to themselves and the places where they make contact with the bottom the metal deposited upon the articles will be of uniform thickness.

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

1. In an electroplating apparatus, the combination of a tank for containing an electrolytic solution, an endless belt located immediately above said tank and the under side thereof being adapted to travel the length of said tank, one or more hooks suspended from said belt and electrically connected with one terminal of an electric circuit, an anode or anodes in said tank electrically connected with the other terminal of said circuit, and a carrier adapted to be supported upon said hook or hooks and to be electrically connected therewith, said carrier being adapted to travel in said solution, substantially as described.

2. In an electroplating apparatus, the combination of a tank for containing an electrolytic solution, an endless belt located immediately above said tank and the under side thereof being adapted to travel the length of said tank, one or more hooks carried by said belt and electrically connected with one terminal of an electric circuit, an anode in the bottom of said tank and one or more anodes in the top thereof, said anodes being immersed in the solution and facing each other, and the top anodes being so disposed as to leave an open passage extending substantially the length of the tank, and a carrier or carriers adapted to be supported upon said hook or hooks and to be electrically connected therewith, said carrier or carriers being adapted to travel between said anodes, substantially as described.

3. In an electroplating apparatus, the combination of a plurality of carriers, each of which comprises a metallic gauze or open-work support, means for moving said carriers through an electrolytic bath, each carrier moving in a different plane parallel to and lower than the immediately-preceding carrier, an electric circuit connected at one terminal to the respective carriers, and suitable anodes connected to the other terminal of the electric circuit, and means for successively automatically advancing the contents of one carrier to the other carriers, substantially as described.

4. In an electroplating apparatus, the combination of a plurality of carriers, each of which comprises a metallic gauze or open-work support, having a plurality of independent metallic wires crossing each other and making contact at the points of intersection, a coat of non-conducting material entirely covering said metallic support except at the points where said wires intersect each other, and at one or more points on the upper surfaces of said wires upon which the articles are adapted to rest, means for successively automatically advancing the contents of one carrier to the other carriers, an electric circuit, suitable anodes, and connections between said electric circuit and said anodes and carriers, substantially as described.

5. In an electroplating apparatus, the combination of a tank for containing an electrolytic solution, a plurality of carriers each of which comprises a metallic gauze or open-work support, an anode in the bottom of said tank and one or more anodes in the top thereof, said anodes being immersed in the solution and facing each other and the top anodes being so disposed as to leave an open passage extending substantially the length of the tank, means for moving said carriers in the electrolytic bath between said anodes, means for successively automatically advancing the contents of one carrier to the other carriers, an electric circuit and suitable connections between said circuit and the anodes and carriers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS POTTHOFF.

Witnesses:
C. V. EDWARDS,
T. D. SCANLON.