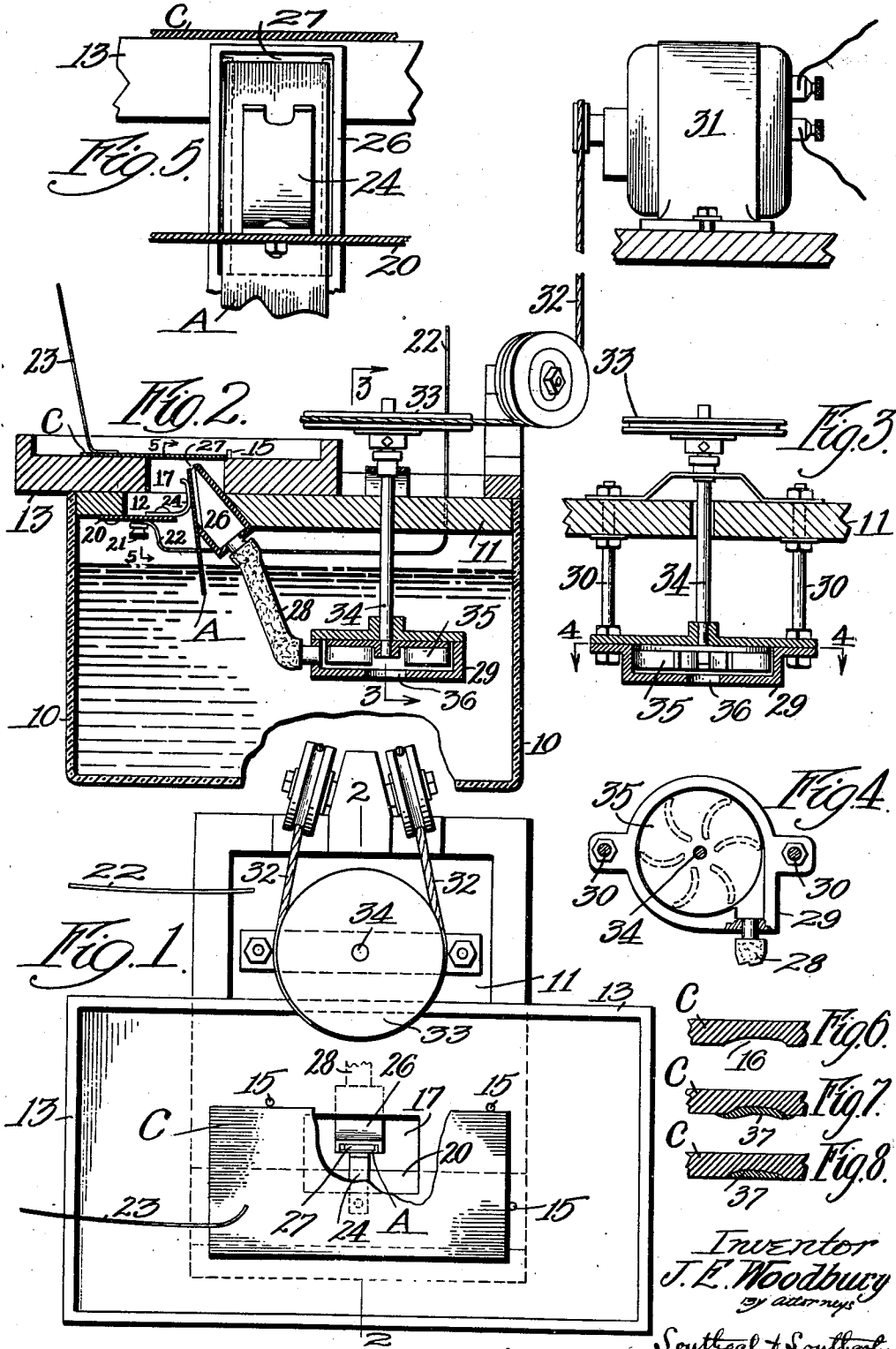


J. E. WOODBURY.
ELECTROPLATING DEVICE.
APPLICATION FILED MAR. 29, 1918.

1,285,875.

Patented Nov. 26, 1918.



Inventor
J. E. Woodbury
by attorneys
Southall & Southall

UNITED STATES PATENT OFFICE.

JOHN E. WOODBURY, OF WORCESTER, MASSACHUSETTS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN E. WOODBURY, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Electroplating Device, of which the following is a specification.

This invention relates to a device for electro-plating and while capable of general use it is designed particularly for repairing copper printing plates.

In printing from copper plates, it is often necessary to change the names of corporations, their officers, addresses, etc., and this is done without destroying the whole plate in order to avoid the production of a new one. These changes are usually made by scraping the letters out and then tapping the back of the copper plate to raise the hollow surface at least even with the printing surface of the plate and then resurfacing and polishing the spot and re-engraving. It is all right in short runs of not over a few hundred prints, but where the run is greater, for example a thousand or more, the copper is so thin where the change has been made as to be a source of great weakness. The pressure required to print the letters is apt to cause a slight bend in the copper which soon results in cracking it completely through and preventing good printing.

Several ways have been devised for filling the back of such a plate. Filling it with solder has proved completely unsatisfactory, mainly on account of the fact that the solder is easily worn away and lacks strength. Autogenous welding would be unsatisfactory because the heating of the plate would destroy the hardness of the copper. Under ordinary conditions electrodeposition would be too slow for practical use. It is well known that the process of electrodeposition is materially facilitated by the agitation of the electrolyte.

This invention is designed to provide a maximum of agitation for the purpose of preventing the formation of nonconducting bubbles of gas on the cathode, and the impoverishment of the solution nearest the cathode, and therefore to secure not only uniform and complete deposition of the metal but rapid results by permitting of a high current density. The continuous removal of the electrolyte from the surface is an important function of this invention

and this coöperates with the above mentioned features. According to this invention a system for bringing fresh electrolyte into close contact with the cathode and continually and immediately removing it, is definitely and practically developed.

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

Figure 1 is a plan of a preferred embodiment of this invention;

Fig. 2 is a central sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view of the pump on the line 3—3 of Fig. 1;

Fig. 4 is a plan of the operative portion of the pump showing what is below the line 4—4 in Fig. 3;

Fig. 5 is a sectional view on the line 5—5 of Fig. 2 showing the arrangement for supporting the cathode and holding the anode, and

Figs. 6, 7 and 8 are three enlarged sectional views of a printing plate showing respectively the condition of the plate before the metal is deposited on it, the condition of it after the deposition, and its condition after it is re-surfaced.

The invention is shown in a simple form, in which a glass receptacle 10 is employed as a holder for the liquid electrolyte. This receptacle is provided with a non-conducting cover 11 having an opening 12 therethrough. Above this cover and supported upon it is an insulating cathode support 13 which can be formed of the same insulating material as the cover. This support is shown as a sort of receptacle in which is placed, up above the surface of the electrolyte, the cathode C, that is, the intaglio copper printing plate shown in Figs. 6, 7 and 8. The surface of the support 13 is shown sunk for the purpose of receiving the cathode and is provided with pins 15 constituting gages for locating the cathode plate C longitudinally and sidewise. The cathode is placed on this support or receptacle 13 in such a way that the hollow 16 comes directly over a perforation 17 therethrough which is in registration with the perforation 12.

On the bottom of the cover 11 is a copper plate 20 which is provided with a binding screw 21 which connects with a terminal 22 of the electric circuit, the other terminal 23 of which is placed in contact with the cathode plate C. This plate 20 also has a clip 24 adjustably fixed thereon and bearing

against the anode A and constituting part of the circuit. This anode is shown as arranged in an upright position and consists of copper, in the present instance. It is pressed by a clip 24 against an open face of a nozzle 26 in such a manner as to close that side of the nozzle and leave a slot 27 at the top constituting the outlet of the nozzle.

The nozzle is connected by a tube 28 with a rotary pump casing 29 immersed in the electrolyte and supported from the cover 11 by bolts 30 or the like. It is operated from a motor 31, belt 32, pulley 33, and shaft 34 connected with a wheel 35 which rotates and draws the liquid in through the inlet 36 and forces it into the nozzle 26. There it necessarily passes along the surface of the anode A and emerges from the nozzle in a solid stream, so to speak, that is a concentrated flow of electrolyte is secured which impinges against a restricted area of the bottom surface of the printing plate C, namely against the hollow 16. I prefer to leave a space between the top of the hard rubber nozzle 26 and the plate C so that the electrolyte can flow in both directions. On account of flowing upward against the lower surface of this plate and at a slight angle it necessarily falls away from it immediately, but it conducts the current on account of its being arranged so as to furnish a constant and voluminous liquid supply and the electro-plating operation is performed through it. This results in forming a deposit, as for example 37, in the hollow 16 completely filling it as shown in Fig. 7. This is afterward surfaced off on the back as shown in Fig. 8, it being understood that the engraving on the plate is on the opposite or upper side. The clip 24 can be loosened readily when the anode has been partly consumed and the anode moved up and fixed in position.

It will be seen that on account of this arrangement there is no danger of having any deposit on the printing side of the plate or on any part of the back except that toward which the liquid is directed. Furthermore the electrolyte is delivered in large amounts in the form of a concentrated stream and removed with equal rapidity so that the effective agitation of the electrolyte is secured and a great current density is possible. By this machine very closely localized additions of metal are secured without necessitating any special precautions, such as "painting up." On account of the great current density possible considerable amounts of metal can be added within a reasonable time so that it is a comparatively quick process. I have employed it in practice and find that it works with extremely satisfactory results in practical operation.

Although I have illustrated and described only a single form of the invention and specified it as being used only for the repairing

of copper printing plates, I am aware of the fact that the invention is capable of general use, and that it can be carried out in other forms without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited in these respects, but what I do claim is:—

1. In an electro-plating device, the combination with means for holding an electrolyte and means for supporting a cathode outside the electrolyte, of an anode, means for delivering electrolyte over the surface of the anode in a constant concentrated stream into contact with a restricted surface of the cathode, and means for passing a current from the anode to the cathode through said stream.

2. In an electro-plating machine, the combination with means for holding an electrolyte and means for supporting a cathode outside the electrolyte, of an anode, means for delivering electrolyte over the surface of the anode in a concentrated stream into contact with a restricted surface of the cathode, said restricted surface of the cathode being located in such position that the electrolyte will be compelled immediately to flow away from it without resting thereon, and means for passing a current from the anode to the cathode through said stream.

3. In an electro-plating device, the combination with means for holding an electrolyte and means for supporting a cathode outside the electrolyte, of an anode, means for delivering a stream of the electrolyte upwardly over the surface of the anode and immediately against a restricted surface on the bottom of the cathode, whereby all the liquid falls away from the cathode immediately, and means for passing a current from the anode to the cathode through said stream.

4. In an electro-plating machine, the combination with means for holding an electrolyte and means for supporting a cathode above the surface of the electrolyte, of an anode extending upwardly toward the cathode, a nozzle located above the electrolyte and extending upwardly, the anode constituting one surface of the nozzle, said nozzle having an outlet opening at the upper edge of said anode located in position to direct a concentrated stream of liquid against a restricted area on the bottom of the cathode, a pump in the electrolyte for forcing a constant stream of electrolyte into said nozzle and out through the outlet thereof, and means for passing a current from the anode to the cathode through said stream.

5. In an electro-plating machine, the combination of a receptacle for an electrolyte, said receptacle having a cover, a support located on said cover and having an opening therethrough, the cover also having an opening adapted to register with the opening in

the support, said support having a cathode on its surface outside the electrolyte, a pump in the receptacle, a nozzle connected with said pump and extending up into said openings, an anode constituting one surface of the nozzle, and means for passing a current from the anode to the cathode through the stream issuing from the nozzle.

6. In an electro-plating machine, the combination of a receptacle for an electrolyte, said receptacle having a cover, a support located on said cover and having an opening therethrough, the cover also having an opening adapted to register with the opening in the support, said support having means thereon for holding and locating a cathode on its upper surface outside the electrolyte, a pump in the receptacle, a nozzle connected with said pump and extending up into both said openings in an inclined direction, an anode constituting one surface of the nozzle, and a metal plate on the bottom of said cover having a clip for holding said anode against the nozzle and constituting a terminal for an electric circuit, the other terminal being adapted to be applied to the cathode.

7. In an electro-plating device, the combi-

nation with means for supporting a cathode, of a nozzle having an open side, the upper end of which extends nearly into contact with a cathode carried by said support, an anode, a conducting plate, a clip on said plate located in position to press said anode against the open side of the nozzle, and means for forcing electrolyte through the nozzle above the edge of the anode against the cathode.

8. In an electro-plating machine, the combination with means for holding an electrolyte and means for supporting a cathode above the surface of the electrolyte, of an anode extending toward the cathode, a nozzle having an outlet opening at the upper edge of said anode located in position to direct a concentrated stream of liquid against a restricted area on the bottom of the cathode, a pump for forcing a constant stream of electrolyte into said nozzle and out through the outlet thereof, and means for passing a current from the anode to the cathode through said stream.

In testimony whereof I have hereunto affixed my signature.

JOHN E. WOODBURY.