

(No Model.)

2 Sheets—Sheet 1.

W. THUM.
ELECTROLYTIC APPARATUS.

No. 588,035.

Patented Aug. 10, 1897.

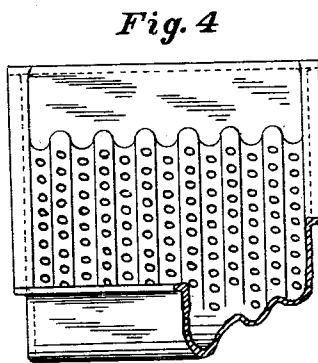
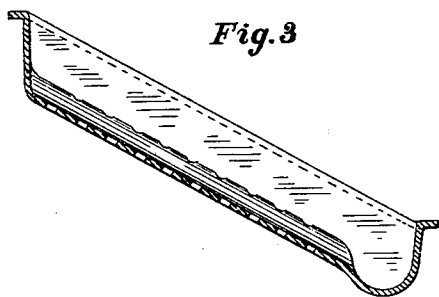
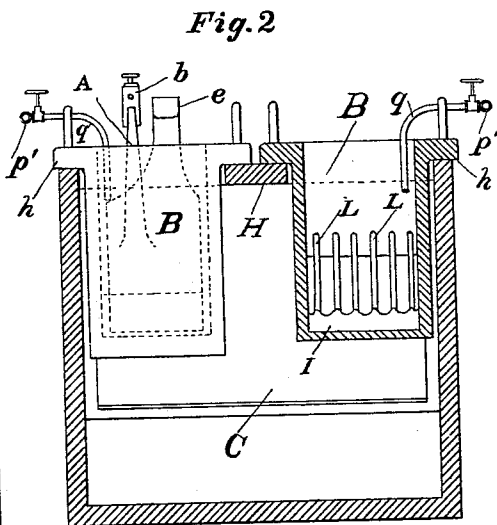
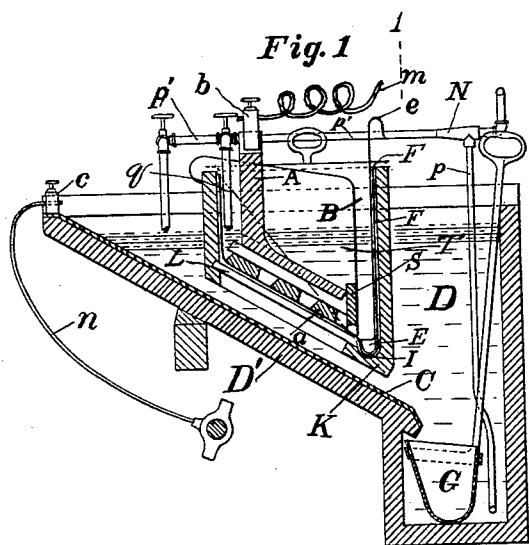


Fig. 5

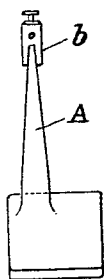


Fig. 6

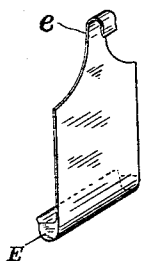
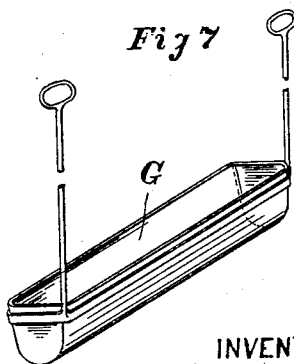


Fig. 7



WITNESSES:

William T. Donnelly.
G. W. Eisenmann

INVENTOR:
William Thum
BY *Robert D. Knapf*
ATTORNEY.

(No Model.)

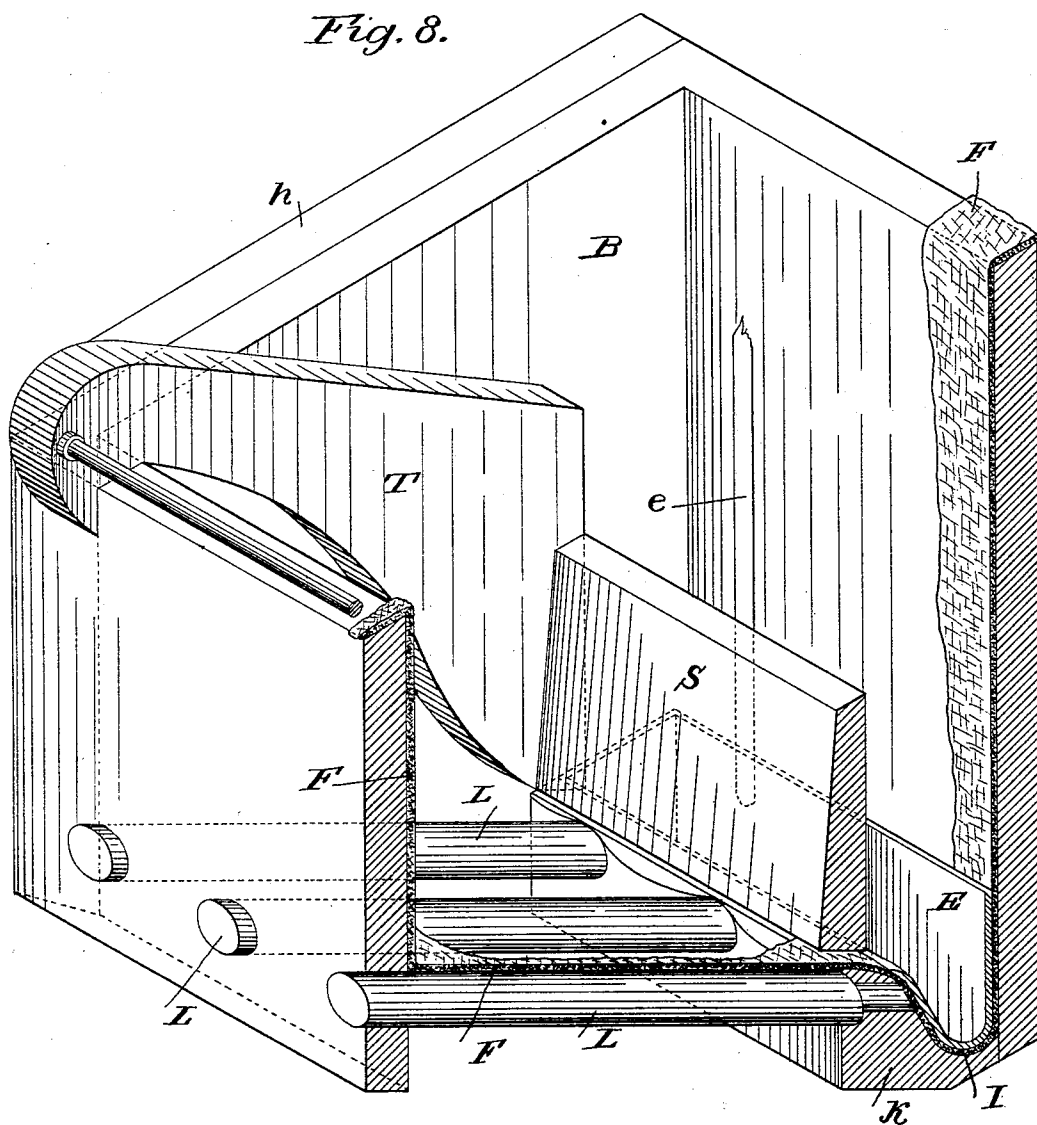
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Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM THUM, OF NEWARK, NEW JERSEY.

ELECTROLYTIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 588,035, dated August 10, 1897.

Application filed October 8, 1896. Serial No. 608,245. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM THUM, a citizen of the United States of America, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electrolytic Apparatus, of which the following is a specification.

My invention relates to the construction of electrolytic apparatus for the deposition of metals in a crystalline or spongy form; and it consists, essentially, in the construction and arrangement of anode-cells with inclined bottoms, a correspondingly-inclined cathode, a removable receptacle into which the metal deposited on the cathode is pushed, and a collecting-receptacle for the insoluble residue from the anode, and means for establishing circulation of the liquid.

My invention will best be understood by reference to the annexed drawings, in which—

Figure 1 is a vertical cross-section of the apparatus. Fig. 2 is a cross-section of the tank on line 1 2 of Fig. 1, showing an anode-cell in elevation to the left and another in section to the right. Figs. 3 and 4 are respectively section and elevation of a modified form of bottom for the anode-cells. Fig. 5 is an elevation of the anode contact-piece. Fig. 6 is a perspective view of the collection-trough I. Fig. 7 is a perspective view of the collecting-trough G for the deposited metal. Fig. 8 is a sectional isometric projection with the filtering-cloth partially removed.

Similar letters refer to similar parts throughout the several views.

In the drawings the letter D designates an electrolytic tank made of any suitable material which will withstand the action of the electrolyte, such as earthenware or pitch-covered wood. This tank has an inclined bottom D', upon which is placed the cathode-sheet C, to which is connected the wire *n* from the negative pole of the electric generator by a binding-post *c*.

One or more anode-cells B are adjustably supported within the tank by strips or projections *h*, resting upon the tank or upon cross-pieces H, so that the position can be readily adjusted. The anode-cell has an inclined perforate bottom parallel to the inclined bottom of the tank, said perforate bottom, as

shown in Figs. 1, 2, and 8, consisting of round bars L, supported at the lower ends by a piece K, having a groove I, and secured at the top to the side of the cell. The bottom and the sides of the anode-cell are covered by filtering-cloth F. Into the channel I is inserted a non-conducting trough E, preferably made of hard rubber and provided with handles *e*, reaching above the top of the anode-cell B.

The perforate bottom of the anode-cell and the collecting-groove I may be made of one piece of china or hard rubber, as shown in Figs. 3 and 4, or constructed in any other suitable manner.

The anode-cell is filled with metal *aa* to be treated, which may be of any suitable form, such as bars, ingots, or granules. A is a specially-formed anode contact-piece, made by preference of the same metal as that undergoing treatment. It is placed upon the anodes and connected to the positive wire *m* by a binding-post *b*. The outer lower end of the tank D (to the right of Fig. 1) forms a trough into which the inclined bottom D' and the cathode C project a short distance. G, Fig. 1, is a removable non-conducting collecting-trough or receptacle. (Shown in perspective in Fig. 7.) This non-conducting collecting-trough G is made of china or hard rubber or other suitable material. Pipes *p p'*, provided with suitable valves, lead from near the lowest part of the tank D to the top of the electrolyte to the left of the anode-cell B, and also by means of flexible tubes *q* into the anode-cells B, an air or steam injector establishing circulation of the electrolyte.

Instead of using an injector for establishing circulation compressed air may be supplied to the pipe *p* near its lowest end in the well-known manner.

The operation of the apparatus is as follows: The anode material under treatment, consisting of a metal that is electrodeposited in a spongy, flaky, or crystalline form—as, for instance, silver—is dissolved by the action of the current in the electrolyte and, filtering through the layer of cloth, is deposited as a pure metal upon the inclined cathode-sheet in the form of a sponge or of loose crystals. By means of a suitable hoe this deposit is easily pushed into the receptacle G, which is then lifted out, emptied, and replaced. As

the anode metal gradually dissolves in the cell B the residues which are not attacked by the current and the electrolyte—such as gold, platinum, &c., in silver bullion—are retained by the filter F and collect in the trough E at the lowest part of the cell B on account of their high specific gravity and through the action of the circulation when directed into the anode-cell. This will largely facilitate the removal of the gold and other residue, which would otherwise be quite difficult to recover from the filter. It also prevents the pores of the filter from being clogged by the minute particles of residue, which would largely increase the resistance to the electric current.

Whenever required, the filter may be taken out and the adhering residue of metal washed off.

As the inclined bottom of the anode-tank B is parallel to the cathode-sheet C, it is evident that by adjusting the position of tank B horizontally on the supports H the distance between cathode and anode is adjusted at will, which is of the highest importance to prevent short-circuiting between the electrodes.

I prefer to use more than one anode-cell to each cathode-tank. In other words, I subdivide my anode-cell into any convenient number of smaller cells. By this arrangement any one of the anode connections may be broken without breaking the current within the tank, the current passing through the remaining anode-cell or anode-cells.

To prevent crowding of the anodes *a* over the collecting-trough E, any suitable guard—such as S, Figs. 1 and 8—may be placed into the anode-cell B after the insertion of the filtering-cloth F. The ends of said guard, as shown, are attached to side pieces T, resting upon the ends of the cross-piece K and hooked over the top of the frame of the cell or otherwise held by the same.

What I claim as new is—

1. In an apparatus for the electrolytic deposition of metals, the combination of a tank with a plane, inclined bottom; a cathode-sheet secured upon the inclined bottom and adapted to receive and guide the deposited metal; one or more horizontally-adjustable anode-cells removably supported within the

tank and provided with plane, inclined perforate bottoms parallel to the inclined cathode-sheet and adapted to receive the pieces of metal to be treated; filtering material covering said bottom; and electric connections, substantially as described.

2. In an electrolytic apparatus, the combination of a tank with an inclined bottom; a cathode-sheet secured upon the inclined bottom; one or more anode-cells adjustably supported within the tank and provided with an inclined perforate bottom parallel to the inclined cathode-sheet; filtering material covering said bottom; and electric connections, substantially as and for the purpose specified.

3. In an electrolytic apparatus, the combination of a tank with an inclined bottom; a cathode-sheet secured upon the inclined bottom; one or more anode-cells adjustably supported within the tank and provided with an inclined perforate bottom and with a collecting-channel; filtering material covering the inside of the anode-cells; a collecting non-conducting removable trough fitting the collecting-channel of the anode-cell; a non-conducting removable collecting-trough beneath the lower end of the cathode; and electrical connections, substantially as and for the purpose specified.

4. In an apparatus for the electrolytic deposition of metals, the combination of a tank with a plane, inclined bottom; a cathode-sheet secured upon the inclined bottom and adapted to receive and guide the deposited metal; one or more horizontally-adjustable anode-cells removably supported within the tank and provided with inclined perforate bottoms parallel to the inclined cathode-sheet; filtering material covering said bottom; electric connections; and means such as described for establishing circulation of the electrolyte, and distributing the same to the anode and cathode cells, substantially as and for the purpose specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 2d day of October, 1896.

WILLIAM THUM.

Witnesses:

CHAS. T. ZIEGLER,
JAMES SIMPSON.