(No Model.) 2 Sheets—Sheet 1.

E. P. THOMPSON.

APPARATUS FOR THE ELECTRO DEPOSITION OF GOLD FROM ITS CHLORIDES.

No. 317,246. Patented May 5, 1885.

Fig. 1.

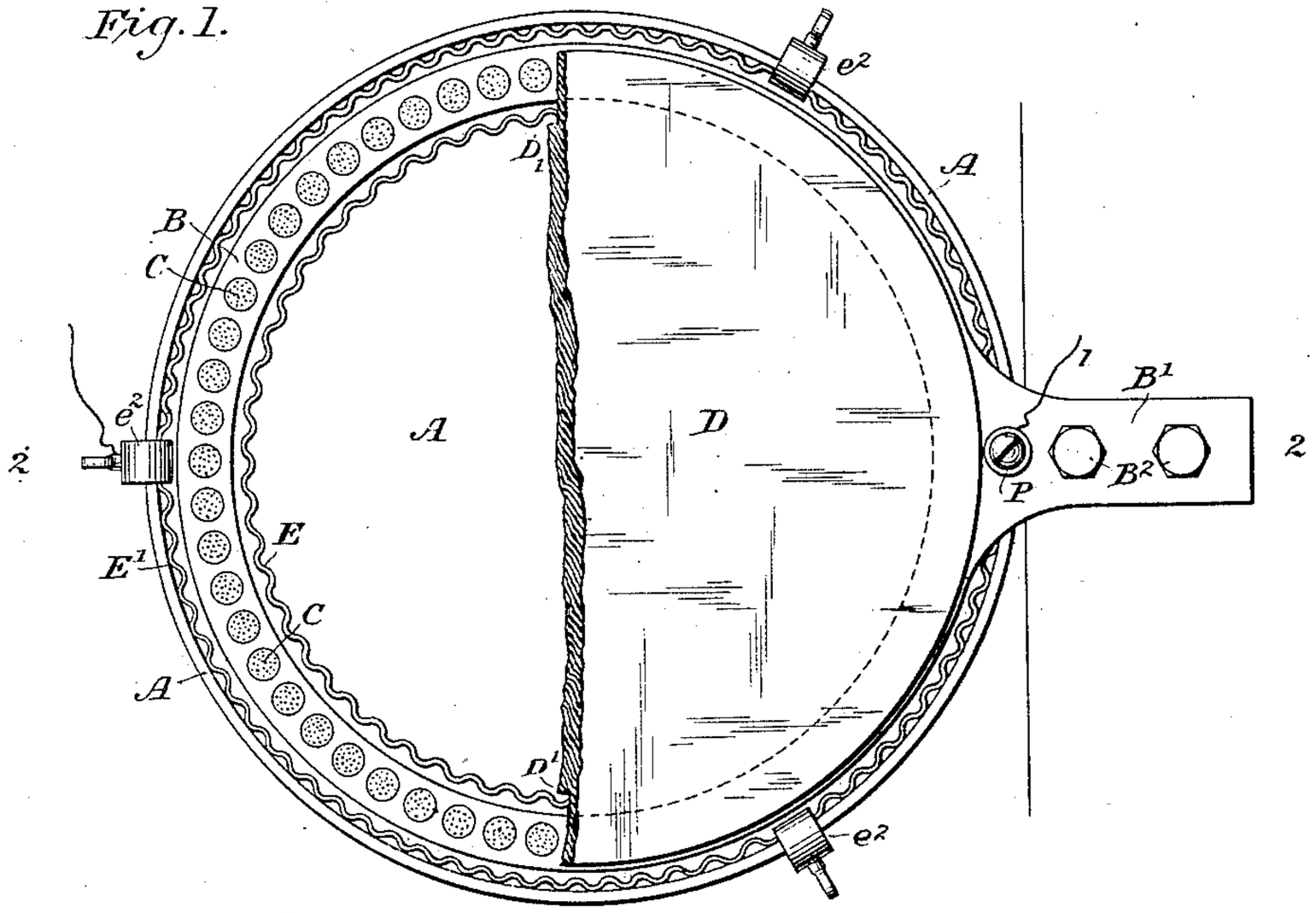
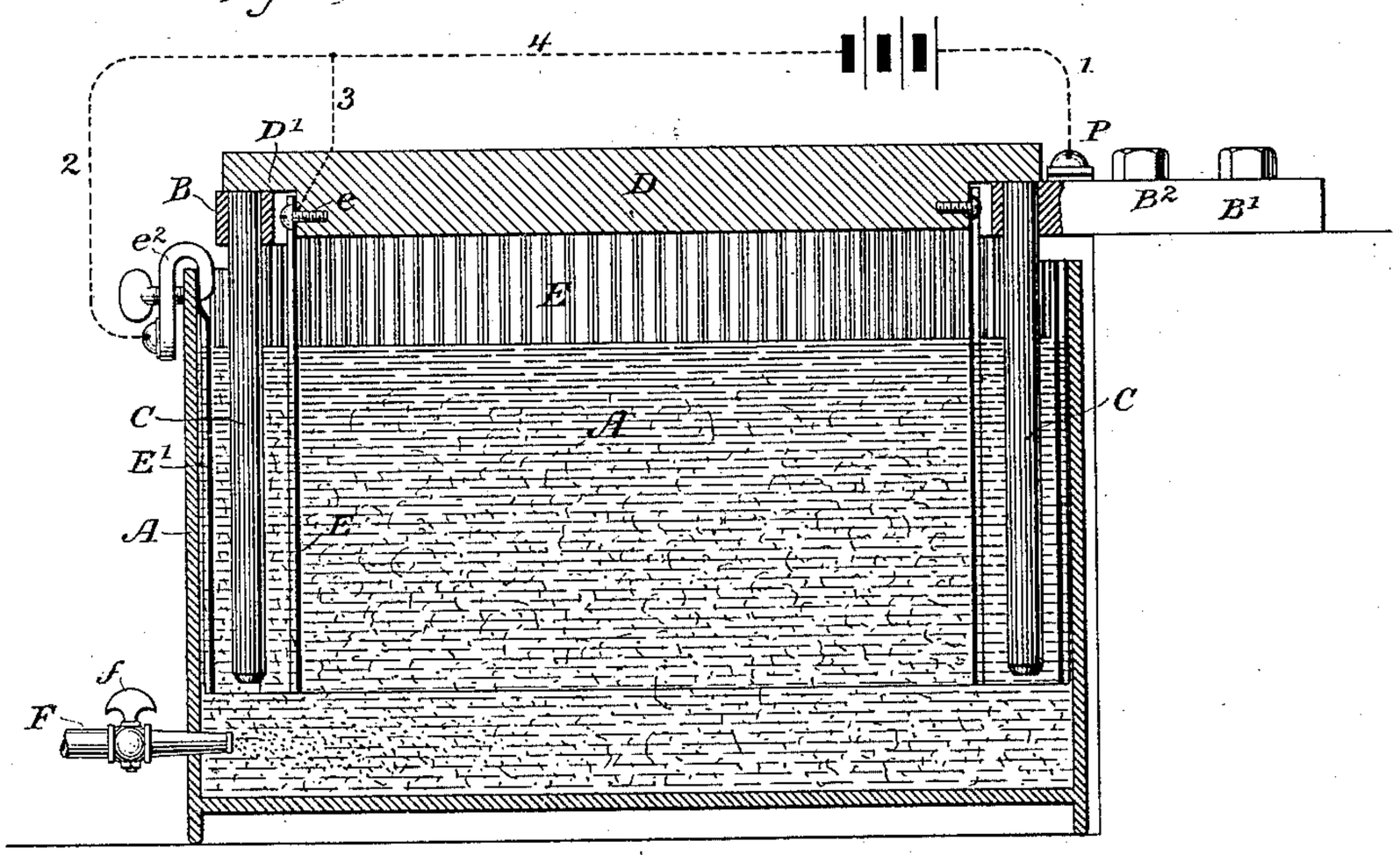


Fig. 2.



WITNESSES

Wm A. Skinkle

Geo W. Breck

INVENTOR

Edward P. Thompson,

By his Attorneys

Pope Edgecomb & Bates.

(No Model.) 2 Sheets—Sheet 2.

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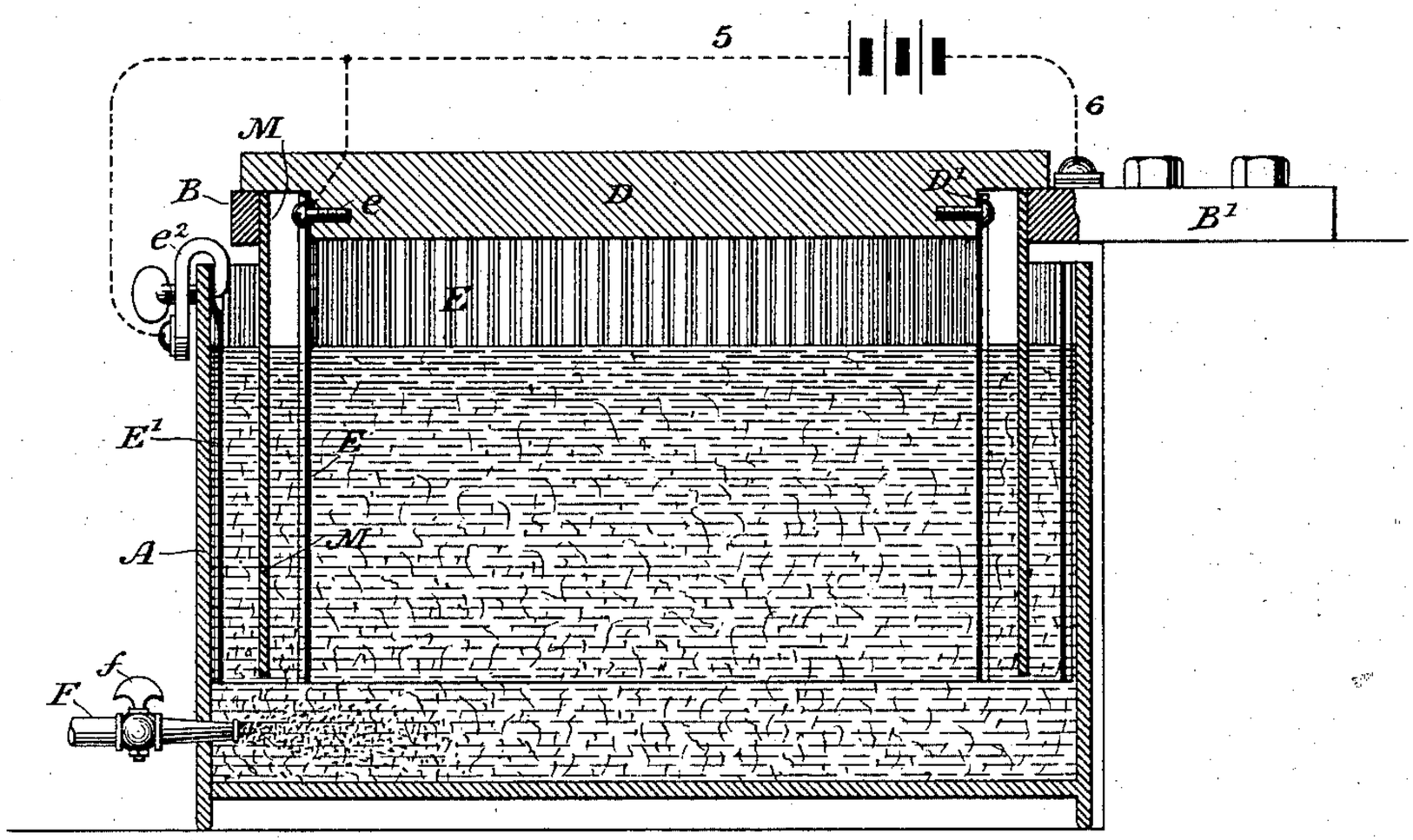
Fig. 3.



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Wm A. Skinkle

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INVENTOR

Edward P. Thompson,

By his Attorneys

Pope Edgecomb & Bentley

UNITED STATES PATENT OFFICE.

EDWARD P. THOMPSON, OF ELIZABETH, NEW JERSEY, ASSIGNOR OF THREE-FOURTHS TO EDWARD P. ROBERTS AND G. H. PIERCE, BOTH OF CHEYENNE, WYOMING TERRITORY.

APPARATUS FOR THE ELECTRO-DEPOSITION OF GOLD FROM ITS CHLORIDES.

SPECIFICATION forming part of Letters Patent No. 317,246, dated May 5, 1885.

Application filed January 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDWARD P. THOMPSON, a citizen of the United States, residing in Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Process of and Apparatus for Electro-Deposition of Gold from its Chlorides, of which the following is a specification.

One of the most efficient methods of separating gold from its ores, or from any of the ordinary compounds of gold, is by the use of chlorine, the affinity of these two elements for each other being such that they readily unite whenever they are brought together, forming thereby the chloride of gold.

The object of this invention is to provide means for separating the gold from its union with chlorine and procuring pure gold for commercial or other purposes; and the invention consists in first depositing the gold upon a surface of baser metal, preferably copper, through the aid of electricity, and then dissolving the copper and separating it from the gold by means of the same force.

The invention will be fully explained and illustrated by reference to the accompanying drawings, in which—

Figure 1 is a plan view of the vat or cell in which the electro-deposition is conducted with a part of the wooden cover removed. Fig. 2 is a sectional view of the same through the line 2 2 of Fig. 1; and Fig. 3 is an elevation of the cell in which the second step of the process is conducted.

The vats or cells in which the principal step of the process is carried on may be arranged in series of any number. As they are, however, all alike, a description of one will suffice. The cell or vat may conveniently be of about eighteen inches in depth, and of any desired diameter; but a diameter about equal to the depth, or a little larger, is found convenient for the purposes of the invention.

The ordinary large carbons prepared for electric-arc lamps being required for that purpose to be made of a superior quality are found to be especially adapted for the electrodes of the cell in which the process of deposition is carried on. The apparatus herein described is therefore designed especially to use this form of carbon. A large number of these carbons joined together is arranged to form the anode of the electrolyte cell, while a thin plate or sheet of copper forms the cathode.

In practice it is found very convenient and economical to use two sheets of copper placed, respectively, within and without a circle of carbons placed close together, held within a ring, and suitably suspended within the cell.

Referring to Fig. 1, A represents the edge of the cell, which may be of wood lined with paraffine, or it may be made of earthenware or other suitable material.

B is an iron ring, the outside diameter of which is a little less than the inside diameter of the cell. This ring has a lip or flange, B′, and by means of bolts B^2 the ring is fastened to a support outside of the cell in such a way that it is held close above the cell and concentric with it.

C C are the electric-light carbons, which are fastened by their tops within the iron ring B in a series extending entirely around the ring, and forming therefore a circle. The wire 1, leading from the positive pole of the battery, is connected with the ring B by means of the binding-post P, and the carbons are thereby made to form the anode of the electrolytic cell.

D is a disk of wood resting upon the top of the ring, and having a shoulder at D′, making the central part somewhat thicker than the part which rests upon the ring B. The thicker portion of the disk D is somewhat smaller in diameter than the inside of the ring B, leaving a space between the shoulder D′ and the inside of the iron ring. To this shoulder D′ is secured a sheet of copper, E, by means of the screws *e*. The upper edge of the sheet of copper E touches the under side of the disk D at *d*, and the lower edge is approximately even with the lower ends of the carbon rods. The sheet therefore forms a cylinder entirely around the cell, and a short distance within the circle of carbons.

E′ represents a similar sheet of copper, which rests against the side of the cell, and is secured thereto by means of clamps e^2 e^2, thus keeping the proper relative positions of the two plates and the ring of carbons. This sheet extends entirely around the cell at a distance outside

the circle of carbons approximately equal to the distance of the sheet E from the inside of the same. The wire 2 extends from the clamp e^2 and joins the wire 3, which extends from the screw *e*, joining the inner sheet of copper, thus electrically connecting the two sheets, and from the junction of the wires 2 and 3 the wire 4 leads to the negative pole of the battery. It will be seen, therefore, that the sheets E and E′ form the cathode of the cell, while the circle of carbons forms the anode. The sheets of copper E and E′ are preferably made very thin and are fluted or corrugated, as shown in Fig. 1, by being passed between two toothed rollers in a well-known manner. By means of the steam-pipe F having the stop-cock *f*, steam at a suitable pressure can be introduced into the lower part of the cell. It will be seen that by means of the apparatus described both electrodes are made to present a large surface to the electrolyte. The copper plates are fluted, both for the purpose of obtaining a large surface and for giving strength and stiffness to the sheet. When the cell A is nearly filled with an aqueous solution of chloride of gold, and the electric circuit is completed, the solution is decomposed, the gold is rapidly deposited upon the copper, and in the course of a few hours a coat of considerable thickness will be formed. During this process steam is admitted by means of the pipe F, and the electrolyte is thereby kept in a state of constant motion. The good effects of this motion, which may be made in practice quite violent by the admission of the steam, are, first, the polarization of the electrodes is prevented, because the gases are driven to the surface and will not adhere in bubbles to the electrodes; secondly, the heat promotes the decomposition of the chloride, so that the utmost efficiency of the electric current is secured in the deposition of the gold upon the cathode. After a considerable thickness of gold has been deposited upon the copper plates, they are removed from the cell and placed in another cell, in which is contained dilute sulphuric acid, or, preferably, a solution of sulphate of copper. Such a cell is represented in Fig. 3, in which A′ represents the cell, E^2 the alloy plates, and M the copper plate. The wire 5 leads from the positive pole of the battery and is connected with the alloy plates, and the wire 6 leads from the copper plate to the negative pole. The alloy therefore in this cell becomes the anode and the copper the cathode. When the electric current is passed through the cell, the copper is separated from the gold and itself deposited upon the copper plate, in a manner well understood, thus leaving the gold practically pure.

I claim as my invention—

The combination, in an electrolytic cell, of an anode formed of a series of carbon rods set in a metal ring, and a cathode formed by two thin corrugated copper plates connected electrically, which are set, respectively, within and without the circle of carbons, substantially as described.

In testimony whereof I have hereunto subscribed my name this 28th day of January, A. D. 1884.

EDWARD P. THOMPSON.

Witnesses:
DANL. W. EDGECOMB,
CHARLES A. TERRY.