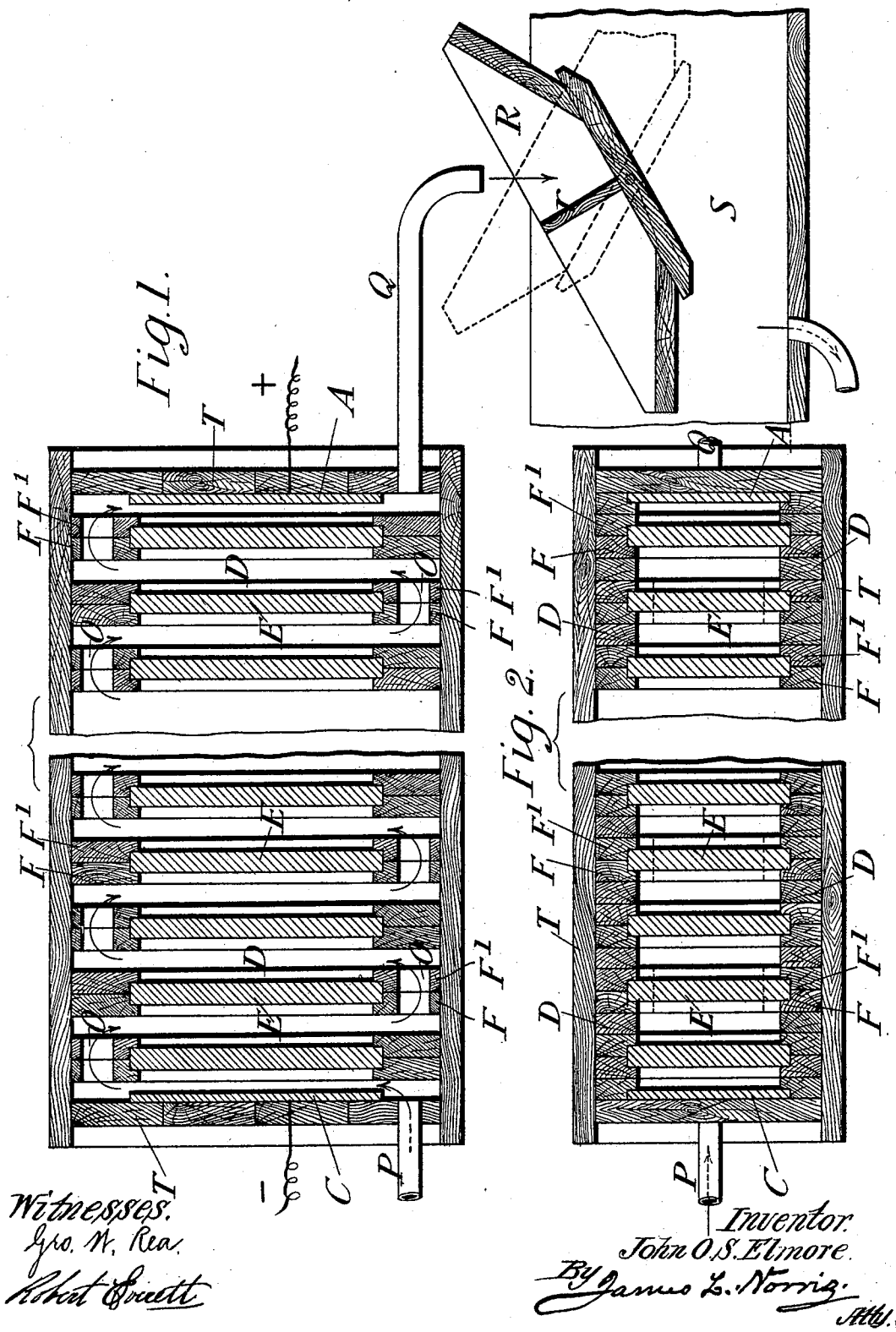
(No Model.)

J. O. S. ELMORE.

APPARATUS FOR REFINING METALS BY ELECTROLYSIS.

No. 589,252. Patented Aug. 31, 1897.



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UNITED STATES PATENT OFFICE.

JOHN OLIVER SURTEES ELMORE, OF KAPURTHALA, INDIA.

APPARATUS FOR REFINING METALS BY ELECTROLYSIS.

SPECIFICATION forming part of Letters Patent No. 589,252, dated August 31, 1897.

Application filed August 17, 1896. Serial No. 603,014. (No model.)

To all whom it may concern:

Be it known that I, JOHN OLIVER SURTEES ELMORE, a citizen of England, residing at Kapurthala, Punjaub, in the Empire of India, have invented a certain new and useful Improved Apparatus for Refining Metals by Electrolysis, of which the following is a specification.

My invention relates to the refining of metals by electrolysis, so conducted by the aid of suitable apparatus as to effect very rapidly the solution of the crude metal and the deposit of the pure metal. I shall describe, with reference to the accompanying drawings, apparatus for this purpose specially adapted for refining copper.

Figure 1 is a vertical section, and Fig. 2 is a horizontal section.

T is a closed tank made of non-conducting material, preferably wood, or it might be of other material, lined, if necessary, with non-conducting material. In this tank I place a number of wooden cross-frames, each of which may be made in two parts F and F′, with wooden distance-pieces D between them. Each of the frames is rabbeted, so that the two when put together present an internal groove in which is held a plate or slab E of the crude copper. Each of the double frames F F′ has an aperture O of considerable area through it, and the frames are so placed that these apertures are alternately in the upper and lower parts of the tank. On the ends of the tank are fixed slabs or plates of copper, the one, A, constituting an anode connected to the + terminal of a dynamo-machine or other source of electricity, the other, C, constituting a cathode connected to the − terminal. Electrolyte liquid is pumped in large quantities into the tank by a pipe P, entering at the one end and, after taking a zigzag course through the alternating apertures O and between the slabs E, issues from the other end, to flow back by a return-pipe Q to the pump, to circulate again through the tank.

In order to prevent short-circuiting through the fluid current, I provide a rocking trough R with a transverse partition *r*, this trough being mounted on a horizontal axis within a receiving-tank S, from which the liquid is drawn to be circulated again. The liquid is discharged into one side of the trough until that side overbalances the other, causing the trough to cant over, discharging its contents, and then receiving liquid on its other side.

By the action of the electrical current copper is dissolved off the one face of each of the slabs E and is deposited in a pure state on the face of the next slab, most of the impurities being carried away by the rapid current of electrolyte liquid, which may from time to time be filtered, or a portion of which may be continually led through a filter by a by-pass from the return-pipe.

Although I have described the apparatus as being applied to the refining of copper, obviously the plates or slabs E might be of other metal capable of being similarly treated.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

The combination with a closed tank, of a series of cross-frames arranged in said tank at intervals apart, plates or slabs of the metal to be refined inclosed within said frames, apertures arranged in the alternate ends of said frames, an anode-plate and outlet-pipe in one end of the tank, a cathode-plate and inlet-pipe at the other end of the tank, and an electric circuit connected at its terminals to said anode and cathode plates, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 19th day of June, A. D. 1896.

JOHN OLIVER SURTEES ELMORE.

Witnesses:

I. FAIRWEATHER,

KANMAR BALBEERSINGH.