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E. G. ELLIOTT & V. KISHNER.

PLATE SEPARATING DEVICE FOR ELECTROLYTIC TANKS.

(Application filed Dec. 24, 1900.)

(No Model.)

Fig. 1,

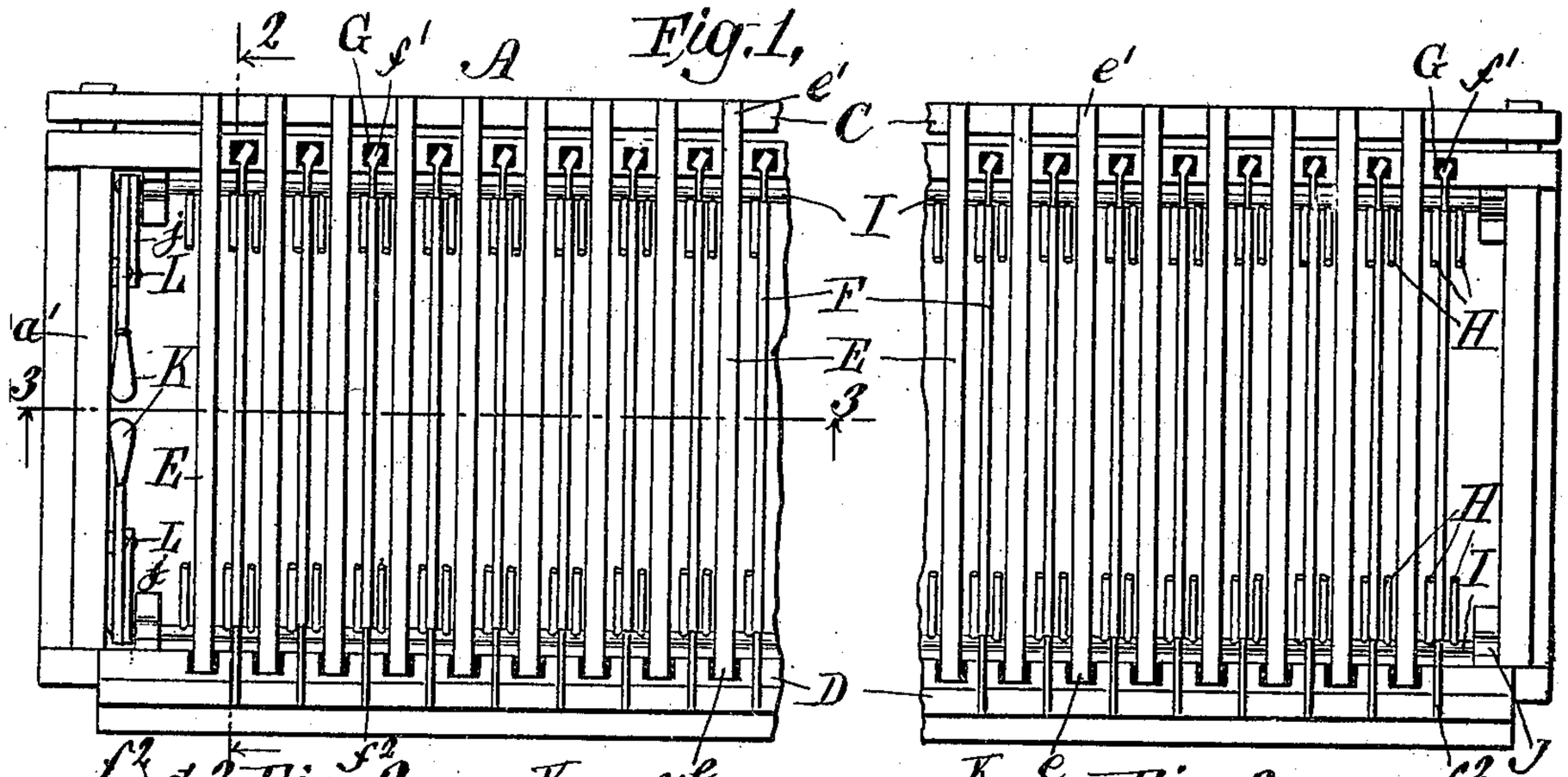


Fig. 2,

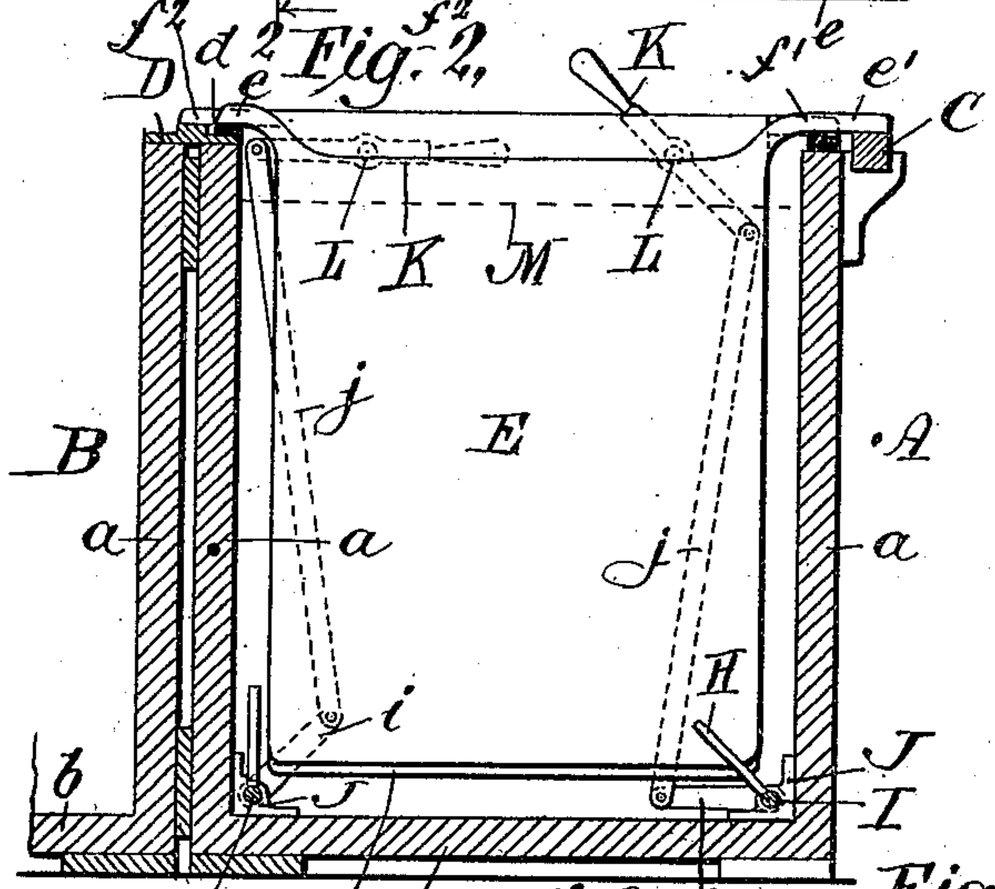


Fig. 3,

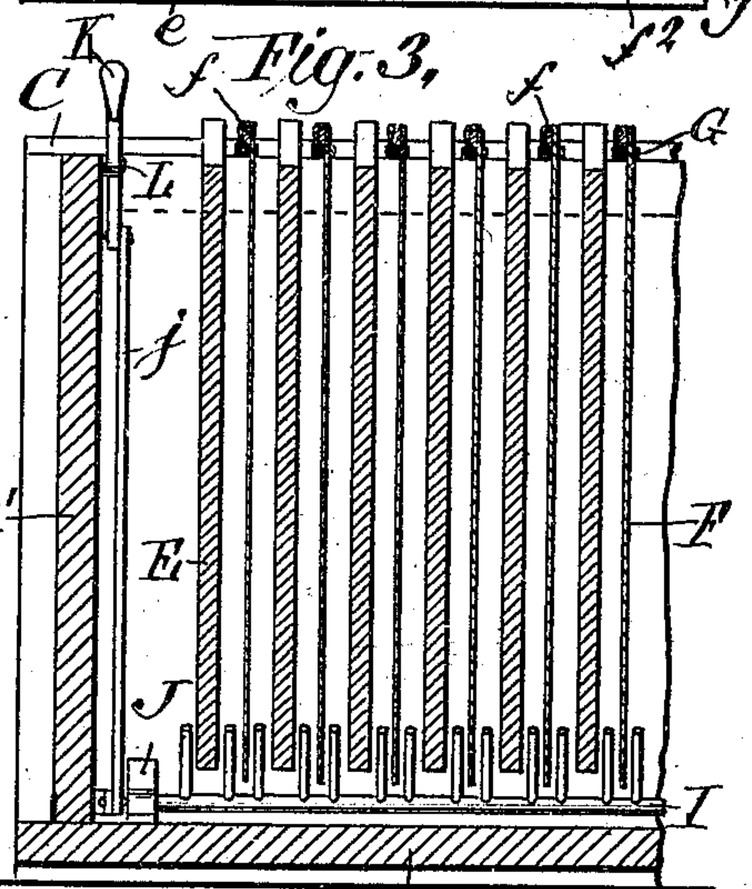


Fig. 4,

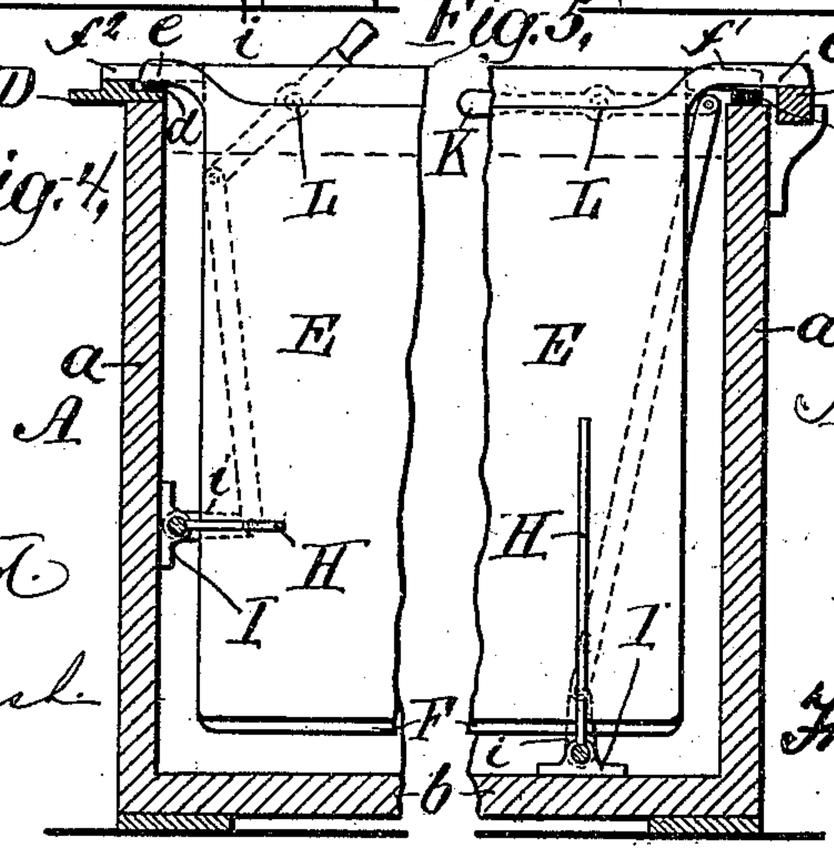
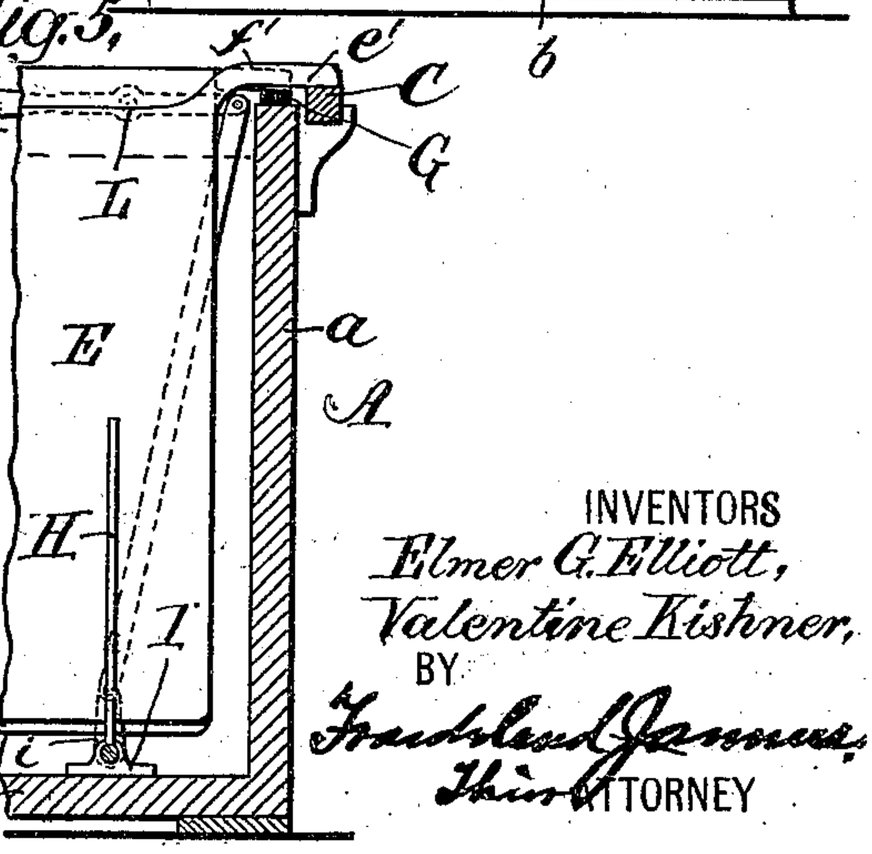


Fig. 5,



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UNITED STATES PATENT OFFICE.

ELMER G. ELLIOTT AND VALENTINE KISHNER, OF PERTH AMBOY, NEW JERSEY.

PLATE-SEPARATING DEVICE FOR ELECTROLYTIC TANKS.

SPECIFICATION forming part of Letters Patent No. 684,049, dated October 8, 1901.

Application filed December 24, 1900. Serial No. 40,880. (No model.)

To all whom it may concern:

Be it known that we, ELMER G. ELLIOTT and VALENTINE KISHNER, citizens of the United States of America, and residents of Perth Amboy, county of Middlesex, State of New Jersey, (post-office address at Perth Amboy, New Jersey,) have invented certain new and useful Improvements in Plate-Separating Devices for Electrolytic Tanks, of which the following is a specification.

Our invention relates to means for maintaining mechanical separation between anode and cathode plates in an electrolytic tank.

In large plants, where many hundred electrolytic tanks are employed and the production of metal by electrodeposition is carried on on a large scale, the size of the tanks and of the plates and their relative depositions, so as to carry the greatest economy in operation, are of the first importance. The cathode-plates are allowed to grow until they have reached the limit of weight which can be conveniently handled by manual power, and when placed in the tanks they are spaced and adjusted with reference to the anode-plates and the density of the electrolyte or solution with which the tank is charged that the resistance between the plates bears the desired relation to the current-density at the rate at which the deposition of metal is desired.

Our invention is applicable to tanks in which any metal is deposited, and we shall hereinafter refer to copper by way of illustration.

It is found in practice that the anode-plates often come from the casting-furnaces more or less distorted by removing from the molds without having been given sufficient time to cool. During operation it frequently happens that some of the plates in a tank will bend or buckle, so as to materially decrease the resistance between the distorted plate and the one next to it, and this will materially lessen the resistance of the tank at that point, diverting the preponderance of current thereto and causing a rapid increase in the rate of deposition, which eventually results in metallic contact between the plates producing a short circuit, which lessens the efficiency of the tank and causes waste of current and loss. By our present invention these conditions are overcome and the injurious action above referred to is prevented. Said invention consists in providing each tank with one or more series of insulating-pins which are mounted upon a movable support which is connected with suitable manual operating devices, whereby the said pins are interposed between the plates to mechanically separate them and keep them apart and in their desired position and also to withdraw said pins from between the plates and move them into a position where they will not in any way interfere with the emptying and recharging of the tank or with any other customary use thereof.

In the accompanying drawings, Figure 1 is a top plan view of a tank embodying our invention. Fig. 2 is a sectional elevation on the line 2 2 of Fig. 1 looking in the direction of the arrow, the plates and separating devices being shown in elevation. Fig. 3 is a sectional side elevation on the line 3 3 of Fig. 1, showing the spacing devices and their operating-levers in elevation. Fig. 4 is a transverse sectional elevation similar to Fig. 2, one-half being omitted, showing the spacing devices in a different location. Fig. 5 is a view similar to Fig. 4, showing the spacing devices also differently located.

In the drawings, A indicates an electrolytic tank, and, as indicated in Fig. 2, B is a second tank closely adjoining.

a a are the sides of the tanks, and *b b* the bottoms thereof.

C is the positive conductor, which is in the form of a bus-bar arranged on the outer side of each tank.

D is the negative bus-bar, arranged between the two tanks and acting as a common return.

E represents anode-plates. F represents cathode-plates, said plates being arranged in alternation in the tanks.

The anode-plates E are provided with strong metallic lugs or extensions *e e'*. The lug *e* rests upon the bus-bar C and is in metallic contact therewith, while the opposite lug *e'* is supported by the negative bus-bar D, but is separated therefrom by a layer of insulating material *d*.

F F are the cathode-plates, which are sus-

pended between the anodes E. The cathode-plates are provided on their upper edge with a suspending-bar *f*, one end *f'* of which rests upon the edge of the tank, but is insulated therefrom, while the other end f^2 is supported upon and in metallic connection with the equalizing bus-bar D.

H represents pins of insoluble insulating material, preferably of hard wood.

I represents rotatable supports or shafts into which the pins H are secured. The shafts I may be of hard lead, hard rubber, hard wood, or any other suitable material, and they are mounted in journal-bearings J, located near the ends of the tanks, and in case of very long tanks additional intermediate bearings may also be provided. The shafts I are provided at their ends with crank-arms *i*, which are connected by connecting-rods *j*, pivotally joined thereto with the inner ends of hand-levers K, which are mounted upon pivotal supports L, secured upon the inner side of the end *a'* of the tank, preferably above the line of the electrolyte, which is indicated approximately by dotted line M in Fig. 2. It will be apparent that with this construction the shafts I are rotated by movement of the hand-levers K and that when so rotated the pins H carried thereby will be moved in the arc of a circle. Where, as indicated in Fig. 2, the said shafts are located in the angle between the sides and bottom of the tank, the shaft can be rotated so as to raise the ends of said pins up against the sides of the tank entirely out of the way of the plates and at the same time into a convenient position to permit cleaning, and by shifting the connection of the crank-arm they could be arranged to be thrown down into the bottom of the tank out of the way, if preferred. Assuming the hand-lever to be in the position indicated in dotted lines in Fig. 2 on the left side of said figure and the pins H to be in their inoperative position, the tanks can be charged with new plates without interference from said pins H, the said new plates being arranged at predetermined distances, which should correspond with the spacing of the pins H in their supporting-shafts I. When the plates are in place, by a simple movement of the hand-lever K the shafts I will be rotated and the pins H will be moved into position between the anode and cathode plates, as indicated on the right side of said Fig. 2, where they will serve to mechanically separate them one from another and keep them at the desired distance apart.

The pins H may vary in length, according to the particular use to which they are to be put, and we therefore do not limit ourselves to any exact length except that they will be to some extent limited by the position in which the shafts I are located. As indicated in Figs. 4 and 5, the said shafts I may be mounted at the sides of the tank or on the bottom, and while we have in each instance shown or indicated a plurality of shafts our invention is not limited to such use, since a single one might in many instances be found to be sufficient. In that event, however, the pins H would be longer than where a plurality of shafts were employed, as indicated in Fig. 5.

It will be understood by those skilled in the art, in view of the disclosure herein made, that various modifications and changes may be made in the construction and arrangement set forth without the exercise of invention and without departing from that herein set forth.

Having described our invention, what we claim is—

1. In an electrolytic tank, the combination of anode and cathode plates suspended therein at desired intervals, a movable support within the tank, projections of insulating material carried by the support, and means for moving the support and the projections and thereby inserting them between the plates, to separate the plates, and for withdrawing them therefrom, as desired.

2. In an electrolytic tank, the combination with anode and cathode plates suspended therein at substantially regular intervals, of a rotatable support, projections of insulating material attached thereto and means for rotating the support to insert the projections between the plates, and vice versa.

3. The combination with an electrolytic tank, a solution therein, anode and cathode plates suspended in the tank and immersed in said solution, of a plurality of rotatably-mounted bars extending longitudinally of the tank below the solution-line, spaced projections from the bars and of insoluble insulating material and means above the solution-line for rotating said bars and thereby inserting the projections between the suspended plates or removing them therefrom.

4. The combination with an electrolytic tank, a suitable solution therein and anode and cathode plates immersed in the solution, of a rotatably-mounted bar extending longitudinally of the tank and immersed in said solution and provided with spaced projections of insulating material, and manual operating devices connected with the rotatable bar and located above the solution-line whereby said bar is operated to insert the projections between the plates for separating them as desired and for withdrawing them therefrom.

Signed by us at Perth Amboy, New Jersey, this 21st day of December, 1900.

ELMER G. ELLIOTT.
VALENTINE KISHNER.

Witnesses:
JAS. H. VORIS,
FRANK W. CONARD.