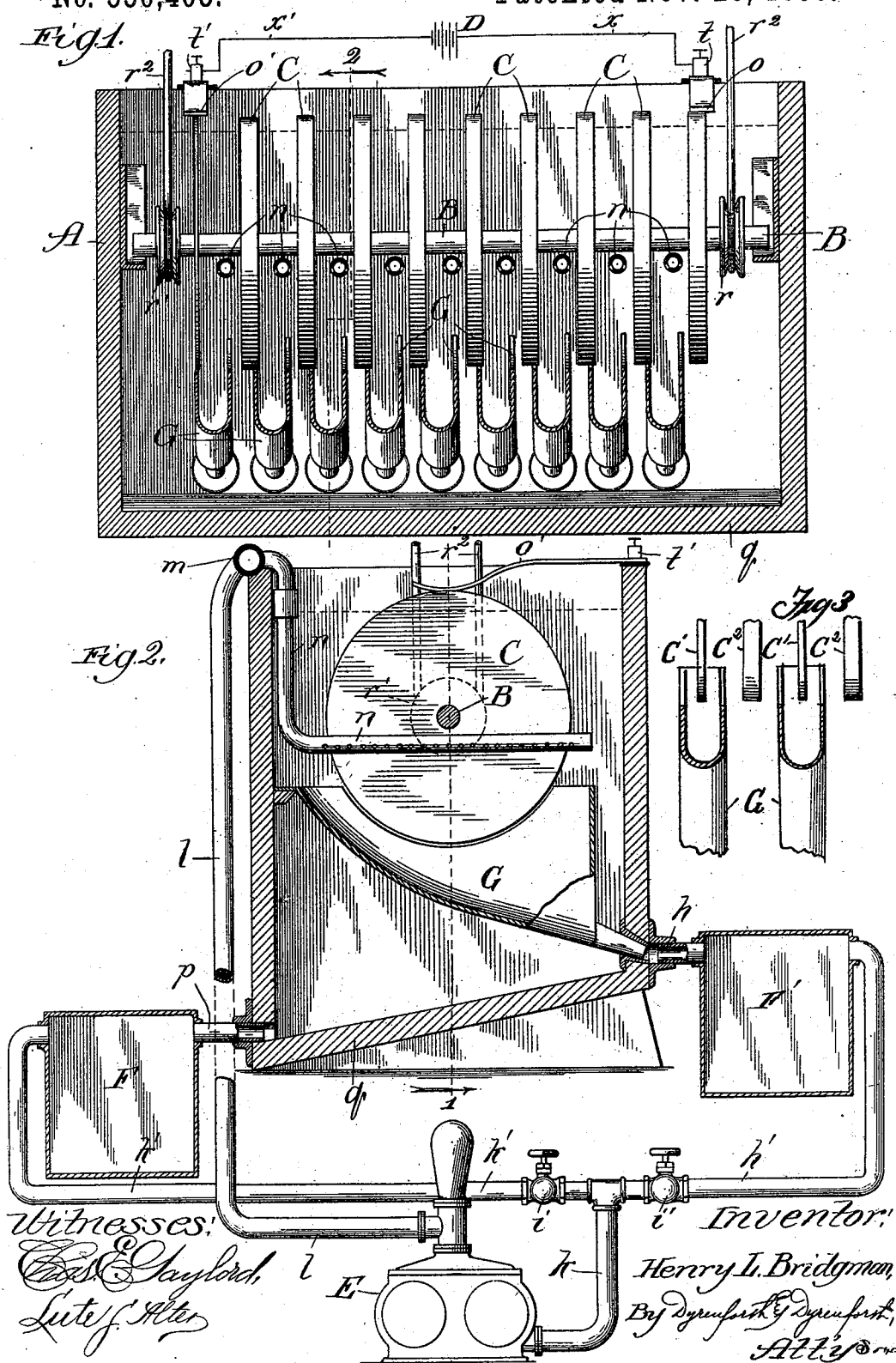


(No Model.)

H. L. BRIDGMAN.
ELECTRODEPOSITING APPARATUS.

No. 550,403.

Patented Nov. 26, 1895.



UNITED STATES PATENT OFFICE.

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ELECTRODEPOSITING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 550,403, dated November 26, 1895.

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To all whom it may concern:

Be it known that I, HENRY L. BRIDGMAN, a citizen of the United States, residing at Blue Island, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electrodepositing Apparatus, of which the following is a specification.

My improvement is primarily intended for use where the anode material to be deposited by electrolysis deposits on the cathode, more especially like silver, more or less loosely, in the form of crystals, thus causing a tendency in the deposit to accumulate at points, whereby the space between each anode and cathode soon becomes bridged by the deposited material and accordingly stops the action of the apparatus. I mean the more or less loose deposit referred to in contradistinction to the smooth solid deposit produced by the electrolysis of such metals as copper. Moreover, where the material of the anode is of a nature which causes its electrolytic deposition in the loose manner mentioned, it is liable to drop or be rubbed off into the electrolytic bath. In my present apparatus I not only cause the cathodes to rotate, thereby to exert the desired stirring effect upon the electrolyte, but I also cause the rotary motion to be imparted to the anodes, whereby the action of the bath is not only enhanced, but a more compact and smoother deposit is produced, particularly where the anode material, like copper, deposits in a solid body upon the cathode. If the anode material be of the loose-depositing character, I prefer to form the anode and cathode in one body or plate, preferably circular, as an "anode-cathode," and to place any desired number of these anode-cathodes on a rotary shaft, and by leading the electric current into that at one end of the shaft and out at the one on the opposite end thereof I render one side of each plate an anode and the opposing side of each adjacent plate a cathode.

In the employment of the loosely-depositing anode material, such as silver ore or matter containing silver, I provide under each rotary cathode, or, as in the present instance, under the cathode side of each rotary anode-cathode, a pocket of peculiar construction to receive and discharge the deposited metal,

which is brushed off into it by suitable means, and the sludge from the anodes or anode sides drops into the vat containing the electrolyte, from which it is removed.

Referring to the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of an electrodepositing apparatus constructed in accordance with my improvement, the section being taken at the line 1 on Fig. 2, and viewed in the direction of the arrow. Fig. 2 is a broken sectional view of the same, partly diagrammatic in character, the section being taken at the line 2 on Fig. 1 and viewed in the direction of the arrow; and Fig. 3, a broken sectional view showing a modification.

A is the vat or tank for containing the electrolytic fluid, and having journaled in it a rotary shaft B, carrying drive-pulleys r r' near its opposite ends, at which to connect the shaft by belts r^2 with the driving-power. (Not shown.)

The shaft B is preferably formed of metal and may be insulated or not, according to the special conditions under which it is employed.

The bottom q of the tank should slant, as represented in Fig. 2, toward one side, at which is provided an outlet-pipe p .

On the shaft B, at suitable intervals apart, are fastened, to rotate with it, plates C of the circular form illustrated, or of any other desired shape, composed of anode material of any desired variety, baked, molded, or otherwise reduced to compact form, the material more especially intended for the particular construction represented of my improved apparatus being such as will, like the silver in silver-bearing matter, be deposited on a cathode loosely in the form of crystals. These plates C may be all of the same dimensions, except that the end plate shown nearest the pulley r' may, but not necessarily, be thinner, as shown, as it affords only a cathode-surface, as hereinafter described. The current from a generator, such as the battery D, is led from a pole thereof to an end plate C, as that nearest the pulley r , through the medium of a brush o , bearing thereon, connected with the battery by a wire x at a binding-post t , and the connection with the opposite pole of the battery is produced by a return-wire

a' , fastened by a binding-post t' to a brush o' , bearing against the plate C at the opposite end of the shaft.

The current entering the one end plate and passing out at the other end plate, all the plates being immersed in an electrolyte contained in the tank A, effects the electrolytic deposit from the first-named end plate upon the adjacent surface of the next plate, whereby the latter becomes a cathode on such surface, while the opposite surface is an anode from which the current deposits its material on the opposing surface of the next adjacent plate, which is thus a cathode, and so on throughout the series of plates to the last, which is only a cathode, and hence may be thinner than the others, as represented. Thus each plate C is rendered an anode-cathode except the end plates of the series, and all are revolved continuously during the operation by rotating the shaft B.

Where the material of which the plates C are formed is of the variety referred to, which deposits loosely in crystals on the cathode sides, in the manner described, to prevent it from building upon the points there presented and thus bridging across the spaces between the opposing cathode and anode surfaces, I provide means for brushing it off such cathode-surfaces. Such means may comprise jets from pipes n , extended into the spaces between the plates C in the tank A and proceeding from a manifold m , communicating through a pipe l with the discharge side of a pump E, the suction side of which communicates through a pipe k and its branch k' , containing a shut-off valve i , with a settling-box F, into which the pipe p discharges. Thus, with the pump E in operation, the electrolyte is withdrawn from the tank A (the heavy matter or sludge it carries depositing in the box F, whence it may be removed from time to time and saved) and forced back into the pipes n , which are perforated to direct the liquid in streams forcibly against the sides of the plates C and wash the material from their surfaces. The loose matter which is thus washed or brushed from the anode-surfaces of the plates C drops to the bottom of the tank A and is withdrawn with the electrolyte through the pipe p by the action of the pump, which circulates the electrolytic fluid. To prevent the material loosely deposited on the cathode-surfaces from dropping into the tank and thereby becoming mixed with the sludge, I provide a pocket G, of suitable material, below each cathode-surface. The best form for each pocket G, which should be composed of adequately stiff or impervious material—such as metal, glass, vulcanite, or the like—is that illustrated, involving sides and a transversely rounded bottom inclining downward toward the higher side of the bottom q of the tank, whence it discharges through an outlet-spout h into a settling-box F', which communicates through a pipe h' , containing a shut-off valve i' , with the suction-pipe k of the pump E.

Thus the supply of the electrolyte to be circulated is not only taken from the bottom of the tank A, but also from each pocket G, and the matter brushed into the latter, and which finds its way into and accumulates in the settling-box F', which may be common to all the pockets, may be removed from time to time and saved.

Where the plates C, instead of forming each an anode-cathode, are alternate anodes and cathodes, as they may be, the pockets G may be provided one only under each cathode-plate, which might then extend in a plane between the sides of the pocket. This construction is shown by Fig. 3 in the drawings, the cathode-plates being denoted C' and the anode-plates C².

What I claim as new, and desire to secure by Letters Patent, is—

1. In an electro-depositing apparatus, a shaft rotatably supported in the tank for holding the electrolyte, one or more cathodes supported on the shaft to rotate with it, anodes supported with relation to the cathodes in the tank, a pocket supported below each cathode-surface in the bottom-portion of the tank and having an inclined bottom leading to a discharge-opening, and means for brushing the cathode-surface, substantially as described.

2. In an electro-depositing apparatus, a shaft rotatably supported in the tank for holding the electrolyte, a series of plates C supported at suitable intervals on the shaft to rotate with it and arranged to form on their relatively opposing sides, respectively, anode and cathode surfaces, pockets extending under the said cathode-surfaces, leaving the anode-surfaces free to shed into the tank, said pockets having inclined bottoms leading to discharge-openings, and means for brushing the anode and cathode surfaces of said plates, substantially as described.

3. In an electro-depositing apparatus, a shaft rotatably supported in the tank for holding the electrolyte, a series of plates C supported at suitable intervals on the shaft to rotate with it and arranged to form on their relatively opposing sides, respectively, anode and cathode surfaces, pockets extending under the said cathode-surfaces, leaving the anode-surfaces free to shed into the tank, said pockets having inclined bottoms leading to discharge-openings, perforated pipes n in the spaces between the plates, and means for circulating the electrolyte from the bottom of the tank and the said pockets through said perforated pipes, substantially as and for the purpose set forth.

4. An electro-depositing apparatus comprising, in combination, a tank A for holding the electrolyte and having rotatably supported in it a shaft B, and provided with an inclined bottom q and with a discharge-pipe p , anode-cathode plates C supported at suitable intervals on the shaft to rotate with it, the end-plates being connected, respectively,

with the opposite poles of an electric generator, pockets *G* supported to extend below the cathode-sides of said plates and having inclined bottoms leading to discharge-pipes *h*,
5 perforated pipes *n* in the spaces between said plates and leading from a manifold *m*, settling-boxes *F* and *F'* into which, respectively, the pipes *p* and *h* discharge, and a pump *E* communicating from its suction-side with said

settling-boxes and from its discharge-side 10 with said manifold, the whole being constructed and arranged to operate substantially as described.

HENRY L. BRIDGMAN.

In presence of—
M. J. FROST,
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