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E. A. LE SUEUR.

ART OF OPERATING ELECTROLYTIC CELLS.

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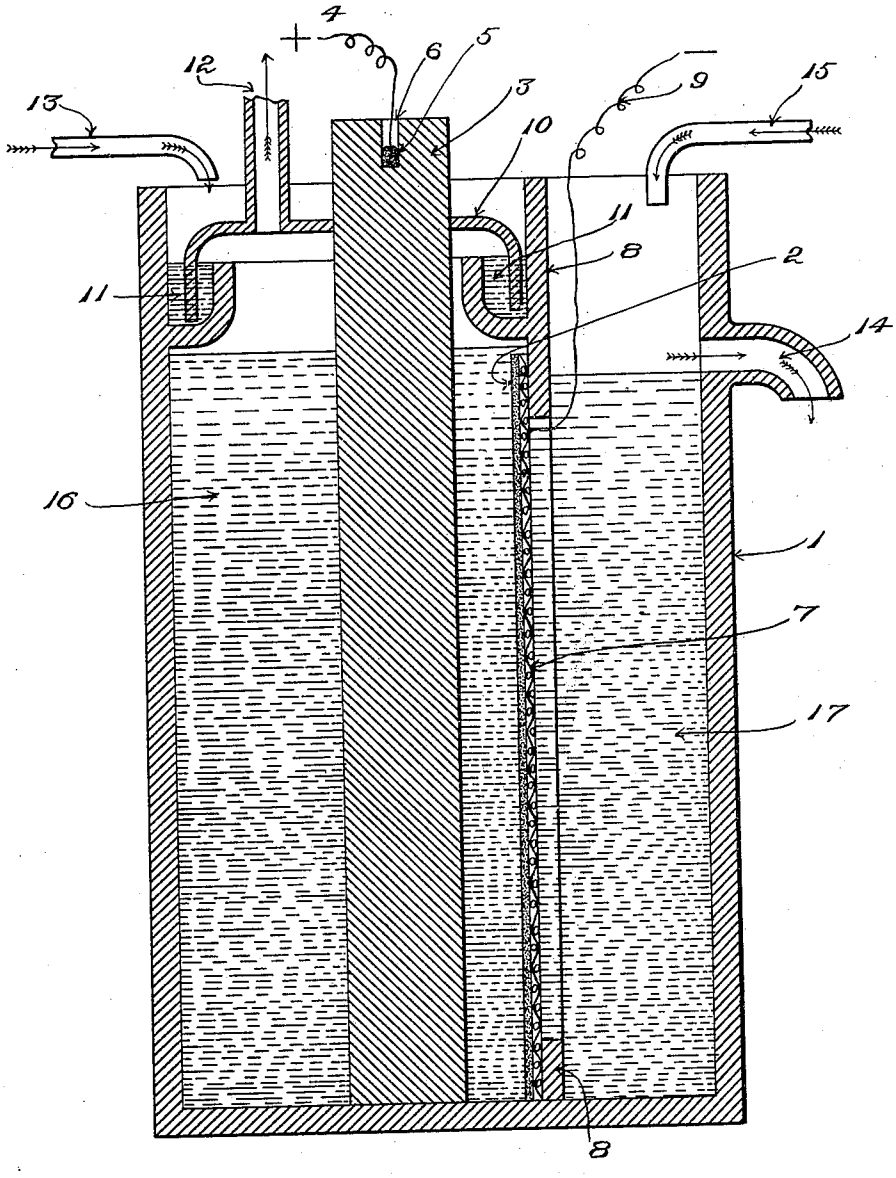
NO MODEL.



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UNITED STATES PATENT OFFICE.

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ART OF OPERATING ELECTROLYTIC CELLS.

SPECIFICATION forming part of Letters Patent No. 723,398, dated March 24, 1903.

Application filed April 24, 1901. Serial No. 57,183. (No model.)

To all whom it may concern:

Be it known that I, ERNEST A. LE SUEUR, a citizen of the Dominion of Canada, residing at Sault Ste. Marie, in the district of Algoma and Province of Ontario, Canada, have invented a new and useful Improvement in the Art of Operating Electrolytic Cells, of which the following is a specification.

My invention is designed to improve the efficiency of electrolyzers possessing porous diaphragms, and especially of electrolyzers used to decompose aqueous solutions of the alkali chlorids.

In the drawing, which represents a vertical section of an electrolyzer arranged to carry my invention into effect, 1 designates the containing vessel or "cell," commonly so called.

2 is an asbestos diaphragm separating the interior space of the cell into the anode-compartment and the cathode-compartment.

3 is a carbon-rod anode occupying the anode-compartment and connected electrically with one pole of a source of electrical energy by means of the positive wire 4, the latter having its free extremity immersed within the mercury 5 contained in the recess 6 in the upper end of the said anode. The cathode (shown at 7) consists of a section of wire-netting placed in upright position within the vessel or cell and supported by means of a frame 8, of slate, with which frame it is connected in suitable manner. The said cathode has connected therewith the negative wire 9. The asbestos diaphragm is shown as making contact with one face of the wire-netting cathode. The anode-compartment is provided with a cover or lid 10, which is fluid-sealed, or "luted," as such sealing is commonly termed in this art in practice, as at 11, the said cover or lid having an opening therethrough, within which the carbon-rod anode is fitted, as shown, and also having a gas-outlet, as 12. An inlet for brine is shown at 13, it discharging into the anode-compartment above the cover or lid therefor and the brine finding its way by its own pressure beneath the edge of the cover or lid and into the electrolyte-containing space of the anode-compartment. The cathode-compartment is furnished with an outlet 14, forming an overflow, the said overflow constituting an outlet for the caustic solution.

At 15 is shown an inlet by means of which water may be caused to enter the cathode-compartment.

The solution to be decomposed is supplied to the anode-compartment of the cell in such quantity as to apply a greater fluid-pressure on the anode side of the diaphragm than that existing on the cathode side, with the result that a tendency is set up to cause flow of said solution from the anode side to the cathode side of said diaphragm, and thereby oppose the tendency which always exists for the products of decomposition in solution at the cathode to find their way into the anode-compartment to the serious prejudice of the cell's efficiency.

With a view to further minimizing the objectionable tendency just mentioned I practice the invention which is the subject of the present application by adding water to the liquid contents of the cathode-compartment preferably in a continuous stream by means of the water-inlet at 15, the said water being preferably of a lower temperature than that existing in the anode-compartment, and I allow it to displace from said cathode-compartment an equivalent volume of an alkaline solution. The effect of said addition of water is twofold. It dilutes the alkaline solution in the cathode-compartment, and thereby renders less objectionable the results arising from the diffusion of a given volume of said solution into the anode-compartment. It also by reducing the temperature of the cathode-compartment minimizes the diffusive powers of the liquid contents of said compartment, which powers rise with the temperature.

I am aware that it has previously been proposed to add hot water or steam to the cathode-compartment of cells; but the object aimed at and accomplished is quite different from mine, in that the amount of such addition has only been enough to make up for a lack of passage of liquid from the anode-compartment in quantity sufficient to dissolve to a strong solution the alkali formed on the cathode.

What I claim is—

1. The improved art of operating electrolytic cells having porous diaphragms separating bodies of liquid on the anode and cathode sides, respectively, which consists in feeding

solution to be decomposed to the anode-compartment, maintaining a greater fluid-pressure on the anode side of the diaphragm than on the cathode side, whereby movement occurs of solution from the anode-compartment through the diaphragm to the cathode-compartment, and feeding water to the cathode-compartment in such a manner as to displace an equivalent volume of the alkaline solution from said cathode-compartment, substantially as and for the purposes described.

2. The improved art of operating electrolytic cells having porous diaphragms which consists in feeding solution to be decomposed to the anode-compartment, maintaining a greater fluid-pressure on the anode side of the diaphragm than on the cathode side, whereby movement occurs of solution from the anode side through the diaphragm to the cathode-compartment, and feeding water to the cathode-compartment, said water having a lower temperature than that of the liquid contents of the anode-compartment, substantially as and for the purposes described.

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