

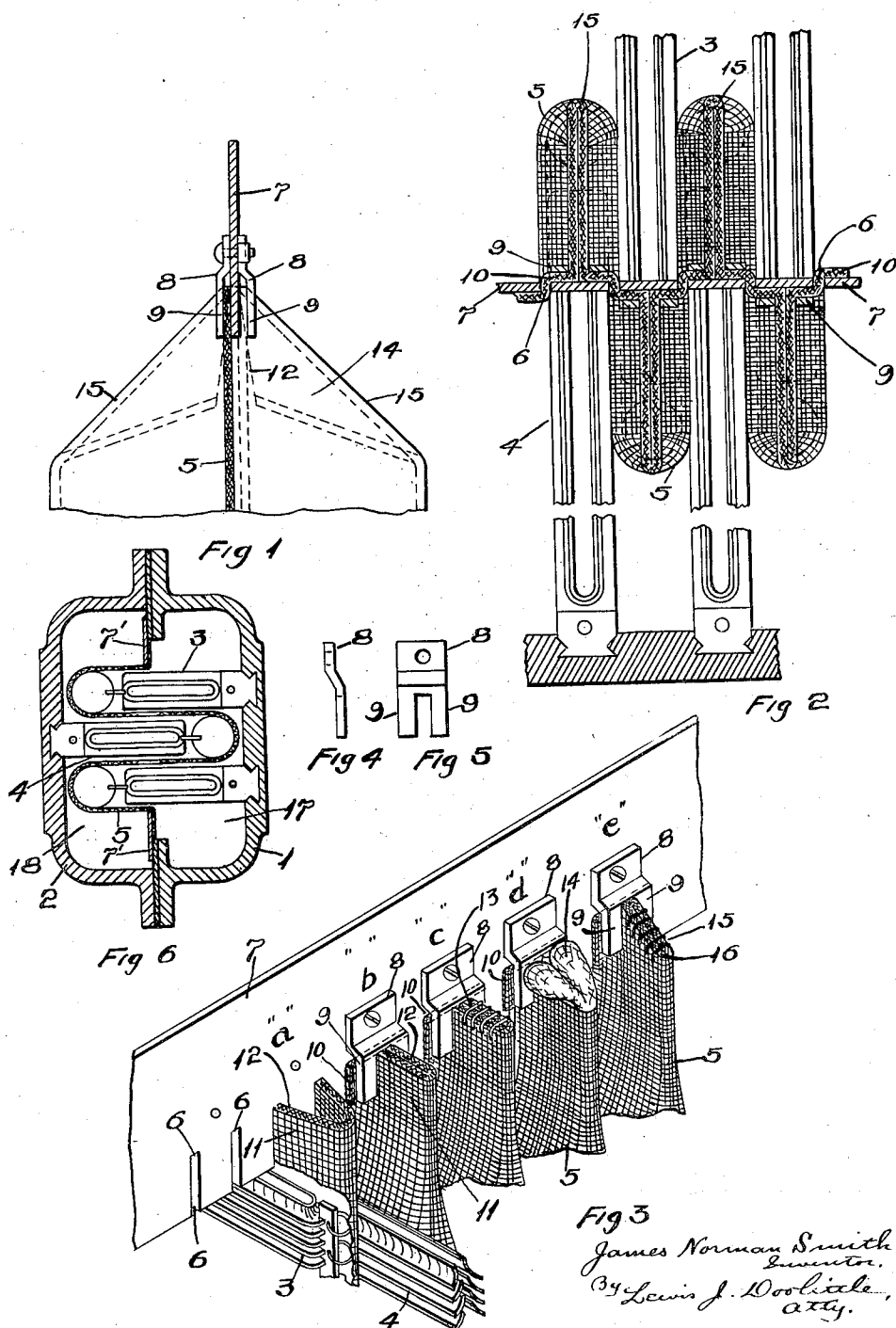
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ELECTROLYTIC CELL

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UNITED STATES PATENT OFFICE

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ELECTROLYTIC CELL

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This invention relates to electrolytic cells, more particularly to cells used in the electrolysis of water.

The object of the invention is to provide an improved construction and arrangement of the diaphragm whereby the anodic and cathodic gases rising from the respective electrolyzing zones of the cell will be prevented from intermingling and will be directed, each within its own compartment.

This I accomplish, generally, by bringing together and sewing or otherwise sealing the upper edges of the diaphragm to form an enclosure over the upper portions of the electrodes. By this arrangement the gas generated on one side of the diaphragm is prevented from mingling with the gas generated on the other side of the diaphragm.

If, in addition to closing over the upper edges of the individual loops of the diaphragm, said edges are infolded so as to incline the upper looped portions of the diaphragm, the said respective gases will be directed away from the intruding areas of the electrodes and within their proper chambers.

Other features of the invention will appear from the description of the illustrative embodiment of the invention shown in the accompanying drawing. In the drawing:—

Fig. 1 is a fragmentary vertical cross-section through a portion of the diaphragm and its support;

Fig. 2 is a fragmentary top view, somewhat diagrammatic, showing the relative position and relation of the diaphragm and the electrodes;

Fig. 3 is an isometric, somewhat schematic view showing the manner in which the diaphragm is woven through the supporting plate and the upper portion thereof infolded and sewn or otherwise fastened together at its edges;

Fig. 4 is a detail side view of a clamp;

Fig. 5 is a front view of said clamp; and

Fig. 6 is a horizontal cross-section of an electrolytic cell, at about the middle of the cell, illustrating the general arrangement of the electrodes and diaphragm in the cell.

The electrolytic cell, shown and described herein for the purposes of illustration only,

is provided with end plates 1 and 2, insulated from each other and of opposite polarity. Supported by and projecting into the cell from the end plates 1 and 2, are a series of electrodes, 3 and 4, extending alternately from the endplates 1 and 2, respectively, in opposite directions. Each of these electrodes preferably comprises a group of separate elements each having a central passage for the gas and electrolyte. The electrodes interleave, one group of elements adjacent the other, and a continuous, pervious diaphragm 5 is disposed and extends sinusoidally between adjacent electrodes, separating the same, as shown in Fig. 6.

The upper part of the diaphragm 5 is woven through notches 6 in the lower portion of an intermediate supporting plate 7, mounted in the upper part of the cell, in the manner indicated at "a" in Fig. 3. A number of clamps 8, each having offset claws 9 (Figs. 4—5), are mounted on the supporting plate 7 in position to clamp the lateral portions 10 of the looped portions 11 of the diaphragm 5 at the upper portion thereof between the claws 9 and the plate 7, forming a gas tight joint. The top edges 12 of the diaphragm 5 are brought together, as indicated at "b" in Fig. 3, and are then secured together, by sewing or otherwise, as indicated at 13, ("c" in Fig. 3), tightly closing this top portion to prevent the intermingling of the gases generated on either side of the diaphragm. Also, the top portion of the loop of the diaphragm may be infolded, as shown at "d" in Fig. 3, also in Fig. 1, as indicated at 14.

This infolding of the diaphragm forms inclined top portions, 15—15', of the diaphragm on both sides of the plate 7.

An alternative method of constructing the diaphragm is to infold the unsewn edges 12 and then secure the inclined folded edges 15—15' thereof together, by clips or stitches 16, indicated at "e" in Fig. 3.

The electrodes 3 and 4 are then inserted into the respective loops of the diaphragm 5 alternately from opposite sides of the intermediate plate 7, as shown in Figs. 2, 3 and 6.

It will be seen that the intermediate supporting plate 7, together with the diaphragm

5, divides the cell into anode and cathode chambers, 17 and 18, respectively, and that intruding or extending into the respective chambers are electrodes of opposite polarity. Consequently, if the diaphragm was not closed at the top, a part of the gas generated on one side of the diaphragm would, upon rising above the electrodes and diaphragm, mingle with the gas generated on the opposite side. By closing the diaphragm over the upper ends of the electrodes on opposite sides of the intermediate plate, as shown and described, intermingling of the gases and leakage between the chambers is prevented. In addition, because of this manner of infolding, the gases are conducted from the upper ends of the electrodes within their proper chambers.

The intermediate plate 7 with the slots 6 through which the diaphragm is woven and the clamping members 8 which secure the upper edge of the diaphragm to the plate 7 between the slots serve to support the diaphragm in suspended position and, as pointed out, the diaphragm is held tightly against the intermediate plate. This, together with the sewing of the infolding, renders the upper portions of the diaphragm gas tight.

The method of securing the side portions of the diaphragm 5 to the downwardly projecting portions 7' of the plate 7, is shown in Fig. 6.

As many changes could be made in the above construction and many apparently different embodiments of my invention designed without departing from the spirit of the invention, as defined in the accompanying claims, I intend that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative merely of an operative embodiment of my invention and not in a limiting sense.

Having described my invention, what I claim is:

1. In an electrolytic cell having oppositely disposed electrodes, a medial supporting plate positioned above said electrodes, and a looped diaphragm suspended therefrom and having closed top portions enclosing the upper portion of the inner ends of each of said electrodes.

2. In an electrolytic cell having interleaved electrodes, a supporting plate positioned above said electrodes, and a sinusoidal diaphragm having a plurality of closed top portions suspended therefrom and clamped thereto, said diaphragm being positioned between adjacent sides and substantially enclosing the upper ends of said electrodes.

3. In an electrolytic cell having oppositely disposed electrodes, a supporting plate positioned above said electrodes, and a diaphragm having inwardly inclined and closed top portions arranged to successively and alternately

enclose the upper portions of the inner ends of electrodes of opposite polarity.

4. An electrolytic cell comprising end plates, electrodes of opposite polarity extending therefrom and into said cell in interleaved arrangement, a supporting plate positioned above said electrodes, and a continuous diaphragm dividing said cell into anode and cathode chambers and suspended from said plate, said diaphragm separating adjacent electrodes of opposite polarity, the upper edges of the diaphragm being closed over the upper portion of the ends of each of said electrodes to substantially enclose the same.

5. An electrolytic cell comprising end plates, electrodes of opposite polarity extending therefrom and into said cell in interleaved arrangement, a notched supporting plate traversed by a continuous sinusoidal diaphragm, extending through said notches and forming loops on either side of said plate enclosing the sides and top of said electrodes, and means for securing said diaphragm to said supporting plate.

6. In an electrolytic cell having interleaved electrodes, a slotted supporting plate extending transversely of and above said electrodes, a diaphragm woven through said slots to form looped sections extending in opposite directions, enclosing the sides and top portions of said electrodes and means for securing said diaphragm to said plate, said electrodes being disposed within said loops.

7. In an electrolytic cell having interleaved electrodes of opposite polarity, a slotted supporting plate, a diaphragm woven through said slots to form looped sections adapted to embrace and separate adjacent electrodes, said loops extending in opposite directions, and the upper edges of said loops being closed to substantially enclose said electrodes, and means for securing said diaphragm to said plate.

8. In an electrolytic cell having interleaved electrodes of opposite polarity, a slotted supporting plate, a diaphragm woven through said slots to form looped sections adapted to embrace and separate adjacent electrodes, said loops extending in opposite directions, and the upper edges of said loops being closed and infolded to substantially enclose said electrodes, and means for securing said diaphragm to said plate.

9. A continuous, pervious, looped diaphragm adapted to be positioned between alternate electrodes and having the upper edges of the loops brought together and infolded, forming a plurality of closed top portions.

10. An electrolytic cell comprising a series of electrodes alternately extending inwardly in opposite directions, a supporting plate positioned in and extending across the upper portion of the cell above and transversely to said electrodes, a continuous diaphragm suspended from said plate and extending on

either side thereof sinusoidally between adjacent electrodes, the upper edges of said diaphragm being closed over the upper ends of the electrodes projecting on opposite sides of said plate.

Signed at Toronto, Province of Ontario,
in the county of York and Dominion of Canada,
this 17th day of September, A. D. 1928.
JAMES NORMAN SMITH.

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