

H. D. RUHM.
DIAPHRAGM FOR ELECTROLYTIC APPARATUS.
APPLICATION FILED OCT. 2, 1912.

1,082,286.

Patented Dec. 23, 1913.

Fig. 1.

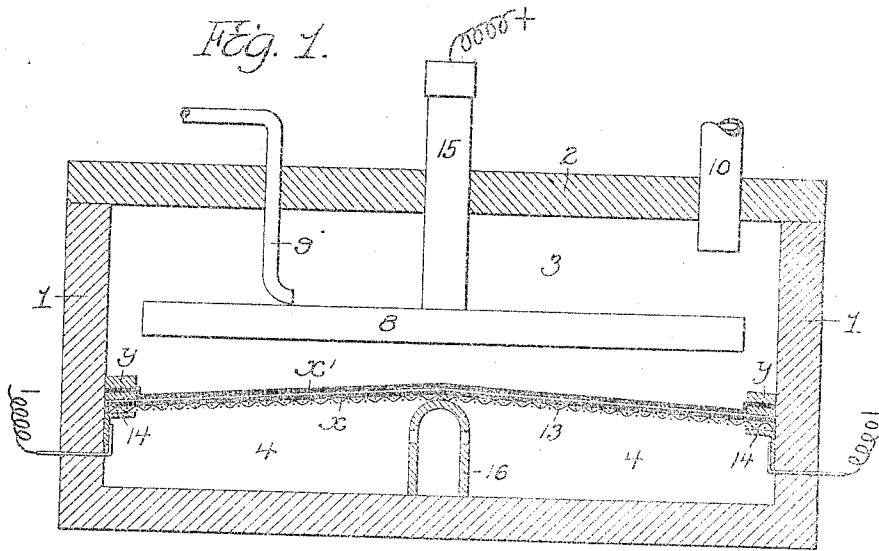


Fig. 4.

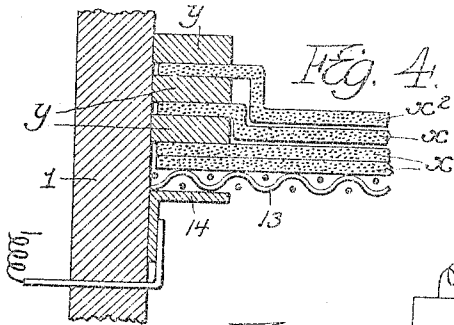


Fig. 3.

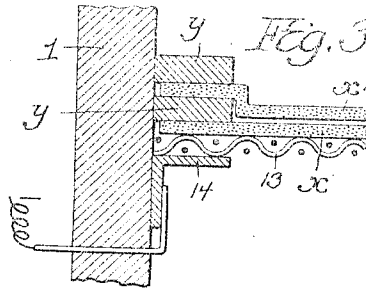
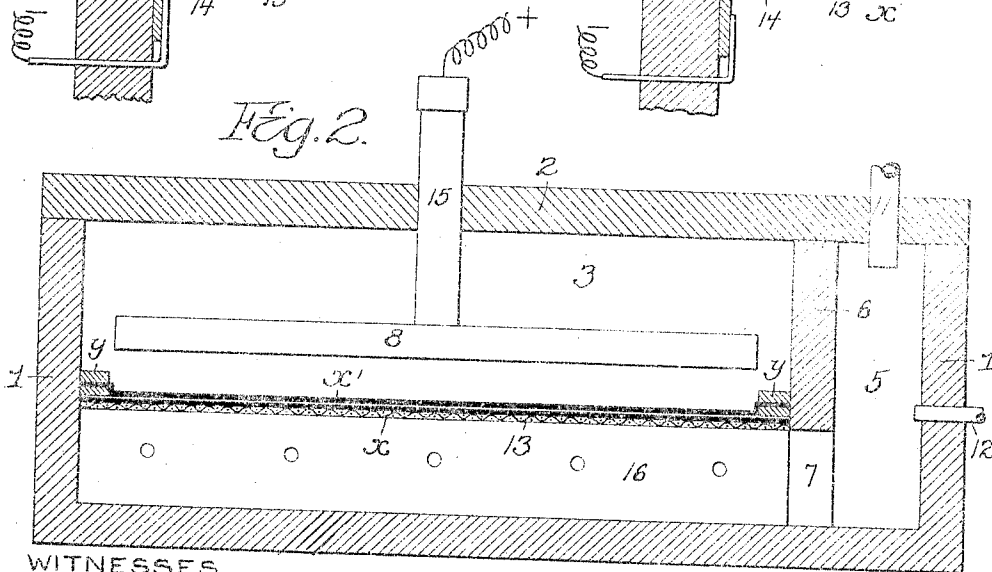


Fig. 2.



WITNESSES

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DIAPHRAGM FOR ELECTROLYTIC APPARATUS.

1,082,286.

Specification of Letters Patent.

Patented Dec. 23, 1913.

Application filed October 2, 1912. Serial No. 723,516.

To all whom it may concern:

Be it known that I, HERMAN D. RUHM, a citizen of the United States, residing in Buffalo, New York, have invented certain Improvements in Diaphragms for Electrolytic Apparatus, of which the following is a specification.

The object of my invention is to so construct the diaphragm interposed between the anode and cathode chambers of an electrolytic cell as to readily vary the permeability of said diaphragm and permit of the ready removal therefrom of the salts or other bodies which may be deposited upon the same during the action of the cell. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which—

Figure 1 is a transverse section of an electrolytic cell provided with a diaphragm constructed in accordance with my invention; Fig. 2 is a longitudinal section of the same; Fig. 3 is an enlarged section of part of one of the walls of the cell and of part of the diaphragm adjacent thereto, and Fig. 4 is a similar view illustrating a modified form of diaphragm.

In the drawing, 1 represents the casing of the cell and 2 the lid or cover of the same. said casing containing an anode chamber 3, a cathode chamber 4, and an end chamber 5, the latter being separated from the anode chamber 3 by a partition 6 but being in communication with the cathode chamber 4 through a passage 7 in the lower portion of said partition. The chamber 3 contains the anode 8 and is provided with an electrolyte supply pipe 9 and a discharge pipe 10, the chamber 5 having a discharge pipe 11 and an overflow pipe 12. The chamber 4 contains the cathode 13 which, in the present instance, consists of a sheet of wire gauze supported at its edges upon angle bars 14 secured to the walls of the cell and connected to the negative pole of the electric generator, whose positive pole is connected to the stem 15 of the anode 8. The wire gauze 13 constituting the cathode of the cell serves as a base or foundation for the diaphragm which separates the anode and cathode chambers, the electrolyte being compelled to pass through this diaphragm in its passage from the anode to the cathode chamber and being decomposed by the electric current.

In a cell intended for the production of

caustic soda, and using brine as an electrolyte, the result of the electrolytic action will be the formation at the anode of chlorine gas which escapes from the discharge pipe 10, and the formation at the cathode of hydrogen gas which escapes through the discharge pipe 11, the caustic soda solution accumulating in the cathode chamber and in the lower portion of the chamber 5 from which it escapes at the overflow pipe 12. In the operation of electrolytic cells of this character much difficulty is experienced because of the necessity of removing and reconstructing the diaphragm whenever its permeability is materially impaired, the action of the cell being, of course, arrested during the time required for such reconstruction of the diaphragm. My invention has therefore been designed with the view of providing a diaphragm whose permeability can be readily varied and which can be readily freed from the accumulation of salts or other bodies deposited thereon by the operation of the cell. With this object in view I construct the diaphragm of any desired number of superposed layers or sheets of permeable material, preferably asbestos cloth of a fairly close weave, the upper or outer layer or layers being loosely applied or being held in place by readily removable retainers so that the thickness of the diaphragm can be readily varied to afford the desired degree of permeability, and so that deposits upon the uppermost layer of the diaphragm can be readily discharged therefrom by removing said upper layer, shaking the deposit therefrom, and then reapplying it, preferably after reversing it top for bottom.

In Fig. 3 of the drawing, I have shown a diaphragm composed of two layers x , x' , of which the lower layer may be secured to the upper surface of the wire gauze cathode, the superposed layers x' being simply placed upon said lowermost layer x and retained in place by means of unconfined edge bars y of glass, stoneware, or the like, which are therefore readily removable and permit like ready removal of the diaphragm layer x' . A layer or layers can thus be quickly added to or removed from the diaphragm in order to decrease or increase the permeability of the same or cleanse the upper or outer layer, and the operation of the cell at all times under the most advantageous conditions can thus be insured, the interruption in the

action of the cell for the correction of the diaphragm or for the removal of deposits therefrom being so slight as to be practically negligible.

5 In the diaphragm shown fragmentarily in Fig. 4, two lower layers x are shown secured in place next to the wire gauze cathode while two superposed layers x' and x'' are also shown as removably secured in place by
10 the bars y and separately removable. The number of fixed and removable layers can readily be varied to give a thinner or a thicker diaphragm and to make up for variations in the thickness and structure of
15 the individual layers. In each case, however, one or more of the outer or upper layers are readily removable with the advantages indicated.

The central portion of the diaphragm is, in the present instance, supported by a hollow arch 16 in the cathode chamber, said hollow arch having perforated side walls and being in communication at one end with the chamber 5 of the cell through the opening 7 in the partition 6.

25 I have shown my invention as applied to a horizontal partition but it may be applied as well to vertical or inclined partitions, suitable means being employed in the latter case for temporarily retaining the bars y in place.

I claim:—

1. The within described diaphragm for electrolytic cells, said diaphragm consisting
35 of a plurality of superposed permeable layers, the outer layer or layers being loosely retained, whereby the thickness of the diaphragm can be readily varied by adding layers to or removing them therefrom, and
40 the material deposited upon the diaphragm can be readily discharged therefrom.

2. The within described diaphragm for electrolytic cells, said diaphragm comprising one or more inner layers secured in position
45 and one or more outer layers loosely retained in place.

3. The within described diaphragm for electrolytic cells, said diaphragm comprising

a wire gauze cathode, and a plurality of superposed layers of permeable material 50 supported thereby, the outer layer or layers being loosely confined so as to be readily applied or removed.

4. The within described diaphragm for electrolytic cells, said diaphragm comprising 55 a wire gauze cathode, and a plurality of layers of permeable material supported thereby, the inner layer or layers being secured to the cathode and the outer layer or layers being loosely confined so as to be 60 readily applied to or removed from the diaphragm.

5. An electrolytic cell having anode and cathode compartments and a permeable diaphragm separating said compartments, said 65 diaphragm consisting of one or more fixed permeable layers, and of one or more removable permeable layers, and removable means for temporarily holding said removable layer or layers in position. 70

6. An electrolytic cell having anode and cathode compartments, and a substantially horizontal permeable diaphragm separating said compartments, said diaphragm consisting of one or more fixed permeable layers 7 and one or more removable permeable layers placed above said fixed layer or layers, and removable means for temporarily holding said removable layer or layers in position.

7. An electrolytic cell having anode and 80 cathode compartments, and a diaphragm separating said compartments, said diaphragm comprising a wire gauze cathode and a plurality of layers of permeable material supported thereby, one or more of 85 said layers adjacent to said wire gauze being fixed in position, and one or more of said layers supported by said fixed layers being removable.

In testimony whereof, I have signed my 90 name to this specification, in the presence of two subscribing witnesses.

HERMAN D. RUHM.

Witnesses:

H. WACHS,

F. V. GEYLER.