No. 823,650. PATENTED JUNE 19, 1906.

K. J. VAREILLE.

APPARATUS FOR THE ELECTROLYSIS OF WATER.

APPLICATION FILED NOV. 15, 1905.

3 SHEETS—SHEET 1.

Fig. 4.

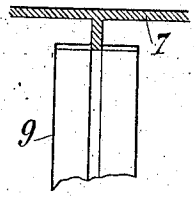


Fig. 5

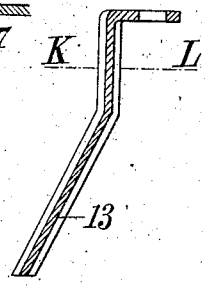


Fig. 6

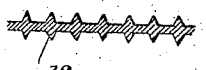
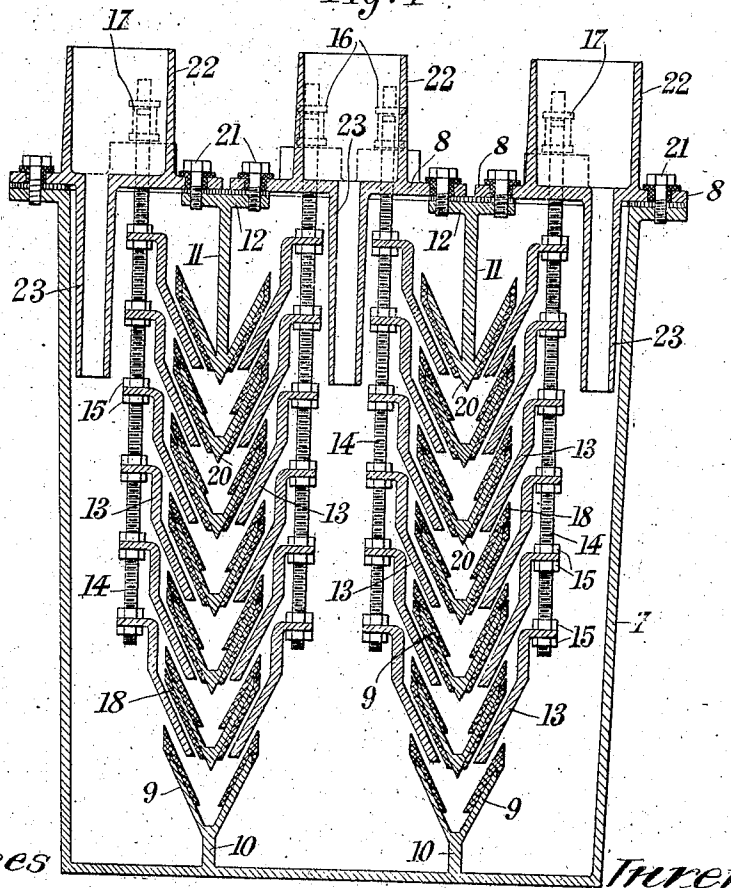


Fig. 1



Witnesses

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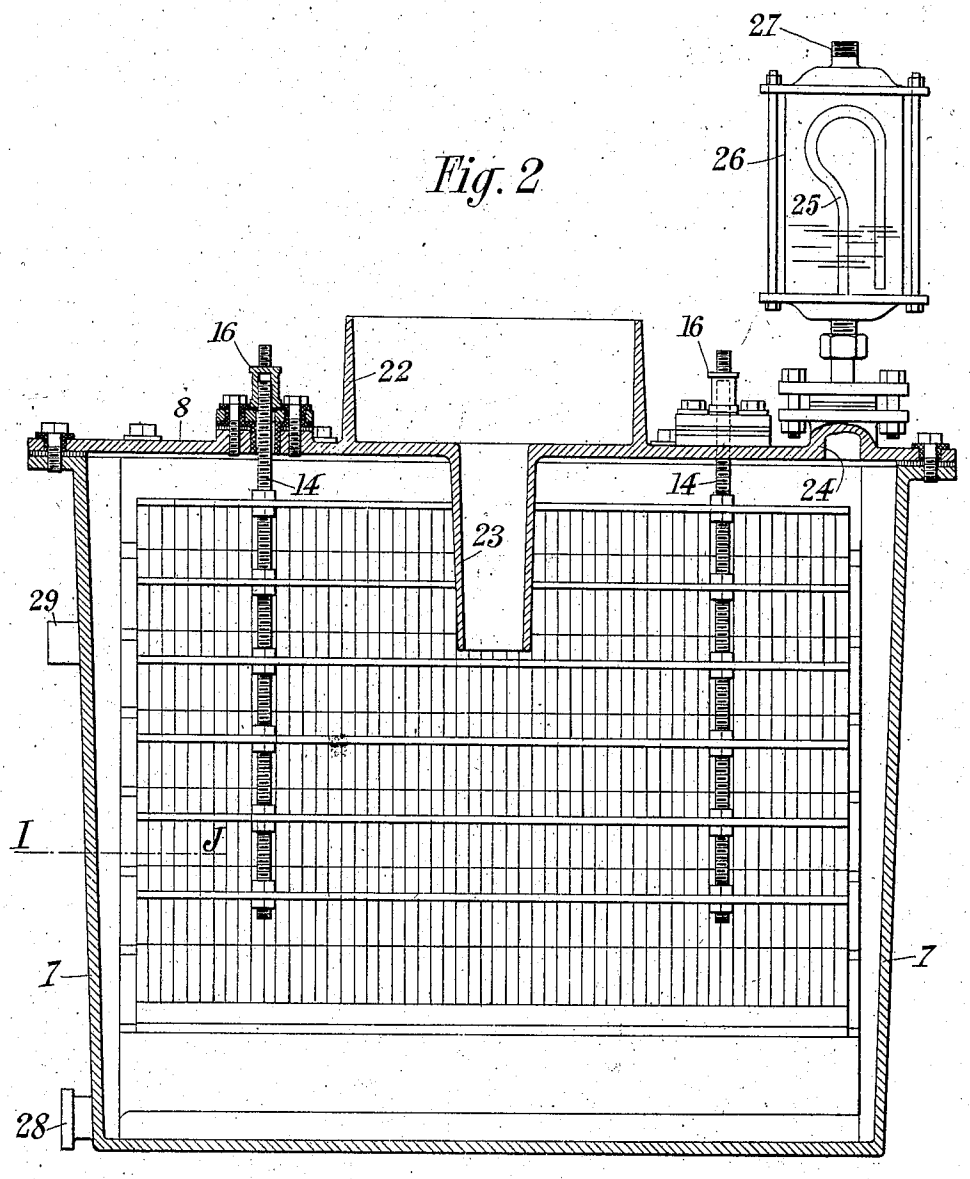
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3 SHEETS—SHEET 2.

Fig. 2



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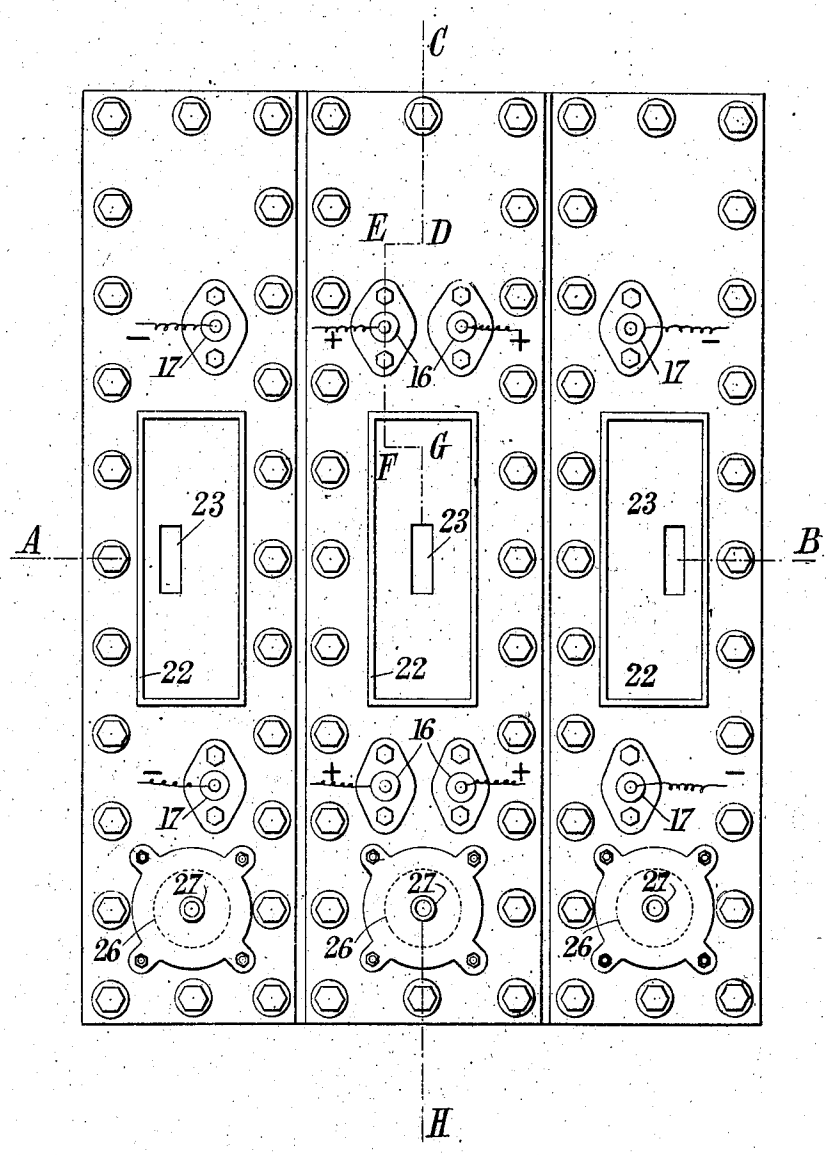
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3 SHEETS—SHEET 3.

Fig. 3



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APPARATUS FOR THE ELECTROLYSIS OF WATER.

No. 823,650. Specification of Letters Patent. Patented June 19, 1906.

Application filed November 15, 1905. Serial No. 287,502.

To all whom it may concern

Be it known that I, KARL JOSEPH VAREILLE, a citizen of the Republic of France, residing at Levallois-Perret, in France, have invented new and useful Improvements in or Relating to Apparatuses for the Electrolysis of Water, of which the following is a specification.

The object of this invention is to provide apparatus for producing oxygen and hydrogen by the electrolysis of water constructed in such a manner that as they are produced the gases are absolutely prevented from mixing with one another and that the apparatus necessitates only a minimum expenditure of electrical energy, owing to the short distance between the electrodes of opposite polarity, thus reducing the resistance to the passage of the current to as low a degree as possible.

The invention will be fully described with reference to the accompanying drawings.

Figure 1, sectional elevation of the vat on line A B, Fig. 3; Fig. 2, sectional elevation through line C D E F G H, Fig. 3; Fig. 3, plan of the vat; Fig. 4, detail section through line I J, Fig. 2; Fig. 5, transverse section of an electrode to a larger scale; Fig. 6, horizontal section of portion of electrode on line K L, Fig. 5, and to the same scale.

The apparatus consists of a vat or tank 7, having a lid or cover 8, formed in two or more sections. Across or along the vat or tank are formed a number of troughs 9, preferably arranged in one or more vertical rows. Two are shown in the drawings, the section of each of which is of V shape. These troughs are preferably cast in one with the vat, which is preferably made of metal, and they are connected at their ends with the latter, as shown in Figs. 2 and 4.

In each row the lowest trough is connected along its lower edge with the bottom of the vat or tank, and the top trough is formed with a division or wall 11 along its whole length, extending to the top of the vat or tank and provided with a flange 12 for connecting it with the corresponding section or sections of the cover or lid 8. Between the sides of the superimposed trough 9 and on both sides of them are placed electrodes 13, formed, preferably, of either sheet or cast iron having corrugations, grooves, or other projections formed thereon and when made of cast-iron are preferably constructed as shown in Figs. 1, 2, 5, and 6.

In each row of troughs the electrodes placed on one side are connected together and supported by means of a number of screwed rods 14, to which the electrodes are attached by nuts 15. At their upper ends these rods are connected to terminals 16 and 17, suitably insulated from the sections of the lid 8 on which they are placed.

The terminals on alternate sections of the lid are connected to leads of opposite polarity.

The sides of the troughs are provided with insulators 18, made of ebonite, glass, amianthus, or other suitable material, for the purpose of completely insulating the electrodes 13 from the other parts of the apparatus.

The electrodes 13 may be adjusted vertically by means of the nuts 15 on the threaded rods 14 and are arranged in such a manner that their lower edges are placed at a level a little above the bottom edges 20 of the troughs which separate them from the electrodes of opposite pole placed opposite to them.

The sections of the lid 8 are separated from the vat by a sheet of india-rubber or other material capable of insuring a tight joint as well as of acting as an insulator, so that if the terminal's band 17 on the separate sections of the cover or lid 8 were badly insulated each section would nevertheless remain insulated from the others and no short circuit could take place between the leads. For this purpose the bolts 21, connecting the sections of lid 8 with the vat 7, are electrically insulated from the said sections 8.

Each section of the lid 8 is formed with a trough or funnel 22 cast with it and also with a tube or pipe downwardly extending therefrom and designed to be immersed deeply in the acidulated water of the vat. Each section 8 of the lid is also formed with a gas-outlet pipe 24, connected, preferably by means of a packed joint, with second pipe 25, the upper end of which is bent over and opens under the level of the water contained in a chamber or receiver 26, the walls of which are preferably made of glass. The top 27 of this chamber 26 is provided with a connection to connect same with a pipe leading to a gasometer. The water in each glass chamber or receiver 26 is kept at the level required for maintaining equilibrium with the pressure of the corresponding gasometer.

If the terminals 16 be connected with the

positive lead, the glass chamber or receiver 26, supported by the same section of the lid 8, is connected with the oxygen-gasometer, while the other chambers or receivers are connected with the hydrogen-gasometer.

It will be easily seen that the apparatus being arranged in this manner the inclined walls of the troughs, between which the gas is produced, give it an upward movement and that the passage of bubbles of gas from one electrode to the other is impossible, because to do so the gas would have to pass under the bottom edge 20 of the trough separating two opposed electrodes, which is impossible, the density of the gas-bubbles preventing them from going downward in the liquid.

It results from the arrangement of the apparatus shown and from the indications of the connections of the electrodes above that the glass chambers or receivers 26 on both sides of the apparatus (see Fig. 3) are designed to receive the hydrogen, while the middle chamber receives the oxygen.

The troughs or funnels 22 serve to fill the vat or tank with liquid, and the pipe 23 is provided to avoid the necessity of having to close or cover the said troughs or funnels 22 and also to prevent the gases formed in the vat from escaping. Should there be, however, from any cause overproduction of gas, the water would be first driven back through the pipes 23, and the gases could afterward escape to the open air without any danger of explosion in the vat. Also, if the level of the water in the vat sinks too low the gases can escape in the same way to the open air.

The projection 28 is formed for the reception of a plug to enable that vat to be employed, and the projection 29 is designed to receive a water-level indicator.

The number of threaded rods 14 which sustain the electrodes 13 may vary with the length of the latter, and the number of vertical rows of troughs may be varied according to the width of the vat, which may be of any size.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. An electrolytic apparatus comprising in combination a tank, a plurality of superposed troughs, and a plurality of electrodes interposed between the walls of said troughs, said troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode.

2. An electrolytic apparatus comprising in combination a tank, a plurality of superposed troughs, and a plurality of electrodes interposed between the walls of said troughs, said troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode, the walls of said trough being insulated at points adjacent the electrodes.

3. An electrolytic apparatus comprising in combination a tank, a plurality of superposed V-shaped troughs, and a plurality of electrodes interposed between the walls of said troughs, said troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode.

4. An electrolytic apparatus comprising in combination a tank, a plurality of superposed V-shaped troughs, and a plurality of electrodes interposed between the walls of said troughs, said troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode, the walls of said trough being insulated at points adjacent the electrodes.

5. An electrolytic apparatus comprising in combination a tank, a plurality of superposed troughs cast integral therewith, a plurality of electrodes interposed between the walls of said troughs, adjustable rods depending from the upper wall of the tank, and means for adjustably securing said electrodes upon said rods.

6. An electrolytic apparatus comprising in combination a tank, a plurality of superposed troughs cast integral therewith, a plurality of electrodes interposed between the walls of said troughs, adjustable rods depending from the upper wall of the tank, and means for adjustably securing said electrodes upon said rods, said troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode, the walls of said trough being insulated at points adjacent the electrodes.

7. An electrolytic apparatus comprising in combination a tank, a plurality of superposed V-shaped troughs cast integral therewith, a plurality of electrodes interposed between the walls of said troughs, adjustable rods depending from the upper wall of the tank, and means for adjustably securing said electrodes upon said rods, such troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode.

8. An electrolytic apparatus comprising in combination a tank, a plurality of superposed V-shaped troughs cast integral therewith, a plurality of electrodes interposed between the walls of said troughs, adjustable rods depending from the upper wall of the tank, and means for adjustably securing said electrodes upon said rods, said troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode, the walls of said trough being insulated at points adjacent the electrodes.

9. An electrolytic apparatus comprising in combination a tank, a plurality of superposed troughs, a plurality of electrodes interposed between the walls of said troughs, said troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode, and a plurality of filling-tubes for said tank having projections extending to a point below the uppermost trough.

10. An electrolytic apparatus comprising in combination a tank, a plurality of superposed V-shaped troughs, a plurality of electrodes interposed between the walls of said troughs, said troughs and electrodes being so arranged that the bottom of each trough projects below the lower edge of the corresponding electrode, and a plurality of filling-tubes for said tank having projections extending to a point below the uppermost trough.

11. An electrolytic apparatus comprising in combination a tank, a plurality of superposed troughs cast integral therewith, a plurality of electrodes interposed between the walls of said troughs, adjustable rods depending from the upper wall of the tank, means for adjustably securing said electrodes upon said rods, and a plurality of filling-tubes for said tank having projections extending to a point below the uppermost trough.

12. An electrolytic apparatus comprising in combination a tank, provided with a top wall composed of separate sections, each section being provided with a filling-tube extending downwardly into said tank, means for insulating said sections from the tank, adjustable rods extending downwardly from said sections into said tank and insulated from said sections, a plurality of superposed V-shaped troughs cast integral with said tank, the uppermost troughs having central walls forming supports for said sections intermediate the sides of the tank, and a plurality of electrodes adjustably mounted on said rods and projecting between the walls of said troughs, said troughs and electrodes being so arranged that the bottoms of said troughs extend below the lower portions of said electrodes.

In testimony whereof I have affixed my signature in presence of two subscribing witnesses.

KARL JOSEPH VAREILLE.

Witnesses:

F. W. CAULDWELL,

JUB L'HERMITZ.