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ELECTROLYTIC CELL WITH MOBILE MERCURY CATHODE

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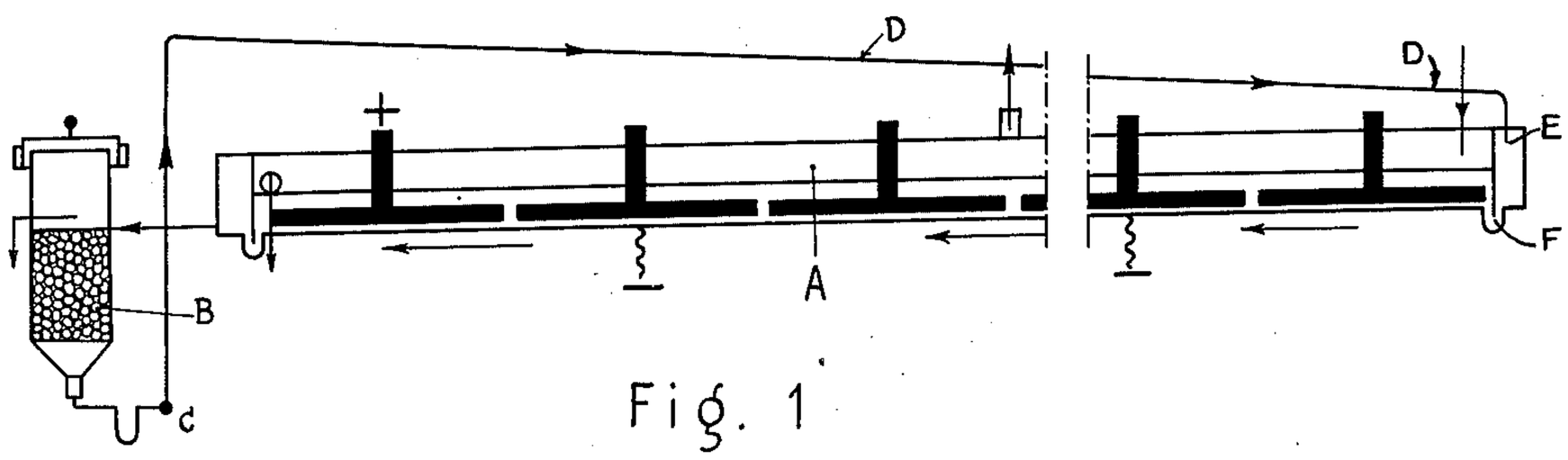

Fig. 1

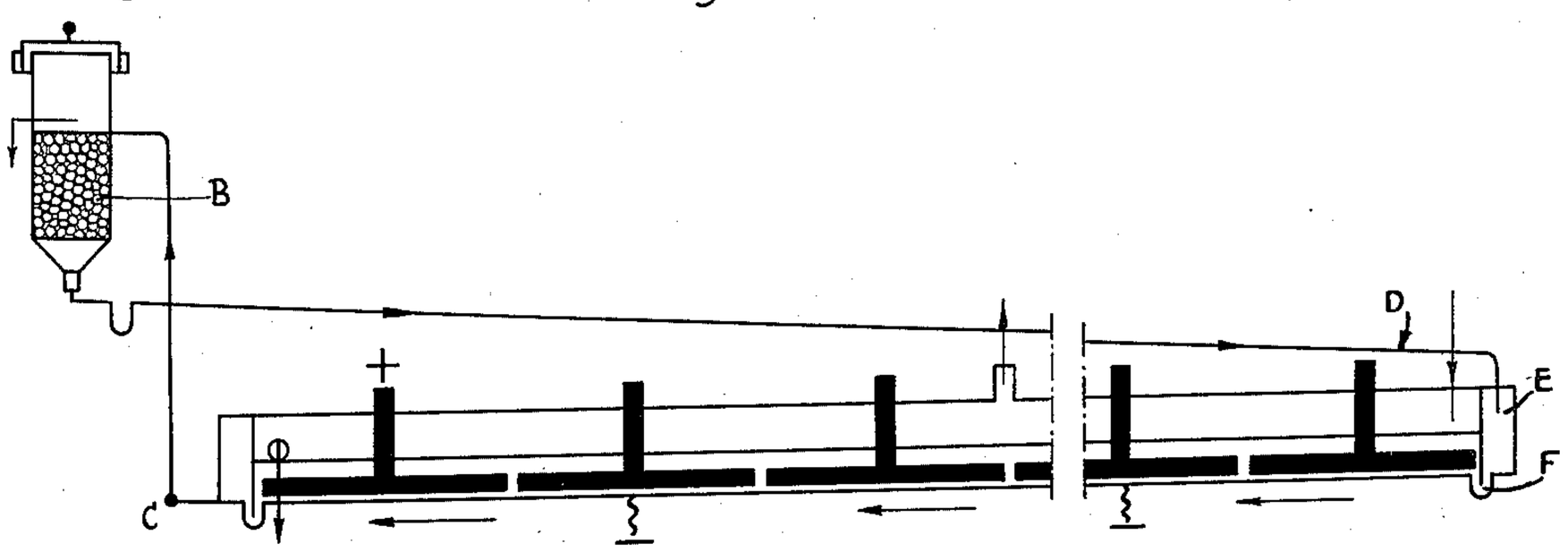

Fig. 2

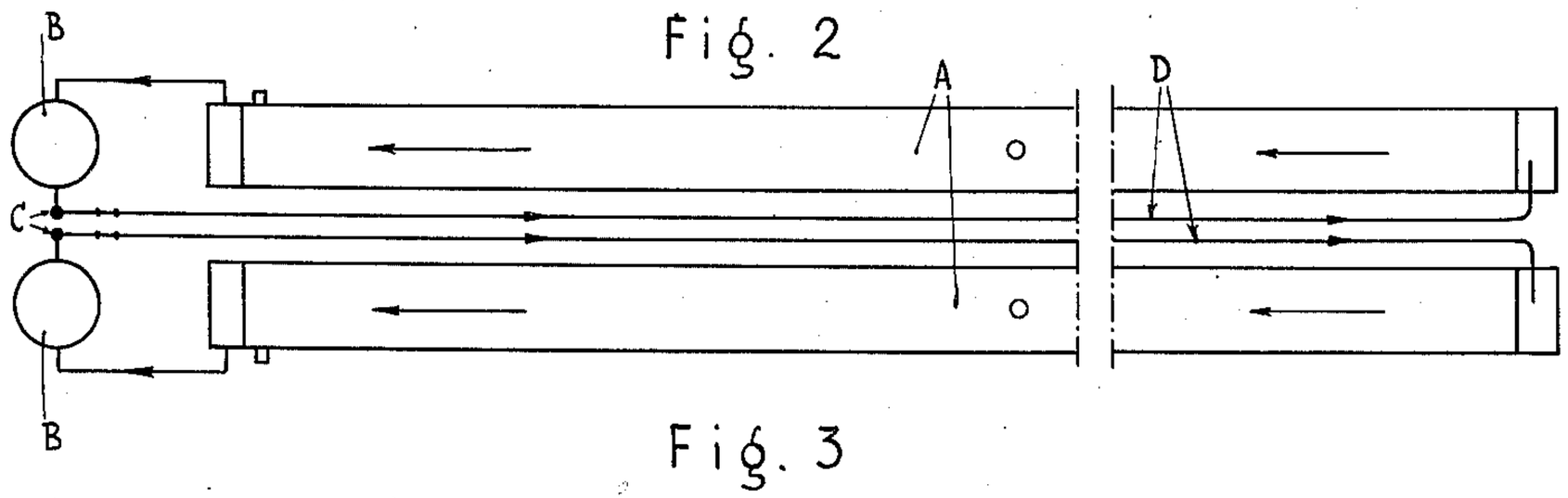

Fig. 3

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ELECTROLYTIC CELL WITH MOBILE MERCURY CATHODE

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1 Claim. (Cl. 204—220)

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This invention relates to a continuous closed cycle electrolytic cell with a mobile mercury cathode.

Electrolytic cells with mobile mercury cathodes have been used in industry for the preparation of hydrates or sulphides of alkali metals and chlorine, and are substantially composed of two compartments arranged side by side, in one of which the electrolytic preparation of the amalgam is effected while in the other compartment the amalgam is decomposed by suitable reagents. The mercury is removed from the decomposition compartment and elevated in order to reenter the first compartment and regenerate new amalgam.

The present invention has as its object a particular disposition of the electrolytic cell and associated apparatus so as to considerably reduce the quantity of mercury employed, the copper necessary for the connection of the cells in circuit and the surface occupied by the cell and associated apparatus.

According to the present invention, the plant comprises an elongated electrolytic cell having its bottom inclined so that the mobile cathode will flow longitudinally thereof from one end toward the other, and a disamalgamation apparatus connected with the cell for receiving the mobile cathode. The disamalgamating apparatus is constructed in such a manner as to effect the subdivision of the amalgam flowing through the same and increase the duration of contact with the disamalgamating agent. Freed mercury is taken from the disamalgamating apparatus and returned to the upper end of the electrolytic cell through a tube lying parallel to the cell but oppositely inclined so that the mercury introduced into the tube will flow to the upper inlet end of the cell.

In order to facilitate an understanding of the present invention, reference is made to the annexed drawings in which:

Figure 1 is the schematic longitudinal sectional view of the plant according to the invention;

Fig. 2 is a similar view of a slightly modified form of the plant; and

Figure 3 is a plan view of the plant of Fig. 1.

Figure 1 shows the electrolytic compartment A connected with the disamalgamation apparatus B, from which the mercury, by means of a pump C, is raised in the tube D, which feeds the electrolytic compartment A. The cycle is closed and continuous.

Figure 2 shows a modified form of the plant in which the electrolytic compartment A is connected to the pump C, which feeds the disamalgamation apparatus B, from which the mercury, by means of the tube D returns to the electrolytic compartment A.

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Figure 3 represents the coupling of two electrolytic compartments as those described in Figure 1 and connected electrically in series.

According to Fig. 1 an electrolytic compartment A having a length equal to at least ten times its width, is fed with an almost saturated solution of an alkali metal chloride, and there is obtained an amalgam of sodium or potassium together with the formation of chlorine. The produced alkali metal amalgam runs due to gravity down along the inclined bottom of the electrolytic compartment and is fed by means of a short conduit to the disamalgamation compartment B, through which the amalgam passes in a downward vertical direction.

The apparatus B comprises a tank with adequate section and height with reference to the capacity of the electrolytic apparatus, containing water or a solution of alkali metal hydrate, in which regular or irregular shaped pieces of graphite or similar material are immersed and placed as filling. These pieces of graphite can be substituted by pieces of other conducting material.

The amalgam coming from the compartment A, falling vertically on the pieces of graphite or similar material, divides into drops, effecting an intimate contact between the amalgam, graphite and water with the formation of alkali metal hydrate and hydrogen.

With the object of producing solutions of sulphides of alkali metals with the amalgam, the apparatus B should be suitably built or covered with non-conducting material, and will contain a solution of alkali metal polysulphide and instead of the metallic filling, a non-conducting filling such as stone, glass or similar materials.

The regenerated mercury flows, due to gravity, into the pump C from the reaction apparatus and is raised by the pump through the vertical portion of the return pipe D to a height equal to the height of the disamalgamator plus twice the difference in level between the two ends of the electrolytic compartment where then it flows by gravity down the other portion of the pipe D which has a slope equal and opposite to that of the electrolytic compartment. The said other portion of pipe returns the regenerated mercury at E above an inlet mercury seal F to feed the electrolytic compartment A and to generate fresh amalgam. The cycle is continuous.

The working of the apparatus illustrated in Figure 2 is perfectly analogous to that of Fig. 1, the variations deriving only from the relative positions of the various parts.

What I claim is:

A continuous cycle electrolytic cell with mobile mercury cathode, comprising in combination an electrolytic compartment having an elongated and narrow form, the length being at least ten times the width, with a slightly inclined bottom, the slope being only that necessary for assuring the flow of the mercury and a vertical disamalgamation device positioned for vertical gravity flow of the amalgam from the electrolytic compartment therethrough, the disamalgamation device being disposed near the outlet end of the electrolytic cell, two portions of pipes providing connections for the return of mercury to the cell from the disamalgamator, one of said pipe portions being vertical and of a length equal to the height of the disamalgamator plus twice the difference in level between the two ends of the cell for conveying mercury from the bottom of the disamalgamator to a point as high above the lower end of the cell as twice the difference in level of the two ends of the electrolytic cell, the other portion of pipe having a

slope equal and opposite to that of the electrolytic cell, and being a continuation of the first recited pipe portion for conveying mercury to the inlet end of the cell, a mercury seal at the inlet end of the cell, said other portion of pipe having its delivery end above the mercury in said seal, a short conduit connecting the outlet of the cell to the inlet of the disamalgamator, and pump means at the lowest end of the vertical portion of pipe.

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