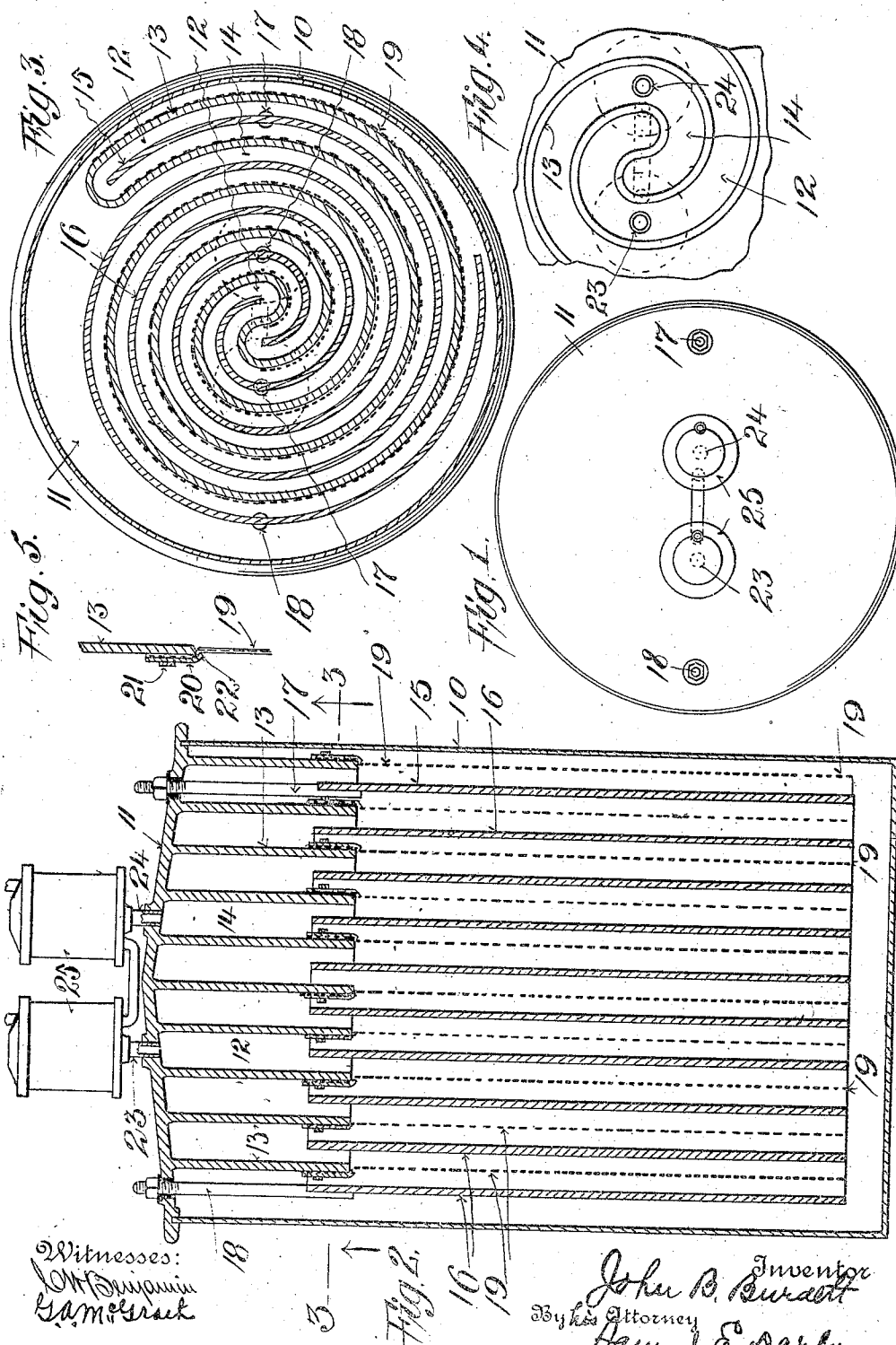


J. B. BURDETT.
ELECTROLYTIC CELL.
APPLICATION FILED NOV. 6, 1912.

1,104,754.

Patented July 21, 1914.



Witnesses:
O. M. Simpson
Samuel E. Early

Inventor
John B. Burdett
By his Attorney
Samuel E. Early

UNITED STATES PATENT OFFICE.

JOHN B. BURDETT, OF CHICAGO, ILLINOIS. ASSIGNOR TO DAVIS-BOURNONVILLE COMPANY, OF NEW YORK, N. Y. AND CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

ELECTROLYTIC CELL.

Specification of Letters Patent.

Patented July 21, 1914.

1,104,754.

Application filed November 6, 1912. Serial No. 729,753.

To all whom it may concern:

Be it known that I, JOHN B. BURDETT, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have made a certain new and useful Invention in Electrolytic Cells, of which the following is a specification.

This invention relates to electrolytic cells and particularly to apparatus of this nature employed for decomposing liquids into their constituent gases.

The object of the invention is to provide an electrolytic cell which is simple in construction and efficient in operation.

15 A further object of the invention is to provide a cell of the nature referred to wherein the danger of intermingling of the gases of decomposition within the cell is efficiently prevented.

20 A further object of the invention is to provide a cell for the purpose stated wherein a maximum of surface area of electrode within a given space is attained.

25 A further object is to provide a cell of the character referred to which is compact and which is completely covered over to prevent ingress of dirt or other foreign substances to the electrolyte to be decomposed.

30 Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement, all as will be more fully hereinafter set forth, as shown in the 35 accompanying drawing and finally pointed out in the appended claims.

Referring to the accompanying drawing:—Figure 1 is a top plan view of an electrolytic cell embodying the principles of my 40 invention. Fig. 2 is a vertical central longitudinal section of the same. Fig. 3 is a horizontal transverse section on the line 3, 3, Fig. 2 looking in the direction of the arrows. Fig. 4 is a fragmentary view in bottom plan of the cap or cover for the cell 45 showing the arrangement of the spiral closed bell or chamber of the cell. Fig. 5 is a broken detail view showing means for supporting the porous diaphragm or curtain employed to insure a separation of the evolved 50 gases.

In the use of electrolytic cells employed for decomposing fluid solutions into their component gases and particularly in the 55 manufacture of oxygen and hydrogen for

use in the industries by decomposition of caustic solutions, various constructions of cells have been proposed and employed which involve more or less complexities of construction designed to prevent the intermingling of the evolved gases within the cell and also for supporting and relatively 60 arranging the electrodes and the separating porous curtains usually employed in such apparatus, and for collecting the evolved 65 gases. In the constructions heretofore employed the electrodes have been suspended within a tank or chamber containing the solution to be decomposed, and in one arrangement each electrode is supported within a 70 bell in which the gas evolved from the electrode collects and from which the collected gas passes through suitable connections to a gasometer or other storage tank and thence into suitable service pipes. Such 75 constructions are usually employed without a covering or top to inclose the receptacle with the result that dust, dirt or other foreign substances is liable to fall or be deposited in the receptacle thereby causing 80 foam to collect and to pass into the gas delivery connections along with the gas, and otherwise interrupting the proper operation of the cell. Moreover, in such constructions, it is impossible within the available space 85 afforded by the receptacle containing the caustic solution to secure a maximum surface area of electrode for efficient operation in the economical production of the gases. It is among the special purposes of my present invention to avoid these objections and 90 to provide a cover for the receptacle containing the solution to be decomposed, and also to secure a maximum surface area of electrodes within a given space or area of 95 receptacle.

In carrying out my invention I propose to employ a cap or cover for the receptacle containing the solution and which closes the same, and to form the cover with a chamber, 100 which, if desired, and preferably, is formed integrally with the cap or cover and of spiral formed, said chamber opening at the lower edges of the spirally formed walls thereof freely into the receptacle, said lower 105 edges of the chamber being immersed in the electrolyte contained in the receptacle. And I also propose, in accordance with my invention, to employ electrode plates or sheets, also formed into spirals, one being received 110

at its upper edge within the spiral chamber of the top or cover and the other similarly formed into a spiral and having its upper edges extending into the space between the spiral convolutions of the walls of the chamber. I also propose to separate the spiral electrode plates with a porous curtain or diaphragm also formed into a spiral and supported upon the walls of the spiral chamber, the electrode plates being suitably suspended within the spiral relation indicated. I also employ a gas delivery connection leading from the closed chamber for the delivery of the evolved gas collected in said chamber, and another delivery connection communicating with the space outside of said chamber for the delivery therefrom of the gas collected therein from the other electrode plate.

In the accompanying drawing reference numeral 10 designates a receptacle adapted to contain the caustic solution or other liquid to be decomposed and which, in the present instance, is of cylindrical contour closed at the bottom and open at the top. The open top of the receptacle is closed by a cap or cover 11. Carried by, or, and preferably, formed integrally with the cap or cover 11 upon the under side thereof is a spirally arranged chamber 12, that is, the walls 13 of the chamber 12 are formed into a spiral, thereby making the chamber 12 within said spiral walls a closed chamber while the space 14 outside of the inclosure of said walls is open. The spiral walls 13 of the closed chamber 12 depend downwardly from the top or cover 11 and at their lower edges are immersed in the solution to be decomposed. Suitably suspended within the closed chamber 12 is an electrode plate 15, which is formed into a spiral to conform to the spiral contour of said chamber, the upper edge of said plate extending through the open mouth of said chamber and into said chamber, the said plate depending therefrom into the receptacle 10, as clearly shown. Similarly, an electrode plate 16, similarly formed into a spiral is arranged with its upper edge to extend into the open space 14 which surrounds the spiral wall of the closed chamber 12, said plate 16 depending therefrom into the receptacle 10, as shown. The electrode plates 15, 16 may be supported in the relation above described in any suitable or convenient manner. I have shown a simple arrangement wherein supporting rods 17, 18 extend through the top 11 and are electrically connected and preferably welded to the upper edges of the plates 15, 16 respectively. These rods 17, 18 not only serve to support the electrode plates 15, 16 but they also constitute circuit terminals for connection to a convenient source of current.

In order to efficiently separate the gas

evolved from or adjacent one electrode plate or the surface thereof from that evolved from or adjacent the surface of the other of said plates, I employ a suitable porous diaphragm or curtain indicated at 19 and apply the same in interposed relation with respect to the electrode plates and in spiral relation thereto. A convenient arrangement for supporting the porous curtain is to support the same at its upper edge by applying it flatwise against one of the walls of the closed chamber 12. In Fig. 5 I have shown a simple arrangement for supporting the porous curtain 19 by applying thereto a ring 20 arranged in encompassing relation with respect to and in position to hug the exterior surface of the wall 13 of the closed chamber and suitably secured to said wall, as, for instance, by means of a clamping band 21, the upper edge of the curtain being clamped between the ring 20 and the wall 13.

In order to prevent the formation of a shoulder at the lower edge or mouth of the chamber 12 which might interfere with the passage of the gas into said chamber, I prefer to provide the lower edge of the ring 20 with an off-set portion indicated at 22 to engage over the lower edge of the wall 13, thereby bringing the curtain 19, or the surface thereof toward parallel relation with the inner surface of the wall 13 and hence preventing an otherwise objectionable shoulder at the lower edge of the wall 13.

A delivery pipe connection 23 delivers from the closed chamber 12, and similarly a delivery pipe connection 24 delivers from the open space 14. These delivery connections may include the usual lanterns 25 through which the separated gases passing therethrough may be delivered into convenient gasometers or receiving tanks and thence into service pipes in the ordinary manner.

From the foregoing description it will be seen that I provide a construction of electrolytic cell which is exceedingly simple and wherein the tank or receptacle containing the electrolyte is closed against the access of dirt, dust or other foreign matter, wherein a maximum surface area of electrodes is attained within a given space by reason of the spiral formations above explained and that the evolved gases are separately connected and maintained in efficient separation from each other within the cell, thereby avoiding danger of forming explosive mixtures.

Having now set forth the objects and nature of my invention and a construction embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent is:—

1. In an electrolytic cell, a receptacle, a

cover or top therefor, said cover or top having spirally arranged walls upon its under surface to form a closed chamber, electrode plates correspondingly formed into spirals
 5 and respectively suspended within said chamber and the exterior space thereof, a porous curtain separating said plates and gas delivery connections communicating respectively with said chamber and said exterior space.
 10

2. In an electrolytic cell, a receptacle, a top or cover therefor having integral spirally arranged walls on the under surface thereof forming a closed chamber and
 15 an open space between the spiral convolutions of said chamber, electrode plates respectively suspended in said chamber and open space and having spiral formations to conform to the spiral outline of said chamber and space respectively, a porous curtain
 20 interposed between said electrode plates and gas delivery connections communicating with said chamber and exterior space respectively.
 25

3. In an electrolytic cell, a receptacle, a top or cover therefor having depending

from the under surface thereof a specially arranged wall forming a closed chamber open at the bottom and an open space exterior of said chamber, electrode plates suspended respectively in said chamber and open space, a porous curtain applied against the spiral wall of said chamber and depending therefrom in spiral formation and interposed between said electrode plates and a
 35 clamping ring for securing said curtain against said spiral wall, said ring having an off-set lower edge to engage over the lower edge of said wall to bring the surface of the curtain toward alinement with the
 40 inner surface of said wall, and gas delivery connections respectively from said chamber and open space.

In testimony whereof I have hereunto set my hand in the presence of the subscribing
 45 witnesses, on this first day of November A. D., 1912.

JOHN B. BURDETT.

Witnesses:

E. H. THOMAS,
 L. M. SHIELDS.