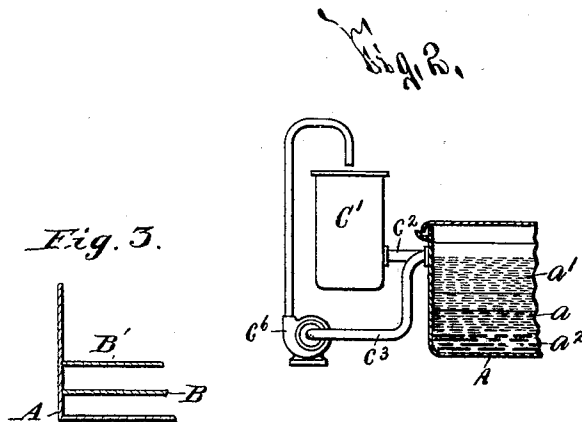
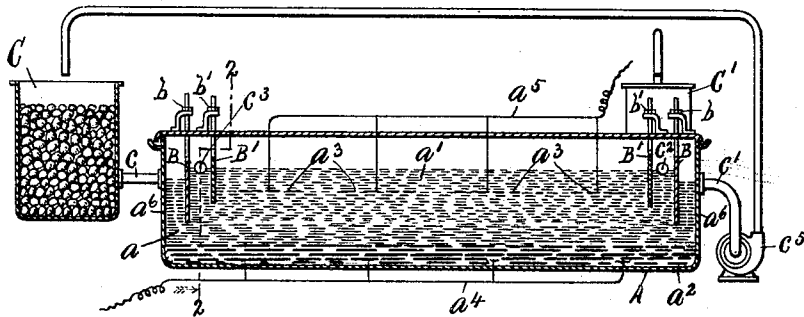


No. 774,230.

PATENTED NOV. 8, 1904.

A. BRICHAUX.
ELECTROLYTIC APPARATUS.
APPLICATION FILED OCT. 4, 1898.

NO MODEL.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ARTHUR BRICHAUX, OF BRUSSELS, BELGIUM, ASSIGNOR TO THE SOLVAY PROCESS COMPANY, OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

ELECTROLYTIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 774,230, dated November 8, 1904.

Application filed October 4, 1898. Serial No. 692,586. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR BRICHAUX, a subject of the King of Belgium, residing at Brussels, Belgium, have invented a new and useful Electrolytic Apparatus, (for which I have filed applications for foreign Letters Patents as follows: Belgium, No. 134,176, dated March 5, 1898; Germany, No. S. 11,224/75, dated March 18, 1898; Great Britain, No. 7,471, dated March 28, 1898; Russia, No. 4,603, dated May 4/16, 1898; France, No. 266,675, dated June 14, 1898; Switzerland, No. 18,984, dated July 29, 1898; Austria, dated August 19, 1898; and Hungary, No. 12,055, dated August 25, 1898,) of which the following is a specification.

This invention has for its object the production of an electrolytic apparatus of the class set forth in my pending application, Serial No. 692,585, and has for its object the production of an apparatus for the desired purpose which reduces to a minimum the liability of recombination of the products separated by the current; and to this end the invention consists in the combination, construction, and arrangement of the component parts of an electrolytic apparatus, as hereinafter fully described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawings, forming part of this specification, in which like letters indicate corresponding parts in all the views.

Figure 1 is a vertical sectional view of my improved electrolytic apparatus. Fig. 2 is a sectional view taken on line 2 2, Fig. 1. Fig. 3 is a horizontal sectional view of one end of Fig. 1, showing the transverse partitions.

My electrolytic apparatus comprises in its organization a receptacle A for receiving the electrolyte and means for maintaining layers of the electrolyte of unequal density, a a' , one above the other within the receptacle. Said receptacle A is of any desirable form, size, and construction, being usually rectangular and of greater length than height. A suitable cathode a^2 , as mercury, is supported upon the bottom of the receptacle A beneath the layer a of greater density. An anode, as conductors

a^3 , is arranged within the layer a' of lesser density, and said cathode and anode are connected to the conductors a^4 a^5 of an electric circuit.

The means for maintaining layers of the electrolyte of unequal density, a a' , within the receptacle A preferably consists of partitions B B B' B', chambers C C', and conduits c c' c^2 c^3 , connecting the receptacle A and the chambers C C'. The partitions B B are supported within the receptacle A between opposite walls a^6 thereof and the adjacent sides of the anodes a^3 , with their outer faces separated from the inner faces of said opposite walls of the receptacle and their lower edges arranged above the bottom of said receptacle and the lower layer a of the electrolyte. Said partitions may be fixed in position, but are generally connected to suitable adjusters, as nuts b , for raising and lowering the partitions in order to regulate the depth of the lower layer a of the electrolyte, which layer preferably fills the portion of the receptacle A, arranged beneath the partitions B B and above the cathode a^2 . The partitions B' B' are supported within the receptacle A between the partitions B B and the adjacent sides of the anode a^3 , with their outer faces separated from the adjacent faces of the partitions B B and their lower edges arranged above the lower edges of said partitions B B. The partitions B' B' may also be fixed in position, although they are generally connected to suitable adjusters, as nuts b' , for raising and lowering the same.

The chambers C C' contain the material to be electrolyzed and are generally of unequal size. The conduits c c' communicate between the partitions B B and the walls a^6 a^6 of the receptacle at points above the lower edges of said partitions, with opposite sides of the portion of the receptacle inclosing the lower layer a of the electrolyte. Said conduit c opens from the chamber C and serves to conduct a solution of the material to be electrolyzed to the receptacle A for forming the lower layer a of the electrolyte. The conduit c' is generally provided with a pump or other suction device c^5 , discharges into the chamber C, and

serves to conduct the layer *a* of the electrolyte from the receptacle A into the chamber C. The conduits *c*² *c*³ communicate between the partitions P' B' B B at points above the lower edges of said partitions, with opposite sides of the portion of the receptacle inclosing the upper layer *a'* of the electrolyte. Said conduit *c*² is connected to the chamber C' for conducting the upper layer *a'* of the electrolyte to the receptacle A, and the conduit *c*³ is provided with a pump or other suction device *c*⁶ and discharges into the chamber C' for conducting said upper layer of the electrolyte from the receptacle A into the chamber C'. The conduits *c* *c'* *c*² *c*³ and the pumps or other suction devices connected thereto effect a positive circulation of the separate layers of the electrolyte and add greatly to the efficiency of my electrolytic apparatus. It is obvious, however, that any other suitable means for effecting a positive circulation of said layers may be used instead of the conduits *c* *c'* *c*² *c*³.

The operation of my electrolytic apparatus is as follows: The electrolyte is divided into upper and lower layers of unequal density, the lower layer being maintained in contact with the mercury or other cathode and being almost or entirely saturated with the material to be electrolyzed, as an alkaline chlorid, and the upper layer being maintained in contact with the lower layer and the anode and impregnated with a less amount of said material. The dense lower layer serves the purpose of a diaphragm without occasioning the inconvenience attending the use of an ordinary solid diaphragm and remains practically free from the material, such as chlorin, being liberated at the anode, since said lower layer in contact with the mercury or other cathode is saturated with the material to be electrolyzed as an alkaline chlorid and cannot readily absorb any liberated chlorin, and since said lower layer being in contact with the mercury during the passage of the current and being maintained in circulation as a distinct layer by the partitions B B and the conduits *c* *c'* does not perceptibly mix with the upper layer of lesser density, which surrounds the anode. Said upper layer readily absorbs the liberated chlorin, owing to comparatively small amount of the material to be electrolyzed as alkaline chlorid in solution therein and is maintained as a distinct layer by the partitions B B B' B' and the conduits *c* *c*. Recombination of the material as chlorin liberated at the anode with the material as sodium or potassium liberated at the cathode is thus prevented.

The construction and operation of my electrolytic apparatus will now be readily understood upon reference to the foregoing description and the accompanying drawings, and it will also be understood that the construction and arrangement of its component parts may be more or less varied without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes, separated partitions supported within the receptacle between opposite walls thereof and having their outer faces separated from the inner faces of said opposite walls and their lower edges arranged above the bottom of the receptacle, and additional separated partitions supported within the receptacle between the first partitions and having their outer faces separated from the adjacent faces of the first partitions and their lower edges arranged above the lower edges of said first partitions, substantially as and for the purpose described.

2. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes, separated partitions supported within the receptacle between opposite walls thereof and having their outer faces separated from the inner faces of said opposite walls and their lower edges arranged above the bottom of the receptacle, additional separated partitions supported within the receptacle between the first partitions and having their outer faces separated from the adjacent faces of the first partitions and their lower edges arranged above the lower edges of said first partitions, and an adjuster for raising and lowering one of the partitions, substantially as and for the purpose specified.

3. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes arranged one above the other, partitions within the receptacle, and means co-operating with the partitions for maintaining layers of the electrolyte of unequal density within the receptacle one above the other and in contact with each other and the electrodes, substantially as and for the purpose described.

4. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes arranged one above the other, separated substantially upright partitions arranged within the receptacle and having their outer faces separated from the inner faces of the contiguous walls of the receptacle and lower edges arranged above the bottom of the receptacle, and inlet and outlet conduits communicating with the receptacle between the outer faces of the partitions and the inner faces of the contiguous walls of the receptacle, substantially as and for the purpose specified.

5. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes, separated partitions supported within the receptacle between opposite walls thereof and having their lower edges arranged above the bottom of the receptacle for maintaining layers of the electrolyte of unequal density within the receptacle and in contact

with each other, and conduits communicating with the receptacle between the partitions and said opposite walls of the receptacle at points above the lower edges of the partitions, substantially as and for the purpose specified.

6. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes, separated partitions supported within the receptacle between opposite walls thereof and having their outer faces separated from the inner faces of said walls and their lower edges arranged above the bottom of the receptacle, additional separated partitions supported within the receptacle between the first partitions and having their outer faces separated from the adjacent faces of the first partitions and their lower edges arranged above the lower edges of said first partitions, and conduits opening into the receptacle between the additional partitions and the first partitions at points above the lower edges of said partitions, substantially as and for the purpose described.

7. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes, separated partitions supported within the receptacle between opposite walls thereof and having their outer faces separated from the inner faces of said walls and their lower edges arranged above the bottom of the receptacle, additional separated partitions supported within the receptacle between the first partitions and having their outer faces separated from the adjacent faces of the first partitions and their lower edges arranged above the lower edges of said first partitions, conduits opening into the receptacle between the first partitions and said opposite walls of the receptacle at points above the lower edges of the first partitions, and additional conduits opening into the receptacle between the additional partitions and the first partitions at points above the lower edges of said partitions, substantially as and for the purpose specified.

8. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and

electrodes, separated partitions supported within the receptacle between opposite walls thereof and having their lower edges arranged above the bottom of the receptacle, a chamber containing the material to be electrolyzed and communicating with the receptacle between one of the partitions and one of said opposite walls of the receptacle above the lower edge of the partition, and a conduit discharging into the chamber and opening from the receptacle between the other partition and the adjacent wall of the receptacle at a point above the lower edge of said other partition, substantially as and for the purpose described.

9. An electrolytic apparatus comprising a receptacle for receiving the electrolyte and electrodes, separated partitions supported within the receptacle between opposite walls thereof and having their outer faces separated from the inner faces of said walls and their lower edges arranged above the bottom of the receptacle, additional separated partitions supported within the receptacle between the first partitions and having their outer faces separated from the adjacent faces of the first partitions and their lower edges arranged above the lower edges of said first partitions, chambers containing the material to be electrolyzed, conduits communicating with one of the chambers and opening into the receptacle between the first partitions and said opposite walls of the receptacle at points above the lower edges of the first partitions, and additional conduits communicating with the other chamber and opening into the receptacle between the additional partitions and the former partitions at points above the lower edges of the additional partitions, substantially as and for the purpose specified.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Brussels, Belgium, this 1st day of September, 1898.

ARTHUR BRICHAUX.

Witnesses:

J. S. FÜRSTENHOFF,
GREGORY PHELAN.