

No. 705,264.

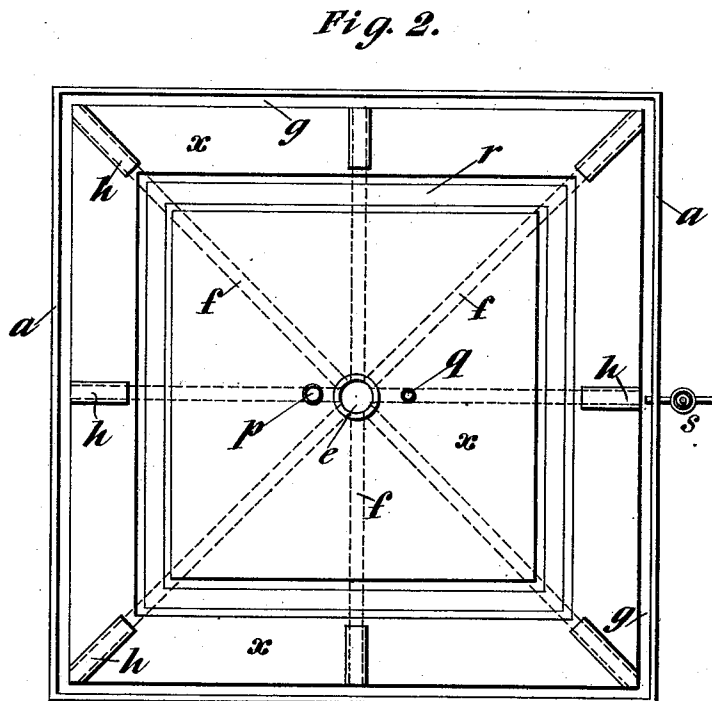
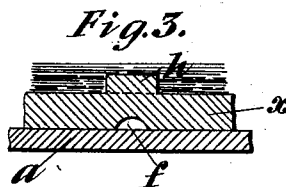
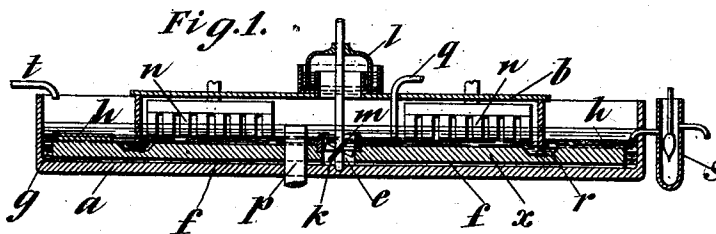
Patented July 22, 1902.

J. MACTEAR.

ELECTROLYTIC APPARATUS FOR THE PRODUCTION OF CHLORIN AND ALKALI.

(Application filed Sept. 8, 1901.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

JAMES MACTEAR, OF WESTMINSTER, ENGLAND.

ELECTROLYTIC APPARATUS FOR THE PRODUCTION OF CHLORIN AND ALKALI.

SPECIFICATION forming part of Letters Patent No. 705,264, dated July 22, 1902.

Application filed September 3, 1901. Serial No. 74,214. (No model.)

To all whom it may concern:

Be it known that I, JAMES MACTEAR, a citizen of England, residing at 28 Victoria street, Westminster, London, England, have invented certain new and useful Improvements in Electrolytic Apparatus for Production of Chlorin and Alkali, of which the following is a specification.

My invention relates to electrolytic apparatus for the production in the known manner of chlorin and alkali by decomposing an alkali chlorid, such as common salt, in solution, liberating the chlorin, and forming an amalgam of mercury with the alkali metal, then oxidizing the alkali metal to form caustic alkali.

My chief object is so to arrange the apparatus that it can be constructed economically and give a high efficiency and also prevent the accumulation of amalgam within the anode-chamber, which accumulation has hitherto been found to considerably reduce the power and efficiency of apparatus of this kind and to be a source of danger from explosion of the mixed gases which are evolved.

I shall describe, by way of example, one form and arrangement of an electrolytic cell according to my invention, referring to the accompanying drawings.

Figure 1 is a section, and Fig. 2 is a plan, with anode-cell removed, of one form of apparatus according to my invention. Fig. 3 is a part section through one of the ducts, drawn to an enlarged scale.

a is an open cathode-cell, which may be of iron or of non-conducting material, such as slate or earthenware, on which is fixed an iron plate x . Centrally in the cathode-cell I place an anode-cell b , made of non-conducting material, closed at the top and having the edges of its sides extending into a recess r , formed in the plate x of the cathode-cell, where they are supported a little above the bottom of the recess. Through the center of the plate x there is a hole forming a well e , from the bottom of which a number of ducts f , consisting of grooves formed on the under side of plate x , extend to a space g between the edge of x and the side walls of the cathode-cell. Ribs h project a little above the surface of the mercury on plate x in the part

outside the anode-cell, these ribs promoting the decomposition of the water by the alkali metal of the amalgam. In the well e is mounted a rotary propeller k , having inclined blades, the spindle of which passes up through the cover of the anode-cell and then has attached to it a bell l , dipping in a cup containing liquid to form a seal. The cell is charged with a quantity of mercury m sufficient to fill the well e , the space g , the ducts f , and the recess r and to form a thin layer all over the surface of plate x . In the anode-cell are fixed anodes n , which may be of carbon connected to the positive terminal of a source of electricity, while the mercury m is connected to the negative terminal. From the anode-cell there is an outlet-pipe p , extending to some height in the cell, so as to act as an overflow-pipe, and nearly to the bottom of the cell extends an inlet-pipe q .

A pipe t , leading from a cistern, supplies water to the space outside the anode-cell, and from this space there is an outlet through a vessel s , containing a hydrometer.

The apparatus operates as follows: The anode-cell being supplied by the pipe q with solution of alkaline chlorid to the height determined by the overflow-pipe p and the space outside the anode-cell being charged with water, the propeller k is caused to revolve and the electric circuit is closed. The chlorid is decomposed, the alkali metal forming an amalgam with the mercury, and the chlorin passing away by the pipe p . The mercury containing amalgam is by the action of the propeller caused to flow along the bottom of the anode-cell through the recess r and onward over the surface of plate x beyond the anode-cell, where the alkali metal becomes oxidized by the oxygen of the water, forming a solution of caustic alkali. The mercury returns along the ducts f to the central well e , to be again propelled outward. As the chlorid solution in the anode-cell becomes weakened fresh solution is supplied by the pipe q , that portion of the solution which is weakest and lightest overflowing by the pipe p along with the escaping chlorin, from which it is afterward separated through a suitable trap. When on inspecting the hydrometer in the vessel s the caustic-alkali solution is found

to be sufficiently strong, fresh water is supplied by the pipe *t*, causing alkali solution to flow out through the vessel *s*.

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

1. In an electrolytic apparatus, a cathode-cell having a plate arranged therein to form a space between the same and the walls of said cell, said plate provided with a recess, a well, and a series of ducts for establishing communication between the said space and well, an anode-cell mounted upon said plate and engaging in said recess, a supply and overflow pipe for the anode-cell, a propeller mounted in said well and having a spindle extending through the anode-cell, a seal for the said spindle, a cathode for said cathode-cell, and an anode for said anode-cell.
2. In an electrolytic apparatus, a cathode-cell having a plate arranged therein to form a space between the same and the walls of said cell, said plate provided with a recess on its upper face, a centrally-arranged well and a series of ducts on its lower face for establishing communication between the said space

and said well, an anode-cell mounted upon said plate and engaging in the said recess, a supply and overflow pipe for the anode-cell, a propeller mounted in said well and having a spindle extending through the anode-cell, a seal for the said spindle, a cathode for said cathode-cell, and an anode for said anode-cell.

3. In an apparatus of the character described, a cathode-cell provided with a plate having a space between the same and the walls of the cell, a well and a series of ducts for establishing communication between the space and the well, a layer of mercury in the said cathode-cell forming a cathode and adapted to fill the space, ducts and well, an anode-cell mounted in said cathode-cell, an anode in said anode-cell, and a propeller mounted in the said well, substantially as shown and for the purpose described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES MACTEAR.

Witnesses:

GERALD L. SMITH,
EDWARD GARDNER.