

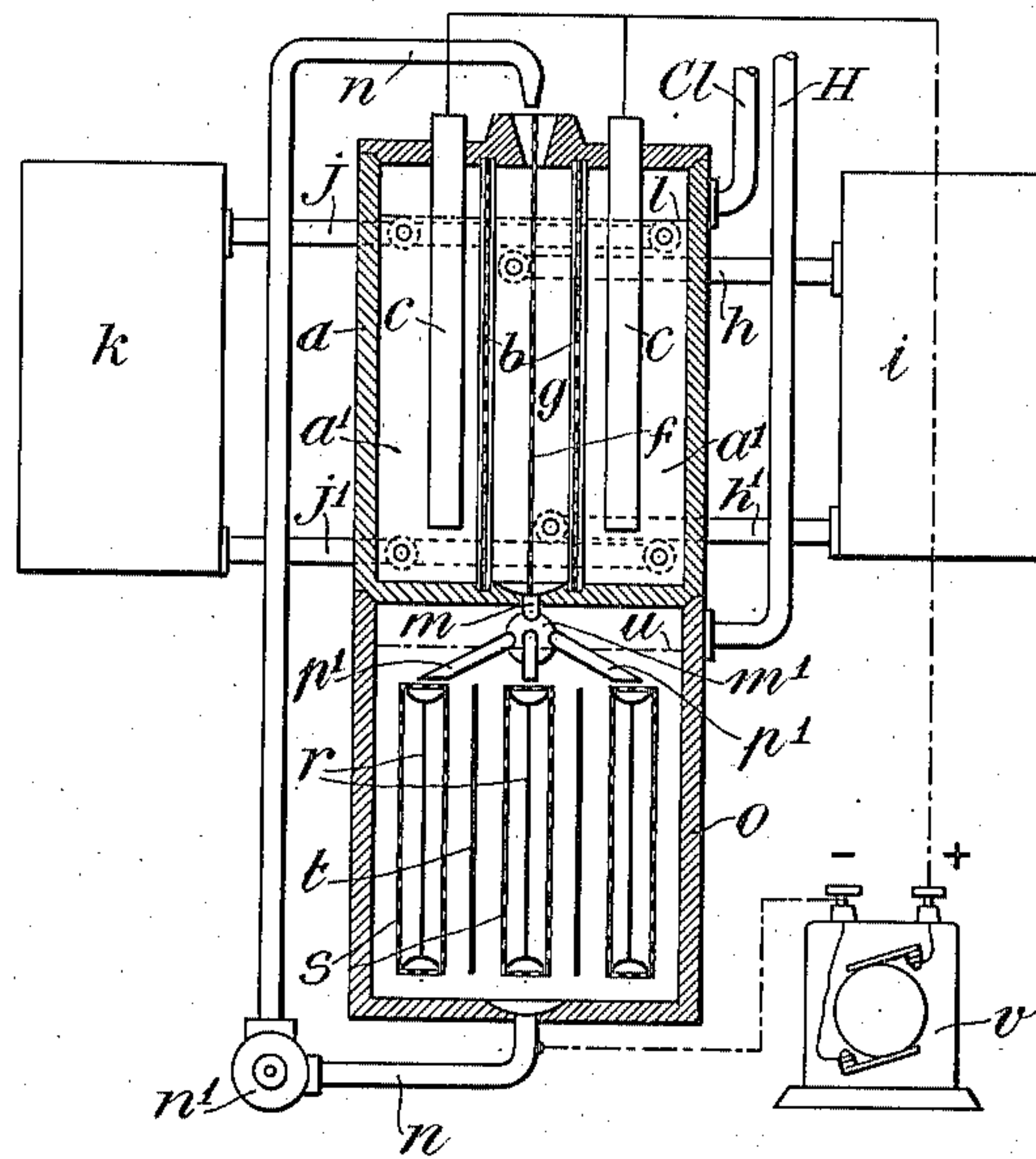
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APPARATUS FOR THE ELECTROLYTICAL DECOMPOSITION OF ALKALI CHLORID SOLUTIONS.

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947,741.

Patented Jan. 25, 1910.



Witnesses:

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Patented Jan. 25, 1910.

Original application filed May 4, 1906, Serial No. 315,127. Divided and this application filed January 7, 1908. Serial No. 471,140.

To all whom it may concern:

Be it known that I, JOHAN JACOB RINK, a citizen of the Kingdom of Denmark, residing at Copenhagen, in said Kingdom of Denmark, have invented certain new and useful Improvements in Apparatus for the Electrolytical Decomposition of Alkali-Chlorid Solutions, of which the following is a specification.

10 This invention relates to an improved apparatus for treating alkali chlorid solutions by electrolysis, this application being a divisional application of my application Serial No. 315,127, filed May 4, 1906.

15 In the application referred to there is described an apparatus in which the film of mercury which forms the cathode lies upon the bottom of a suitable vessel, so that amalgamation takes place only at the upper surface of such film.

20 The object of this invention is to provide an apparatus in which both surfaces of the mercury film are utilized for amalgamating surfaces, and instead of a horizontal film the mercury is caused to flow over opposite surfaces of an upright conduit-plate at both sides of which the amalgamation takes place, there being anodes at opposite sides of said conduit-plate and diaphragms by which the bubbles of chlorin gas generated at the anodes are prevented from reaching the cathode formed by said conduit-plate and the stream of mercury flowing over the same. Means are also provided by which the deposited metal is removed from the mercury by suitable apparatus and by which the mercury is returned to the conduit-plate for further use.

40 The novel features of the invention will appear from the following description and the appended claims.

The drawing shows in vertical section an apparatus constructed in accordance with the invention.

45 The receptacle *a*, which contains the electrolyte, has placed at the center thereof an upright perforated metal plate *f*, termed a conduit-plate, which, in connection with the stream of mercury flowing downwardly over opposite surfaces thereof from the top of the receptacle, forms the cathode. The mercury is delivered to the upper end of the

plate *f* by a pipe *n*. Anodes *c*, formed of bars or plates of carbon or like material, extend downwardly through the insulated cover of the receptacle *a* at opposite sides of the conduit-plate, and between each anode and the conduit-plate *f* is interposed a diaphragm *b*. These diaphragms separate the receptacle *a* into three vertical spaces or compartments which are shut off from each other, the middle compartment *g* containing the conduit-plate *f*, while the other compartments or spaces *a*¹ contain the anodes. The compartment or space *g* is located at opposite sides of the cathode *f* and contains the pure solution, it being connected by means of upper and lower pipes *h*, *h*¹ with a concentration vessel *i* in which the chlorid to be treated is placed in solid form. The circulation of the pure solution is produced through said pipes and concentration vessel. The spaces *a*¹ are connected in a similar manner by means of pipes *j*, *j*¹ with a second concentration vessel *k*, whereby the circulation of the solution contained in the spaces *a*¹ is produced.

Below the electrolyte receptacle *a* is a washing box *o* into which the mercury amalgam passes by means of an opening in the bottom of the receptacle *a* directly beneath the conduit-cathode. In this opening is placed a short tube *m* provided with a mercury seal *m*¹ from which pipes *p*¹ extend radially directly over washing plates formed by supporting plates *r* over which wire nettings *s* are placed. Interposed between the washing plates are vertical metal plates *t* adapted to be electro-negatively charged. The pipe *n* is connected with the washing box *o* at its lower portion, said pipe being connected to a suitable pump *n*¹ by which the washed mercury is pumped back to the conduit-plate *f*. A pipe *C*¹ connected with the electrolyte receptacle carries off the chlorin gas, while a pipe *H* connected with the washing box *o* takes off the hydrogen generated. The anodes *c* are connected to the positive pole of a source of electricity *v*, the negative pole of which is connected to the mercury-conducting pipe *n*, as indicated.

The operation of the apparatus is as follows: The receptacle *a* is filled with the electrolyte up to the line *l*, and the electric cur-

rent being turned on the mercury is pumped through the pipe n until it discharges over the conduit-plate f down which it runs at opposite surfaces of said plate, at which surfaces the amalgam is formed in the well known manner. The circulation of the electrolyte in the spaces a^1 and g is produced by the pipes and concentration vessels hereinbefore described. The diaphragms b separate the pure electrolyte from that contained in the anode compartments a^1 in which the chlorine bubbles are formed, these bubbles being thus prevented from reaching the cathode. The washing of the mercury takes place in the washing box o which is filled with water or diluted lye up to the line u . After the deposited metal has been removed from the mercury and the latter thoroughly washed, it is again returned by means of the pump n^1 and pipe n to the conduit-cathode.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An alkali electrolyzer comprising a vessel containing the chlorid solution, a perforated cathode presenting a single mercury-film adapted to receive a deposit at both sides, diaphragms at both sides of the cathode, anodes located outside of the diaphragms, and means for retaining concen-

trated solution inside and outside of the diaphragms.

2. An alkali electrolyzer comprising a vessel containing the active solution, anodes in the same, a perforated conduit-cathode located between the anodes and presenting a single mercury-film adapted to receive a deposit at both sides, and means for washing off the amalgam and returning the same to the cathode.

3. An alkali electrolyzer comprising a vessel containing the working solution, anodes in said vessel, a conduit-cathode between the anodes and provided at both sides with amalgamated surfaces, a second vessel containing the washing solution for dissolving the alkali metal, washing plates located in said vessel, means for spreading the amalgam over the washing plates, metal plates between the washing plates, means for conducting the amalgam from the cathode to the washing plates, and means for returning the washed off mercury to the conduit-cathode.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JOHAN JACOB RINK.

Witnesses:

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