(No Model.)

J. C. RICHARDSON.

ELECTROLYTIC APPARATUS.

No. 508,241. Patented Nov. 7, 1893.

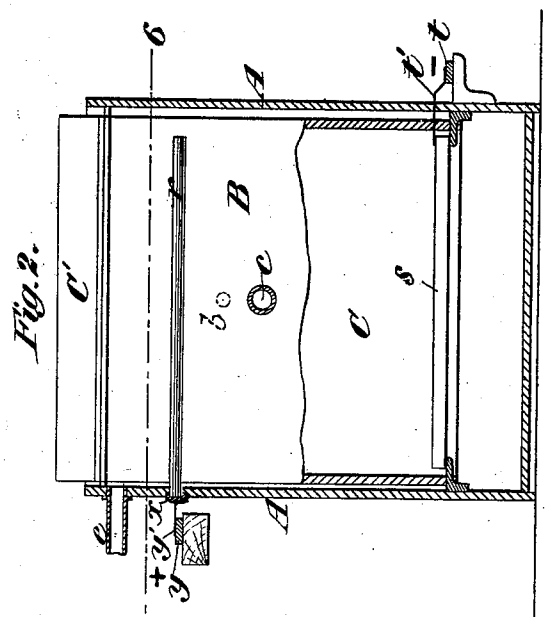

Fig. 2.

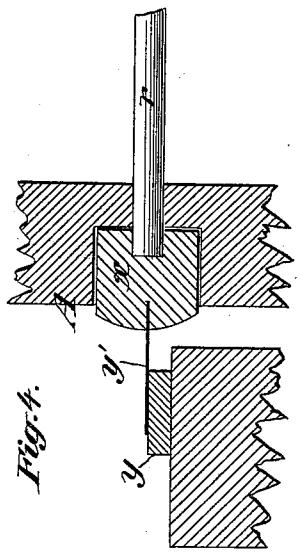

Fig. 4.

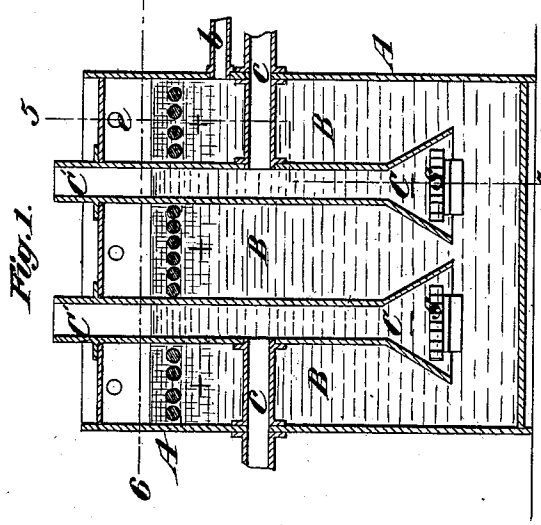

Fig. 1.

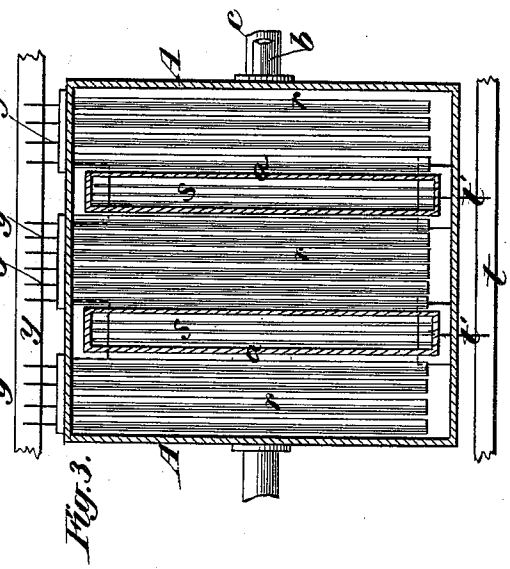

Fig. 3.

Witnesses:—
George Barry.
C. L. Sundgren

Inventor:
James C. Richardson
by attorneys
Brown & Seward

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES CHARLES RICHARDSON, OF LONDON, ENGLAND.

ELECTROLYTIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 508,241, dated November 7, 1893.

Application filed March 26, 1891. Serial No. 386,586. (No model.) Patented in England February 12, 1890, No. 2,297; in France February 12, 1891, No. 211,368; in Belgium March 27, 1891, No. 94,307; in Austria-Hungary September 22, 1891, No. 14,151, and in Canada March 15, 1892, No. 38,484.

To all whom it may concern:

Be it known that I, JAMES CHARLES RICHARDSON, of 23 Claremont Square, Clerkenwell, London, in the county of Middlesex, England, have invented a new and useful Improvement in Electrolytic Apparatus, (for which I have obtained an English patent, No. 2,297, dated February 12, 1890; a French brevet d'invention, No. 211,368, dated February 12, 1891; a Belgian patent, No. 94,307, dated March 27, 1891; an Austro-Hungarian patent, No. 14,151, dated September 22, 1891, and a Canadian patent, No. 38,484, dated March 15, 1892,) of which the following is a specification.

The main object of the present invention is to facilitate the electrical decomposition of common salt (chloride of sodium) for the production of chlorine and caustic soda suitable for use in the manufacture of paper, but the invention is also applicable in electrolysis for other purposes.

When chloride of sodium in solution is decomposed by an electric current with an insoluble anode, it is resolved into its elements chlorine and sodium, the chlorine being set free next the anode or pole by which the current enters the solution and the sodium eventually becomes caustic soda by the decomposition of the water present, being set free next the cathode or pole by which the current leaves the solution, hydrogen being at the same time given off at that pole. In tanks usually employed, the anode and cathode are separated from each other by a partition which will more or less prevent the liberated elements from re-combining while the passage of the current is still permitted.

One part of my invention relates to the construction of the partitions above mentioned whereby effective provision is made to prevent the recombination of the liberated elements and at the same time provision is made for the escape of the chlorine and the hydrogen.

Another part of my invention relates to the connections of a series of anodes in an electrolytic apparatus with a continuous conductor common to the whole series.

The nature of the improvement will be described with reference to the accompanying drawings and its novelty set forth in the claims.

Figure 1 in the drawings represents a transverse vertical section of as much of an electrolytic apparatus as is necessary for the illustration of my invention. Fig. 2 is a vertical section of the same at right angles to Fig. 1, taken approximately to the line 5, 5. Fig. 3 represents a horizontal section of the same in the line 6, 6 of Figs. 1 and 2. Fig. 4 represents on a larger scale, a vertical sectional view of the anode connection.

Similar letters of reference designate corresponding parts in all the figures.

A is a covered tank of slate or other suitable material divided longitudinally by partitions *a* into compartments of which those denoted by B are anode compartments and the alternate ones denoted by C are cathode compartments. The said partitions *a* are constructed in pairs in the form of narrow flat tubes which extend the whole length of the tank, the upper ends of said partitions or flat tubes extending upward through the cover of the tank and their lower ends, which are open and flared in the form of inverted hoppers, terminating at such distance from the bottom of the tank as will permit the free passage of the electric current under them through the solution in the tank yet to prevent the elements liberated in the anode and cathode chambers from recombining. By this construction of the partitions the upper parts of the anode chambers are made wide that each may contain a number of anodes *r* and the lower parts of the alternating cathode chambers are made wide that they may contain a number of cathodes *s* as shown in Fig. 1.

b is a pipe for feeding the salt solution to the tank.

e are pipes connected with the upper parts of the anode chambers for the escape of chlorine.

c are pipes leading from the cathode chambers through the walls of the tank for drawing off the caustic soda solution as soon as it is sufficiently strong.

The upward extensions *c'* of the partitions

a above the cover of the tank form pipes for the escape of the hydrogen.

The several pipes *e* C′ may communicate with any suitable receivers or conduits according to the uses to be made of the chlorine and hydrogen which are liberated.

The anodes or positive electrodes *r* are represented as consisting of rods of carbon which pass through the sides of the tank into the compartments B and are fixed in leaden or other metal plugs *x* of which there is one shown for each chamber B, in electrical connection by branch conductors with a main conductor *y* running the whole length or width of the tank outside. The said plugs *x* are represented as supported in recesses in the sides of the tank. The cathodes or negative electrodes *s* may consist of parallel strips of copper grouped and connected in the form of a horizontal grid for each compartment C and each of said grids connected by a branch conductor *t*′, which passes through the wall of the tank, with a main conductor *t* running the whole length of the tank outside thereof.

I have only particularly described this invention with reference to chloride of sodium but it is obviously applicable to the electrolyzing of solutions of chloride of potassium.

What I claim as my invention is—

1. A tank for the electrolytical production of caustic soda and caustic potash from solutions of chloride of sodium and potassium consisting of a closed vessel having compartments formed by partitions which extend downward within said vessel nearly to the bottom thereof and upward through the cover thereof and which divide the said tank into chambers which are alternately wider at the top and at the bottom, the electrodes of one polarity being in the upper wide parts of alternate chambers and those of opposite polarity being in the lower wide parts of the intervening chambers, substantially as herein set forth.

2. In a closed tank for electrolyzing solutions of chloride of sodium and potassium, the combination with a series of chambers formed by partitions extending downwardly in the tank, of leaden plugs arranged one in the side of each anode or positive chamber, a continuous electrical conductor connected with the several plugs and a plurality of anodes fixed in said plugs and projecting through the side of the tank into the anode chambers as hereinbefore described.

JAMES CHARLES RICHARDSON.

Witnesses:
H. K. WHITE,
A. W. SPACKMAN.