C. C. TITUS.

ELECTROLYTIC CELL.

APPLICATION FILED DEC. 14, 1910.

1,111,977. Patented Sept. 29, 1914.

Fig. 1.

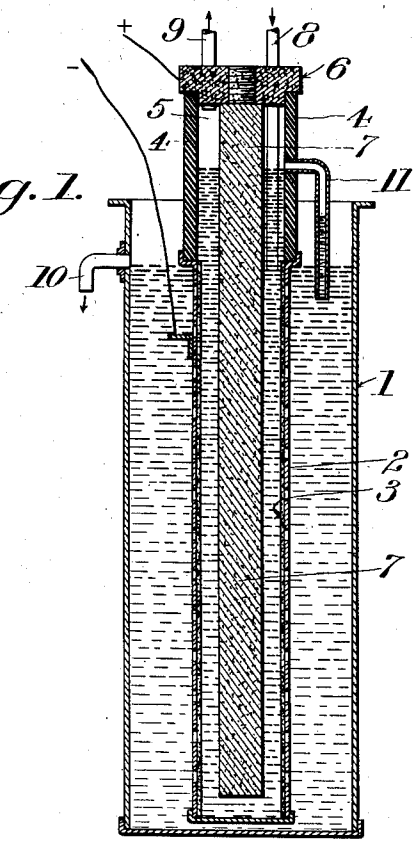
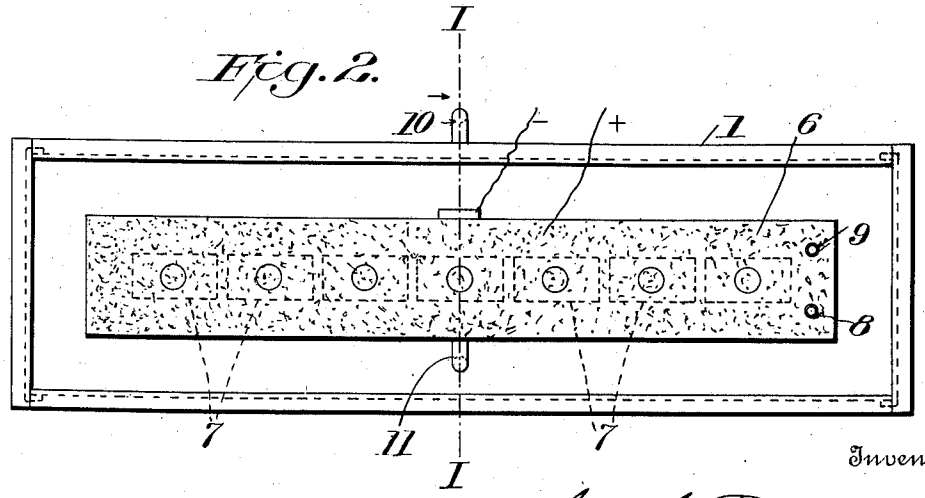


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ELECTROLYTIC CELL.

1,111,977. Specification of Letters Patent. Patented Sept. 29, 1914.

Application filed December 14, 1910. Serial No. 597,223.

To all whom it may concern:

Be it known that I, COURT C. TITUS, a citizen of the United States, residing at Helena, in the county of Lewis and Clarke and State of Montana, have invented certain new and useful Improvements in Electrolytic Cells, of which the following is a specification.

This cell is especially designed for the electrolysis of sodium chlorid and production of chlorin and caustic soda. The cell has two compartments separated by a diaphragm and a foraminous sheet-metal cathode, and an overflow pipe for brine leading from the upper end of the anode compartment into the outer compartment.

Referring to the accompanying drawing—Figure 1 is a transverse vertical section of the cell on the line 1—1 of Fig. 2; and Fig. 2 is a plan view of the cell.

The cell illustrated comprises a rectangular sheet steel vessel 1, within and spaced away from which is a rectangular sheet steel vessel 2 having perforated sides and serving as the cathode. Within the cathode vessel, and lining its sides is the diaphragm 3 of asbestos cloth. Supported on the flanged upper ends of the cathode vessel are plates 4 of slate or silicated asbestos, forming a chamber 5 which is closed at the top by a graphite cover 6. A series of depending graphite bar anodes 7 are carried by this cover, their upper ends being screwed into holes therein. A brine-supply pipe 8 and a chlorin-discharge pipe 9 extend through the cover. A discharge-pipe 10 for the causticized brine extends from the upper end of the vessel 1.

In cells of this type, it is customary to maintain a higher level in the anode compartment than in the outer compartment, in order to cause percolation of the brine outward through the diaphragm at such a rate as to continuously dissolve and carry off the caustic produced. In using these cells to electrolyze impure natural salt or brine, however, the diaphragm is clogged by the insoluble basic products of electrolysis, *e. g.*, hydroxids of magnesium and calcium, so that the rate of brine-percolation rapidly decreases, necessitating cleaning or replacement of the diaphragm. Yet the deposit on the diaphragm does not materially raise the internal resistance of the cell or require an increased potential difference at its terminals, but does increase the resistance to diffusion and current-efficiency.

According to the present invention, such basic deposit is allowed to remain and accumulate on the diaphragm, and the cell is provided with a special overflow pipe 11 leading from the upper end of the chamber 5 and thence extending downward into and being sealed by the brine in the outer compartment. In use, brine is supplied to the anode compartment through the pipe 8, sealed by the brine therein, and the chlorin is withdrawn through the pipe 9 by means of an exhaust pump, creating a partial vacuum in the chamber 5 and raising the level of the anolyte until it reaches the pipe 11, whereupon the brine continuously overflows into the outer compartment. The pipe 11 is fixed at such height that there is a pressure of about two inches of brine against the inner surface of the diaphragm, notwithstanding the partial vacuum, to prevent diffusion and leakage of the catholyte into the anode chamber. The rates of supply of fresh brine to the anode compartment and removal of causticized brine from the outer compartment are correlated and predetermined to give the desired percentage of caustic in the product.

I claim:—

1. In an electrolytic cell having two compartments separated by a diaphragm and foraminous cathode, an overflow passage extending from the upper end of the anode compartment into the other compartment.

2. In an electrolytic cell having two compartments separated by a diaphragm and foraminous cathode, an overflow pipe extending from the upper end of the anode compartment downward into the other compartment.

3. In an electrolytic cell having two compartments separated by a diaphragm and

foraminous cathode, a gas-tight chamber at the upper end of the anode compartment, means for maintaining a partial vacuum therein, and an overflow pipe extending from said chamber downward into the outer compartment and sealed by the liquid therein.

In testimony whereof, I affix my signature in presence of two witnesses.

COURT C. TITUS.

Witnesses:
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