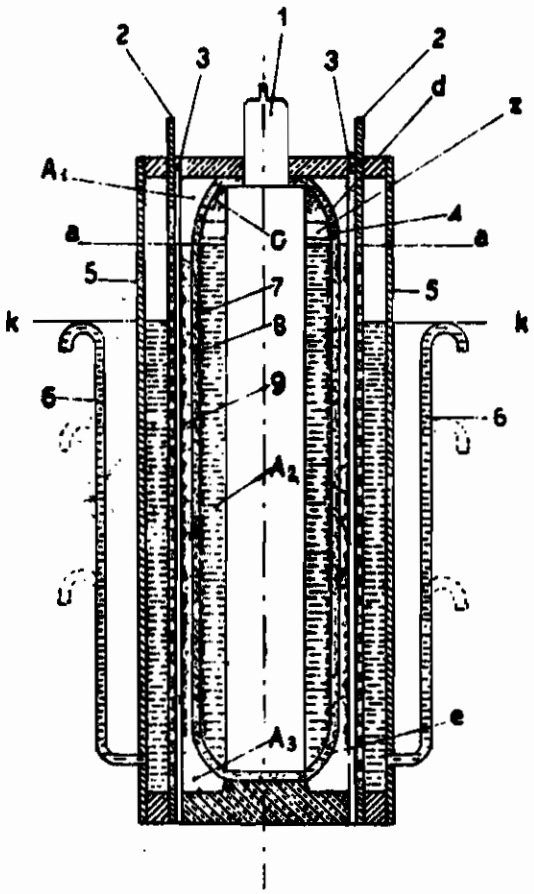
PUBLISHED
MAY 18, 1943.
BY A. P. C.

B. FELEDI
ELECTROLYTIC CELLS
Filed Oct. 25, 1940

Serial No.
362,843



Béla Feledi
Applicant
by Willard Light
Agent

Published May 18, 1943

Serial No. 362,843

ALIEN PROPERTY CUSTODIAN

ELECTROLYTIC CELLS

Bela Feledi, Budapest, Hungary; vested in the Alien Property Custodian

Application filed October 25, 1940

The present invention relates to electrolytic cells commonly used for the electrolysis of alkali chlorides and other similar solutions, and in particular to an arrangement for reducing in a substantial extent the obstruction which occurs in the porous diaphragms used in these cells.

It is well known how in these cells, for the fact that the brines used are not very pure, and as some grains or particles of graphite are easily detached from the graphite electrodes forming the anodes, the porous diaphragms in contact with the metal electrodes forming the cathodes are easily obstructed by such solid particles. These obstructions rapidly reduce the efficiency of the cell, so as frequent washing of the said diaphragms are required in order to eliminate the above mentioned particles. For washing said diaphragms it is necessary however to stop the normal operation of the cell at least for a period of 24 hours, and this is another considerable difficulty experienced in the operation of said cells.

The main object of my invention is to eliminate the mentioned difficulties and to provide a cell, which may operate for a long time-period with a good efficiency and without requiring washing.

Another object of this invention is to provide a cell provided with one or more supplementary diaphragms located between the graphite-anodes and the porous covering of the cathodes.

Such a supplementary diaphragm retains most of the graphite-grains, which leave the anodes, without preventing the free circulation of the electrolyte in the cell.

Another object of this invention is to obtain a better operation of the graphite-anodes, providing for an electric connection between the particles deposed on the diaphragms and the anodes so as to cause said particles to work as anodes in the electrolytic process. The electrolysis which occurs near said diaphragms through the action of these particles, causes a development of gas on the whole surface of the diaphragms and the impurities deposed on them are continuously eliminated by means of the developed gas-bubbles, so that the obstruction of diaphragms results considerably hindered.

The accompanying drawing is a sectional elevation of an electrolytic cell according to the invention, where a single anode and a single cathode are shown.

In the illustrated embodiment of the invention, the cell comprises a metallic casing **5** with discharge tubes **6** and a graphite-electrode **1** connected with the positive pole of the electric source so as to work as anode.

The cathode **2** is constituted with a perforated sheet iron, covered in the usual manner with the diaphragm **3** formed with textile-fabric or asbestos-board. According to the invention the anode is encircled with an envelope of asbestos-fabric **4**.

The spaces A_1, A_2 and A_3 constitute the anodic room containing the brine as electrolyte.

Heretofore in such a cell, the level a of the fluid in the anodic room was maintained at a constant height, while in the cathodic room the level k was lowered changing the position of the outlets of the discharge pipes according to the progress of the obstruction on the diaphragms. When said obstruction had reached a predeterminate limit, the level k could not be still lowered and the stopping of the operation of the cell was necessary for washing or changing the diaphragms. Furthermore, as the obstruction of said diaphragms is not quite uniform, a noninform passage of the liquid throughthere results.

According to the present invention, the participation of said graphite-particles to the electrolysis with the consequent production of gas-bubbles reduces the possibility to excessively increase the depth of the graphite-layer and due to the said gas-development, on the whole surface of diaphragms, a uniform filtration is obtained.

This gas-development on the diaphragms-surface is assured as follows: the chlorine developed in the rooms A_1 and A_3 and having a slight overpressure, passes through the pores of the envelope **4** and through the openings d provided in it and pushes the envelope **4** near the diaphragm **3**.

Through the fine graphite-particles indicated on the drawing with **7** and deposed on the inner-surface of the envelope **4**, and through the graphite-particles indicated with **8** and obstructing some pores of said envelope, the electric current passes from the anode **1** to the layer **9** of graphite-particles deposed on the diaphragm **3**, so as said layer may work as anode and decompose the electrolyte, producing the above mentioned gas-bubbles on the diaphragm-surfaces.

The passage of the electric current from the anode **1** to the graphite-layer **7** is obtained as follows:

The specific gravity of the fluid in the room A_3 during the operation of the cell, is ever higher than the specific gravity of the fluid contained in the room A_2, due to the gas-bubbles produced

in said room A_2. In consequence of said specific gravity difference, a liquid flow from the lower room A_3 to the upper room A_2, is established. This flow of the liquid is also aided by the gas-bubbles flowing upwards, and by the openings *e* provided in the lower portion of the envelope 4. The above described flow of the anodic liquid convey the graphite-grains which leave the anode into the room C between said electrode and the envelope 4 forming in this manner an electric connection between them.

The electric connection between the anode and the diaphragm may also be obtained by means of conducting preces located between the anode and the graphite layer deposed on the said envelope. Said conducting pieces are formed in the embodiment known as projections *z* provided on the graphite-electrode 2.

The graphite-particles leaving the anode represent commonly a loss of material. On the contrary according the process that is the object of my invention most of the said graphite-particles are not lost because they remain in electric contact with the anode and still form a part of the anode.

An identical operation of the cell may be obtained, according my invention, also without the intermediate diaphragm 4, and providing direct electrical connection, between the anode and the graphite-particles which are gathered on the diaphragms of the cathodes. Said electric conducting connections may be located either outside or inside the cell.

BELA FELEDI.