E. A. SPERRY.

CATHODE.

APPLICATION FILED JAN. 26, 1909.

961,549. Patented June 14, 1910.

Fig. 1.

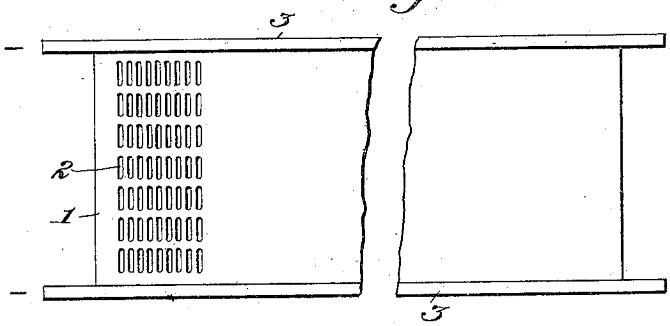

Fig. 4.

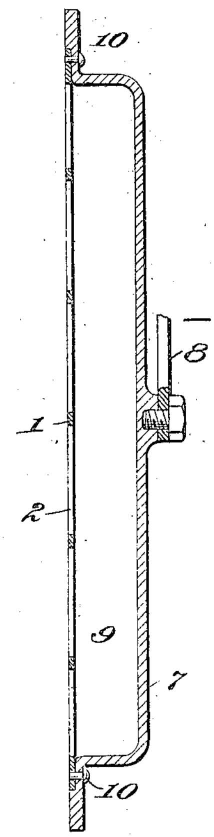

Fig. 2.

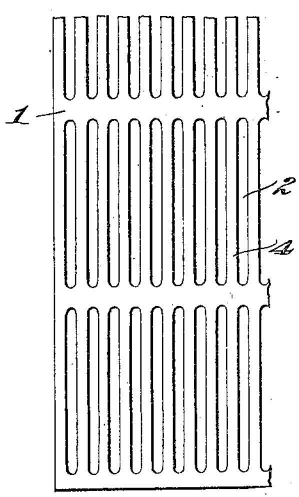

Fig. 3.

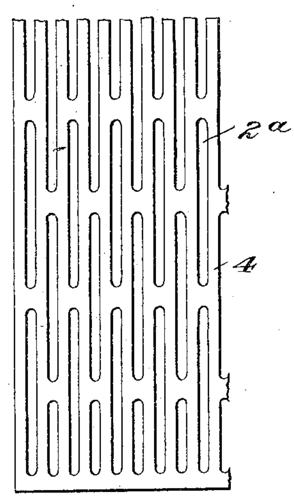

Fig. 5.

Witnesses:
C. H. Potter.
N. P. Leonard.

Inventor:
Elmer A. Sperry.
by Byrnes, Townsend & Brickenstein
Attys.

UNITED STATES PATENT OFFICE.

ELMER A. SPERRY, OF BROOKLYN, NEW YORK, ASSIGNOR TO HOOKER ELECTRO-CHEMICAL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CATHODE.

961,549. Specification of Letters Patent. Patented June 14, 1910.

Application filed January 26, 1909. Serial No. 474,255.

To all whom it may concern:

Be it known that I, ELMER A. SPERRY, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Cathodes, of which the following is a specification.

This invention is a metallic cathode plate which is particularly adapted for use with electrolytic cells of the type wherein a diaphragm is laid in contact with one face of the cathode, an example of a cell of this character being that described in U. S. Patent No. 779,384, issued January 3, 1905, to C. P. Townsend. In such cells, and particularly in case a high current density is employed at the cathode, it is desirable to secure a substantially even distribution of the current over the face of the cathode plate, as otherwise irregularities of action may ensue, resulting in a decreased efficiency of operation. The perforations of the cathode should preferably aggregate 50% or more of its exposed area. These perforations have heretofore usually comprised uniformly distributed circular apertures. While the electrical conductivity of a plate of this character is substantially uniform in all directions, it has been found that such apertures tend to clog or fill in practice when in contact with impure liquors, the deposit accumulating in the lower portion of each aperture to a height dependent upon the thickness of the plate; after a certain amount of material has collected, any further deposit is washed out and eliminated by the escaping gases and percolating liquid. I have found that the difficulty due to the clogging of these perforations may be largely overcome and other important advantages secured by elongating the apertures in a vertical direction. In this case the deposit, being dependent upon the thickness of the plate, does not rise higher than in a circular orifice, and thus clogs or fills a much less proportion of the area of the perforations. These elongated perforations or slots possess a further advantage which is independent of their vertical or other position, in that for a given percentage area of aperture in the plate, they afford, as compared with circular apertures, an increased active cathode area: this results from the fact that the walls of the perforations are cathodically active to the extent that they are wet with the brine or other solution undergoing electrolysis, or are in contact with the saturated diaphragm; and a far greater length of wall is provided by the use of the elongated apertures. It is desirable that the cathode plate should be as thin as is consistent with strength and the considerations of electrical conductivity. In order that it may be made thin and at the same time may effect a substantially even distribution of the current, I have found it essential that the current should be conducted from the cathode at those edges which are transverse to the slots or elongated perforations. In this way a direct and short path is afforded for the current from any portion of the plate to the conductors. It will be understood that contact may also be made along the edges parallel to the perforations.

For a full understanding of the invention reference is made to the accompanying drawings, wherein:

Figure 1 is a face view of one form of cathode plate in accordance with my invention; Fig. 2 is an enlarged fragmentary face view of the same; Fig. 3 is a similar view showing a staggered arrangement of slots; Fig. 4 is a vertical sectional view of a cathode compartment of an electrolytic cell, showing the cathode; and Fig. 5 is a partial longitudinal section through a cathode plate and diaphragm.

Referring to the drawings, 1 represents a steel or iron plate, illustrated as having a plane surface provided with closely spaced elongated slots or perforations 2, which in practice may amount in the aggregate to 50% or more of the exposed area of the plate. These slots are disposed at right angles to the longer edges of the plate, in contact with which edges are conductors 3. In the application of this cathode to an electrolytic cell having a metallic cathode compartment, it will be understood that the cathode connection may be made to this compartment, which should then be in effective electrical contact with the cathode plate along both of those edges which are transverse to the perforations, that is to say along the upper and lower edges of a plate positioned as shown in Fig. 1.

Fig. 2 shows a fragment of the slotted plate having parallel, alined perforations. Fig. 3 shows a fragment of a modification having staggered perforations alined in the direction of their longest dimensions. It will be observed that in either case the metal strips 4 between the perforations are straight and uninterrupted across the working face of the plate, affording direct current paths to the lateral current leads, or to the abutting portions of the cathode compartment, as the case may be. This last mentioned construction is illustrated in Fig. 5, wherein 7 is a metallic cathode compartment or chamber, having a cathode connection at 8. The cathode plate 1 overlies the recessed portion 9 of this compartment and is shown as secured to its upper and lower edges in such manner as to secure an effective electrical contact. This may be accomplished by riveting the cathode plate into rabbets in upper and lower flanges of the cathode compartment as illustrated at 10 in Fig. 5, or by welding; or electrical contact between the cathode plate and the cathode compartment may be secured by any other appropriate means.

The apertures 2, 2^a are preferably punched by suitable dies whereby a somewhat rounded contour is given to the edges of the intermediate strips 4 on one face, as illustrated at 6 in Fig. 5. In assembling the cell the diaphragm 5 is in certain cases placed upon this face of the plate, as illustrated in Fig. 5. This affords the advantages of reducing the flat cathode surface facing the anode, and of facilitating the entry of the diaphragm, under pressure of the electrolyte, into the apertures as clearly shown in Fig. 5, thereby considerably increasing the active cathode surface in actual contact with the diaphragm. Under certain conditions of operation however this arrangement may be reversed, the apertures being rounded outwardly or away from the diaphragm, thus permitting a ready clearance of the percolating electrolyte and tending to prevent the accumulation of any deposit in the apertures.

I claim:—

1. A cathode plate comprising a metallic sheet having longitudinally-alined, elongated perforations disposed transversely to the longest dimension of the plate.

2. A cathode plate comprising a metallic sheet having longitudinally-alined, elongated perforations disposed transversely to the longest dimension of the plate, in combination with current conductors in contact with the longer sides of the plate.

3. In combination, a recessed metallic plate, and a cathode plate in metallic contact therewith and overlying the recessed portion thereof, said cathode plate comprising a metallic sheet having longitudinally-alined, elongated perforations disposed transversely of the longest dimension of the plate.

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

ELMER A. SPERRY.

Witnesses:

THOMAS F. EGAN,

FRANCIS O. PAUST.