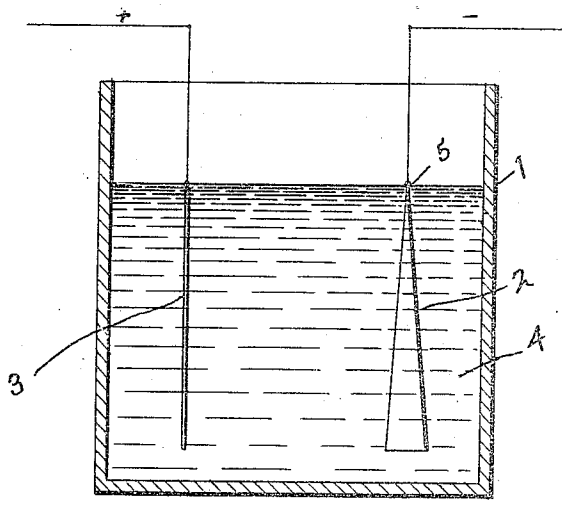
F. H. BRIGGS.

ELECTROLYTIC CELL.

APPLICATION FILED JUNE 22, 1910.

981,371. Patented Jan. 10, 1911.



Witnesses.
E. B. Gilchrist,
H. R. Sullivan

Inventor.
Frank H. Briggs
by Thurston & Kwis
Attys.

UNITED STATES PATENT OFFICE.

FRANK H. BRIGGS, OF ELYRIA, OHIO.

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981,371. Specification of Letters Patent. Patented Jan. 10, 1911.

Application filed June 22, 1910. Serial No. 568,255.

To all whom it may concern:

Be it known that I, FRANK H. BRIGGS, a citizen of the United States, residing at Elyria, in the county of Lorain and State of Ohio, have invented a certain new and useful Improvement in Electrolytic Cells, of which the following is a full, clear, and exact description.

Considered broadly, this invention relates to an electrolytic cell in which the cathode electrode is so formed that hydrogen gas evolved at the cathode will readily become disengaged from and leave that electrode and thereby reduce the possibility of polarization of the electrode to a minimum.

More specifically, it is proposed to use the cathode electrode here shown and described in the electrolytic production of chlorates and hypo-chlorites, from alkaline metal and alkaline earths.

It has previously been discovered that the chlorids of the alkaline metals and alkaline earths may be treated electrolytically, using metallic electrodes and without the use of a separating diaphragm if the amount of chlorid present in the cell be maintained at a low percentage. That is to say, by observing the conditions just mentioned, the chlorin and hydrogen which are liberated at the anode and cathodes respectively of the electrolytic cell do not chemically unite to any great extent. But on the other hand, the hydrogen liberated at the cathode does have an objectionable result in that it accumulates upon the cathode electrode and causes the electrode to become polarized in a short time. It is for the purpose of obviating this polarization that the cathode electrode herein shown is designed. But it will be quite evident that the electrode here shown may find a broader use than in connection with the specific use here suggested, viz: it may be used in any electrolytic cell wherein hydrogen is evolved at the cathode, with equally good results.

Generally speaking, the invention comprises the elements and combinations thereof set forth in the accompanying claims.

Reference should be had to the accompanying drawings in which the figure represents a vertical section through an electrolytic cell.

In the drawing, 1 represents the container which may be made of any suitable material, such as glass, porcelain or analogous material. Suspended within the cell in any suitable manner is the cathode electrode 2, and the anode electrode 3, which are connected with suitable conductors which are in turn connected with a suitable source of electrical energy. The cell is filled with a quantity of material 4 which is to be electrolyzed.

The electrode 2 may assume various forms which may be found necessary for the particular work for which it is used, but in every case it is formed so that at the top it comes to a point, as represented at 5, and at the base is broadened out so that the sides are slanting from the point toward the base. The electrode may be solid or, if desired, may be made hollow with a closure member for the bottom. A vertical cross section in a transverse plane passing through the apex or point should be triangular in shape.

It is a well known fact that the hydrogen bubbles in passing through the liquid will tend to rise to the surface in a substantially straight line. Hence, when the hydrogen is evolved at the cathode, the bubbles of gas tend to rise in a straight line toward the surface and will leave the electrode at substantially the point of the electrode at which they are evolved. In the old forms of electrode, wherein the cathode is a straight plate, the bubbles of hydrogen travel along the surface of the plate, and in the first instance collect upon the plate at the surface of the electrolyte, but as the evolution of hydrogen continues these bubbles will gradually form a layer of gas which extends farther and farther from the surface of the liquid and will eventually cover the whole plate, or substantially the entire surface thereof. This is due to the fact that the hydrogen evolved near the lower part of the plate travels along the plate itself, because the plate occupies substantially a vertical position within the cell, which is the path that the hydrogen would tend to follow when rising toward the surface. As before stated, when the cathode electrode is formed with slanting sides, the hydrogen tends to leave the electrode at substantially the point at which it is evolved and reaching the surface of the electrolyte passes into the atmosphere. Furthermore such hydrogen bubbles as may by any chance travel along the surface of the cathode electrode and such as are evolved at the upper part more readily pass from

the plate due to the fact that the walls of electrodes meet to form an apex or point at the top.

It will be noticed that the form of my electrode necessarily results in producing a larger active surface than an electrode of the old plate form of equivalent height. This is apparent from the fact that sides represent the hypotenuse of triangles. The fact just mentioned permits the use of more electrolyte in a given cell because in electrolytic actions the quantity of electrolyte bears a fixed relation to the surface of the electrodes.

I prefer to place the cathode electrode within the solution to be electrolyzed so that the point of the electrode is just at the surface of the electrolyte, in this manner obtaining the greatest efficiency for the electrode. However, it is within the scope of my invention to place the top of the cathode electrode at a point below the surface, if such be desired.

The cathode electrode may be formed of any suitable conducting material, the material being selected according to the character of the electrolytic bath in connection with which it is used. When used in connection with the electrolytic production of chlorate and hypochlorites, as above suggested, I have used a cathode electrode formed of lead which is coated with platinum or other chlorin resisting material which is a conductor of electricity.

Having thus described my invention, what I claim is:

1. An electrolytic cell having two electrodes connected respectively to the positive and negative poles of a source of electricity, the negative electrode being formed with slanting sides which meet in a point at the upper part thereof the bottom of said electrode being closed.

2. An electrolytic cell containing a suitable electrolyte, said cell having two electrodes connected respectively to the positive and negative poles of a source of electricity, the negative electrode being formed with slanting sides which terminate in a point at the upper part thereof the bottom of said electrode being closed, the point of the said electrode being placed substantially at the upper surface of the electrolyte.

3. A cathode electrode formed of suitable conducting material, having slanting sides which terminate in a point, and closed at the bottom.

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

FRANK H. BRIGGS.

Witnesses:
A. J. HUDSON,
A. F. KWIS.