

(No Model.)

E. A. LE SUEUR.
ELECTROLYTIC CELL.

No. 468,880.

Patented Feb. 16, 1892.

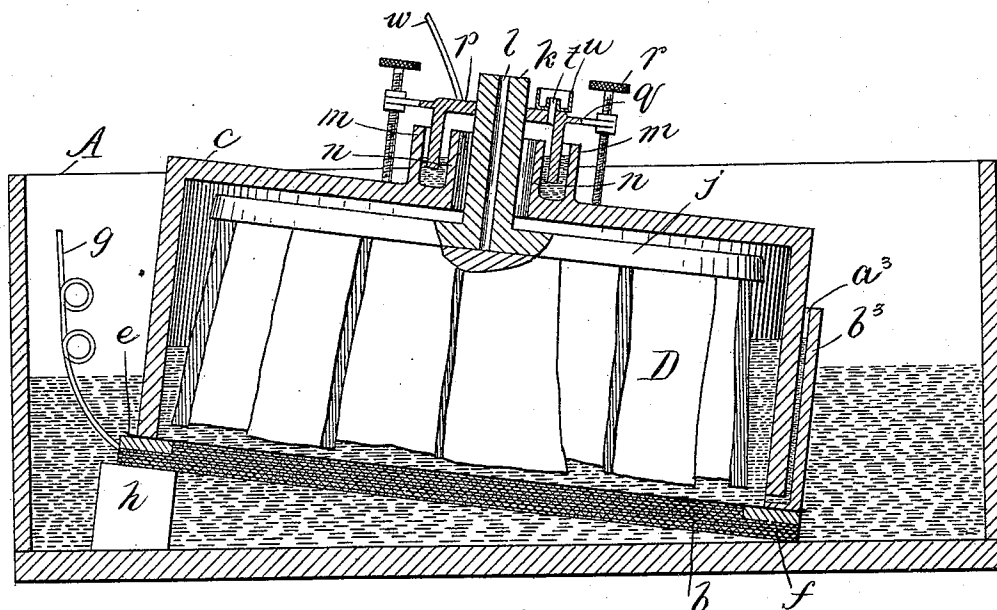


Fig. 1.

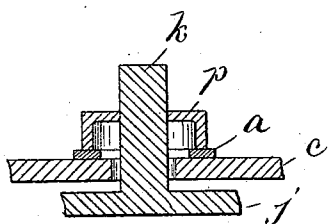


Fig. 3.

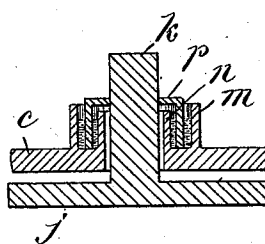


Fig. 2.

WITNESSES.

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ERNEST ARTHUR LE SUEUR, OF OTTAWA, CANADA.

ELECTROLYTIC CELL.

SPECIFICATION forming part of Letters Patent No. 468,880, dated February 16, 1892.

Application filed June 6, 1891. Serial No. 395,351. (No model.)

To all whom it may concern:

Be it known that I, ERNEST A. LE SUEUR, of Ottawa, Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Electrolytic Cells, of which the following is a specification.

My present invention is an improvement in and is applicable to cells such as are set forth in my Letters Patent of the United States, granted April 7, 1891, No. 450,103. In said patent a cell is shown which employs a bell of earthenware, within which is placed a carbon electrode having a metallic backing, from which project, through the top of the bell, three metallic supporting-rods. I have found it difficult and expensive to seal up the opening in the top of the bell around these rods in an efficient manner, so as to prevent the escape of the gas—as chlorine, for example—which may be liberated at the positive electrode.

My present invention has for its object the practical and efficient sealing of the bell where the rods project through it; and it consists in the peculiar construction hereinafter set forth, by means of which the opening in the bell is sealed by liquid, and which is more particularly pointed out in the claims, which are appended hereto and made a part hereof.

In the drawings, Figure 1 is a vertical central section through a single cell, showing my improvement. Figs. 2 and 3 are details showing modified forms thereof.

A is the outer vessel or tank, which contains the liquid in which the negative electrode *b* is immersed.

c is a bell, of stoneware or similar material, within which the positive electrode *D* is placed. The mouth of the bell *c* is covered by a diaphragm *e*, which is firmly clamped by the weight of the bell between the edge thereof and a ring *f*, which may be connected with the negative electrode and which is preferably of metal. The positive electrode *D* is partially immersed in liquid which is within the bell and which is of somewhat higher level than the liquid outside the bell, as shown. When the diaphragm breaks, the liquid inside the bell will sink to the level of the liquid outside the bell, as will be obvious, and in order to detect this the stoneware bell

c is provided at one side near the lower edge with an overflow-opening *a*³, which passes through the bell and then upwardly outside the bell proper, as shown, Fig. 1, to a sufficient height to prevent the escape of the liquid from the interior of the bell. To accommodate this passage *a*³, the bell at this point is thickened out by a projection *b*³, as shown. The passage *a*³ opens inside the bell at a point below that at which the chlorine gas is liberated, so that none of the gas will escape through the said passage *a*³. By this arrangement the change in the level of the liquid inside the bell may be easily detected. The height of the passage *a*³ relatively to the liquid inside the bell may be increased by turning the bell so that the passage *a*³ will be brought nearer the upper side of the bell. As shown in the drawings, the said passage is at the lowest side of the bell when the bell is inclined. The negative electrode and the ring *f* are connected with the negative wire *g*.

For the purpose of facilitating the escape of gas which is formed at the negative electrode the bell is tilted somewhat, as shown, by placing a block *h* underneath one side of it or in any other suitable manner.

The positive electrode consists, preferably, of rough-sided sticks of carbon, the upper ends of which are embedded in a metallic backing *j*. The bell should be so arranged as to facilitate the introduction and withdrawal of the liquid contents thereof, as also the escape of the gas which is formed at the positive electrode, and it must also be arranged to permit of the introduction of the electric current to the positive electrode.

My apparatus is more particularly designed for the decomposition of the alkaline chlorides in the manufacture of chlorine, and when so used chlorine gas is liberated at the positive electrode. As this gas is highly corrosive and very difficult to handle, it is very important that the passages to the bell be efficiently sealed, as also that as few passages be employed as possible.

To secure the positive electrode in place, one or more metallic rods or stems *k* are employed, which project upwardly from the metallic backing *j* of the positive electrode

through the top of the bell, an aperture being made therein for each of said rods k . I use, preferably, one such rod k , having a central aperture l therethrough and through the metallic backing j , said aperture being for the purpose of introducing or withdrawing the liquid contents from the bell. When one rod k is employed, it must be somewhat larger and stronger than if more than one were employed, as will be obvious.

Around the aperture in the bell through which the rod k passes I provide an annular cup, formed by the concentric walls or upward projections m n , which are preferably formed of the same material as the bell and integral therewith. The hole in the top of the bell through which the rod k passes is preferably somewhat larger than the rod to provide for the escape of the chlorine, which will pass up around the rod. The annular groove is used as a lute-cup to hold the sealing-liquid.

On the rod k and firmly secured thereto by solder, preferably, is a bell-shaped collar p , preferably of lead, which extends outwardly from the rod k and then downwardly into and below the surface of the liquid in the lute-cup. The downwardly-projecting edge of the bell or collar p should be a sufficient distance from the bottom of the lute-cup to permit of the lowering of the electrode whenever required by the destruction of the lower ends of the carbons of the positive electrode. Projecting from the collar p are three or more arms q , which are provided with adjusting or leveling screws r , the lower ends of which rest on the top of the stoneware bell c , as shown, and by means of which the positive electrode may be raised or lowered in the bell.

As will be obvious, any well-known means may be employed instead of the leveling-screws r and arms q for raising or lowering the positive electrode and holding it in a given position. Wedges, for example, might be employed under the arms q instead of the screws r . At one point on the top of the metallic bell or collar p an aperture t is formed, which communicates with the interior thereof, said aperture being surrounded on the upper exterior surface of the collar p by a lute-cup u , by means of which the conducting-pipe which conveys the chlorine gas to the absorbing-chamber or other receptacle may be connected with the apparatus. It will be obvious, however, that the chlorine escape-pipe may be connected by any other well-known means.

As the rod k is of metal and in contact with the backing of the positive electrode, the positive conducting-wire w may be connected with the rod k , or if the collar p be of metal, (which is preferably the case,) said wire may be connected either with the rod k or with said part p .

By my device one supporting-rod k will ordinarily be sufficient for cells of the usual size or even for cells of large size; but if it is desirable to use in any case more than one

supporting-rod—as, for example, three (which is the number shown in my application for Letters Patent above referred to)—then in that case one of said rods may be used for the introduction of the current of electricity, in which case the rod will be solid, as shown, Figs. 2 and 3. Another may be used for the escape-pipe of the chlorine or gas formed at the positive electrode, in which case the support will be tubular, and the third, which will also be tubular, may be employed for the introduction and withdrawal of the liquid contents of the bell. As will be clear, the passage l , Fig. 1, through which the liquid of the bell is introduced or withdrawn, will, when the cell is in use, be closely plugged.

In Fig. 2 I have shown a somewhat modified form of my device in which the collar or metallic bell p , which is soldered or otherwise secured to the rod k , projects downwardly in the lute-cup, so that its edge rests on the bottom of the cup, and no means are employed for raising or lowering the positive electrode, this being accomplished by chiseling or cutting away the metal of the part p , which is usually lead, where it joins the rod k , then raising or lowering the rod and electrode and again soldering and sealing the part p to the rod in its new position.

In Fig. 3 the construction is modified by using in place of the lute-cup and sealing-liquid a number of rings or washers a , of asbestos, paper, or similar material, which are tarred or otherwise suitably treated and which are placed underneath the edge of the metallic bell p , so that the weight of the electrode will rest upon them and they will form a packing to hermetically close or seal the opening to the bell c , and thus prevent the escape of the gas.

What I claim is—

1. An electrolytic cell having a bell of earthenware, a positive electrode within said bell, a supporting-rod for said positive electrode projecting through the bell, and a collar or bell-shaped part rigidly secured to said supporting-rod and having the space between the downwardly-projecting edge thereof and the top of the bell sealed, substantially as and for the purpose set forth.

2. An electrolytic cell employing a bell of stoneware or similar material, a positive electrode therein, a supporting-rod connected with said positive electrode and projecting through the top of said bell, a collar or bell-shaped part rigidly secured to said supporting-rod, and a lute-cup surrounding the opening in said bell and containing sealing-liquid, into which the edges of the bell-shaped part project, substantially as and for the purposes set forth.

3. An electrolytic cell employing a bell of stoneware or similar material, a positive electrode within said bell, a supporting-rod secured to said positive electrode and projecting through an aperture in said bell, a collar or bell-shaped part rigidly secured to said sup-

porting-rod, a lute-cup surrounding the aperture in said stoneware bell and having sealing-liquid therein, into which the edge of said collar or bell-shaped part projects, means, as
5 the leveling-screws *r*, for raising or lowering said positive electrode, and an opening, *ast*, in the collar or bell-shaped part *p* for the escape

of the gas, substantially as and for the purposes set forth.

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