No. 674,931.

Patented May 28, 1901.

M. MAURAN.

ELECTROLYTIC CELL.

(Application filed June 14, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

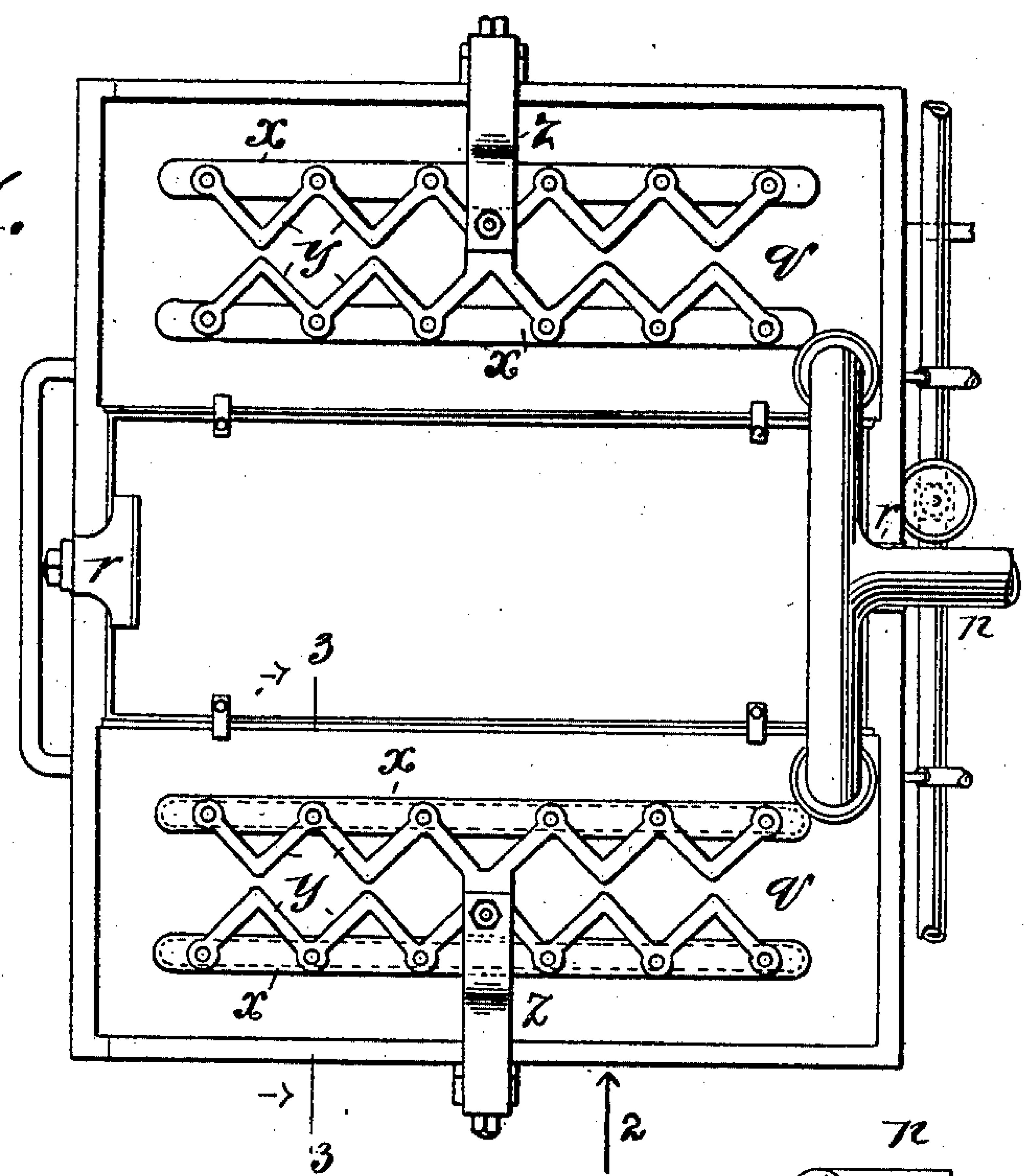
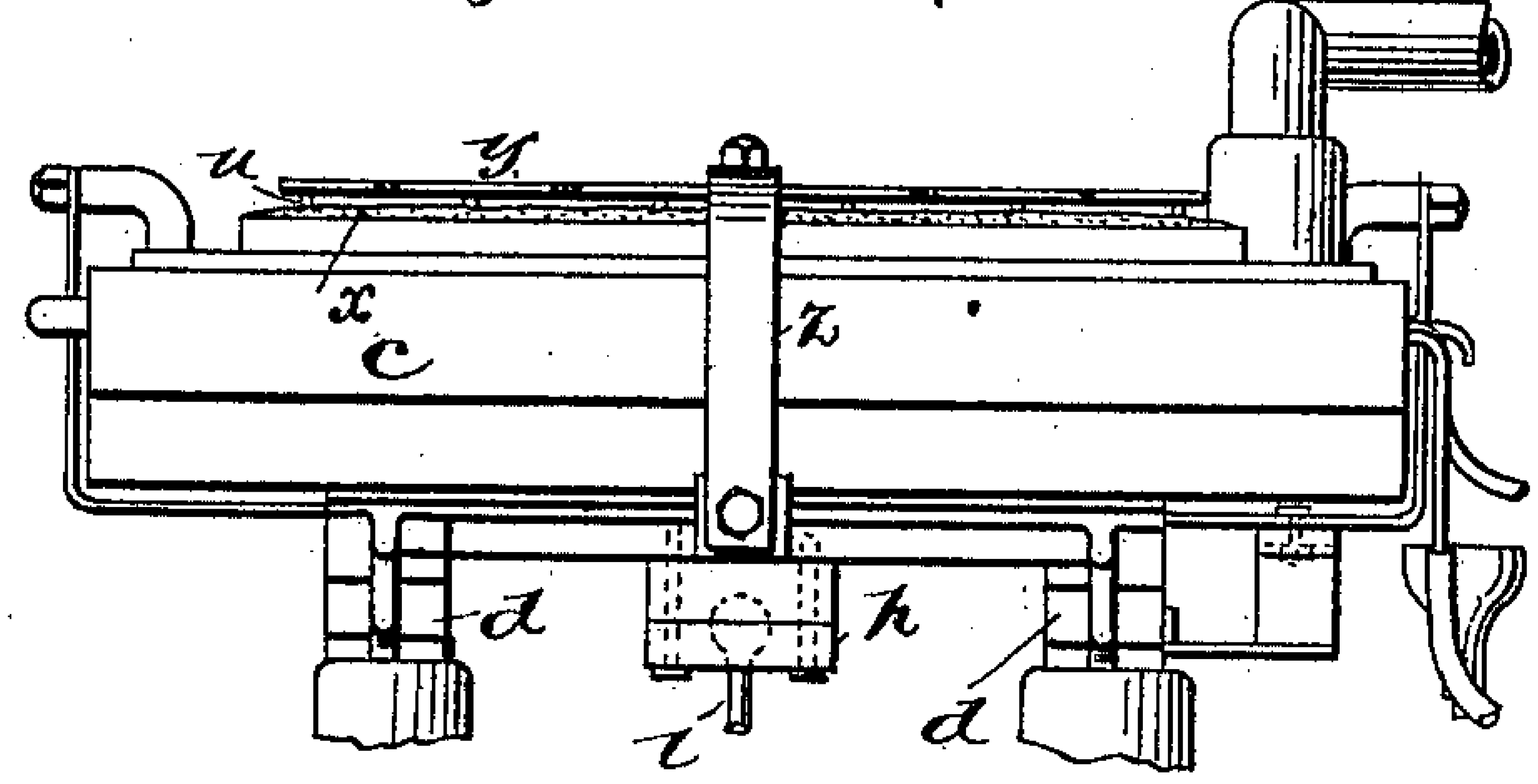


Fig. 2.



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THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 3.

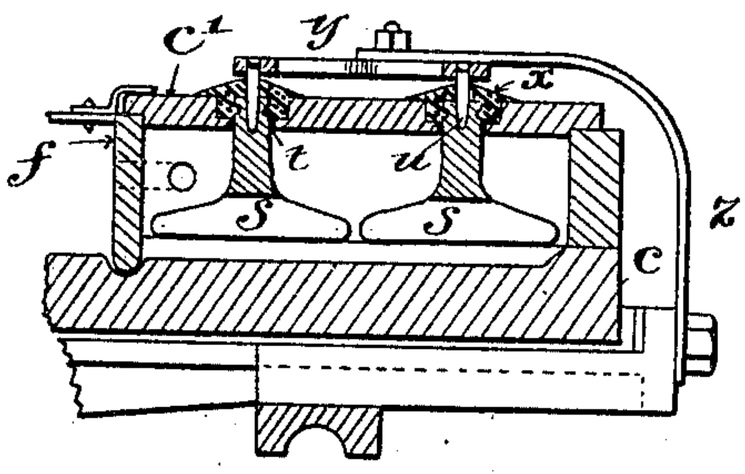


Fig. 4.

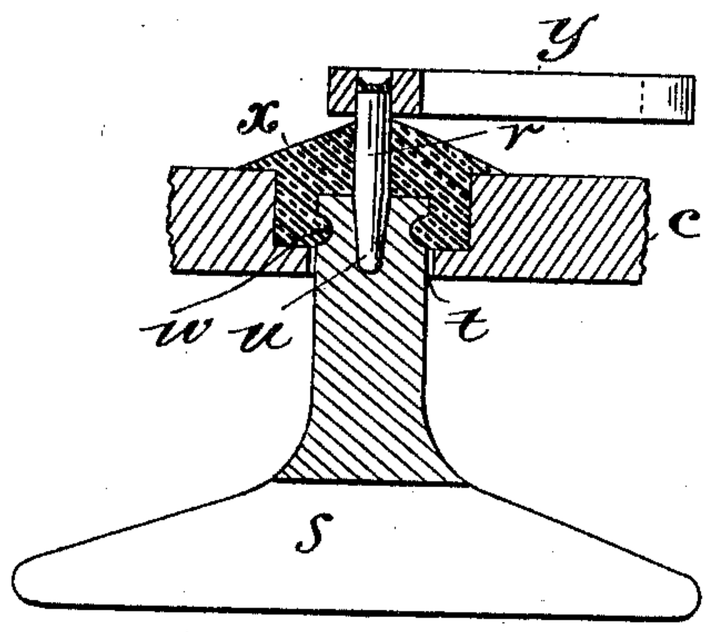
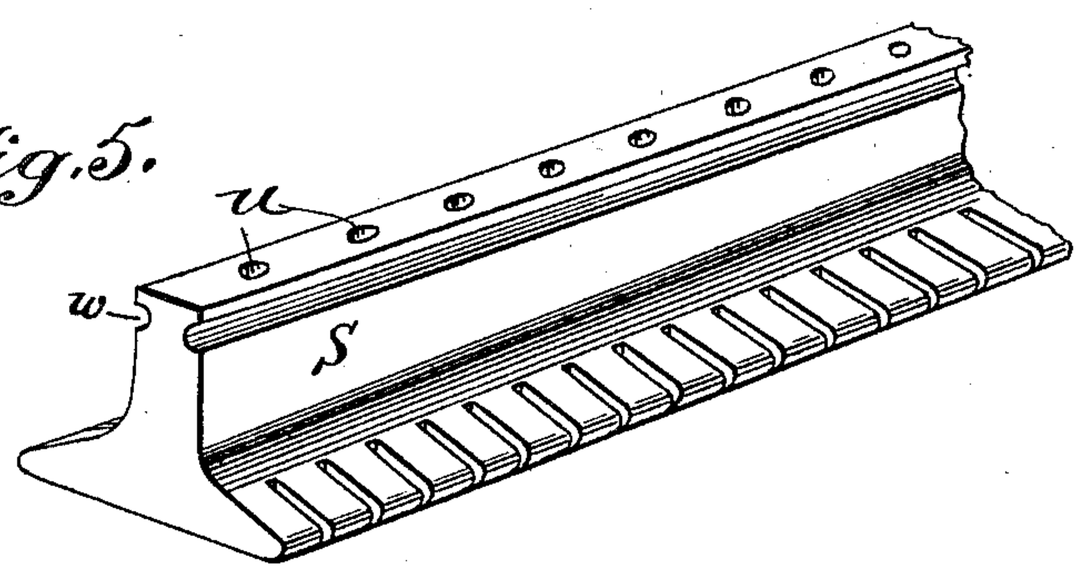


Fig. 5.



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UNITED STATES PATENT OFFICE.

MAX MAURAN, OF NIAGARA FALLS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CASTNER ELECTROLYTIC ALKALI COMPANY, OF VIRGINIA.

ELECTROLYTIC CELL.

SPECIFICATION forming part of Letters Patent No. 674,931, dated May 28, 1901.

Original applications filed March 16, 1900, Serial Nos. 8,968 and 8,969, and March 26, 1900, Serial No. 10,220. Divided and this application filed June 14, 1900. Serial No. 20,264. (No model.)

To all whom it may concern:

Be it known that I, MAX MAURAN, mechanical engineer, a citizen of the United States, with residence and address at Niagara Falls, State of New York, have invented new and useful Improvements in Electrolytic Cells, (Case No. 4,) as set forth in the following specification with drawings.

The invention is especially related to cells designed for the electrolytic decomposition of common salt—for example, the type of cells shown in United States Letters Patent to Castner, Nos. 518,135 and 528,322. It is not, however, limited to such a cell. It concerns primarily the electrodes and their supports and connectors.

This application is a divisional application covering subject-matter shown, but not claimed, in my three applications, Serial Nos. 8,968 and 8,969, filed March 16, 1900, and No. 10,220, filed March 26, 1900.

One object of the invention is to improve electrodes, and especially the electrodes constituting the anodes for electrolytic cells, and to increase both their life and their effectiveness.

Another object is to improve their connections and means of support.

In certain types of electrolytic cells, especially such as the Castner and similar gas-producing cells for decomposing halogen salts of the alkalies and alkaline earths, great trouble is usually experienced in keeping the joints around the electrodes clean and gas-tight and in keeping the electrical resistance low. The present improvement reduces the electrical resistance to a minimum by peculiar forms of anode and of electrical connections therewith and prevents leakage both of gas and of current by means of an improved support and sealed joint for the gas-producing electrode.

The drawings show one preferred embodiment of the invention.

Figure 1 is a plan view of a cell provided with the improvements. Fig. 2 is an elevation of the same viewed in the direction shown by the arrow 2 in Fig. 1. Fig. 3 is a vertical section on the plane 3 3 of Fig. 1. Fig. 4 is an enlarged sectional detail view of one of the electrodes and its connections, and Fig. 5 is a view of one of the electrodes.

The cell *c* and its manner of support need not be here mentioned in detail, as they are not part of the matter claimed in this application. The partitions *f*, which divide it into three compartments, dip into and are sealed in mercury at the bottom of the cell, as well understood in Castner cells. The cathodes in the central compartment are indicated at *r*. Commonly in cells of this character anodes consisting of a series of carbon pencils parallel to each other and with their axes in a horizontal plane and secured in the wall of the cell have been used. This involves a large number of carbon pencils, with the attending expense of mounting and caring for them and the danger of breakage, displacement, and leakage both of solution and of current. The construction is furthermore objectionable for the reason that in removing and replacing the carbons and their mountings the side of the cell has often to be removed, thus involving trouble from imperfect joints.

The present improvement dispenses with the large number of carbons and eliminates the chief danger of breakage and displacement. The anodes are supported from the top or cover *c'* of the cell. This avoids the troubles arising from imperfect joints below the surface of the electrolyte.

The form of the improved anodes *s s* is shown clearly in Figs. 3, 4, and 5. They are of inverted-T section and are supported from above by the shank of the T. The horizontal flanges are slitted or channeled vertically and horizontally, as shown at *s*, so that chlorin or other gases forming on the lower faces of the anodes readily rise and escape through the channels. These slits may be mere sawkerfs at short intervals apart, though I have usually made them an eighth of an inch or more wide and about three-quarters of an inch apart.

The mechanical support and electrical connections for the anodes under the present invention will be best understood from the

cross-sectional views, Figs. 3 and 4. Great difficulty has been experienced in preventing the capillary creeping of the brine solution and its evaporation on the top of the cell-cover, with consequent formation of salt deposits, and in preventing corrosion around the joint between the anode and the cover of the cell and between the anode and the metallic connection due to the electrolytic action of the current and resulting in a poor connection and consequent high resistance.

Under the present improvement the upward-projecting portion of the anode should be of size to approximately fit the opening *t* in the cover of the cell, Fig. 4. A series of holes *u* are formed in the upper surface of the anode, and conducting-plugs, preferably of ordinary arc-lamp carbons, copper-plated and tinned at their head ends to facilitate soldering, are driven in, making good electrical contact between the plugs or rods *v* and the anode. The anode should also be provided with cement-engaging irregularities or recesses *w*. After the upward-projecting portion or support of the anode has been placed in the slot or opening *t* in the cover of the cell cement, preferably of a dense character, such as Portland cement, is applied, as at *x*, so that by entering into the recesses *w* and entirely surrounding the upper part of the anode the anode will be firmly held and supported, and at the same time a very complete closure and filling up of the space around the anode between it and the cover is effected. If desired, the cement may be painted over, after it has set and dried, with some impervious substance, such as asphaltic or bituminous paint. When the anode is so secured in the cover of the cell, there will be left only the plugs or rods *v*, projecting upward from the cement *x*. I connect the electric terminals to these plugs or rods *v* by means of peculiarly-shaped metallic connectors *y*, which form the subject-matter of a divisional application, Serial No. 33,308, filed October 16, 1900, and which are provided with perforations to fit closely around the rods or plugs *v* and with the zigzag or crooked portions between the neighboring perforations. Such crooked portions afford ready adaptability in the connectors to slight variation between the plugs *v*, which variation may be due either to irregularity in spacing the plugs or to the subsequent contraction and expansion of the parts under changing temperatures. When the connectors have been placed in position upon a series of the plugs *v*, solder is run in between the end of the plugs *v* and the connector *y*, so as to unite these parts and produce a very intimate union, and consequently a low electrical resistance. I find it convenient to make the connectors *y* of lead in order that the soldering-iron may partially melt the lead in the immediate vicinity of the top of the plugs *v* and facilitate the soldering.

A cell provided with my improvements combines low resistance with unusual cleanliness and freedom from corrosion and great durability, ease, and accessibility for repairs.

Having now set forth one preferred form of my invention and explained in what manner it may be applied and employed, I claim, without enumerating the many modifications that may be made without departing from the principles of the invention, the following several characteristic features:

1. An electrode for an electrolytic cell of inverted-T section, having a broad lower face formed by the flanges of the T and a short shank extending along the upper side of the anode, the upper part of the said shank being recessed to engage and interlock with a cement mass, substantially as set forth.

2. An electrode for an electrolytic cell of inverted-T section, having a broad and elongated lower face formed by the flanges of the T and a short shank extending along the upper side of the anode, the said lower face and the flanges of the said T being slotted or channeled transversely, substantially as set forth.

3. An electrode for an electrolytic cell of inverted-T section, having a broad lower face formed by the flanges of the T and a short shank extending along the upper side of the anode, the said lower face and the flanges of the said T being slotted or channeled transversely, and the shank of the T having recesses for engaging and interlocking with a cement mass, substantially as set forth.

4. An electrolytic cell having a carbon anode provided with one or more plugs secured in holes in the anode, and means for supporting the anodes consisting of an opening in an appropriate part of the cell and of a mass of cementing material filling in said opening and embedding the portion of the anode in the vicinity of the said plugs, the ends of the plugs projecting through the said material, whereby the said anodes are tightly sealed, substantially as set forth.

Signed this 4th day of June, 1900, at Niagara Falls, New York.

MAX MAURAN.

Witnesses:
ROBERT L. RICE,
ANNIE V. MULLIN.