No. 786,823. PATENTED APR. 11, 1905.

F. LUX.

ELECTRICITY METER.

APPLICATION FILED NOV. 29, 1902.

2 SHEETS—SHEET 1.

Fig. 1.

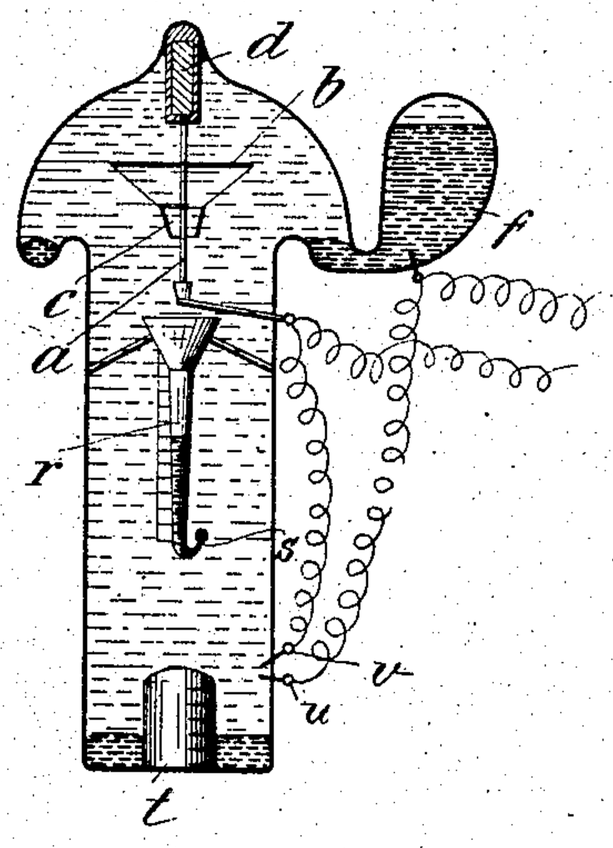
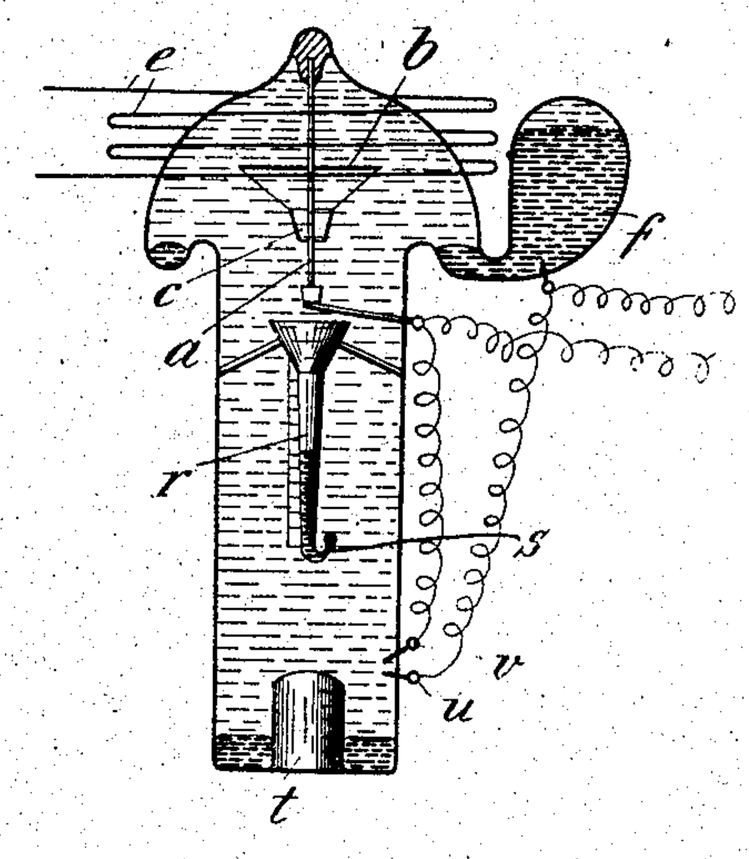


Fig. 1a.



Witnesses:
Theodor Franz.
L. Staaden.

Inventor:
Friedrich Lux,
by Alfr. Hille,
Atty.

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2 SHEETS—SHEET 2.

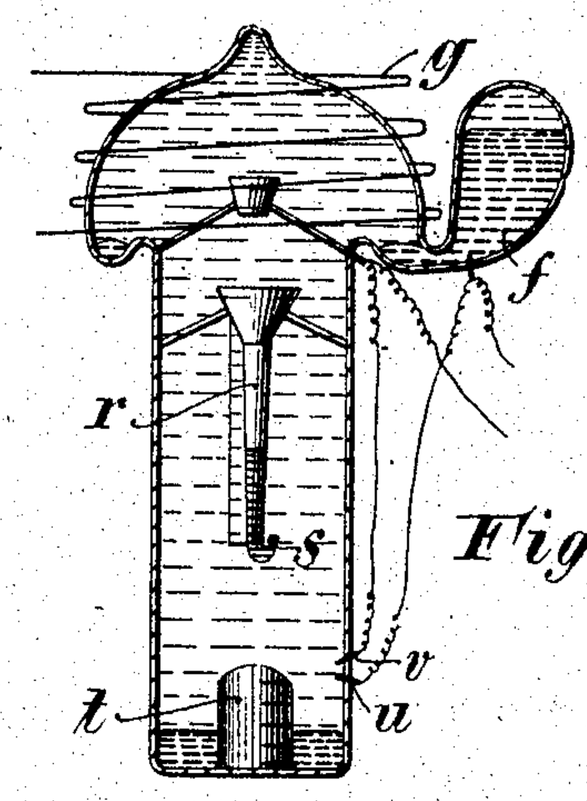


Fig. 2.

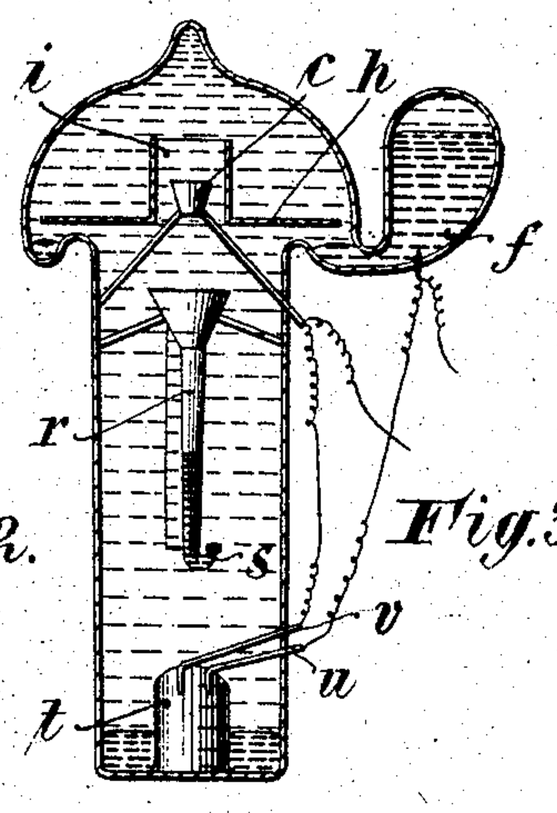


Fig. 3.

Fig. 4.

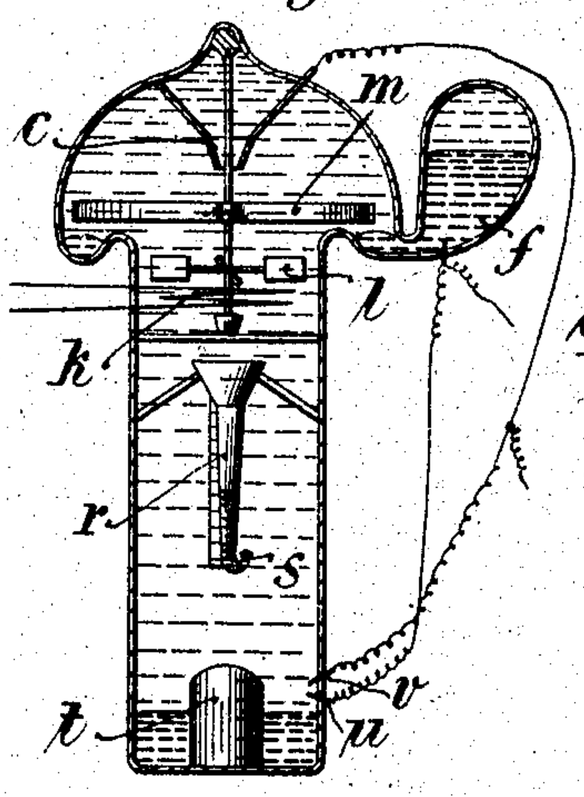


Fig. 5.

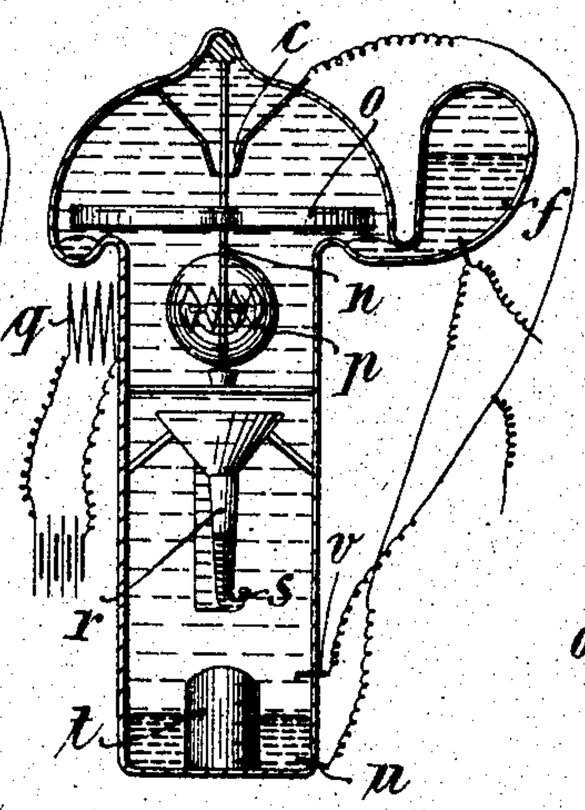
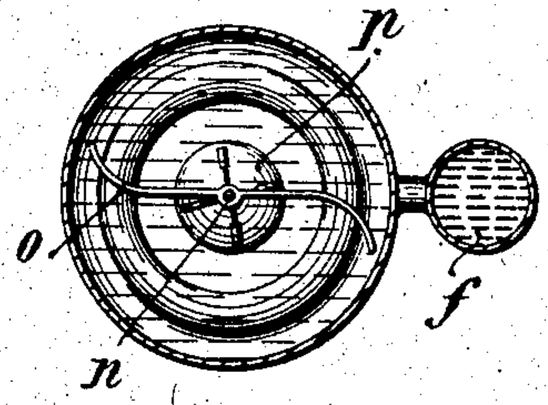


Fig. 6.



Witnesses
Bruno Treile.
L. Staaden.

Inventor
Friedrich Lux.
per Alfred Müller.
Attorney

No. 786,823. Patented April 11, 1905.

UNITED STATES PATENT OFFICE.

FRIEDRICH LUX, OF HEIDELBERG, GERMANY.

ELECTRICITY-METER.

SPECIFICATION forming part of Letters Patent No. 786,823, dated April 11, 1905.

Application filed November 29, 1902. Serial No. 133,186.

To all whom it may concern:

Be it known that I, FRIEDRICH LUX, a subject of the King of Bavaria, residing at Heidelberg, in the Grand Duchy of Baden, German Empire, have invented certain new and useful Improvements Relating to Electricity-Meters, of which the following is a specification.

My invention relates to improvements in electrolytic electricity-meters in which metallic mercury is used to serve as an anode, and a metallic body—such as, for instance, a platinum funnel located laterally above said anode—serves as the cathode, from which the mercury precipitated from the solution surrounding the said cathode freely drops into the bottom chamber or tube provided with a scale to indicate the amount of precipitated mercury.

The object of my invention is to prevent the formation of crystals upon the anode and the consequent prejudicial effect upon the operation of the same, and I attain this object by maintaining the electrolyte constantly in motion by means of a special device, and thus maintaining its constituent of dissolved salts constant at the various points of its depth.

Several constructional forms of my novel appliance are illustrated in the accompanying drawings.

Figure 1 is a vertical section of the instrument with the internal parts thereof in full view. Fig. 1[a] is a similar sectional view with a slight modification. Fig. 2 is a similar view of a modification of the instrument. Fig. 3 shows another modification, and Figs. 4 and 5 represent in section two further modifications. Fig. 6 is a plan of the instrument shown in Fig. 5.

In Fig. 1 upon the vertical spindle *a* is arranged a small metal disk *b*, from the periphery of which the cathode—a platinum funnel *c*—is suspended by means of thin wires. Above the disk is arranged a magnet *d*, inclosed in glass, or instead of this magnet the magnet-coil *e* (shown in Fig. 1[a]) may be provided. The current flowing from the anode *f* to the cathode *c* passes from the latter through its suspension-wires to the periphery of the disk *b* and through the disk to its spindle and thence outside. The disk *b*, traversed by the current, then rotates under the influence of the magnet *d*, (or of the energized coil *e*,) and so maintains the solution (the electrolyte) in movement.

In the arrangement shown in Fig. 2 that portion of the glass vessel where the current flows from the anode to the cathode is surrounded by a coil *g*, through which the current passes. The electrolyte traversed by the current here takes the place of a metal disk traversed by current and rotates under the influence of the magnet-coil. Instead of the coil a permanent magnet may be arranged within the vessel in this case also.

In the constructional form illustrated in Fig. 3 there is arranged immediately above the mercury anode a disk *h*, (preferably of glass,) provided with a central tube *i*, within which the platinum cathode *c* is situated. Mercury is deposited upon the cathode, and the lighter solution flows through said tube *i* upward and back again to the anode, driving the heavier electrolyte solution (forming the liquid layer above the lower surface of the anode) away from the anode, so that it will pass below the disk *h* to the central part of said disk. The device *h i* thus obviously acts exactly in the manner of a chimney, drawing in fluid at the bottom of the tube *i* and exhausting the drawn-in fluid at the top thereof.

In Fig. 4 a heating-wire *k* is arranged in the instrument, and above the same is attached upon the same spindle as the agitating-disk *m* a vane-wheel *l*, with vanes inclined to the horizontal. The liquid heated by the wire *k* ascends, and thus causes the vane-wheel to rotate.

In the constructional form illustrated in Figs. 5 and 6 there is arranged upon a readily-displaceable spindle *n* a vane-wheel *o* for agitating the solution, and as driving member a glass sphere *p*, provided with an internal radiometer vane-wheel. Outside the apparatus is arranged a heating-wire *q*, owing to the heat of which movement of the radiometer, and consequently of the agitating-wheel, is produced.

In order to permit of obtaining a convenient and exact measurement by means of this apparatus, there is arranged below the cathode

a funnel-tube *r*, which is laterally bent below and terminates in an exceedingly fine opening *s*. The mercury dropping into the tube forms at this fine opening *s* a small drop. When the mercury has reached a predetermined height in the tube *r*, its pressure exceeds the superficial tension of the drop of mercury and the tube is emptied. Its contents may be read upon a scale on the tube. The emptying of the tube into the lower chamber fills this latter to the extent of a division of the scale-tube *t*. This scale-tube indicates units, while the scale upon the tube *r* indicates decimals. When all the mercury of the anode has been exhausted, oxygen would be formed upon the fused-in platinum wire. In order to prevent this, the two platinum wires *u* and *v* are fused into the lower portion of the instrument in connection with the anode and the cathode. These wires may either be arranged side by side, as shown in Figs. 1 and 2, or in the tube *t*, Fig. 3, or in such a manner that one of them, *u*, Fig. 5, is in contact with the mercury which has flowed out, while the other, *v*, is normally free. If the last supply in the measuring-tube *r*, Fig. 1, has flowed out, the mercury will be at such a height in the bottom of the instrument that both *u* and *v* will be in contact therewith, thus short-circuiting the anode and the cathode and preventing any production of gas.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination in an electrolytic electricity-meter, of an anode consisting of liquid mercury with a cathode located in a plane above the surface of said anode and a device for constantly stirring or agitating the electrolyte, substantially as described.

2. In an electrolytic electricity-meter the combination of an anode consisting of liquid mercury with a cathode located in a plane above the surface of said anode and a tube, *i*, with a rim or flange, *h*, to produce a movement of rotation in the upper portion of the electrolyte, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRIEDRICH LUX.

Witnesses:
JACOB ADRIAN,
FRIEDRICH LUX.