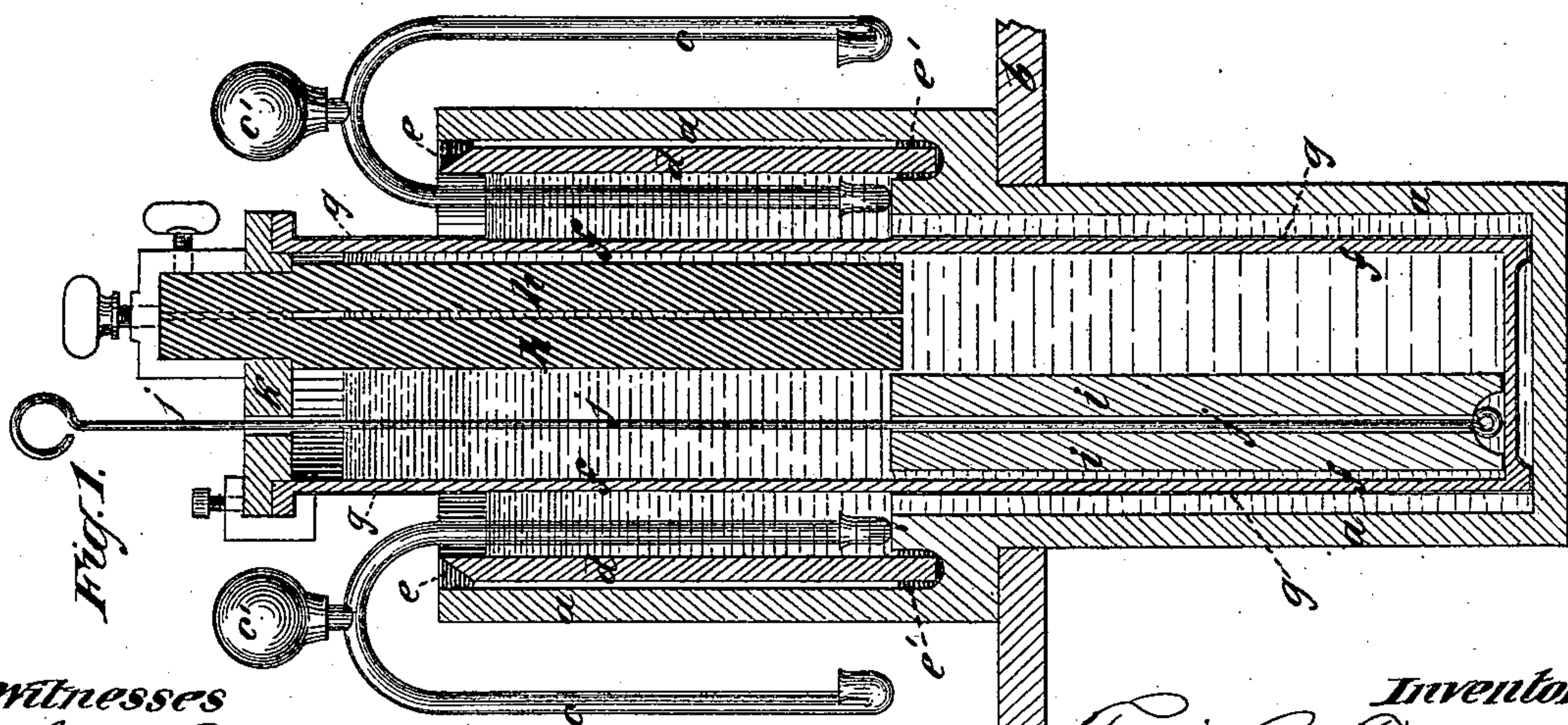
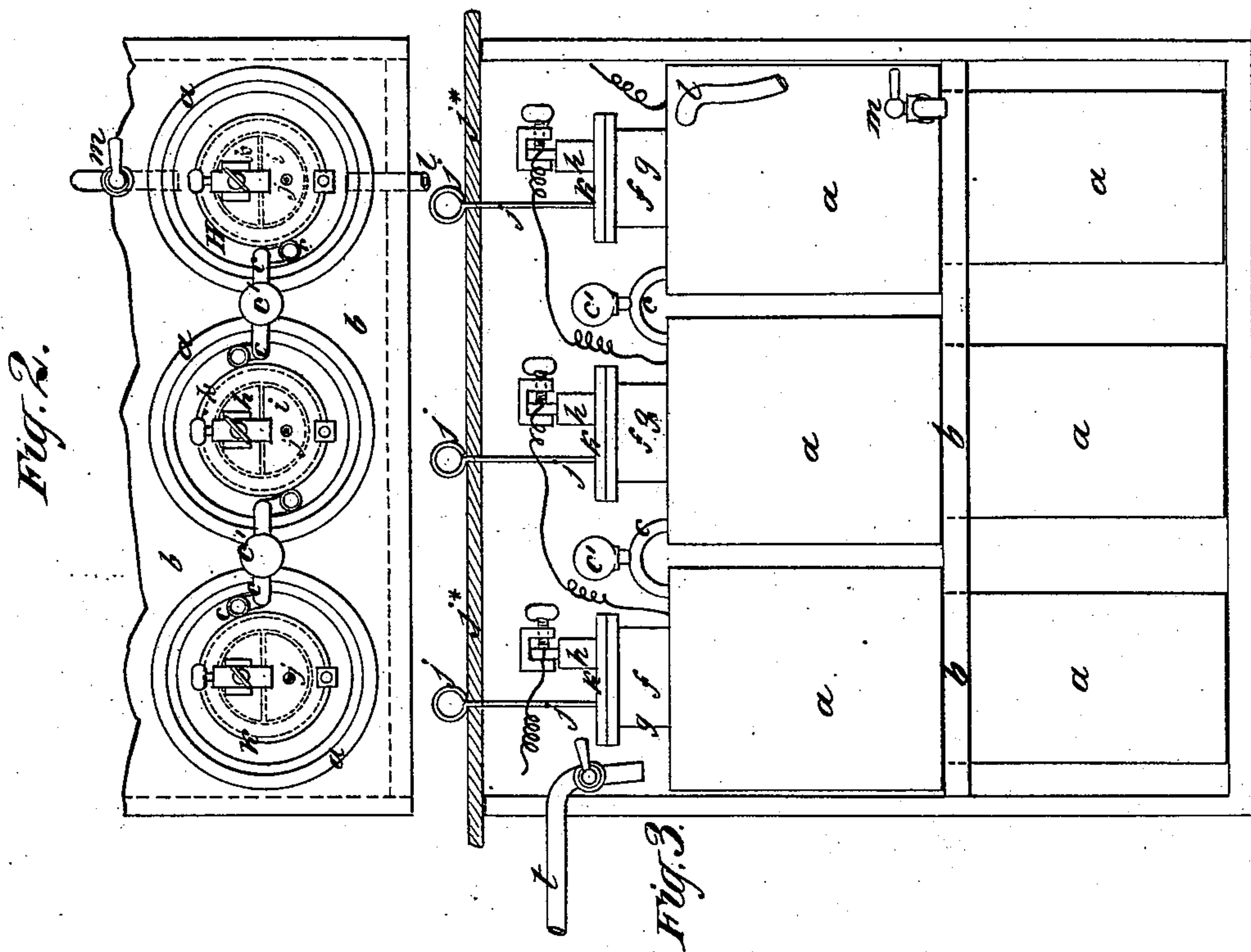


F. TOMMASI.
Galvanic-Battery.

No. 227,076.

Patented April 27, 1880.



Witnesses

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FERDINANDO TOMMASI, OF PARIS, FRANCE.

GALVANIC BATTERY.

SPECIFICATION forming part of Letters Patent No. 227,076, dated April 27, 1880.

Application filed January 10, 1880.

To all whom it may concern:

Be it known that I, FERDINANDO TOMMASI, of Paris, in the Republic of France, have invented certain new and useful Improvements in Electric Batteries; and I hereby declare that the following is a description of the same, reference being had to the accompanying drawings.

This invention relates to improvements in what are known as "double-liquid" batteries, and especially to that known as the "Bunsen" battery, whereby I am enabled to obtain a battery capable of operation with a perfectly regular intensity during an unlimited time, but which will not waste its materials when not in operation.

My invention consists in a special construction of the elements of the battery.

A reservoir or supply-fountain containing water acidulated to the suitable degree is placed at the exterior of the box which contains the elements of the battery, in order that a small stream of fresh liquid may constantly be received in the first cup of the series to replace the waste liquid which escapes by the overflow of the last cup, which passes to the outside of the box. I employ, also, special means, which will be hereinafter described, for maintaining for a long time the amalgamation of the zinc and for renewing the nitric acid in the porous cups.

Figure 1 is a vertical section of one element of a battery illustrating my invention. Fig. 2 is a plan, on a smaller scale than Fig. 1, showing the connection of three such elements in one battery. Fig. 3 is an elevation corresponding with Fig. 2.

The exterior cups, *a*, of earthenware or other impermeable material, which contain the water acidulated with sulphuric acid have their lower parts, from the bottom about half-way up, of a smaller diameter than the upper parts, as shown in Fig. 1, in order that they may be introduced into a box in which a shelf, *b*, is furnished with holes to receive the said cups and support them in such manner that they do not touch the bottom of the box.

The siphons *c*, which form communications between each cup *a* and the next cup on either side of it, are furnished with india-rubber bulbs *c'* at their forks, and they are turned up at the

bottom in such manner as to prevent them from discharging themselves.

The cylinder of zinc *d*, contained in each of the said cups, occupies only the upper part thereof, of which the diameter is greater. It may be fixed, if desired, against the wall of the cup by the aid of an impermeable cement. The cylinder is beveled externally in conical form at its upper end, in order to furnish between its circumference and the upper edge of the cup a channel, into which is placed quicksilver *e*, which maintains the amalgamation. It rests also in a circular channel which is full of quicksilver *e'*, which contributes also to maintaining the amalgamation.

The porous cup *f*, which contains the nitric acid, and in which is placed the carbon, is covered on the bottom and about half-way up its sides with a coating of enamel, *g*, which may be applied either externally, as shown, or internally, and a similar coating is applied upon its upper part, which is situated above the level of the acidulated water in the outer cup, *a*. This cup, of which the porosity only exists at and near the middle part of its height, has a cover, *h*, of porcelain, which is secured to it by clamps, and through which passes a demicylinder of carbon, *h*, which is composed of two or more pieces, as may be seen in the drawings, in order to present more surface of contact to the nitric acid, and which, occupying nearly half the height of the cup, is opposite the porous unenameled portion thereof.

Within the porous cup *f*, and capable of being raised and lowered therein by a rod, *j*, from the exterior, is a plunger, *i*, of porcelain or other material not capable of being destroyed or corroded by the acid. In order that this plunger may displace a large quantity of the liquid in the cup *f*, it is shown of semi-cylindrical form, conforming to the carbon *h*. By lowering this plunger the acid in the cups *f* will be caused to rise therein and immerse the carbon, while, on the contrary, by raising this plunger into the upper part of the cup, where it will be side by side with the carbon *h*, the acid will be allowed to descend into the lower enameled part of the cup, where it will not be in contact with the carbon, and will not have any communication with the sulphuric acid of the exterior cup. The battery

then ceases to operate and no waste of the material takes place. To cause it to operate again it is only necessary to lower the porcelain plunger into the lower part of the cup.

5 It will be seen that the porous cup *f*, being enameled and impermeable above the level of the liquid in the exterior cup, *a*, and the cover *k* being equally impermeable, the escape of dangerous or disagreeable nitrous fumes is
10 prevented.

The cover *k* has a hole closed by a glass stopper, and intended to provide for the introduction of nitric acid into the porous cup by means of a funnel, when necessary; or the
15 cover itself might be made concave, like a funnel, to facilitate the introduction of the acid, and the cover-clamps may be arranged in such manner that they may be protected from the acid.

20 The upper part of the porous cup *f*, which is enameled, and which is above the level of the liquid in the exterior cup, serves to keep stored up a certain quantity of nitric acid, which descends little by little, and is used as
25 required during the operation of the battery.

In case the battery is composed of several elements and it may be desired to raise together all the porcelain plungers, the several rods *j* may also be connected with one horizontal lifting-bar, *j*^{*}, or they may be all suspended from two racks worked by pinions on
30 a shaft furnished with a crank.

In Figs. 2 and 3 there is represented a tube, *t*, which constantly supplies the acidulated
35 water as fast as required, from a suitable reservoir, to the first of the cups *a a* of the series, whence it circulates to the others of the said

cups, so as to be kept at the same level in all through the siphons *c c*. The last cup is furnished with an overflow-pipe, *l*, for the waste liquid, and also with a discharge-cock, *m*, to provide for letting out all the liquid from the wide upper parts of the several cups *a a*, and so leave the zincs dry when the battery is not desired to operate. 40

The cups *a f* and the zincs *d*, instead of being of circular form, as represented, may be of oval or square form, the carbons *h* and plungers *i* being of corresponding form. 45

I claim— 50

1. The combination, with the outer cup, *a*, of a double liquid battery having its upper part larger than its lower part, and having within it, above and around its smaller lower part, a channel for containing quicksilver, of the zinc *d*, having its lower edge adapted to enter the said channel to maintain its amalgamation, substantially as herein described. 55

2. The combination of the outer cup, *a*, having its upper part larger than its lower part, the zinc *d*, supported in said cup entirely above the smaller lower part thereof, the channels *e e'*, for containing quicksilver, the inner cup, *f*, having the lower part, up to the level of the smaller part of the outer cup, enameled or impermeable and the part above porous, the carbon *h*, occupying only the upper part of the inner cup, and the displacing-plunger *i*, all substantially as herein described. 60 65

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Witnesses:

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