5 Sheets—Sheet 1.

C. R. JENNISON.

GALVANIC BATTERY.

No. 190,684. Patented May 15, 1877.

Fig. 1.

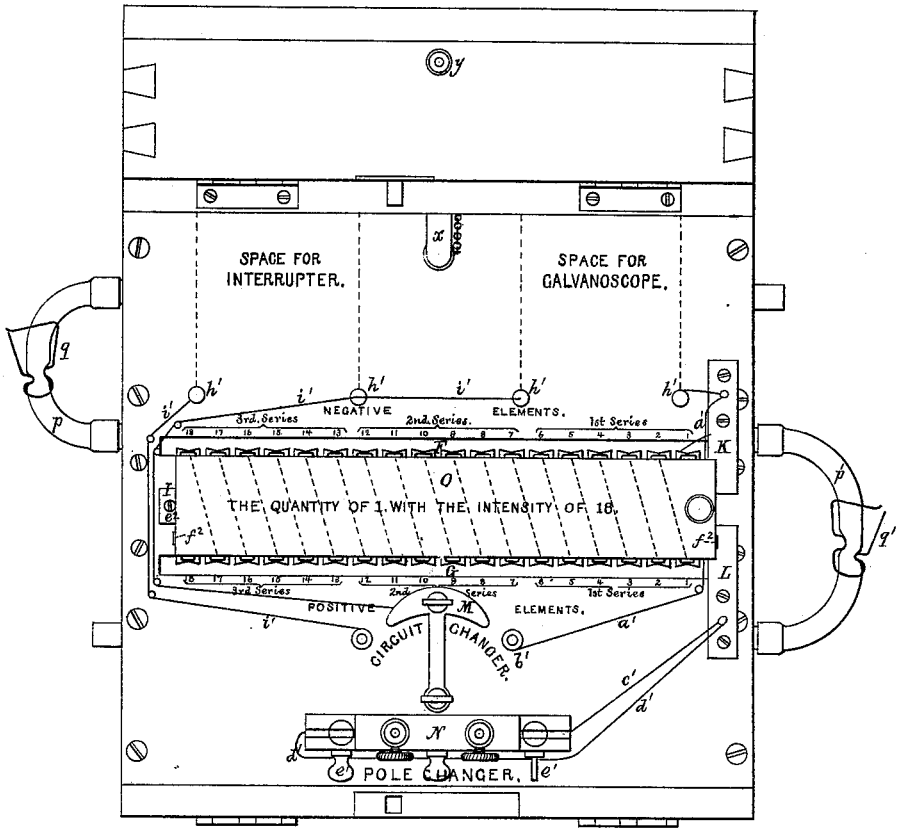

Fig. 7.

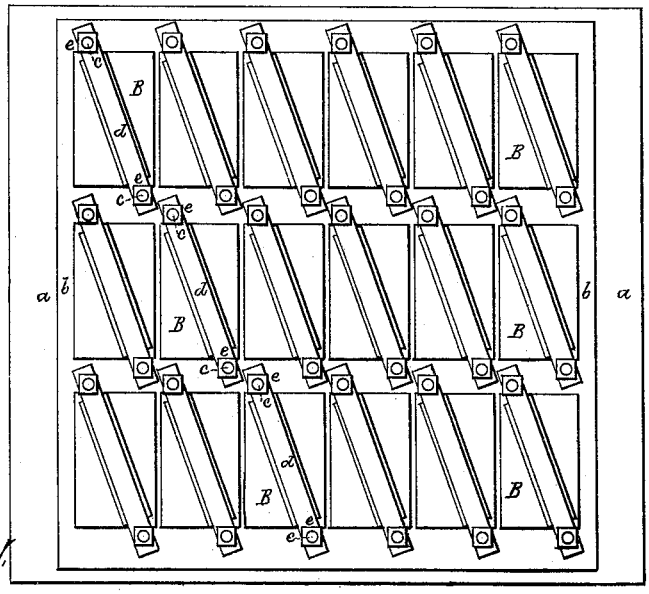

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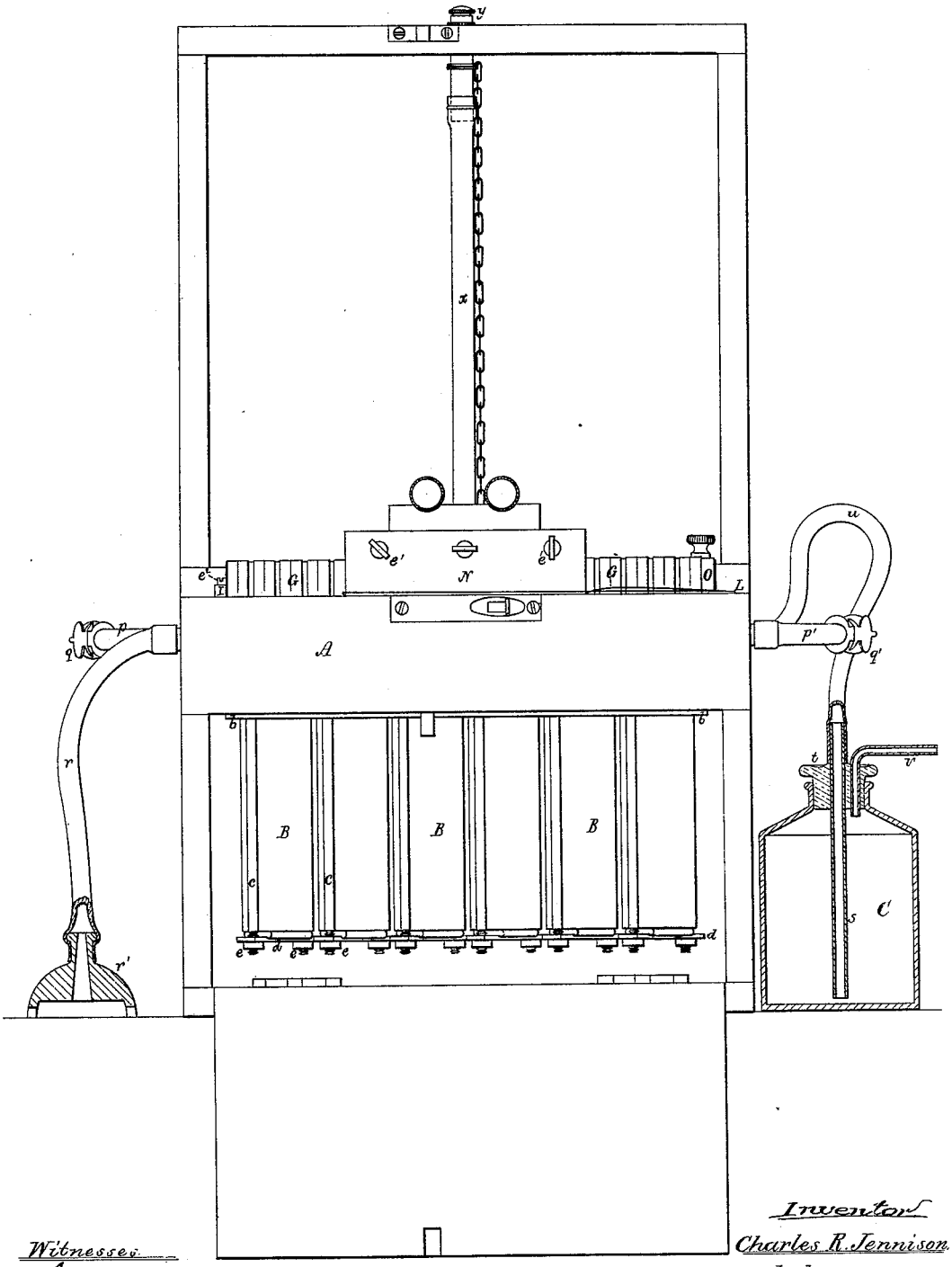
Fig. 2.



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GALVANIC BATTERY.

No. 190,684. Patented May 15, 1877.

Fig. 3.

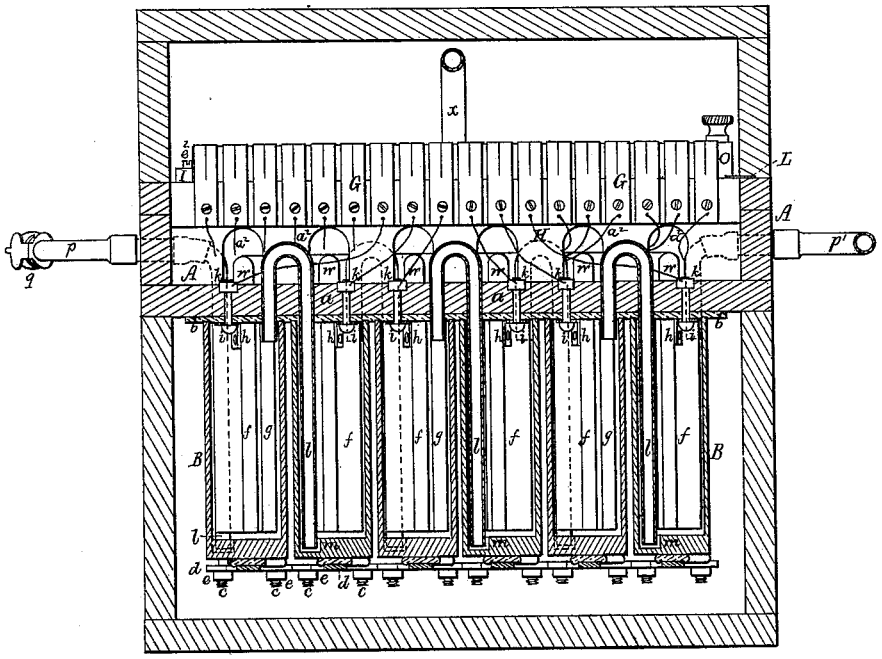
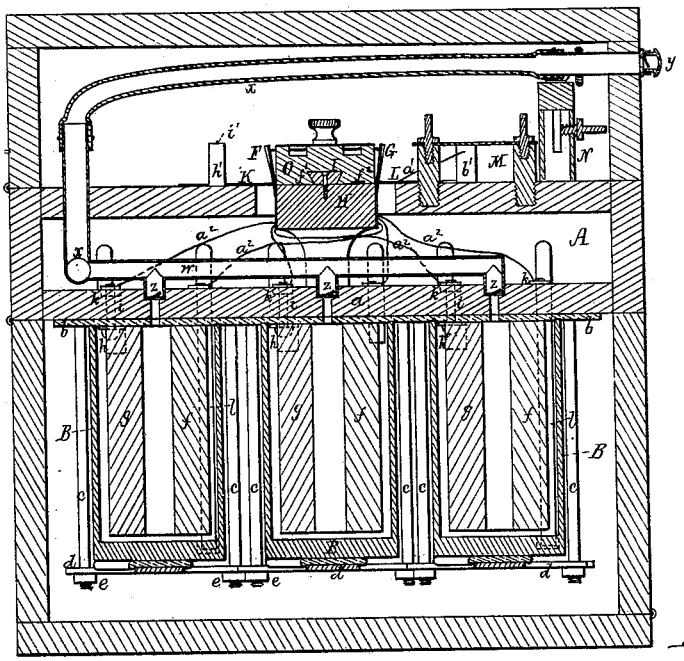


Fig. 4.



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GALVANIC BATTERY.

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Fig. 5.

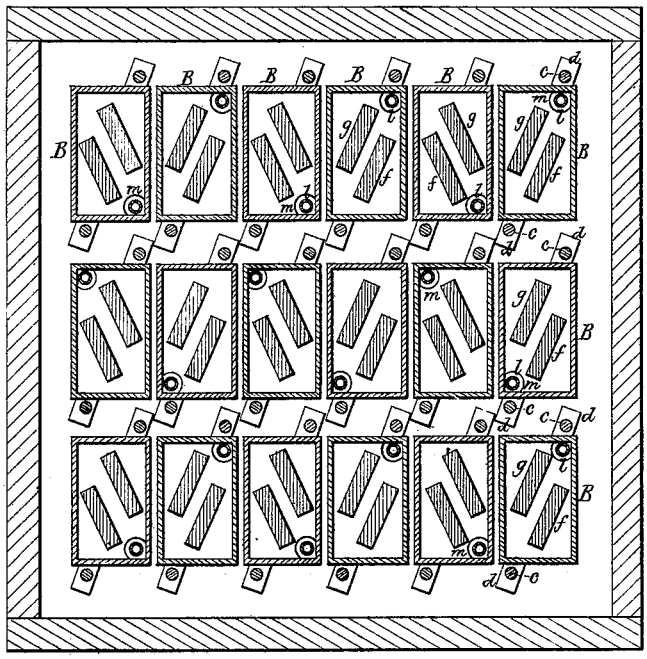
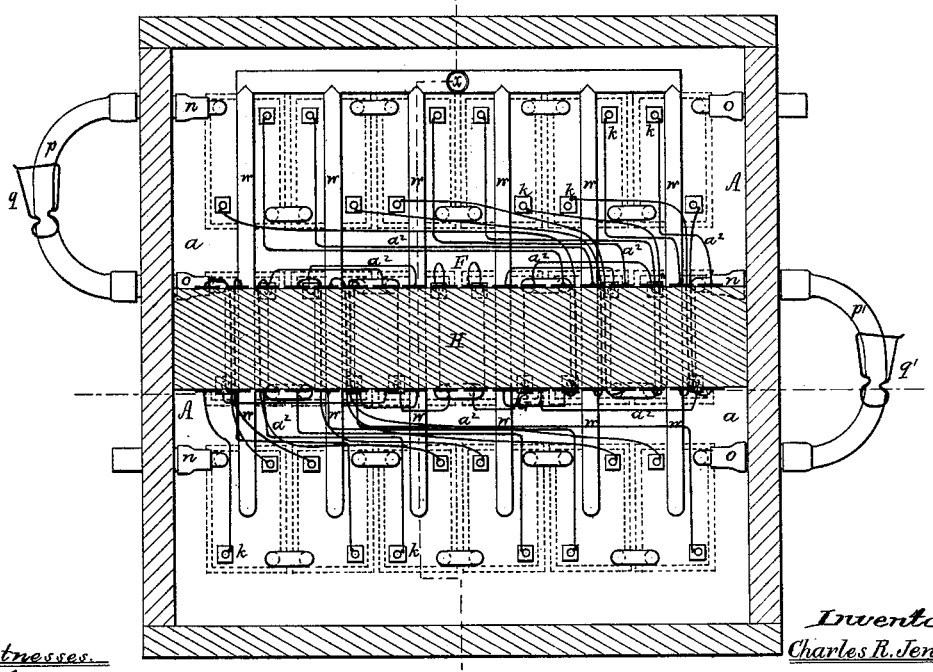


Fig. 6.



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GALVANIC BATTERY.

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Fig. 8.

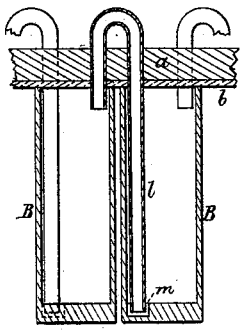
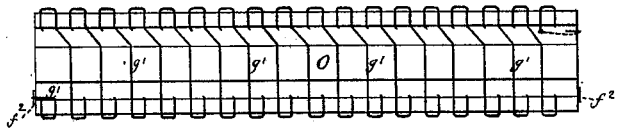


Fig. 9.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN GALVANIC BATTERIES.

Specification forming part of Letters Patent No. **190,684**, dated May 15, 1877; application filed March 13, 1877.

To all whom it may concern:

Be it known that I, CHARLES R. JENNISON, of Boston, of the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Electro-Galvanic Batteries; and do hereby declare the same to be described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a top view, and Fig. 2 a front elevation, of my improved battery as open. Figs. 3 and 4 are transverse sections of it in planes at right angles to each other. Fig. 5 is a horizontal section, taken through its groups or series of cells. Fig. 6 is a horizontal section, taken so as to show the connecting-pipes of the groups or series of cells, and the arrangement of the wires. Fig. 7 is an under-side view of the cells and their fastenings. Fig. 8 is a vertical section of two of the cells, with their inducts and educts or circulation-pipes.

In carrying out my invention I apply to the under side of the bottom board *a* of a shallow box, A, a sheet of caoutchouc or india-rubber, *b*, against which I place the mouths or upper ends of a series or group of glass cells, B B. These cells are represented as arranged in three sets or ranges, each cell being held in place by two screw-bolts, *c c*, extending down from the board *a*, and going through a cross-bar, *d*, which is held to the bolts by nuts *e e* screwed on the bolts, all being arranged with the cell in manner as shown.

Each cell B contains a zinc plate or "positive element," *f*, and a carbon plate or "negative element," *g*, which are arranged in it, in manner as represented. Each of the said elements has an ear, *h*, projecting from it. A screw-bolt, *i*, goes through this ear and screws into a nut, *k*, embedded in or firmly fixed to the bottom *a*, the said ear, screw, and nut serving to hold the element in place.

Each cell has a glass induction-pipe, *l*, leading into it, and extending down nearly to its bottom, or into a small well, *m*, arranged in the bottom of the cell. This pipe I usually place at or near one corner of the cell. The induction-pipe of the second, and each of the succeeding cells of each set, leads out of the top of the cell next preceding, all being as shown.

From the top of the last cell of each set an eduction-pipe, *n*, is led, as shown, which pipe I prefer to have made of vulcanite or glass. The first cell of the set has an induction-pipe, *o*, leading into its top. A coupling-hose, *p*, provided with a clamp, *q*, couples the eduction-pipe of the first set of cells with the induction-pipe of the second set. So, a similar coupling-hose, *p'*, provided with a clamp, *q'*, couples the eduction-pipe of the middle set with the induction-pipe of the third set of cells, all being as shown.

A flexible pipe, *r*, having a glass weight, *r'*, attached to its outer end, is projected from the eduction-pipe of the third set of cells. When the battery is in use the pipe *r* is to extend into a suitable vessel to intercept the overflow of the acid solution used in the cells.

In order to fill the cells with the acid solution I employ a suitable vessel, C, of about double their capacity. A glass tube, *s*, extends through the stopper *t* nearly down to the bottom of such vessel, and at top opens into and is connected with a flexible tube or hose, *u*, which is coupled to the induction-pipe of the first set of cells. Another glass tube, *v*, is inserted in and through the said stopper.

The vessel C being arranged above the level of the battery, air should be blown through the tube *v* into the said vessel. This will force the acid solution up into the hose *u*, and cause said hose to operate as a siphon to extract the solution from the vessel C and deliver it into the first cell of the first set of cells. After this first cell may have become filled, the solution will pass from it into the next cell, which, in turn, will be filled. Thus each cell of the set will be filled in succession, the solution flowing from the last cell of the set into the first cell of the next set. The cells of the middle set having been thus supplied with the solution, the fluid will pass successively into and through those of the third set, the surplus escaping through the eduction-pipe of the last cell of the said third set. This having been accomplished the vessel C should be brought down to a level with the battery, in order to stop the further ex-

traction of fluid from it (the said vessel C) until an additional supply may be needed. To save the necessity of so moving the vessel C there may be a stop-cock in the tube *v*, which cock may be closed, or the said tube may be closed by a suitable plug.

From the above it will be seen how easy it is by my arrangement of the cells, and mode of connecting them, and that of supplying them with fluid, to effect the supply and the increase of it, as occasion may require.

When it may be desirable to extract the fluid from the cells, the vessel C should be depressed below the level of the battery, in which case the liquid will flow back into the vessel.

Each cell has a conduit, *w*, leading from its top, and communicating with a single escape-pipe, *x*, arranged as shown. This latter pipe has at its outer end a valve, *y*, to open outward. By means of the conduits *w* and *x* air and gases will be discharged from the cells. Furthermore, there is in each conduit *w*, when it leads from its cell, a valve, *z*, to open upward. These latter valves are to prevent air from passing from one cell into another by the pipes *w* and *x*. This is necessary to enable the battery to be emptied of fluid by the siphonic action induced by moving the vessel C below the battery.

The clamps *q q'* enable me to cut off the flow of liquid from one set of cells to the next one, as may be required.

In conjunction with the elements of the cells I use two series of springs, F and G, one set being for the positive, and the other for the negative, elements. These springs, arranged as shown, are fastened to opposite sides of a wooden bar, H, and each spring is out of contact with that next to it. To the several nuts *k*, hereinbefore mentioned, wires a^2 are to be soldered, and are to lead to the springs F and G. Each two opposite springs of the two sets have the wires of a cell leading to them.

Midway between the ranges of springs, and parallel to them, is a dovetailed rail, I, which is fixed to the top of the bar H.

Two metallic springs, K L, arranged as shown, are employed with the springs F G. The spring K is to be electrically connected with the first spring of the set F, and is also connected, by a wire, a^1, with a post, b^1, of a circuit-changer, M. Two wires, c^1 d^1, leading from the spring L, connect it with the opposite poles of a pole-changer, N, provided with clamp-screws e^1, to its poles.

A slide, O, of wood, or other proper material, which is non-conductive of electricity, has a dovetailed groove, f^1, running through it lengthwise, to fit the dovetailed rail I.

The dovetailed rail and groove while admitting the slide to be moved endwise prevent it from being lifted upward out of electrical connection with the springs F G, and thereby prevent the evil consequences that sometimes might result from such lifting of the slide. At one end of the rail I is a stop, e^2, to arrest the slide when wholly between the ranges F G of springs.

A strip of metal, f^2, fixed to the bottom of the slide, on its positive side, extends from end to end of the slide. This strip is connected with the end wire of a series of wires, *g'*, arranged in the strip in manner as represented in Fig. 9, which is a top view of the slide O without its cover. The wires project beyond the opposite sides of the strip, in order to come into contact with the springs F and G when the strip is on its rail and against the stop. In using the slide O the strip of metal f^2 on its bottom bears against the spring L, whereby the latter is brought into electrical connection with the battery elements, as set forth. The oblique arrangement of the wires *g'* is to avoid having a direct metallic connection with the carbon and zinc elements of each cell.

As the slide may be pushed in more or less of the battery will be brought into action at the poles.

With the slide as above described I am enabled to obtain the quantity of electricity of one with the intensity of electricity of eighteen cells, there being six cells in each of the three sets, as shown.

With a battery as described I generally have a series of such slides, their connecting-wires being so arranged as to vary the quantity and intensity of the electrical current, as may be required—as, for instance, one may produce the quantity of two with the intensity of eight cells; another may produce the quantity of three with the intensity of six cells; or one may produce the quantity of eighteen cells with the intensity of one of them only.

This enables me to effect with my battery what usually requires several batteries, as heretofore made, to accomplish.

To render my battery useful in other respects I have shown a current-changer, of ordinary construction, applied to it, and with such a galvanometer and an interrupter may be used, the circuit-posts *h'* and wires *i'* therefor, being represented in Fig. 1.

The advantage of this battery, in regard to cleaning it, or repairing it, will be readily understood and appreciated by electricians or other persons who may use it.

Having thus described my improved electro-galvanic battery, what I claim therein as of my invention is as follows:

1. A set of battery-cells, B, provided with induct and educts *l o n*, arranged with such cells, substantially as set forth.

2. A set of battery-cells, B, provided with wells *m* and inducts and educts *l o n*, arranged with such cells, substantially as set forth.

3. Two or more sets of battery-cells, B, provided with wells *m* and inducts *l o n*, and one or more connection-hoses, *q*, arranged with such cells, substantially as set forth.

4. The combination of the liquid supply and extractive vessel C and its air and flexile pipes

s u v with a set of battery-cells, B, provided with inducts and educts *l o n*, all being arranged substantially in manner to operate as set forth.

5. The combination of the suppport-board *a* and the india-rubber packing *b* with the series of open battery-cells B and mechanisms for clamping the cells to the packing and board, substantially as set forth, such being the said bolts *c*, cross-bars *d*, and nuts *e*, arranged as represented.

6. The slide O, provided with wires *g'*, or such and a metallic strip, f^2, arranged substantially as set forth, in combination with the two ranges F G of springs, the auxiliary springs K L and the battery-cells, and the positive and negative elements electrically connected with such ranges of springs, all being arranged essentially in the manner, and to operate as specified and represented.

7. The combination of the air and gas escape conduits *w x* and their valves *y z* with the battery-cells, their positive and negative elements, and fluid-supply inducts and educts, arranged substantially as specified.

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Witnesses:
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