

(No Model.)

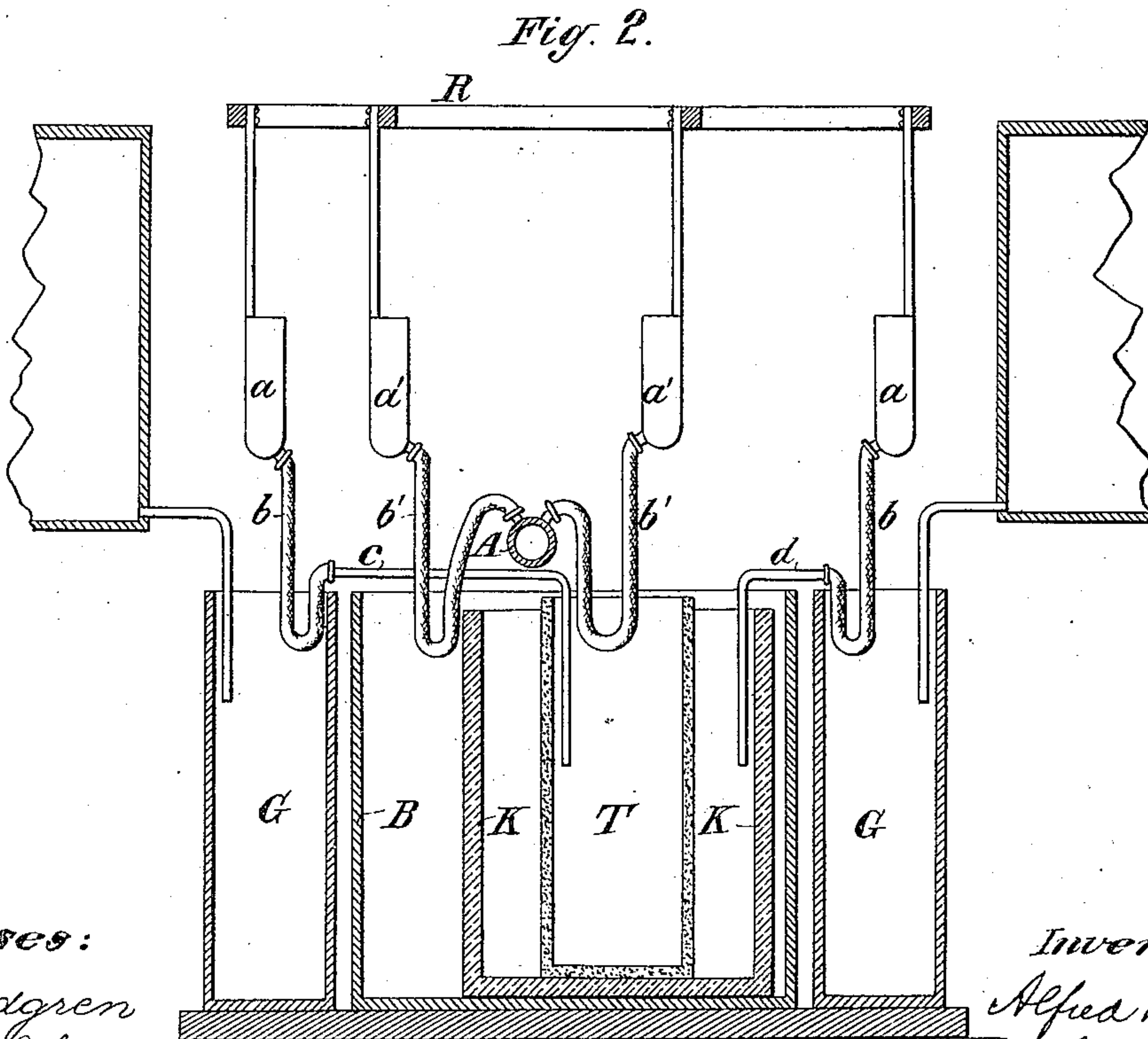
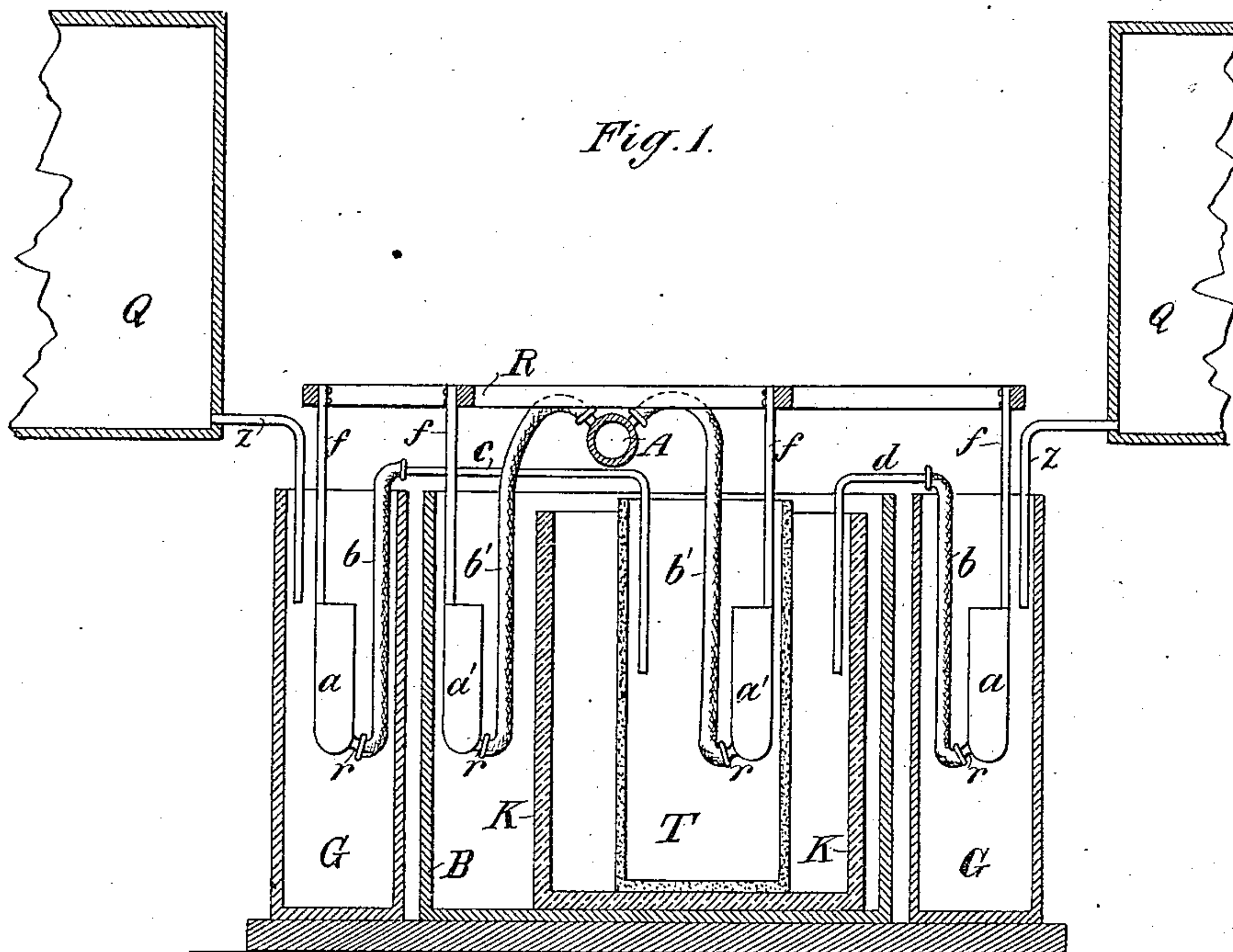
2 Sheets—Sheet 1.

A. DUN.

APPARATUS FOR EMPTYING AND CHARGING GALVANIC ELEMENTS.

No. 312,340.

Patented Feb. 17, 1885.



Witnesses:
O. Sundgren
Emil Schwartz

Inventor:
Alfred Dun
by his Attys
Brown & Hall

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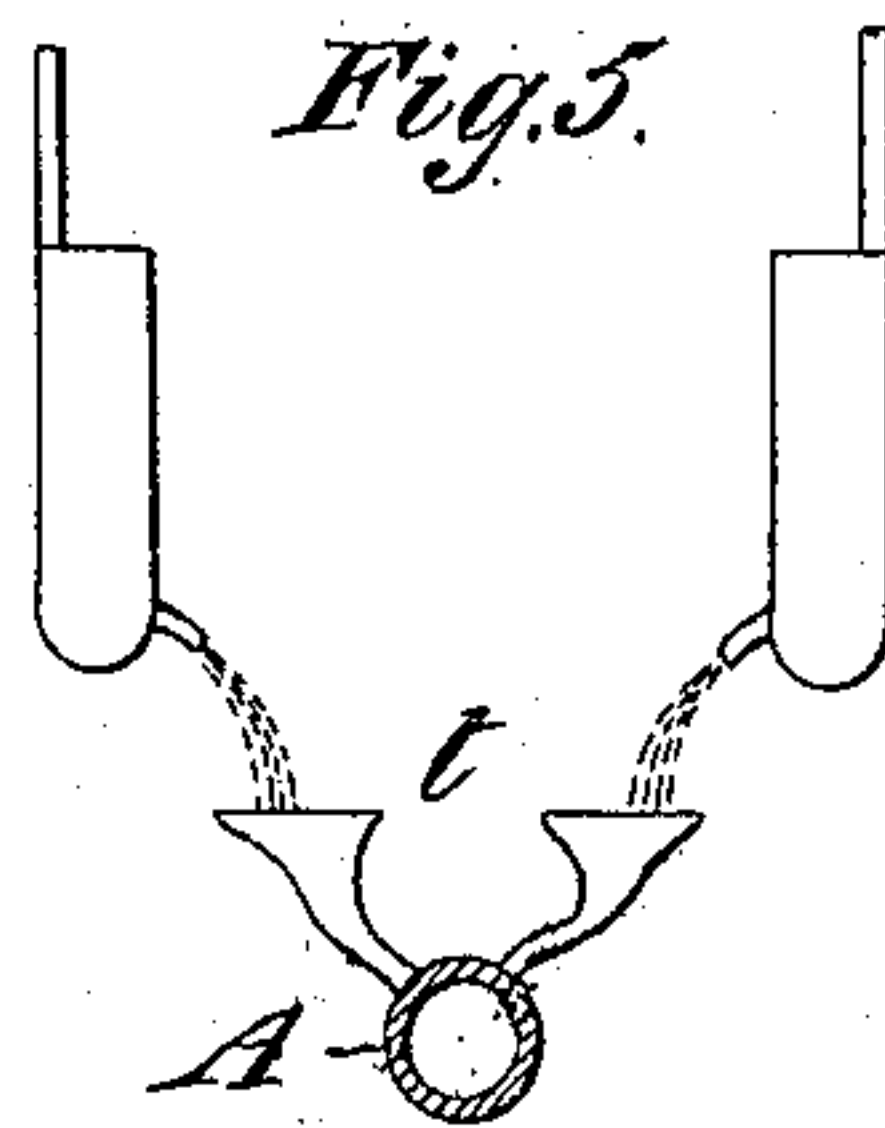
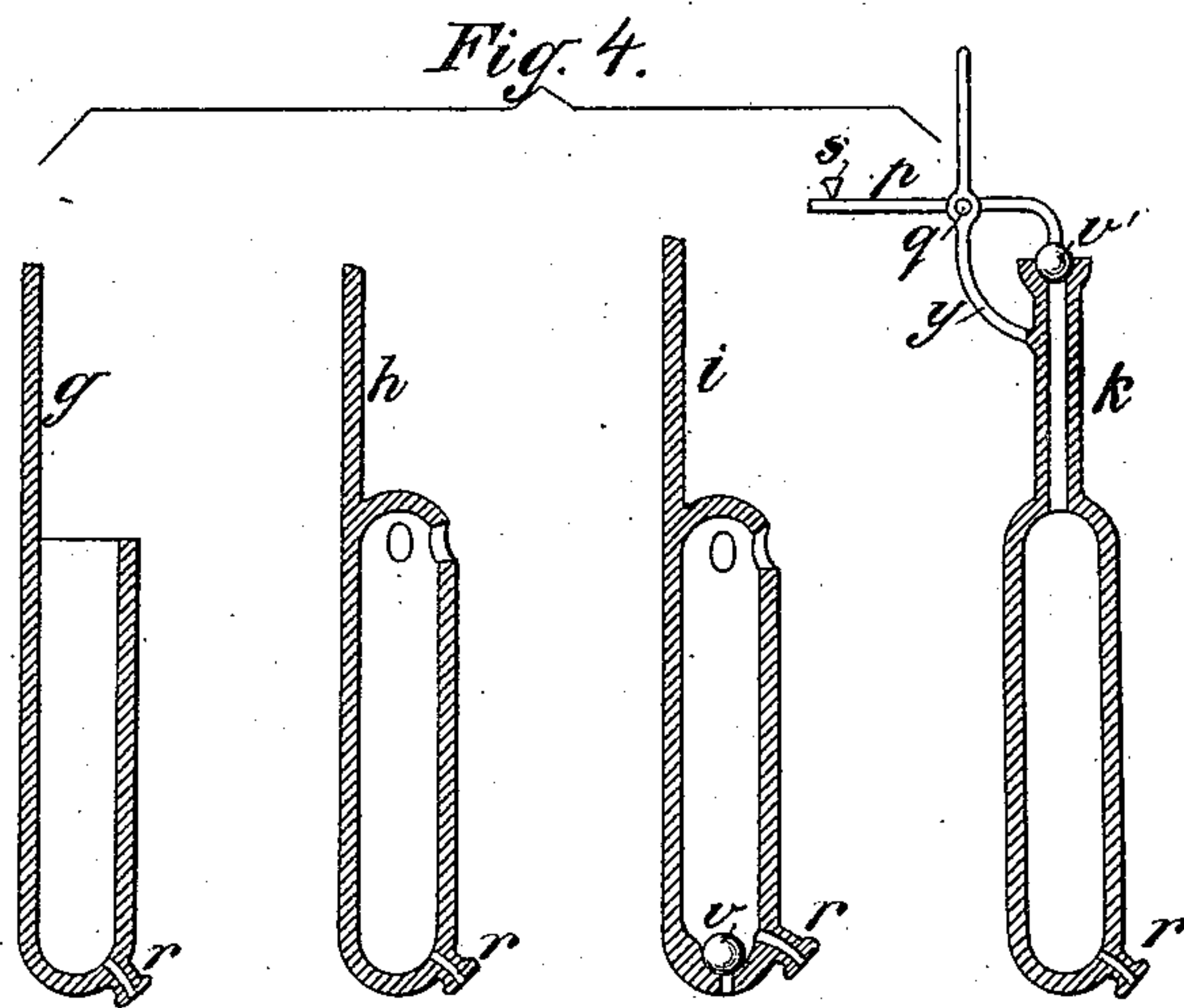
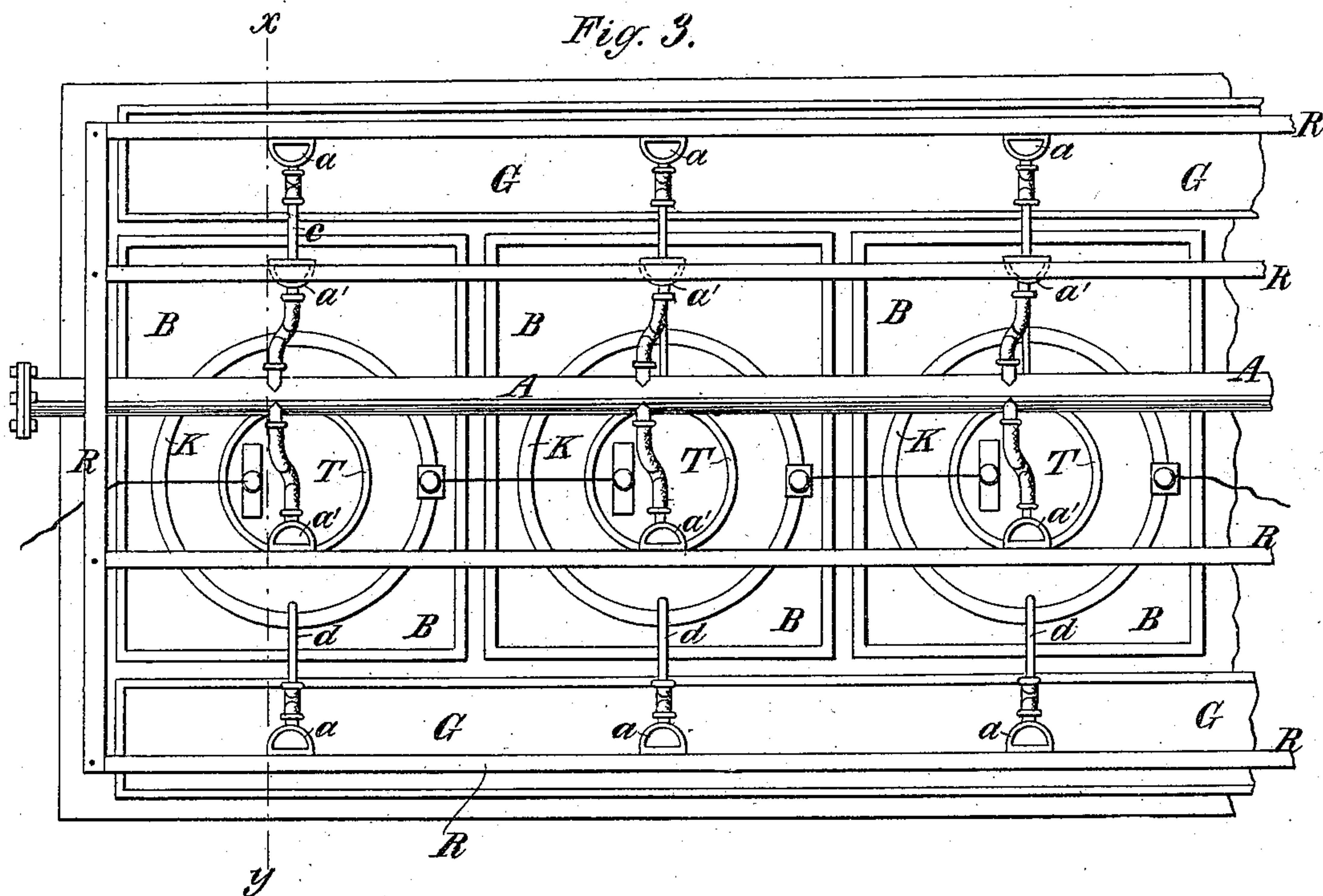
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UNITED STATES PATENT OFFICE.

ALFRED DUN, OF FRANKFORT-ON-THE-MAIN, GERMANY.

APPARATUS FOR EMPTYING AND CHARGING GALVANIC ELEMENTS.

SPECIFICATION forming part of Letters Patent No. 312,340, dated February 17, 1885.

Application filed August 7, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALFRED DUN, a subject of the Emperor of Germany, and a resident at Frankfort-on-the-Main, Germany, have
5 invented new and useful Improvements in Apparatus for Emptying and Charging Galvanic Elements, of which the following is a specification.

A battery which is to be used to any great
10 extent in practice must, besides possessing great constancy, be provided with an effective, and simple means of refreshment, whereby the emptying and filling up or adding to the battery may be effected without causing any in-
15 terruption of the current. This is accomplished in the most complete and effectual manner by the arrangement hereinafter described, which forms, as hereinafter claimed, the subject of the present invention.

20 Referring to the accompanying drawings, Figure 1 represents a cross-section, on line *x y*, Fig. 3, of one of the cells and the supply-troughs with the parts depressed; Fig. 2, a similar view with the parts elevated; Fig. 3,
25 a top plan view omitting the reservoirs. Fig. 4 shows in vertical section four several forms of the dipping vessels, and Fig. 5 an end elevation and partial section of a modification of the discharge or emptying apparatus.

30 In constructing the battery the outer vessel, B, of the cell is preferably of oblong rectangular form in plan, but may be of other form, and the cylinder K is placed in this vessel in such a way that it stands moderately
35 close to one of the short sides of the latter, by which means a moderately broad free space is left at the opposite end inside the vessel B. At each side of a row of cells, B, is a distributing-trough, G, which troughs are au-
40 tomatically kept filled from a larger reservoir, Q, at a higher level, closed air-tight, and from which a dip-pipe, Z, descends into the adjacent trough G, the liquid flowing into the trough only so long as the mouth of the dip-
45 pipe Z remains unsealed.

Attached by arms *f* to a common supporting-frame, R, above the battery are a number of small dipping vessels, *a a'*, which are simul-
50 taneously raised and lowered by means of a winch. In descending, the vessels dip into

the liquid contained in the compartments or vessels immediately below them and are filled therewith. The vessels *a* dip into troughs G, containing the fresh liquid, for filling up the cells, while the others, *a'*, respectively dip the
55 one into the vessel B, between the latter and the cylinder K, and the other into the earthenware cylinder T for the purpose of removing an equal quantity of exhausted liquid therefrom. The dipping vessels *a a'* have dis-
60 charge-orifices *r* at bottom, those of the vessels *a a* being attached to tubes *c d* by india-rubber tubes *b b*, while those of the vessels *a'* are in communication by similar flexible
65 tubes, *b'*, with the discharge-pipe A, leading to a receptacle for collecting the liquid. When these dipping vessels are lowered and raised simultaneously as above described, the fluid
70 contained in the vessels *a a* flows out through pipes *b b c d* into T and K, while the liquid in the vessels *a' a'* passes through the tubes *b' b'* into the discharge-pipe A.

Instead of the vessels *a'* being coupled by tubing with the pipe A, they can discharge
75 into funnels *t*, placed on pipe A, into which the fluid flows when the vessels *a'* are sufficiently raised. (See the modification, Fig. 5.) The india-rubber tubes *b b b' b'* are so long that they are not drawn tight when the vessels are
80 raised to the full height, but a bight of the tube hangs down into the corresponding vessel, as shown, so that the fluid draining from the outside of the vessels *a a'* and the tubing
85 *b b'* will drop back into the same compartments or vessels. If the exhausted liquids taken from the vessel B and the earthenware cylinder T are to be kept separate, two dis-
charge-pipes A must be provided, to which the tubes of vessels *a'* are respectively coupled.

The dipping vessels can be made of glass,
90 earthenware, ebonite, or any other material not acted on by acids, and in various forms. For instance, they may either be entirely open at top, as at *g*, Fig. 4, or partly closed, and pro-
95 vided with small inlet-holes at top for the entry of the liquid, as at *h*, Fig. 4; or, in addition to the above, they may have an inlet-hole at bot-
tom, closed by a ball-valve, through which in dipping into the liquid the latter flows into
100 the dipping vessel, the said inlet-orifice being

closed by the ball-valve *v* when the vessel rises, as at *i*, Fig. 4; or, when the dipping vessel has not attached outlet-tube *b* or *b'*, the outlet-orifice may also be the inlet for the liquid, as at *k*, Fig. 4, the vessel being narrowed at top into a long neck closed by a ball-valve, *v'*, connected to a lever, *p*, pivoted at *q* to a support, *y*, carried by the dipping vessel. When the dipping vessel sinks in the liquid, the latter enters the vessel through the discharge-orifice as the inclosed air raises the valve by its pressure. When the vessel rises, the valve above closes and the liquid is prevented by atmospheric pressure from flowing out until just before the vessel has reached the determined height the lever-arm of the vessel meets a stop, *s*, by which the valve is opened, thus allowing the contents of the vessel to flow out by the discharge-orifice. If several batteries are arranged in stages one above the other, then the several frames *R*, by which the vessels *a a'* are carried, are connected so that all can be raised and lowered together by the same arrangement. The system can also be arranged to work in connection with a clock, by which the operation is performed automatically at certain periods of time, and a record of the number of times it is performed is kept. If the emptying and filling are independent of each other, the dipping vessels for filling and emptying must be fixed to separate frames instead of to the same one. By special working arrangements these frames can be raised and lowered in the required manner independently of each other. The emptying and filling will be more or less complete, according to the size of the dipping vessels or the frequency of their raising and lowering, or the necessities of the case, a mere addition to the liquid being oftentimes all that is requisite.

Having thus described my invention and the manner of employing the same, I claim—

1. The combination, with the vessels *B*, *K*, and *T*, and the supply-troughs *G*, of dipping vessels *a*, and outlets therefor into the vessels *K* and *T*, and the vessels *a'*, and outlets therefor conducting from the vessels *K* and *T*, and a movable frame for said vessels *a a'*, whereby they may be raised and lowered with respect to the first-named vessels, substantially as described.

2. The battery-cell composed of the outer vessel, *B*, and the cylinder *K*, placed nearer one end thereof than the other, and containing the cylinder *T*, combined with the troughs *G* at opposite ends, the movable frame *R*, the dipping vessels *a*, suspended from said frame within the said troughs and discharging into the vessels *K* and *T*, and the dipping vessels *a'*, suspended in the vessels *K* and *T* and discharging into the waste-pipe *A*, substantially as shown and described.

3. The combination, with an electric battery, of adjacent supply-troughs containing the exciting liquid or liquids, dipping vessels suspended within said supply-troughs and connected with the battery cell or cells to supply the excitant thereto, other and independent dipping vessels suspended in or over said battery and connected with a discharge-pipe, and a frame supporting said dipping vessels and adapted by any suitable means to be raised and lowered to empty and fill or renew said battery, substantially as described.

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

ALFRED DUN.

Witnesses:

FRANZ WIRTH;

FRANZ HASSLACHER.