(No Model.) 2 Sheets—Sheet 1.

J. H. DAVIS.

REGULATOR FOR ELECTRO THERAPEUTIC APPARATUS.

No. 450,577. Patented Apr. 14, 1891.

FIG. 1.

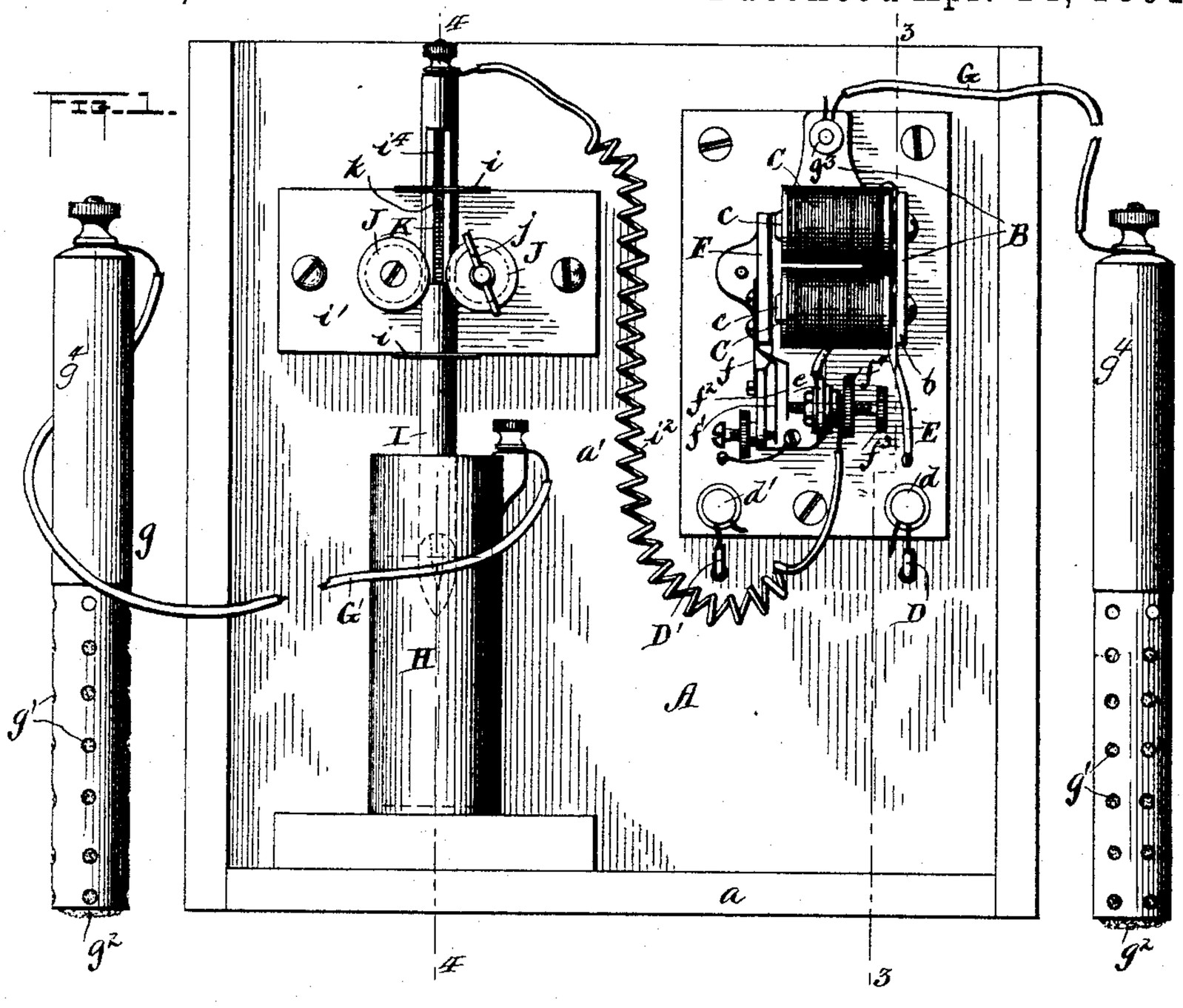
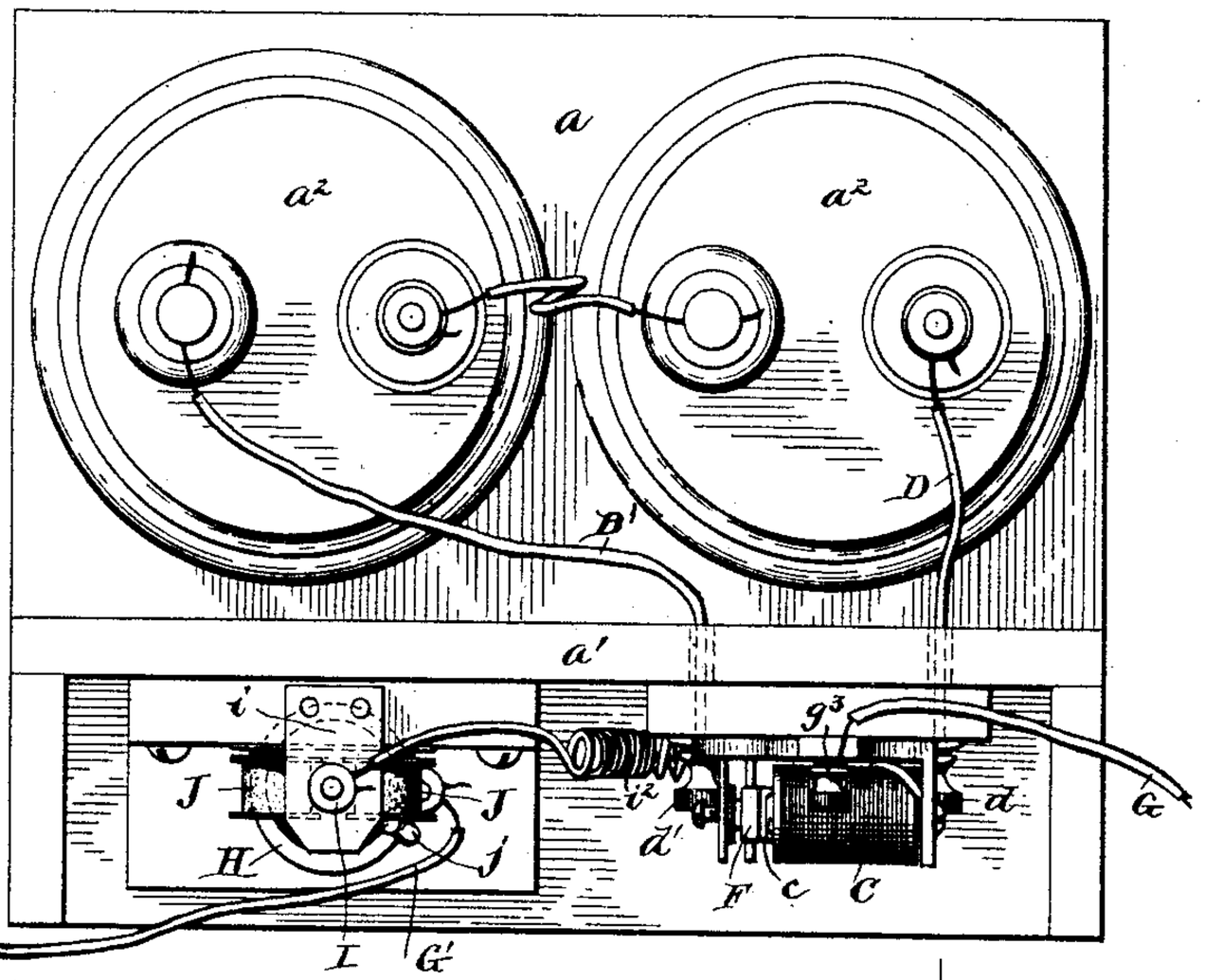


FIG. 2.



Witnesses:—

Severance.

Theodore S. West,

Inventor:—

John H. Davis,

By L. Deane,

his Attorney.

(No Model.) 2 Sheets—Sheet 2.

J. H. DAVIS.

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FIG. 3.

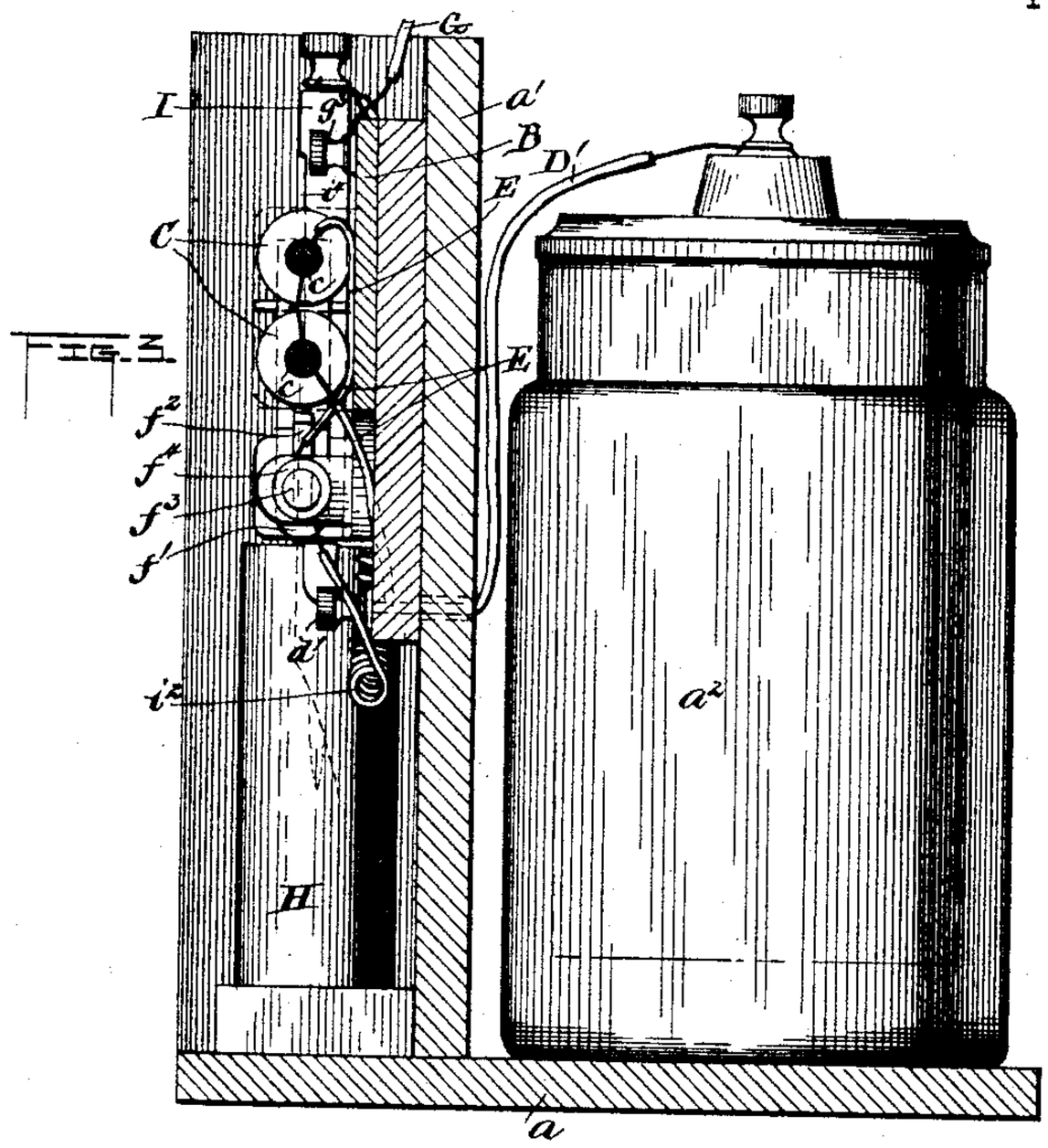


FIG. 4.

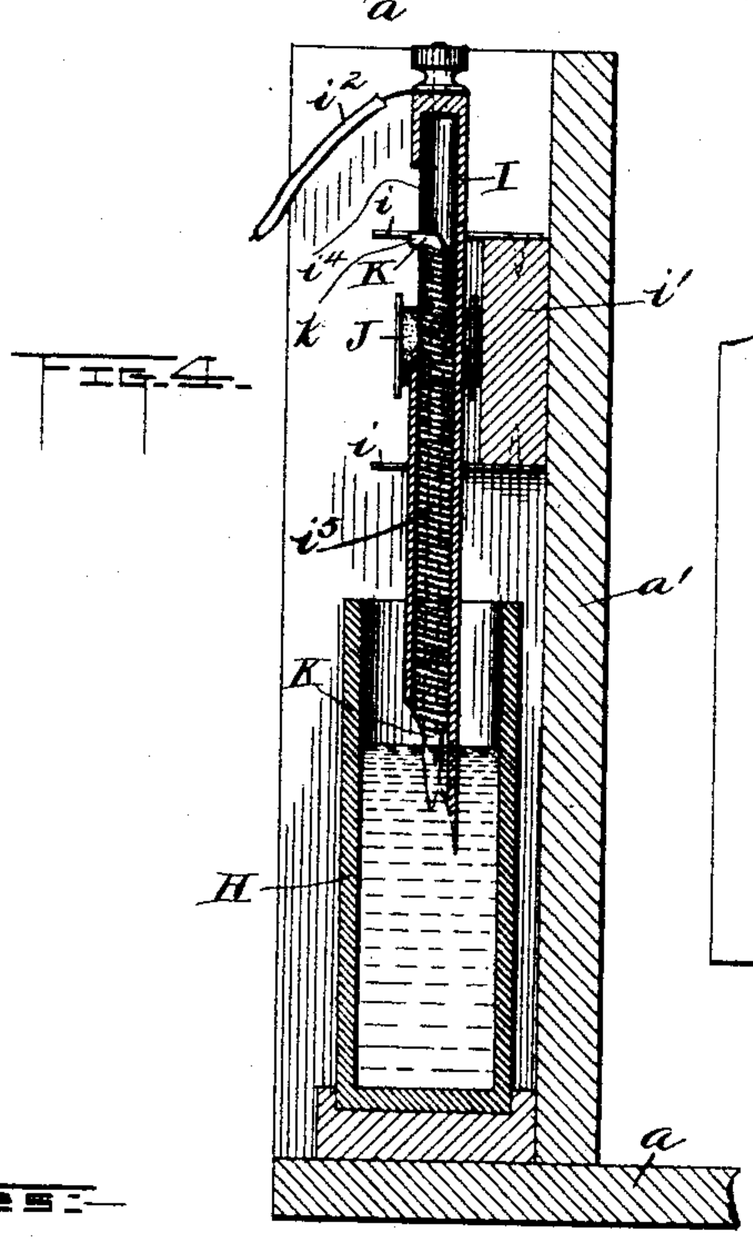
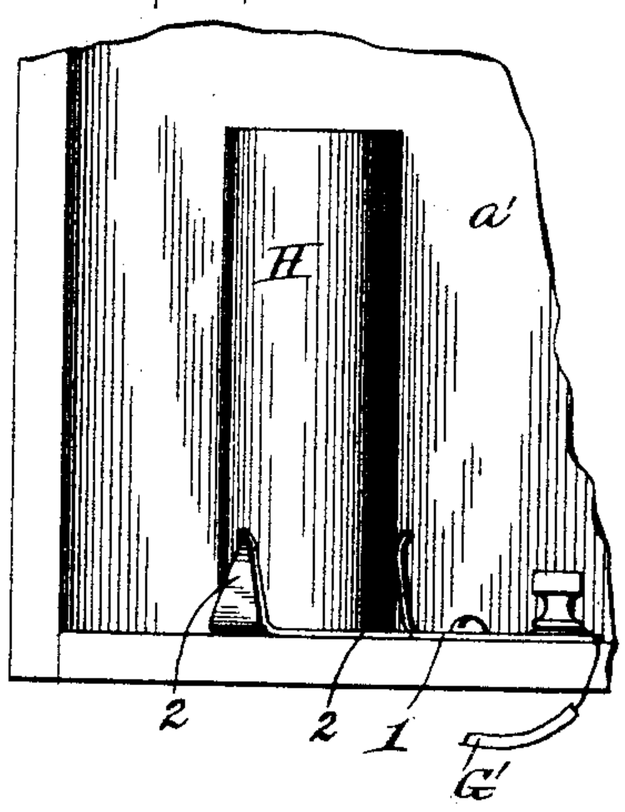


FIG. 5.



Witnesses:
Severance.
Theodore L. West.

John H. Davis,
By L. Deane
his Attorney.

UNITED STATES PATENT OFFICE.

JOHN H. DAVIS, OF FINDLAY, OHIO, ASSIGNOR OF ONE-THIRD TO YEATMAN BICKHAM, OF SAME PLACE.

REGULATOR FOR ELECTRO-THERAPEUTIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 450,577, dated April 14, 1891.

Application filed May 12, 1890. Serial No. 351,840. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. DAVIS, a citizen of the United States, residing at Findlay, in the county of Hancock and State of Ohio, have invented certain new and useful Improvements in Rheostats; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in electric batteries of the kind usually designed for medical purposes, and pertains particularly to the regulator or rheostat to equalize the current, which rheostat is adapted to contain water; and it consists in the construction and novel combination of parts hereinafter described, illustrated in the drawings, and pointed out in the appended claims.

In the accompanying drawings, in which similar letters of reference indicate corresponding parts, Figure 1 represents a front or face view of a device embodying the invention. Fig. 2 is a plan view thereof. Fig. 3 is a vertical section on the line 3 3 of Fig. 1. Fig. 4 is a vertical section on the line 4 4 of Fig. 1. Fig. 5 is a detail in front elevation, showing a modification in the means for supporting and fastening the cylinder.

Referring to the drawings by letter, A designates the frame or casing of the device, which is composed of a base-board a and a vertical supporting-board a', to which the magnet, rheostat, and connecting parts are attached. The battery-cells a^2 a^2 stand upon the base-board, which is made large enough to support a suitable number of cells. To the front of the supporting-board a' is secured by screws or otherwise a board having similarly secured to itself the magnet-bracket B, upon the vertical flange b of which the horizontal cores c c of the coils C C are mounted, the opposite ends of which cores project outward from the coils or helices for the purpose of coming in contact with an armature hereinafter described.

D D′ are circuit-wires extending from the battery through the supporting-board a' and having electric connection with the respective binding-posts d d'. From the binding-post d a wire E extends to the lower coil of the magnet, and after making the two helices around the cores c extends downward from the upper coil of the magnet to the arm e on the magnet-bracket.

F is a vibratory armature such as are used in connection with call-bells, the said armature being connected to and held in place by springs $f f' f^2$ and adjusted by the screws f^3 f^4.

The foregoing parts are common to all devices of the sort and form no essential part of the present invention.

G G′ are the hand-wires, the former of which is connected by a binding-post g^3 to the magnet-bracket, while the latter is connected to the cylinder of the rheostat. These wires G G′ have at their free ends the cylindrical tubular metallic handles g g, provided for about half their length from their outer ends with the perforations g' g' and covered the remaining half of their length with thin insulating material (such as rubber) g^4, the outer ends of the handles being open, while their ends that connect with the wires G G′ are closed.

g^2 g^2 are cylindrical pieces of sponge inserted in the handles and standing in the perforated portions thereof. The inner end of such handle—namely, the part covered by the thin insulating material—is used to contain water or other fluid for moistening the sponge in the other end of the handle, and thereby increasing the conductive capacity.

H is the vertical rheostat-cylinder, which is nearly filled with water and is firmly secured to the support-board a' of the main frame.

I is the rheostat-tube passing through openings in guide-plates i i, attached to a block i', secured to the support-board a'. The said tube is at its upper end connected by an insulated wire i^2 with the screw f^4, that adjusts the armature, and its lower end i^3 is beveled, as shown.

i^4 is a longitudinal slot in the tube I, for a purpose hereinafter described.

The tube I is sustained in position by the rollers J, mounted on pins or bolts standing out from the block i', which rollers bear against it on opposite sides and are provided with circumferential end flanges to prevent the displacement of the tube I. The said

tube can be moved up and down by the handle *j* on the outer end of one of the rollers J, by means of which the said roller can be rotated, moving the tube I as described, and thereby causing the opposite roller to rotate also.

K is a core in the tube I, wrapped with a suitable packing i^5, to prevent its falling from place and provided with a pin *k*, standing out through the slot i^4. By means of said pin the core can be raised or lowered in the rheostat-tube, and by means of the rollers the said tube may be pushed to different depths in the water in the rheostat-cylinder, thus varying the strength of the current as desired. The packing around the needle must be wet, so as to fill it with moisture. This acts as a partial conductor, and when the needle is pushed down in the case, upon touching the water a very slight current is felt in the poles, and as the needle is more and more submerged or pushed down into the water the current slowly but surely increases, and when the pen-shaped point of the tube comes in contact with the water it is again increased and gets stronger as the tube is pushed down. Finally the point of the needle comes in contact with the bottom of the cylinder H and makes metallic connections, and by further pushing down the tube the needle will slide upward in the tube until the point of the tube touches the metallic cylinder. Then metallic connection is complete and the full current is thus thrown into the patient.

The rheostat-tube stands axially in the rheostat-cylinder and the core K is metallic.

While the battery-cells are shown and described as standing on a base-board and so quite exposed to view, it is evident that the battery can be placed in a compartment so that the inclosures shall be in a box-shape or other convenient structure; also, it is not essential that the board shown as interposed between the bracket B and the support-board *a'* be always used, because the bracket can be attached directly to the said board or in any other or desired way secured in position.

The cylinder H may be held in position by a metallic claw-plate 1, of three or more fingers, which make contact by their spring or elasticity. Said claw-plate is secured to the base-board of the wooden frame and has a binding-post 2 for one of the hand-electrodes. Instead of having the tube I movable, it may be fixed; but in either event the needle or core K is movable.

From the foregoing description the operation of this device, which is as follows, will be clearly understood. The primary current is continual from the positive element (the zinc of the cell) to the negative element, (the carbon,) and through the helix by means of any usual and ordinary connections. In the drawings this is indicated sufficiently clear for those skilled in this art to see at a glance. When this connection is broken, the current ceases. The primary current passes through the helix and thence through the armature, springs, &c., in the usual manner back to the carbon. The secondary current at one end joins the primary current at the screw f^4 and at the other end at the binding-post g^3, and when the patient takes the handles and the needle of the rheostat is inserted in the water the current is thus completed, and when the rheostat is brought in contact and the patient forms a part of the secondary or induced circuit the elementary forces of the battery are turned into the course where the least resistance is. Hence when the rheostat is in full contact the patient gets the strongest current. The regulator-needle has a pin-shaped point, because this is the most convenient shape of reducing the surface contact with the water in the cup and bringing on the contact gradually and of preventing shocks, &c.

Having described my invention, I claim—

1. The combination, with a battery, of the cylindrical tubular handles, perforated for about half their lengths from their open ends and covered for the remainder of their lengths with insulating material, and the pieces of sponge fitting in the perforated portions of said cylinders, substantially as specified.

2. The combination, with the battery, of the rheostat, consisting of the vertical cylinder adapted to contain water, and the vertically-adjustable tube arranged to enter said cylinder, substantially as specified.

3. The combination, with the battery, of the vertical rheostat-cylinder, the vertically-adjustable rheostat-tube, and the packed metallic core inserted in said tube.

4. The combination, with the rheostat-cylinder, the rheostat-tube having the slot i^4, and the rollers sustaining the said tube, of the packed metallic core K in said tube provided with a pin projecting out of said slot, substantially as specified.

5. The combination of the metal cylinder H with the tube I, slotted at i^4, and the core K, surrounded with moistened packing, said tube being movable up and down and adapted to come in contact with the base of the cylinder.

6. In a rheostat, as described, the combination of the battery with the movable tube and a core inside, also movable, and surrounded with a moistened packing, and the metal cylinder adapted to hold water.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. DAVIS.

Witnesses:
R. F. POLLOCK,
Y. BICKHAM.