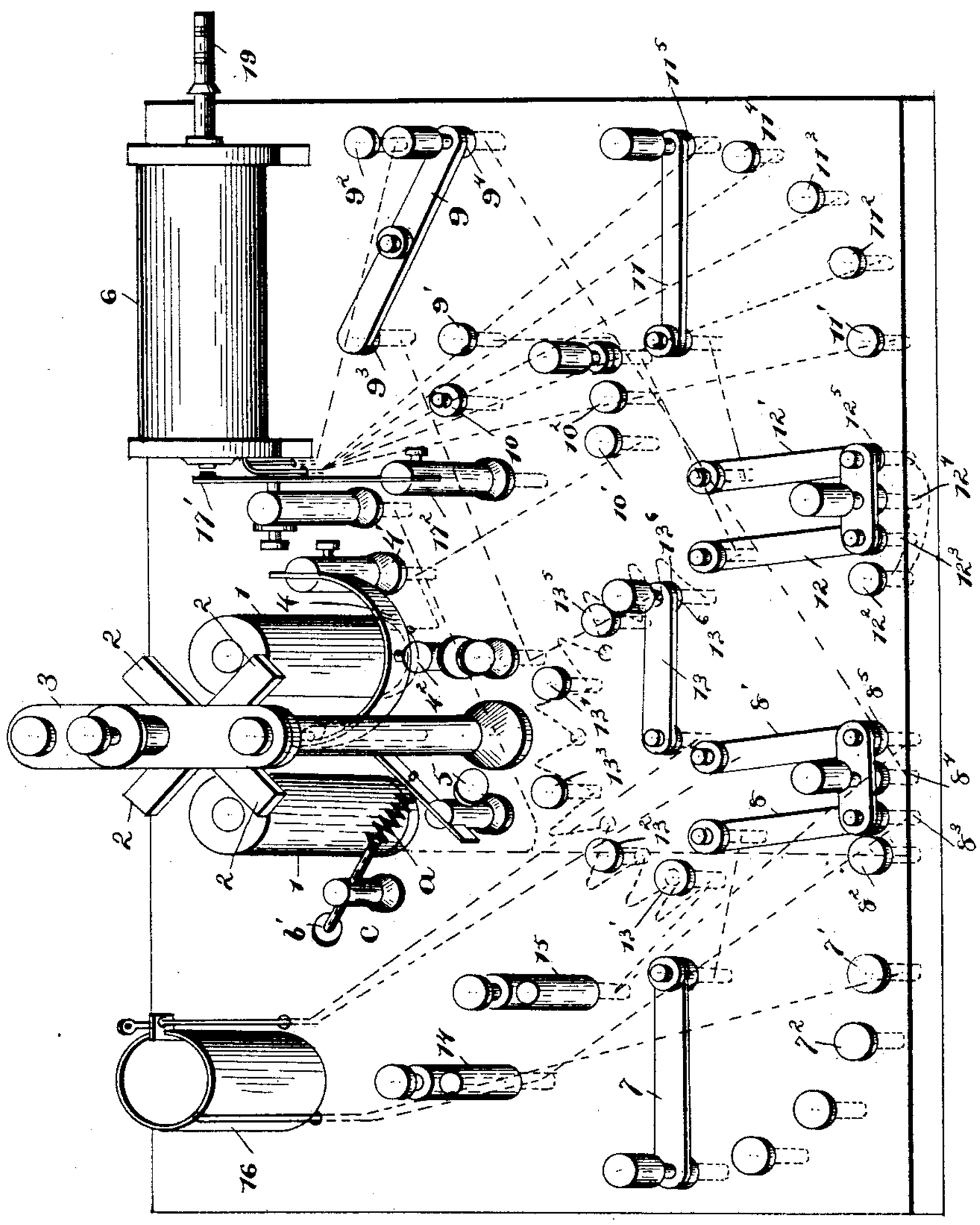
(No Model.)

J. R. ETTER.

ELECTROMEDICAL APPARATUS.

No. 543,003. Patented July 23, 1895.



Witnesses:
Geo. E. Frech,
Geo. H. Snyder

Inventor.
J. R. Etter,
per
O. U. Perrin,
Attorney.

UNITED STATES PATENT OFFICE.

JACOB R. ETTER, OF CRAWFORDSVILLE, INDIANA.

ELECTROMEDICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 543,003, dated July 23, 1895.

Application filed June 19, 1893. Serial No. 478,208. (No model.)

To all whom it may concern:

Be it known that I, JACOB R. ETTER, a citizen of the United States, residing at Crawfordsville, in the county of Montgomery and State of Indiana, have invented a new and useful Electromedical Machine, of which the following is a specification.

My invention has special reference to a portable electromedical machine, having as its object the controlling more minutely of the electric current than has ever been done heretofore; and it consists in the novel construction, combination, and arrangement of the several parts, hereinafter described as having a common object and a unity of purpose—the construction of a perfectly-portable electromedical machine wherein all of the necessary electric currents are produced and used for the treatment of disease.

Referring to the accompanying drawing, forming a part of this specification, the figure is a perspective view of an electromedical machine embodying my invention.

Like numbers of reference indicate corresponding parts.

In the embodiment of my invention I use a rheotome, a rheostat, an induction-coil, suitable switches, points, and metallic connections of substantially the form as shown in the annexed drawing. The rheotome, comprising a pair of electromagnets 1 1, a cross-shaped revolving armature 2, a metallic frame 3, supporting the armature, a commutator 4, and a speed-controlling device 5, is placed by suitable connections in the galvanic circuit for interrupting and intensifying the electric currents.

The speed-controlling device consists of a plate 5, which has its inner end to bear against the shaft of the revolving armature, and the pressure of this plate is controlled by the spring *a* and the screw-rod *b*, which passes through the post *c*.

An induction-coil 6, constructed in the ordinary manner, produces the induced or faradic current, the secondary layer being wound in any number of sections desired and connected with suitable switches and points for the purpose of placing said layer in the galvanic circuit, thereby converting the induction-coil into a rheostat, for the purpose of regulating the galvanic current in the most minute quantity by manipulating the controlling-slide 19.

To attain a simplicity of construction and a convenience in use not obtained heretofore in any machine, the switches, points, and connections are arranged and combined substantially as shown in the drawings, wherein 7 refers to a battery-switch, 8 to a double galvanic switch, 9 to a single galvanic switch, 10 to a selecting-switch, 11 to a controlling-switch, 12 to a pole-changing switch, 13 to a cautery-switch, 14 and 15 to binding-posts, and 16 to a battery-cell. 17 indicates the base of the machine.

In tracing the steady or unbroken galvanic current, the battery switch-lever 7 is placed on the switch-point corresponding with the number of battery-cells desired to be used, and the double galvanic-switch lever 8 8′ is placed on the switch-points 8^3 8^5, whereby the current is conveyed from the battery-cell 16, through the switch-lever 8′, the switch-point 8^5, the binding-post 15, electrodes, patient, the binding-post 14, the switch-point 8^3, the switch-lever 8, the battery switch-lever 7, the switch-point 7′, and back to the battery-cell 16, thereby tracing the steady galvanic circuit.

In tracing the broken or interrupted galvanic current, the battery switch-lever 7 is placed as in tracing the steady galvanic current, the double galvanic switch-lever 8 8′ is placed on points 8^2 8^4, the single galvanic switch-lever 9 on points 9^3 9^4, the selecting switch-lever 10 on point 10′, and the controlling switch-lever 11 on point 11^5, thereby passing the current from the battery-cell 16, through point 7′, switch-lever 7, switch-lever 8, point 8^2, electromagnets 1 1, commutator-post 4′, commutator-spring 4, commutator-post 4^2, point 9^3, switch-lever 9, point 9^4, point 8^4, switch-lever 8′, and back to the battery-cell 16, which traces the primary circuit. At the point of interruption the current has another path to travel, from the commutator-post 4′, through point 10′, switch-lever 10, and then by suitable connections through the secondary layer of the induction-coil 6, which is used in this circuit as a rheostat 6, the primary circuit being open at points 9′ and 9^2. Continuing from said rheostat the current passes point 11^5, switch-lever 11, switch-lever 12′, point 12^5 and 12^2, binding-post 14, elec-

trodes, patient, binding-post 15, point 12^3 and 12^4, switch-lever 12, and commutator-post 4^2, completely tracing the broken galvanic circuit.

In tracing the faradic current the battery switch-lever 7 is placed, as hereinbefore stated, the double galvanic switch-lever 8 8′ on points 8^2 8^4, the single galvanic switch-lever 9 on points 9′ 9^2, the selecting switch-lever 10 on point 10^2, and the controlling switch-lever 11 on point 11′, which conveys the current by this manner of arranging the switch-levers from the battery-cell 16, through point 7′, switch-lever 7, switch-lever 8, point 8^2, commutator-post 17, commutator-spring 17′, commutator-post 17^2, primary layer of the induction-coil 6, point 9^2, switch-lever 9, point 9′, point 8^4, switch-lever 8′, and back to the battery-cell 16, thus retracing the primary circuit.

In tracing the secondary or induced current, beginning with the binding-post 14, the currents pass through points 12^2 and 12, switch-lever 12′, switch-lever 11, point 11′, secondary layer of the induction-coil 6, switch-lever 10, point 10^2, switch-lever 12, point 12^3 and 12^4, binding-post 15, electrodes, patient, and back to binding-post 14.

In tracing the cautery-circuit the current passes from the battery-cell 16, through cautery-lever 13, point 13^6, resistance-wire 18, point 13′, binding-post 15, cautery-cords, binding-post 14, and back to the battery-cell 16.

In using the steady galvanic current the battery-lever is placed on the point corresponding with the number of battery-cells desired to be used and the double galvanic lever on the points 8^3 and 8^5, thereby conveying the current directly through the binding-posts to the patient.

In using the broken galvanic current the battery-lever is placed as in using the steady galvanic current and the double galvanic lever on the points 8^2 and 8^4, the current continuing from lever 8 to the rheotome, where any desired number of interruptions can be obtained per minute. At the point of interruption there are two paths for the current to travel, one, the battery-circuit, passing the single galvanic lever 9, placed on points 9^3 9^4, through point 8^4 and switch-lever 8′, back to the battery-cell 16, and another, the shunt-circuit, the rheotome being placed therein which passes the commutator-post 4′, point 10′, switch-lever 10, the secondary layer of the rheostat, the controlling-lever 11, the pole-changing lever 12 12′, the binding-posts, and the patient.

The secondary layer of the rheostat is wound in any number of sections desired, the sections having suitable connections with the controlling switch-lever and points, whereby any number of sections of resistance may be thrown in or out of the circuit at will. The intensity of the current may be diminished in the most minute quantity by drawing out gradually the controlling-slide 19, or it may be minutely increased by gradually pushing in said slide. The direction of the current may be changed at will by the manipulation of the pole-changing lever.

In the construction above described I produce a perfectly-portable electromedical machine that combines in one switchboard all necessary electrical currents for medical and surgical use, together with regulating devices for controlling the currents more minutely than has ever been done heretofore. My invention furthermore embodies in it a simplicity of form and a convenience in use not embodied in any electromedical machine heretofore known.

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

1. In an electro-medical machine, the combination in a switch-board of the switch-points, the metallic connections, and the switch-levers comprising a battery lever, a double galvanic lever, a single galvanic lever, a selecting lever, a controlling lever, a pole-changing lever, and a cautery lever, for the purpose of regulating and minutely controlling the electric currents, substantially as specified.

2. In an electro medical machine, an induction coil producing the induced current and a rheostat controlling the galvanic current, embodied in one instrument, the same having the form of an induction-coil constructed in the ordinary manner, the sections of the secondary layer being connected with a suitable, circular switch and points for the purpose of placing said layer in the galvanic circuit and for cutting on and off resistance in sections, the resistance of the sections of the secondary layer being controlled more minutely by means of the longitudinal adjustment of the non-magnetic controlling slide whereby all the sections or any fractional part of a section may be cut in and out of the galvanic circuit, the secondary layer being non-usable and not performing any function when the instrument is in use as an induction-coil and the primary layer being non-usable and not performing any function when the instrument is in use as a rheostat, substantially as specified.

3. In an electro medical machine, the combination in a switch-board of the switch-points, the metallic connections, the switch-levers, a rheotome, and an induction-coil producing the induced current and a rheostat controlling the galvanic current embodied in one instrument, the same having the form of an induction-coil constructed in the ordinary manner and adapted to perform the functions of each as and when desired, substantially as specified.

JACOB R. ETTER.

Witnesses:
H. A. WILKINSON,
J. W. FULLEN.