

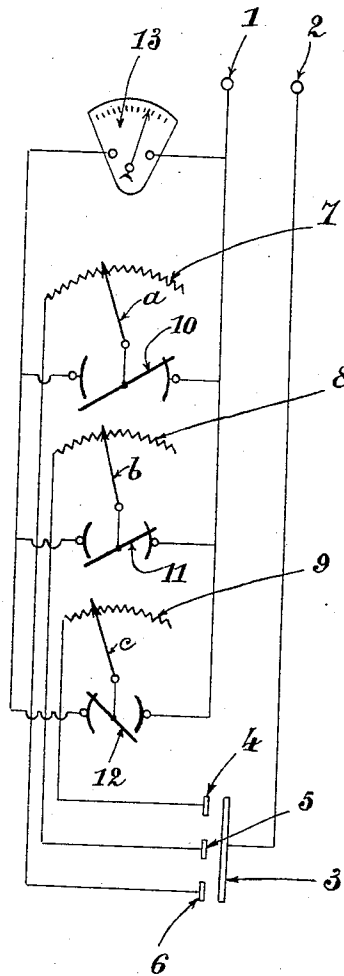
March 15, 1927.

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1,621,279

APPARATUS FOR CONTROLLING AND DISTRIBUTING ELECTRIC CURRENTS

Filed Dec. 30, 1922



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APPARATUS FOR CONTROLLING AND DISTRIBUTING ELECTRIC CURRENTS.

Application filed December 30, 1922, Serial No. 610,049, and in France January 6, 1922.

This invention relates to an apparatus for distributing electric current to a plurality of electrodes, the distribution being measured by means of a single amperemeter. Said apparatus is particularly adapted for use in therapeutic applications of electricity by using high frequency alternating currents, and may also be used with direct current.

In therapeutic treatments the electric current has to flow between one inner or outer point of the patient's body and one or several other points thereof thus causing a physical or chemical modification, for instance an elevation of temperature of the parts which are flowed through by said current. To this end, electrodes are applied to said points of the patient's body and in the most cases one of said electrodes, which I call main electrode, is applied to an inner point of the body by introducing it into a cavity thereof, and one or several of the other electrodes which I call branch electrodes are put in contact with one or several outer points of the surface of the body. In this manner the current will flow between the said outer points of the body and all the said inner points through the parts of the body located between said outer branch electrodes and said inner main electrodes. The medical result which is thus obtained varies according to the nature and the strength of the current used and to the duration of the medical treatment.

The accompanying drawing shows by way of example a diagram of the connections of the apparatus according to the invention in the case where three branch electrodes and one main electrode are used.

The source of current is connected to terminals 1 and 2; the main electrode is diagrammatically shown at 3 and the branch electrodes at 4, 5 and 6. Moreover, the device is provided with three rheostats or adjustable resistances 7, 8 and 9, the movable arms of which are shown at *a*, *b* and *c*, three single pole-double throw switches 10, 11 and 12, and a single amperemeter 13. Said different elements are connected as shown on the drawing.

The drawing shows at 10, 11 and 12 the switches in three various positions. The method of use of the device is as follows: Assuming that the branch electrodes and main electrode are applied in any suitable positions on the human body, for instance by introducing the main electrode into a cavity of said body and placing the branch electrodes exteriorly on the skin of the same, and further that all the switches are in the position indicated at 10, no current will pass through the amperemeter 13. Now, if the operator desires to measure the strength of the current that flows through one of the branch electrodes and corresponding rheostat, say branch electrode 4 and rheostat 9, he will turn switch 12 into the position indicated at 12; for such position, current flows through pole 1, amperemeter 13, switch 12, arm *c*, rheostat 9, electrodes 4 and 3 and terminal 2. It will be observed that when moving switch 12 from its initial position (similar to that indicated at 10) to the position indicated at 12, said switch will pass through a middle position such as indicated at 11. For such middle position, since the switches are of the type without break, a part of the current passing through electrode 4 will flow directly between terminal 1 and rheostat 9 while the other part of said current will pass through amperemeter 13, in such manner that the strength of the current through electrode 4 never undergoes any appreciable change since the resistance of the amperemeter 13 is relatively very small. This is of the greatest importance in electro-therapeutic applications, since in many medical cases of use any sudden variation in the strength of the current flowing through the human body could occasion very dangerous complications, particularly when using high frequency currents of relatively great strength as it is usual now-a-day in medical treatment for internally heating, to an accurately predetermined temperature, certain portions of a patient's body.

It is easy to understand that according to the position into which the switches 10, 11 and 12 are brought the amperemeter 13 indicates either the intensity of the current flowing through one of the branch electrodes, or of the total current flowing through two branch electrodes, or of the total current flowing through all branch electrodes or through the main electrode. If it is desired the amperemeter may also be cut out of circuit.

On the drawing, the positions of the switches are such that the current which flows through the branch electrode 4, passes through terminal 1, amperemeter 13 which

indicates its intensity, rheostat 9, branch electrode 4, main electrode 3 and terminal 2, while the current flowing through the branch electrodes 5 and 6, passes respectively through terminal 1, rheostats 7 and 8, branch electrodes 5 and 6, electrode 3, and terminal 2 without flowing through the amperemeter 13.

In general the branch electrodes may be in any number whatever involving an equal number of rheostats. The intensities of the branched current flowing through the branch electrodes depend from the electrical resistance of the parts of the patient's body located between said branch electrodes and the main electrode and also from the variable resistances of the rheostats put in circuit with said branch electrodes. If supposing the effective electric tension at the terminals 1 and 2 keeps a constant value, it is possible by means of said rheostats to vary independently from each other, the effective intensities of the current flowing through the branch electrodes. Further by acting on the source of current before the terminals 1 and 2, it will be possible to vary simultaneously the intensities of all the said branched currents.

The main electrode 3 may be constituted by one or a plurality of plates.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

An apparatus for distributing, regulating and measuring electric currents for electro-therapeutic uses comprising one main electrode, several branch electrodes, one amperemeter, a line connecting said main electrode to one pole of a source of current, means for electrically connecting one terminal of the amperemeter to the other pole of the source of current, several adjustable rheostats each corresponding to one of said branch electrodes, several throw-over switches without break each corresponding to one of said rheostats, means for electrically connecting one terminal of each rheostat to the corresponding branch electrode, means for electrically connecting the other terminal of each rheostat to the main terminal of the corresponding switch, means for electrically connecting one branch terminal of each switch to the pole of the source of current which is connected to the amperemeter, and means for electrically connecting the other branch terminal of each switch to the other terminal of the amperemeter.

In testimony whereof I have signed my name to this specification.

ERNEST ROUCAYROL.