Dec. 24, 1929. K. STOYE 1,740,963

ELECTROTHERAPEUTIC MACHINE

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Fig. 1.

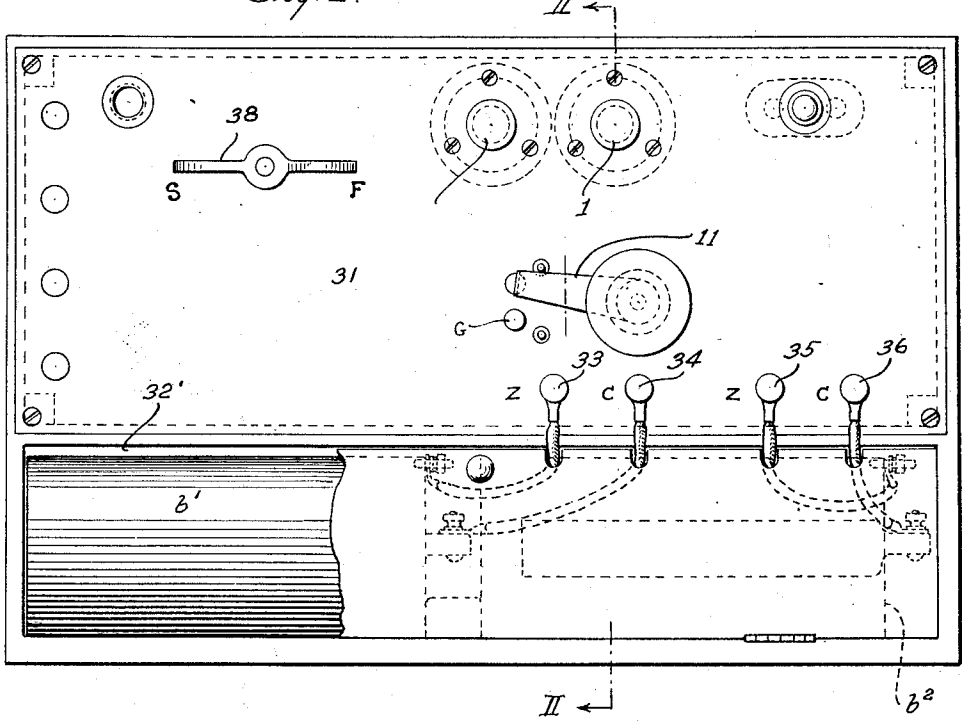

Fig. 2.

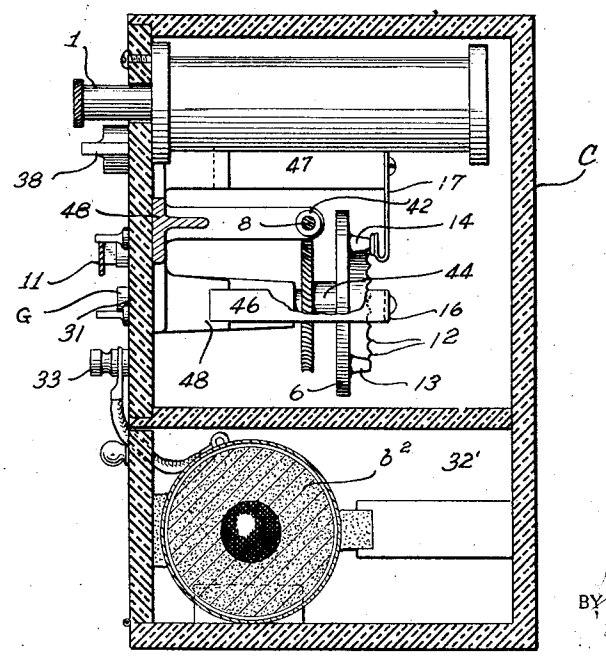

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Fig. 3.

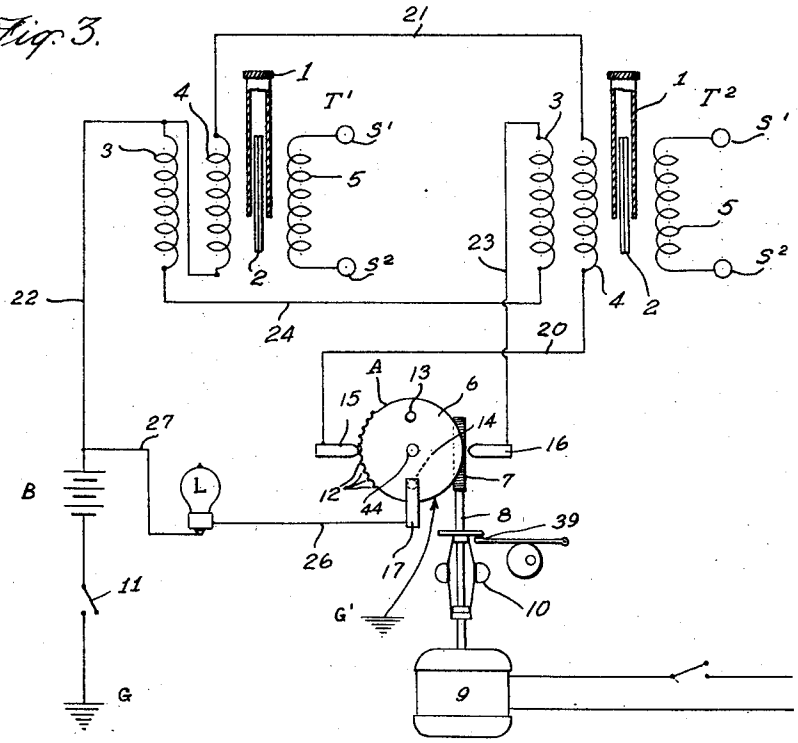


Fig. 4

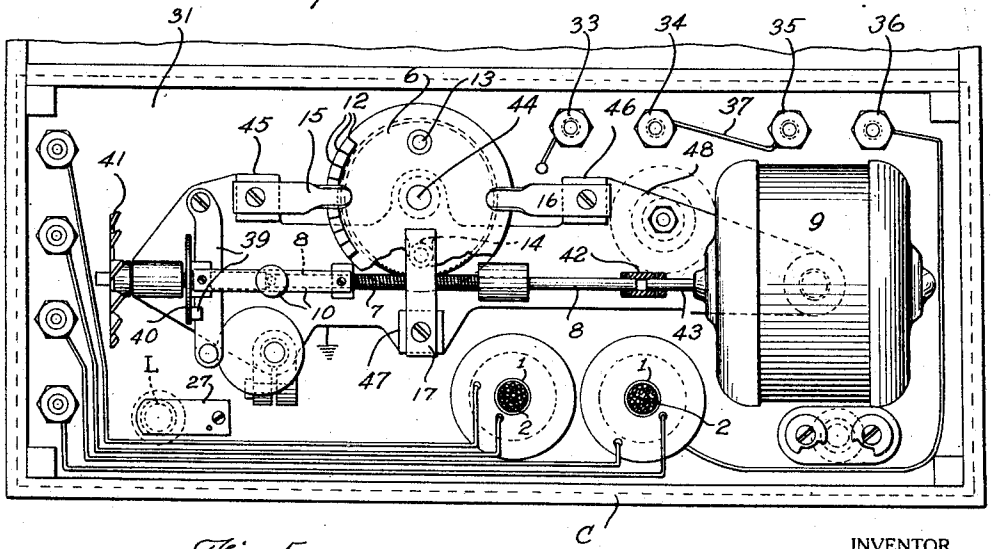
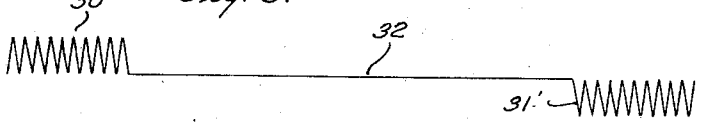


Fig. 5.



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UNITED STATES PATENT OFFICE

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ELECTROTHERAPEUTIC MACHINE

Application filed July 29, 1925. Serial No. 46,801.

The therapeutic value of faradic currents depends largely upon the manner in which such currents are applied to the human body. In this respect the most important factors are the regular spacing of the impulses and the sign thereof. An important use of such current is for inducing involuntary muscular exercise. To this end, and to produce the most beneficial results a series of say ten impulses of one sign should be alternated with a second series of impulses of the opposite sign with a rest period between each two adjacent series of impulses. The rest periods may be slightly longer than the duration of each series of impulses of either sign. It is by some authorities considered desirable that the time spacing of the series of impulses be coordinated with the pulse beats of the patient.

The object of the present invention is the provision of cheap, simple, easily controllable and foolproof apparatus for controllably delivering electrical impulses for use on the human body therapeutically in accordance with the above desiderata. More particularly, it is the object of the present invention to accomplish some or all of these desired results by the medium of a simple mechanical circuit interrupter; to subject such circuit interrupter to a simple speed control; and to effect the current reversals as to sign through the medium of a simple single contact circuit interrupter, and without the use of a reversing switch.

Other objects of the invention are to improve in general a therapeutic apparatus for home use in the application of faradic currents and will be more particularly pointed out in the accompanying claims which are directed to the illustrative embodiment of the invention described in the following specification in connection with the accompanying drawings, but merely for the purposes of illustration and not of limitation.

In the drawings, Figure 1 is a plan view of the completed apparatus; Figure 2 is a vertical section through line II—II of Figure 1; Figure 3 is a circuit diagram, showing the associated electrical apparatus also diagrammatically; Figure 4 is a rear view of the functioning apparatus as preferably embodied; and Figure 5 is a diagrammatical showing of the series of reversed impulses as they may be delivered by the apparatus.

Two separate induction coils or transformers T^1 T^2 are employed, and are each controllable and of normal induction coil type, having each a tubular controller 1 adapted adjustably to inclose the core 2. Each induction coil however, is provided with two exactly similar primary windings 3 and 4, and with a single secondary winding 5. The reversal of sign is accomplished by the alternating use of the two primary windings as will hereinafter more fully be set forth.

A simple circuit interrupter A comprises essentially a rotating member 6 normally driven constantly in one direction by the worm 7 on the shaft 8, extending from an electric motor 9 and controlled as to speed by a governor 10. A battery B consisting preferably of two dry cells b^1 b^2 supplies the electric energy for therapeutic purposes. One side of the battery B is preferably grounded to the frame of the apparatus through the control switch 11 as indicated by the ground G. A similar ground connection G^1 is provided for the circuit interrupter A. In its preferred embodiment the member 6 is a disk rotating on a vertical axis, and carries two sets of contact projections, one a series of equally spaced projections 12, constituting preferably a little less than ¼ of the angular extent of the disk and two diametrically positioned single contacts 13 and 14. Two diagrammatically positioned contact fingers 15 and 16 are adapted to co-operate one at a time with the series of projections 12. One intermediate contact finger 17 is adapted to co-operate solely with the single contacts 13 or 14. For the contact finger 15, the circuit through the induction coils from battery B may be traced as follows:

Battery B, switch 11, ground G, ground G^1, projections 12, finger 15, wire 20, primary winding 4 of transformer T^2, wire 21, primary winding 4 of transformer T^1, wire 22 back to battery B. The circuit for contact finger 16 is traced as follows:

Battery B, switch 11, ground G, ground G^1, projections 12, contact finger 16, wire 23, pri-

mary winding 3 of transformer T^2, wire 24, primary winding 3 of transformer T^1, wire 22, back to battery B. In this circuit, the magnetizing direction of the current through coils 3 is opposite to the previous magnetizing direction of the current, through coils 4, so that in the one case the impulses delivered from the secondary terminals S^1 S^2 are first as indicated by 30 in Figure 5 and then as indicated by 31 in Figure 3, the series following the series 30 by the time interval indicated by the line 32.

The circuit for the tell-tale lamp L, may be traced as follows:

Battery B, switch 11, grounds G and G^1, contacts 13 or 14 (one after the other), contact 17, wire 26 lamp L, wire 27, back to battery B. Two flashes of the lamp L are therefore caused to be made for each rotation of the member 6 corresponding to the two sets of plus and minus impulses to be generated, so that by controlling the governor 10, the impulses may be synchronized with the patient's pulse by synchronizing the light flashes with the patient's pulse.

All the parts are preferably mounted within a convenient case C, and are preferably mounted directly upon an insulating panel 31, the potential controls 1 each projecting through the panel.

For convenience, the dry batteries b^1 and b^2 may be fitted into a special compartment 32, and their electrodes may be connected directly to terminals 33, 34, 35 and 36, appropriately labeled Z and C to correspond with the carbon and zinc electrodes of the dry batteries, and so that no confusion in the mind of the users will be had. A permanent jumper 37 connects terminals 34 and 35 to give proper series connections for the dry cells.

The electric motor 9 may be energized in a convenient manner from the usual electric house service. 38 indicates a finger control for the governor 10, which operates in the usual manner through a brake 39, engaging the disk 40. A cooling fan 41 is shown on the end of the shaft 8, while the shaft 8 runs in suitable bearings and may be flexibly coupled through the coupling 42 with the motor shaft 43. In the embodiment illustrated it is to be understood that the contact fingers 15 and 16 and 17 are each appropriately mounted upon insulating supports such as 45, 46 and 47. For simplicity of construction, the ground connection for the rotating disk 6 is made through its bearings for its shaft 44 in the frame 48. The contact fingers 15 and 16 are in a plane to cooperate with the projections or teeth 12, located along the periphery of the disk 6, and projecting axially and not radially outward. The contact tip of the contact finger 17 is in a plane axially separated from the plane of fingers 15 and 16, and corresponds with the tips of the projections 13 and 14.

What I claim and desire to secure by United States Letters Patent is:—

1. In combination in therapeutic apparatus a plurality of transformers each having two primary windings and a secondary winding; a source of electric energy; a rotating member; a series of make and break projections localized upon a part of the circumference of said rotating member; a plurality of contact fingers for cooperating with said rotating member and angularly positioned about the same; a plurality of relatively reversed circuits each including said source of energy, one of said contact fingers and one primary winding of each of said transformers; whereby said transformers are energized with a series of pulsations first of substantially one sign and then of substantially opposite sign, separated by a predetermined time interval.

2. In combination in therapeutic apparatus potential transforming means; a source of low potential electric energy; a single contact make and break device; a plurality of relatively reversed circuits, each including said source of energy said contact means and appropirate parts of said transforming means and capable of effecting the creation of a series of high potential pulsations, one series being of substantially opposite sign to the other series.

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