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3,025,857

DEVICE FOR ELECTROTHERAPY

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2 Sheets-Sheet 1

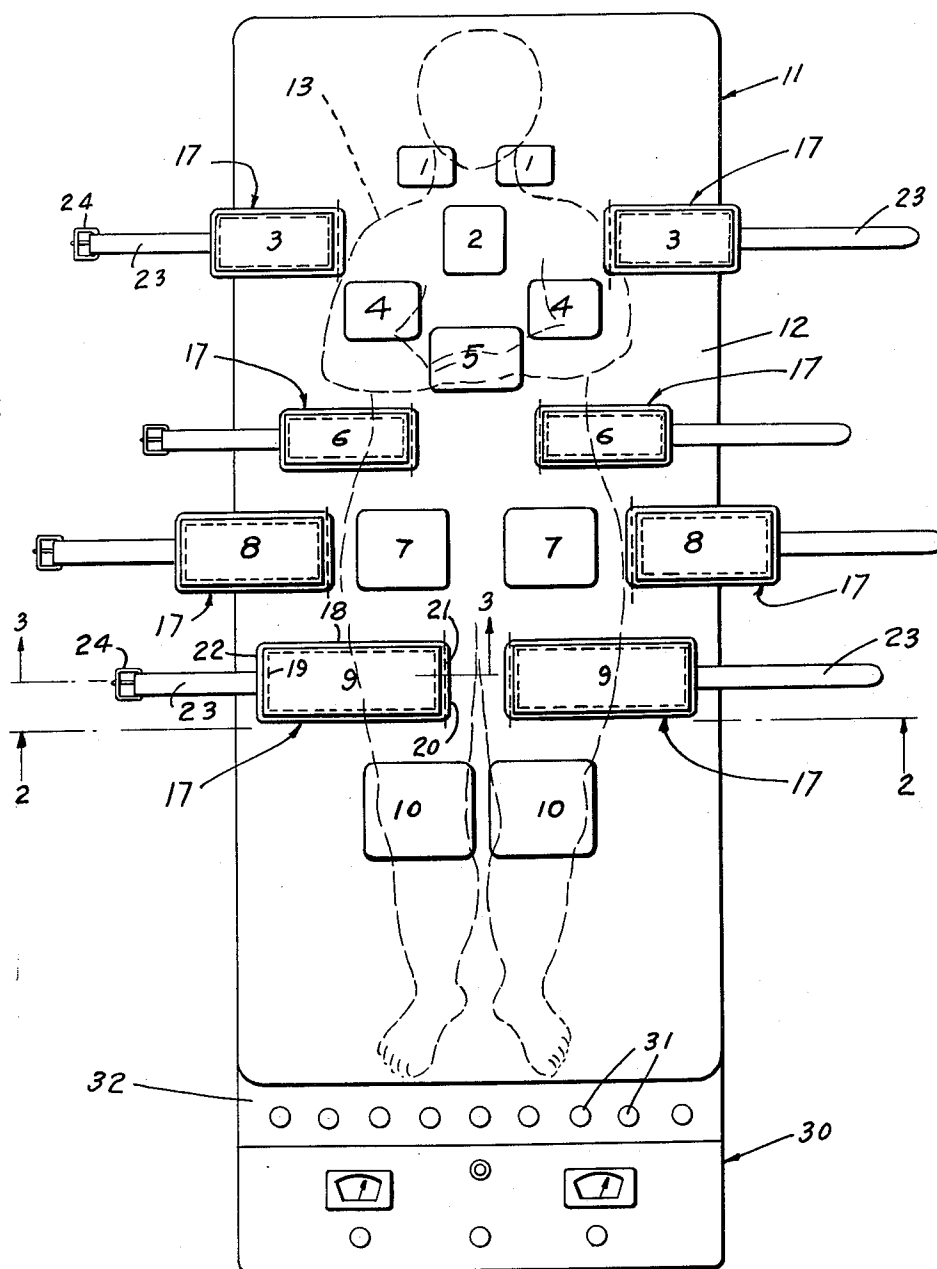


Fig. 1.

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Fig. 2.

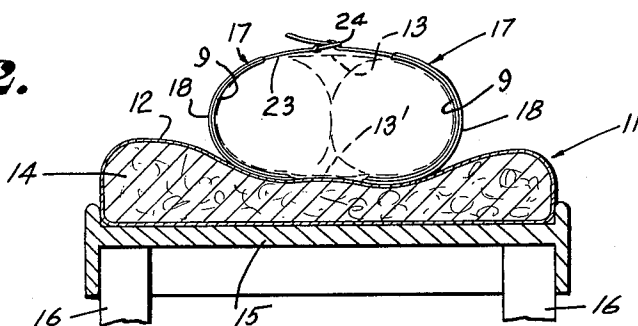


Fig. 3.

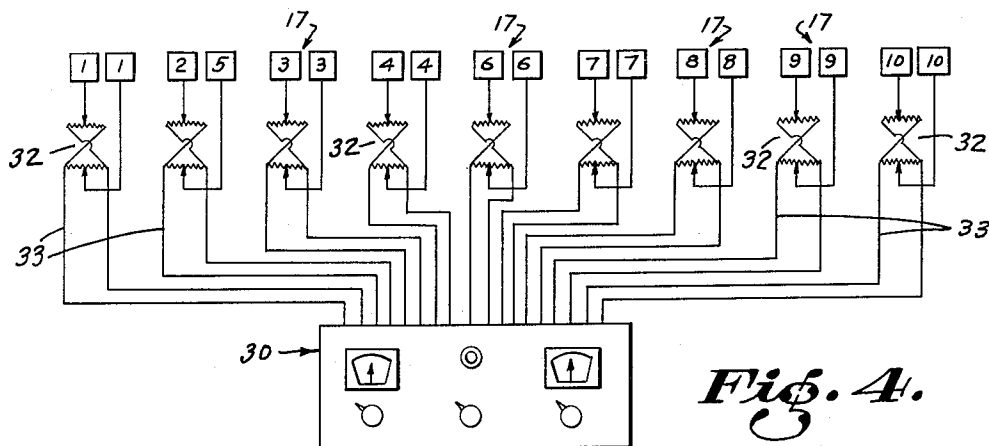
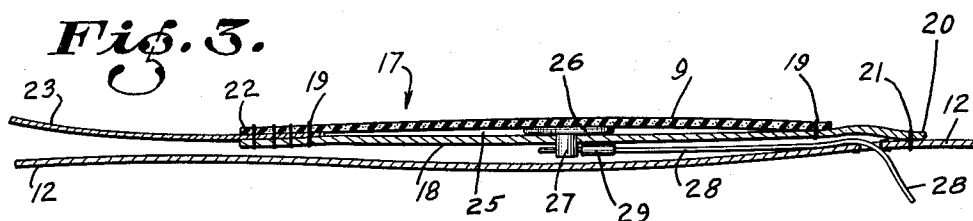
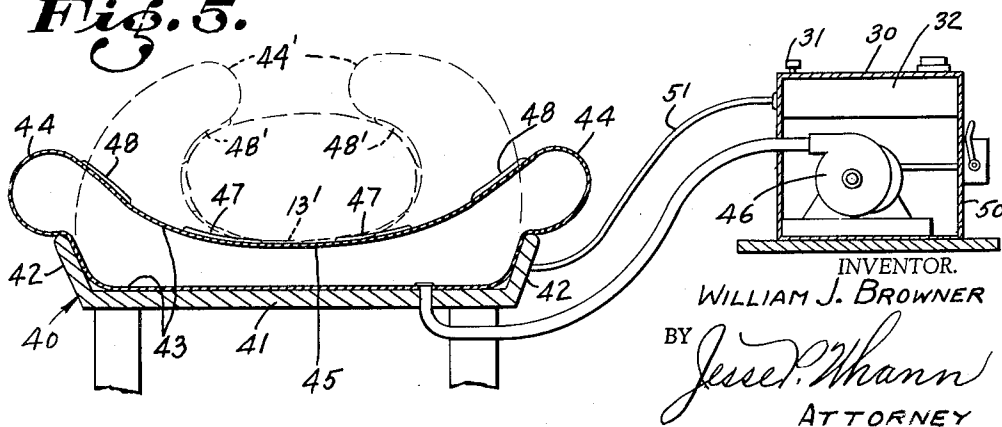


Fig. 4.

Fig. 5.



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DEVICE FOR ELECTROTHERAPY

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This invention relates to devices for treatment of the human body by application of electrical energy thereto, and relates to a device which is especially adapted for selective electrical contraction of muscles.

It is an object of the invention to provide a device having a support to receive the patient and having means for holding electrical contact members in engagement with selected skin areas and having means for passing electrical energy through portions of the body between the areas engaged by the contact members.

In the preferred form of the invention herein disclosed the support for the patient's body is disclosed in the form of a couch on which the patient may lie, the upwardly faced fabric of the couch having thereon contacts which engage areas associated with nerve ends which, when energized by an oscillating current, will effect contraction of associated muscles.

It is an object of the invention to provide a body support which is yieldable and will conform to the surface contour of the body. The upper fabric of this support reacts upwardly against the downward weight of the body, and therefore, presses the electrical contacts against selected portions of the skin area which engages the upper fabric of the support. By providing a support which conforms to the portion of the supported body engaging the same, electrical contacts are automatically brought into engagement with predetermined skin areas merely as the result of the patient assuming a position on the support.

A further object of the invention is to provide a device for the electrical treatment of the human body having in addition to the contact applying means referred to in the foregoing, additional body engaging contacts and simple means for applying them to other surfaces of the body. For example, when the patient reclines upon the treatment couch, electrical contacts are automatically brought into engagement with downwardly presented skin areas of the body. The additional contact supporting means are arranged to be brought up around the body in such a manner as to bring additional contacts into areas which are not faced downwardly.

It is a further object of the invention to provide an electrotherapy device for treatment of the human body having a supporting member which is fluid filled and wherein the action of the fluid therein is to cause the upper fabric of the supporting member to be brought into engagement with areas of the body other than downwardly faced. In an alternative form of the invention the upper fabric of the supporting member is inflatable so that air pressure within the supporting member will move upwardly extending portions of the upper fabric of the supporting member laterally inwardly into engagement with the body of the patient, thereby holding against selected areas of the body electrical contacts supported by the fabric.

Further objects and advantages of the invention may be brought out in the following part of the specification wherein the explanation of details is for the purpose of disclosure and not intended to limit the scope of the invention defined by the appended claims.

Referring to the accompanying drawings which are for illustrative purposes only:

FIG. 1 is a schematic plan view of a preferred form of the invention;

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FIG. 2 is a cross section to enlarged scale taken as indicated by the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view taken as indicated by the line 3—3 of FIG. 1;

FIG. 4 is an electrical diagram of the device shown in FIGS. 1—3; and

FIG. 5 is a cross sectional view showing a form of the invention wherein the body supporting member is adapted to be air-inflated.

Referring to FIGS. 1 and 2, the invention includes a support 11 having an upper wall 12 on which the patient's body may rest, as indicated by dotted lines 13. The upper wall 12 is referred to as a fabric. It may be cloth, plastic or rubber. It is characterized by flexibility so that when the weight of the patient's body is applied to the support 11, the fabric 12 will conform to the external configuration of the downwardly presented portion 13'. Fabric 12 is resiliently supported either by air or a soft and yieldable padding 14 so that, where engaged by the patient's body the fabric 12 may yield downwardly in the manner shown in FIG. 2. The support 11 is carried upon a table 15 equipped with legs 16 which, engaging the floor, support the member 11 at substantially bed height.

As shown in FIG. 1, electrical contacts 1, 2, 4, 5, 7 and 10 are mounted directly upon the fabric 12 so that when the patient 13 lies upon the support 11, these electrodes will engage skin areas of the body, and the upward reaction of the fabric 12 against the supported weight will hold these electrodes in pressural engagement with such skin areas. Contacts 3, 6, 8 and 9 are supported by elements 17 adapted to be extended up around contiguous portions of the body so that these contacts 3, 6, 8 and 9 will be held against skin areas which are not engaged by the fabric 12. FIG. 3, to enlarged scale, shows the lefthand contact 9 and is illustrative of all of the elements 17 for supporting the contacts 3, 6, 8 and 9. The contact 9 consists of an electroconductive sheet, shown in FIG. 1 as being rectangular in shape. In the preferred practice of the invention the contact 9 is made from an electroconductive rubber compound. Its periphery is joined with the peripheral portion of the flap 18, which may consist of a rectangular sheet of flexible plastic, by stitches 19, FIG. 3, and the inner end 20, of the flap 18, is connected to the fabric 12 of the support 11 by a line of stitches 21.

The outer end 22 of the flap 18 has a strap 23 extending therefrom. As shown in FIG. 2, the flaps 18 which support the contacts 9, are pulled up around opposite sides of the body 13 and the straps 23 are connected by a buckle 24, holding the flaps 18 so that they curve around the body and hold the contacts 9 in engagement with the contiguous skin areas.

Contacts 9 are adapted to be brought into a position against the sides of the thighs, the contacts 8 against the sides of the hips, the contacts 6 against the sides of the waist area and the contacts 3 against the sides of the upper arms or shoulder. The contacts 1, 2, 4, 5, 7 and 10 comprise rectangular pieces of electroconductive fabric and are stitched directly upon the fabric 12 of the support 11. As shown in FIG. 3, there is a space 25 between each contact and the flap 18 which supports it. Within the space 25 there is a metal contact element 26, the upper face of which engages the lower face of the electroconductive sheet forming the contact. A short post 27 projects downwardly through the flap 18 and an insulated electrical conductor 28 is connected by a connector tip 29 with the post 27. All of the conductors 28 from the various contacts 1 to 10 are carried back to a source 30 of therapeutic electric current. In the form of the invention disclosed the device 30 is a generator of intermittent or oscillating, muscle-contracting electrical current and potential. It has a plurality of adjusting knobs 31 for the regulation of the flow of current through co-

operating pairs of the conductors 28. As shown in the electrical diagram, FIG. 4, the pairs of conductors 28 which extend from the pairs of contacts are carried to potentiometers 32 which are individually operated by the knobs 31. The potentiometers 32 are connected by conductors 33. The potentiometers 32 are characterized by the ability to control not only the strength of the current flows through the conductors 28 but also the polarity of each current flow so that maximum effectiveness of the muscle contractions may be obtained.

The present invention greatly simplifies the giving of electrical treatment, especially with respect to the initial preparations which consist of bringing desired contacts into engagement with selected portions of the body. Instead of it being necessary for the operator to secure electrodes in place by use of belts, straps, or the like, the subject, with back uncovered, reclines upon the support 11. This simple act, in itself, brings many contacts into engagement with the body. The remaining contacts, 3, 6, 8 and 9, as required, may be readily brought into operative position by adjustment of the supporting elements 17, as previously described. Selected portions of the musculature may be then energized by adjustment of the control knobs 31. Electrical contraction of many sets of muscles, or only a few, may be accomplished at one time and the potentials of the electrical flows through different parts of the body may be individually adjusted as needed during the progress of the treatment.

As hereinbefore stated, the support 11 may be air filled so that the upper patient supporting wall 12 thereof will be characterized by yieldability and resilience when the patient disposes himself thereon. In FIG. 5, I show, in cross section, a form of the invention wherein the body support is inflatable and the pressure of air therein acts to move portions of the upper wall of the support into engagement with side or upper portions of the patient's body. A couch 40 is provided having a bottom wall 41 and side walls 42 defining a trough in which an inflatable container 43 is placed, this container 43 having side portions 44 which extend upwardly with relation to the side walls 42 of the support 40. After the patient reclines on the central portion of the upper wall 45 of the container, an electrically driven air pump 46 is operated so as to inflate the container 43. Air pressure, acting upwardly against the upper container wall 45 presses it upwardly against the lower surface portion of the body 13', holding thereagainst flexible electrodes 47, of electroconductive flexible sheet material, which electrodes or contacts 47 are secured to the upper face of the wall 45. Thereafter, as the air pressure is increased within the container 43 the air pressure in the side portions 44 will move the same inwardly toward lateral portions of the patient's body, as indicated by dotted lines 44', and electrical contacts 48 carried by the upper wall 45 in spaced relation to the contacts 47 will be moved into engagement with lateral skin areas of the body 13', as indicated by dotted lines 48'.

The generator 30 of therapeutic electrical current and potential is schematically shown mounted upon the struc-

ture 50 which carries the air pump, and through a cable 51 which extends from the generator 30, the conductors 28, described with relation to FIG. 4, are carried, these conductors being connected to the body engaging contacts which are secured to the upper wall 45 of the inflatable container 43.

I claim:

1. In an electrical device for treatment of the human body having a source of therapeutic electrical current: a fluid receiving container having a flexible upper wall including a longitudinally extending central portion separating longitudinally extending side portions, said upper wall defining a horizontally extending trough to receive therein the body of the patient in a reclining position with said central portion forming the bottom of the trough and said side portions forming the sides of the trough, said container being so shaped that upon inflation the side portions of said upper wall will flex inwardly and partially encircle the body of a patient reclining within said trough; electrical contacts mounted on said central and side portions of said upper wall and positioned so as to be held against predetermined skin areas of the body by pressure of said wall portions against said body; and means for connecting said contacts to said source of electrical current.

2. In an electrical device for treatment of the human body having a source of therapeutic electrical current: a fluid receiving container having a flexible upper wall including a longitudinally extending central portion separating longitudinally extending side portions, said upper wall defining a horizontally extending trough to receive therein the body of the patient in a reclining position with said central portion forming the bottom of the trough and said side portions forming the sides of the trough, said container being so shaped that upon inflation the side portions of said upper wall will flex inwardly and partially encircle the body of a patient reclining within said trough; electrical contacts mounted on said central and side portions of said upper wall and positioned so as to be held against skin areas of the body by pressure of said wall portions against said body; means for connecting said contacts to said source of electrical current; and a fluid pump having its outlet connected to said container for delivering of fluid under pressure into said container.

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