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2,249,935

ELECTRODE MEANS FOR USE IN SHORT-WAVE DIATHERMY TREATMENT

Filed May 6, 1940

2 Sheets-Sheet 1

Fig. 1.

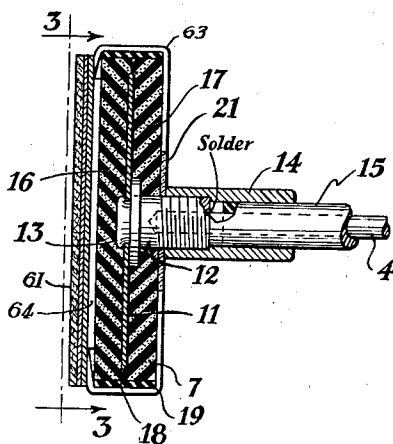
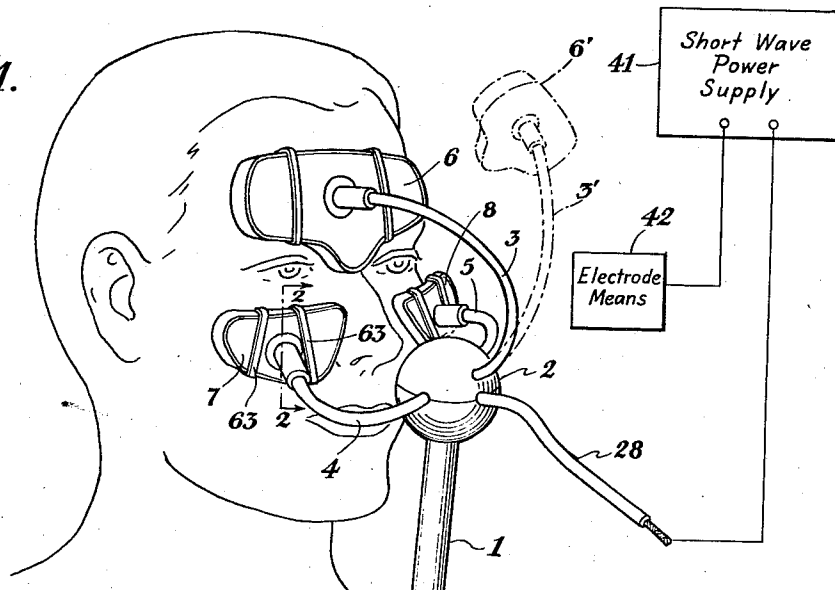


Fig. 2.

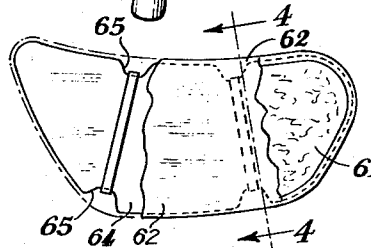


Fig. 3.

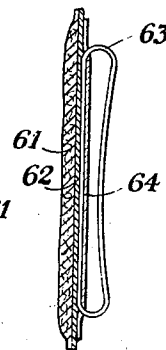


Fig. 4.

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2 Sheets-Sheet 2

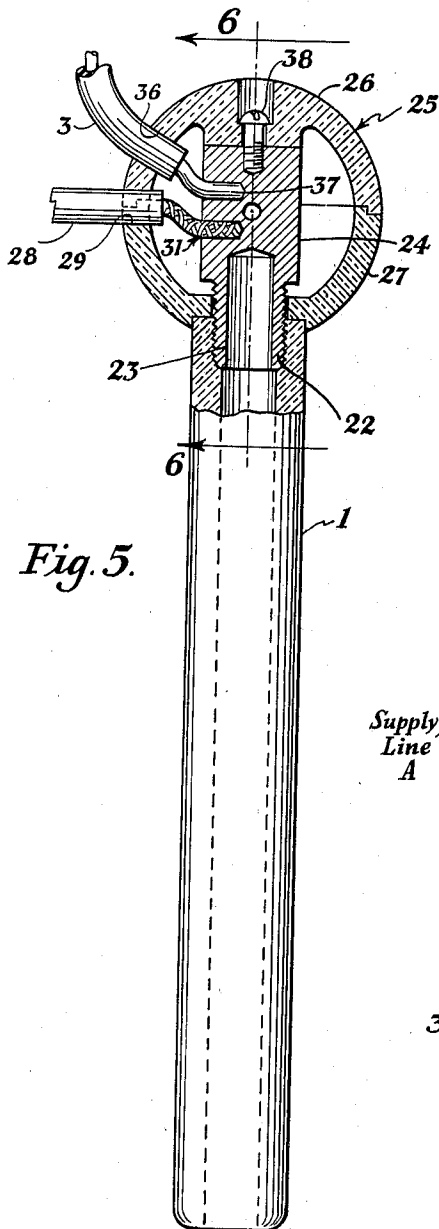


Fig. 5.

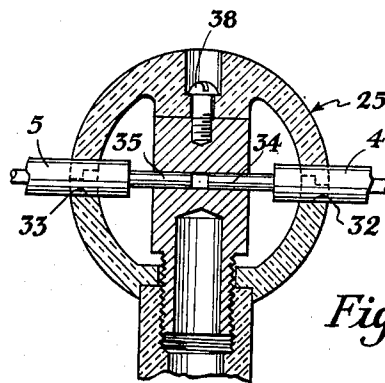


Fig. 6.

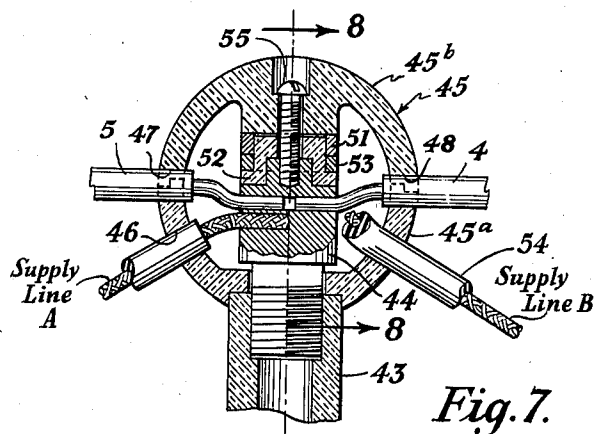


Fig. 7.

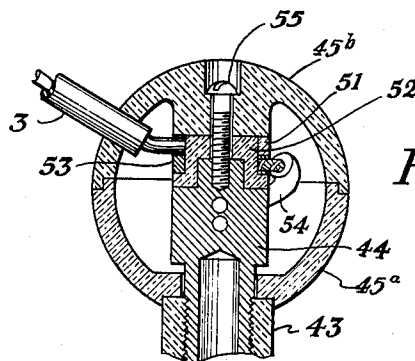


Fig. 8.

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UNITED STATES PATENT OFFICE

2,249,935

ELECTRODE MEANS FOR USE IN SHORT-WAVE DIATHERMY TREATMENT

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Application May 6, 1940, Serial No. 333,508

4 Claims. (Cl. 128—413)

This invention is concerned with so-called "short-wave" applicators, for application of short-wave energy to a patient through the generation of a heating effect within the patient's body by means of capacity coupled short-wave electrical energy. The invention is primarily concerned with a specific form of applicator which I have designated a "caput" applicator, for treatment of the head portion of a patient.

The application of short-wave energy in diathermy treatment requires that the patient's body portion be electrically insulated from the electrodes which establish the high-frequency treatment field, and in the treatment of localized zones in the head considerable difficulty has heretofore been experienced in securing the proper placement of the treatment electrodes with respect to treatment efficiency and the comfort of the patient. For the most part rather large electrodes or applicators have been employed, these electrodes being strapped into place, which failed to secure the desired localization of the treatment and resulted also in considerable discomfort to the patient.

One of the particular objects of this invention is to provide a diathermy applicator of the type described, provided with a plurality of treatment electrodes mounted on a common support adapted to be manually supported by the patient, such electrodes being flexibly secured to the support through the agency of conductor means which are so fabricated as to be readily bendable manually and to retain the form in which they are bent during the application of the treatment energy, wherefore the several electrodes may be comfortably positioned with respect to the desired localized portions of the patient's head and maintained in such position by the patient himself, making it possible for the patient to remove the applicator from the treatment position at any time should the treatment become uncomfortably strong and to return the applicator to the original treatment position at will.

A further object of the invention is to provide a caput diathermy applicator of the type above set forth in which the individual electrodes making up the device are of a deformable nature wherefore they may be deformed to comfortably conform to the surface outline of the localized zone under treatment, and to retain such deformation.

A further object of the invention is to provide a diathermy applicator of the type set forth in which the respective treatment electrodes are provided with a disposable absorbent pad mem-

ber removably secured to the treatment face of such electrodes for contact with the area to be treated.

Other objects of the invention will be set forth in the following description of certain preferred embodiments thereof, or will be apparent from such description.

The accompanying drawings illustrate such embodiments and referring thereto:

Fig. 1 illustrates the caput applicator of this invention with its plurality of electrodes arranged for direct treatment of the frontal and antrum sinuses of a patient;

Fig. 2 is a vertical section through one of the treatment electrodes, such as may be taken along the line generally indicated at 2—2 in Fig. 1;

Fig. 3 is a partly broken away view of one of the disposable absorbent pads which may be used on one of the electrodes according to this invention, looking in the direction indicated by the arrows 3—3 in Fig. 2;

Fig. 4 is a transverse section thereof as taken on line 4—4 in Fig. 3;

Fig. 5 is a longitudinal (vertical) section of the support means for the plurality of electrodes;

Fig. 6 is a vertical section thereof taken on line 6—6 therein;

Fig. 7 is a view corresponding to Fig. 6, showing an alternative form of the device; and

Fig. 8 is a vertical section thereof taken on line 8—8 in Fig. 7.

Referring particularly to Figs. 1 and 2, the device may comprise a handle member 1 of "Bakelite" or comparable non-conductive material, carrying a junction 2 from which a plurality of conductors 3, 4 and 5 branch outwardly, the respective conductors carrying at their outer ends treatment electrode members 6, 7 and 8. The respective conductors 3, 4 and 5 may be formed of copper or the like and are of sufficient rigidity to maintain any curvature to which they may be bent, yet flexible enough to be readily bent manually. Specifically, I have found that No. 9 B. & S. gauge copper or copper-beryllium alloy wire is entirely satisfactory for the purpose. The electrode members 6, 7 and 8 may comprise a flat sheet electrode 11, preferably of copper and of such thickness as to be manually deformable and yet of such rigidity as to retain such deformed condition, to which a metallic boss 12 is attached preferably adjacent the central portion, said boss conveniently extending through an opening in electrode 11 and being peened or riveted over at the opposite side as at 13. The boss 12 is bored axially to receive the end of the

conductor 4, for example, which may be soldered in place, and is exteriorly threaded to receive a threaded insulated sleeve 14 which surrounds the rubber or other suitable insulating envelop 15 for the conductor 4. The electrode sheet 11 is suitably encased within an insulated envelop, which may comprise two sheets of sponge rubber or the like 16 and 17 disposed at the two faces of the sheet 11 and projecting marginally thereof. The two sheets 16 and 17 are inter-secured at their adjoining marginal portions, as at 18, and a band of rubber or the like is preferably provided peripherally of the sheets 16 and 17 as at 19 and the rubber structure is preferably then vulcanized into an integral unit to completely encase the electrode sheet 11. In order to prevent inadvertent contact by the patient with the metallic boss 12, I preferably provide a thin insulated washer 21 about the boss 12 and against the rearward face of the sponge rubber sheet 17, against which the forward end of the insulating sleeve 14 may be caused to bear when threaded upon the boss 12.

The mounting of the respective conductors 3, 4 and 5 within the junction 2 may conform to the showing in Figs. 5 and 6, and referring thereto the handle member 1 is indicated as being tubular in form and provided with an internally threaded upper end 22 adapted to receive the threaded end 23 of a metallic terminal 24 secured within an insulating housing 25 which may be defined by two mating hemispherical shell members 26 and 27. As shown further in Fig. 1, a current supply line 28 may be brought through a suitable opening 29 in the housing 25 and is electrically secured to the terminal 24 as at 31. The laterally extending conductors 4 and 5 may be brought through the housing 25 in circumferentially spaced relation to the conductor 23 as at 32 and 33, and are electrically intersecured with the terminal 24 as at 34 and 35. The conductor 3 may be brought through a suitable opening 36 in the upper shell 26 of the housing 25, and is electrically intersecured with the terminal 24 as at 37. The terminal 24 may be secured to the upper shell member 26 through the agency of a screw 38, and the mating upper and lower shell members 26 and 27 may be fixed in their mating relation when the handle 1 is rotated to take up on the threaded portion 23 of the terminal 24, drawing the upper shell 26 downwardly upon the lower shell 27.

The above construction provides for positive attachment of the bendable conductors 34 and 35 to the terminal 24, which is rigidly secured to the handle 1, and in view of the fact that the exterior insulating covering for the respective electrodes such as shown at 15 is preferably extended through the respective openings in the housing 25, some cushioning effect is secured during any bending operation on the conductors with respect to the application of any strong bend at the position of attachment to the terminal, wherefore a long life of the conductor under repeated bendings is secured. In other words, the respective conductors are firmly attached to the interior of the supporting junction structure as to the centrally disposed terminal 24, and are supported at positions outwardly removed from such centrally disposed terminal through the agency of the housing 25.

In Fig. 1 the caput electrode is specifically illustrated as positioned for treatment of the frontal sinus through the electrode 6 and for treatment of the antrums through side electrode

members 7 and 8. It will be appreciated that the device may be employed to treat only the antrums by the simple expedient of bending the conductor 3 upwardly, as indicated by dot-dash lines at 3' to carry the electrode 6 to a position 6' spaced from the patient's forehead. Similarly the lateral electrodes 7 and 8 may be positioned about the throat for application of the short wave energy to the tonsil regions, if desired. In this particular form of the applicator, all of the electrodes are connected to a common pole or lead from the short wave power supply which is indicated diagrammatically at 41, and it will be appreciated that the other side of the short wave power supply may be connected to an insulated electrode 42 which may be placed at the back of the patient's head, against the shoulder blades or in any other suitable position to accentuate the condenser field. The use of the electrode 42 is not essential inasmuch as the body capacity of the patient may be relied upon to secure the desired capacitative coupling.

It will further be appreciated that it may at times be desirable to more effectively accentuate the electrostatic field at the position of the electrodes, in specific treatment problems, wherefore it is within the contemplation of this invention that certain of the electrode members 6, 7 and 8 will be connected to one side of the short wave power supply means and others will be connected to the opposite side of the short wave power supply means. For this purpose I have illustrated in Figs. 7 and 8 a form of junction which may be employed to connect the lateral electrode members 7 and 8 to one side of the short wave power supply means and the upper electrode member 6 to the other side. Referring to these figures, a handle means is indicated at 43, corresponding to the handle member 1 and threadedly attached to a terminal member 44 to which a supply line A, corresponding to the supply line 28 and connected to one side of the short wave power supply is extended through a suitable opening in the lower shell 45a of a housing 45, as at 46 and electrically connected to the terminal 44. The conductors 4 and 5 are brought through the sides of the housing 45 as at 47 and 48 and electrically connected to the terminal. The conductor 3 communicating with the electrode 6 is provided with separate connection to the other side of the short wave power supply in any suitable manner as through the agency of a metallic connector ring 51 extending about an insulating sleeve 52 mounted on the upper end of the terminal 44 and bearing against a similarly mounted connector ring 53 which is electrically connected to the other side of the short wave power supply through a flexible conduit 54 which may be designated as supply line B. The respective shells 45a and 45b may be intersecured as described in connection with Figs. 5 and 6 and the upper shell 45b may be rigidly connected to the terminal 44 through the agency of a screw 55 corresponding to the screw 38, which may also be employed to rigidly clamp the connector rings 51 and 53 in longitudinal engagement. The connection of the two lateral electrode means 7 and 8 to one side of the energy source and the electrode member 6 to the other side is illustrative only and it will be appreciated that any alternative connection of these electrode members is within the contemplation of the invention.

Referring more particularly to Figs. 1 to 4, the

respective electrode members are preferably provided with a disposal absorbent pad structure which may be caused to bear directly upon the surface to be treated, for the absorption of moisture from the surface to thus minimize surface burns to the patient. This moisture accumulates as a result of perspiration induced by the diathermy treatment and the provision of such pads contributes materially to the proper function of the structure. The pad structure may comprise an absorbent layer 61 at its forward face, adhesively secured to a backing layer 62 which is preferably shaped to conform to the outline of the electrode member to which it is to be applied. Attaching means for securing the absorbent layer to the electrode member are provided, such as rubber bands or the like 63 disposed at the rearward face of the backing layer 62 and held in position with respect thereto through the agency of an attachment layer 64 which may be adhesively secured to the backing layer 62. The attachment layer 64 is preferably recessed in its plane at the position of the ends of the bands 63, as at 65 to minimize the tendency for the attachment layer to be pulled away from the backing layer 62 when the rubber bands are stretched about the electrode structure, as illustrated in Figs. 1 and 2. Alternative forms of absorbent pads will occur to those skilled in the art and I do not choose to be limited to the specific structure thereof herein delineated. Other modifications of the specific electrode assembly will also occur to those skilled in the art and the illustrated embodiments are to be taken by way of example only.

I claim:

1. In an electrode means for use in short-wave diathermy treatment, the combination which comprises; two shell members disposed in superimposed mating relation to define a housing; an elongated electrically insulative handle member provided with a threaded axial bore at one end; an electrically conductive terminal member disposed within said housing and provided with a projecting threaded portion extending through an opening provided in the lower of said shell members in threaded engagement with said axial bore to secure said lower shell member relative to said handle member; means securing said shell

members in mating relation; and a plurality of conductors each extending inwardly of said housing through passages provided in said shell members and electrically intersecured at their inner ends to said terminal member.

2. An electrode device for use in short-wave diathermy treatment comprising a rigid insulating handle member, a metallic terminal member rigidly secured to said handle member, a plurality of insulated electrical conductors each having one end rigidly and electrically connected to said terminal member and extending outwardly therefrom in different directions, an insulating housing member rigidly secured to said handle member and enclosing said terminal member, each of said conductors extending through an opening in said housing member and being rigidly supported against lateral movement by the wall of said opening at a point spaced from said terminal member, said terminal member and housing member thereby providing a two-point support for each of said conductors, and a surface insulated contact member supported by and electrically connected to the free end of each of said conductors.

3. An electrode device for short-wave diathermy comprising a terminal member adapted to be electrically connected to a short-wave supply, a plurality of insulated electrical conductors each having one end electrically connected to said terminal member and extending therefrom in different directions, electrode members electrically connected to and supported by the free ends of said electrical conductors, each of said electrode members being provided with an electrically insulating surface covering, said electrical conductors being sufficiently rigid to maintain a fixed space relationship between said electrode members in the normal use of said device but manually bendable to permit the manual adjustment of the space relationship thereof.

4. An electrode device as defined in claim 3 in which the electrode members are sufficiently rigid to maintain a given shape in normal use but are manually deformable to permit the manual adjustment of their shape to conform to the contour of an area to be treated.

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