ELECTRICAL STIMULATION DEVICE

The present invention relates to an electrical stimulation device. The invention has been developed especially, but not exclusively, as a device for stimulating muscle to relieve soreness or discomfort and the invention is herein described in this context. However, it is to be appreciated that the invention has broader applications and is not limited to this particular use.

It is well-known that muscle stimulation has therapeutic effects and can be used to relieve soreness, discomfort or stress. Traditionally, muscle stimulation has been through manual manipulation such as massage or the like. More recently, electric devices have been available which are able to transmit electric pulses to the body to stimulate the surrounding muscles. These electrical devices include a control unit and a pair of electrical couplings. The control unit is connected to a power source, such as mains power or a battery, and both the couplings are electrically connected to the control unit. With this arrangement, the control unit is operable to generate variations in electrical potential between the couplings so that when they are applied to a user, an electrical charge can be transmitted to the muscle between these couplings.

A known stimulation device of this type includes couplings in the form of pads which are secured to the body by an adhesive. The adhesive may be in the form of a gel which is applied to a conductive surfaces of the respective pads, or by an adhesive strip which is adapted to overlie the contacting pad. Whilst these contacting pads are effective in being able to transmit a charge to a body, difficulties have been experienced in locating or securing the pads to some parts of the body.

An aim of the present invention is to ameliorate this problem and to provide a stimulation device which is more versatile than previous devices and which is more easily able to provide an electrical connection to different parts of a user's body.

In its broadest terms, the present invention provides an electrical stimulation device including a housing, a first electrical coupling mounted to said housing, said coupling being in the form of a projection which extends outwardly from said housing and includes an outer conductive surface which forms an

electrical terminal of said coupling, and a control unit connected to said coupling, wherein said control unit is adapted to be connected to a power supply and to a second electrical coupling located remote from said housing and is operable to establish a variation in electrical potential between said first and second electrical couplings.

In a preferred form, the housing is generally elongate and is arranged with the projection extending outwardly from one end thereof.

In use, the electrical couplings are adapted to be connected to a body to enable the control unit to transmit the electrical charge through the body. The arrangement of the first coupling provides significant benefits over previous designs in that it enables the coupling to be easily and simply applied to the body merely by holding the projection in contact with the body. With this arrangement, the second electrical coupling may be secured to the body and manipulation of an area of the body is achieved by moving the first coupling around the body whilst maintaining the second coupling in its secured position.

In a preferred form, the control unit is mounted in the housing of the device. This has the advantage that it enables a person to position the first electrical coupling and regulate the strength of the charge generated by the stimulation device using only one hand.

In a preferred form, the outer surface of the projection of the first coupling is formed of metal. In a preferred form, a cover is adapted to overlie the outer surface of the projection. The cover has two primary functions. Firstly, the cover provides a comfortable interface for the first coupling. Secondly, the cover can be adapted to vary the conductive properties of the projection thereby enabling more control over the electrical charge which is applied to the body.

In a particularly preferred form, the cover is in the form of a sponge or other open cellular material. In a particularly preferred form, the sponge is required to be wetted to enable it to conduct a charge. With this arrangement, the degree of wetting determines the conductivity of the projection.

The second electrical coupling may be of any suitable form. In one arrangement, this coupling is in the form of a conductive pad which is located remote from the control unit and typically connected thereto by leads or the like

which plug into the housing. The advantage of this arrangement is that the conductive pad may be easily adhered to the body, thereby enabling a user to operate the stimulation device, including both positioning the first coupling as well as regulating the control unit, using only one hand.

It will be convenient to hereinafter describe an embodiment of the present invention with reference to the accompanying drawings. The particularity of these drawings is to be understood as not superseding the generality of the preceding broad description of the invention.

In the drawings:

Figure 1 is a perspective view of an electrical stimulation device according to the present invention;

Figure 2 is an exploded view of one of the contact points of the stimulation device of Figure 1; and

Figure 3 is a variation of the stimulation device of Figure 1.

Figures 1 and 2 illustrate an electrical stimulation device 10 which is specifically for stimulation of muscles to release soreness or tension. The device 10 comprises a control unit 11, power source 12 and two electrical couplings 13 and 14.

The couplings 13 and 14 are electrically connected to the control unit 11 so that the power source 12 is able to generate a variation in the electrical potential between the two couplings 13 and 14. The magnitude of this variation is controlled by the control unit 11. In use, each of the couplings is adapted to be placed in contact with a user's body which establishes an electrical connection between the device 10 and the body. The couplings are spaced apart on the body and an electrical charge, designed to stimulate the surrounding muscles of the body, is passed through the body on operation of the control unit.

In the illustrated form of Figures 1 and 2, the device 10 includes a housing 15 which incorporates the control unit 11, and a battery compartment 16 which houses batteries (not shown) to provide the power source 12. The housing 15 also includes one of the electrical couplings 13. This first coupling device 13 is in the form of a projection 17 which extends from an upper end 18 of the housing 15.

As best illustrated in Figure 2, the projection 17 includes an outer surface 19 which is formed of a conductive material which is preferably metal. This outer surface provides the electrical terminal for the coupling 13 through which electric current can pass. A sponge cover 20 is adapted to overlie the outer surface 19 of the projection 17. The purpose of the sponge cover 20 is twofold. Firstly, it provides a comfortable contacting surface for a user of the device. Secondly, it is adapted to regulate the conductivity of the first coupling 13 and thereby enable control over the charge which is transmitted to the body under operation of the device 10.

To establish the required electrical connection to operate the device 10, it is necessary that an electrical charge is able to pass from the outer surface 19 of the projection 17 through the sponge 20 and into the user's body. The metal outer surface 19 is a good conductor as it provides a constant low resistance. However, the sponge 20 has a variable resistance depending on whether it is wet or dry. When the sponge is wet, it is an effective conductor. However, when dry, its resistance is much higher and therefore its ability to conduct an electric charge is much less. Regulating the amount of wetting of the sponge 20 thereby regulates the conductivity of the first coupling 13.

The control unit 11 is mounted below the first coupling 13 and includes two control dials 21 and 22 which are adapted to control the charge which is transmitted to the user of the device. The charge is in the form of electrical pulses which are generated in the control unit 11. Specifically, the control unit 11 includes a capacitor or similar device which is able to store and discharge an electrical charge. By controlling this capacitor and, more specifically, the amount of charge which is accumulated and the mode of discharge, the control unit 11 is able to control the timing and intensity of the electric pulses. With this arrangement, one of the control dials 21 varies the level of the accumulated charges, whereas the other control dial 22 varies the mode of discharge.

The second electrical coupling 14 is in the form of a conductive pad 23. The pad includes a conductive surface 24 which forms the terminal for the second coupling 14, and incorporates an adhesive gel coating. In this way, the conductive pad is able to be removably adhered to the user's body. The

conductive pad 23 is coupled to the housing 15 through a lead 25. The lead 25 includes a plug 26 which is adapted to be plugged into a corresponding jack socket 27 in the housing 15.

In operation of the device, the conductive pad 23 is applied to the user. The stimulation device is then turned on under operation of the control unit 11 and the first coupling, with the sponge covering 20 wetted, is placed in contact with the user's body in the vicinity of the location of the conductive pad 23. The user's body bridges the two electrical couplings thereby allowing an electrical charge to be transmitted to the body between the couplings which stimulates the surrounding muscles.

The design of the device 10 enables the first coupling 13 to be easily moved around the body. Moreover, as the control unit forms part of the housing 15, the charge transmitted to the body can be easily regulated whilst positioning the first coupling.

Figure 3 illustrates a variation of the stimulation device 10. In the embodiment of Figure 3 an additional conductive pad 28 is provided. This conductive pad 28 is connected in parallel to the first coupling 13 and thereby provides more alternatives to the user. With this additional conductive pad 28, a user is able to stimulate a muscle through the connection to the body of the conductive pad 14, and either or both of the first coupling and the second conductive pad 28.

It will be understood that various alterations, additions and modifications may be made to the parts previously described without departing from the spirit or ambit of the invention.

THE CLAIMS:

1. An electrical stimulation device including a housing, a first electrical coupling mounted to said housing, said coupling being in the form of a projection which extends outwardly from said housing and includes an outer conductive surface which forms an electrical terminal of said coupling, and a control unit connected to said coupling, wherein said control unit is adapted to be connected to a power supply and to a second electrical coupling located remote from said housing and is operable to establish a variation in electrical potential between said first and second electrical couplings.

2. An electrical stimulation device according to claim 1, wherein said control unit is mounted in said housing.

3. An electrical stimulation device according to either claim 1 or 2, wherein said outer surface of said projection is formed of metal.

4. An electrical stimulation device according to any preceding claim, wherein said first electrical coupling further includes a cover which is adapted to be located over said outer surface of said projection.

5. An electrical stimulation device according to claim 4, wherein said cover is adapted to be wetted to form a conductive surface of said projection.

6. An electrical stimulation device according to either claim 4 or 5, wherein said cover is formed of a sponge or other open cellular material.

7. An electrical stimulation device according to any preceding claim, wherein the control unit is operable to vary the difference in electrical potential between said first and second electrical couplings.

8. An electrical stimulation device according to any preceding claim wherein the power source is in the form of at least one battery which is mounted in the housing.

9. An electrical stimulation device according to any preceding claim, wherein said housing includes an electrical connection adapted to releasably receive the second electrical coupling so as to connect said second electrical coupling to said control unit.

10. An electrical stimulation device according to claim 9, wherein said electrical connection is in the form of a jack in which the second electrical coupling is adapted to be plugged.

11. An electrical stimulation device according to claim 9 or claim 10, further including a said second electrical coupling, said second coupling including a pad having a conductive surface which forms a terminal of said second coupling, and a lead which extends from said pad and which is adapted to be connected to said control unit through said electrical connection.