

may use piezo. elec. crystal.

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M. FUCHS

2,690,174

MESSAGE APPARATUS

Filed March 19, 1949

Fig. 1

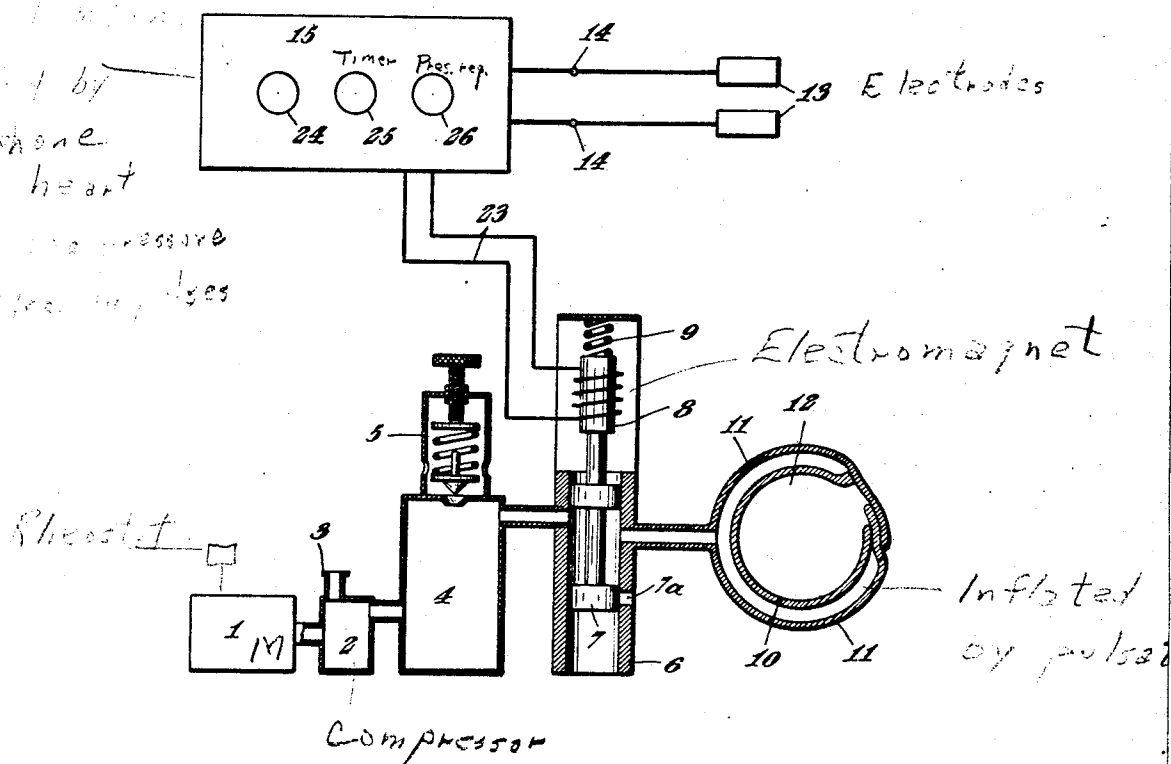


Fig. 2

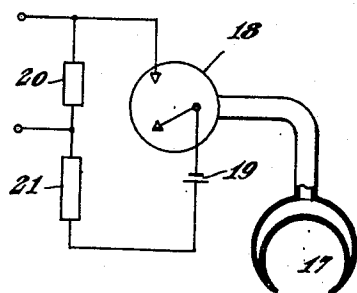
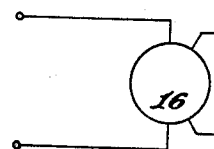


Fig. 3



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MESSAGE APPARATUS

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7 Claims. (Cl. 128-44)

1

This application is a continuation-in-part of my co-pending application Serial No. 671,355, now abandoned.

The present invention relates to a massage apparatus, which possesses specific characteristics different from those of the known massage apparatuses, and which possesses advantages thereof.

According to the invention, a massage apparatus comprises a control means, which control means is adapted to operate in accordance with the rhythmical heart impulses, which are produced by the heart action of the patient. The electromechanical control means is so formed, that by means of the received impulses, a pressure transmitting device causes the massage as such to function. The pressure transmitting device is attached to a massage member applied to the part of the body to be massaged, in such a way that by means of the pressure transmitting device actuated by the heart action, compressions are exerted on the part of the body to be treated in heart rhythm of the patient.

Preferably, the control means may comprise an electromagnet in a circuit which is rhythmically closed and opened, respectively, according to the rhythm of the heart impulses, whereby said electromagnet is provided for transferring the heart impulse received from the control means upon the pressure transmitting device with the result that the action of the latter occurs in rhythm with the heart action.

The electromagnet may suitably act upon a blow-off valve arranged in the connection between the pressure transmitting device and the massage member with the result that the supply of compressed medium from the container is rhythmically interrupted and that the medium contained in the massage member may simultaneously escape therefrom during this interval, whereby the blow-off valve will suitably be reset into its normal position by means of a spring as soon as the action of the electromagnet is suspended.

Another likewise suitable way is to provide control means comprising piezoelectric crystals which transform the rhythmical pressure resulting from the heart action into electrical energy which may be amplified by at least one amplifier valve and used for controlling the rhythm pressure transmitting device.

Alternatively for instance, the control means may be rhythmically actuated by means of a manometer which may be applied to a pulsating part of the body, whereby there may be suitably

2

provided a differential manometer, for instance, which transforms the impulses of the heart by means of a diaphragm and a lever connected thereto, that thereby the circuit of an electromagnet will be accordingly closed and opened respectively.

Preferably, the pressure transmitting device is actuated by a motor, for instance an electric motor, which may be provided with a rheostat which permits adjusting the speed of the motor.

Preferably, the control means may comprise at least one amplifier valve which is adapted to amplify at least one of the currents arising by the heart actions to such an extent that this action current may be used for controlling the pressure transmitting device.

The action currents of the heart may be suitably led to the amplifier valves by means of electrodes which are applied to the body to be treated.

Also a container can be provided which contains a medium under pressure, for example, compressed air.

In the drawings, Fig. 1 is a schematic illustration, partly in section, of a massage apparatus according to the present invention, and;

Figs. 2 and 3 are variations thereof.

A motor 1 drives a compressor 2 which carries a pipe 3 having an opening through which air is sucked from the atmosphere and which is in communication with an air reservoir, which is provided with a pressure regulating valve 5. To the air reservoir 4 is connected a control valve acting as a blow-off valve, which comprises a housing 6, in which is positioned a movable piston 7, which is actuated by an electromagnet 8, and which returns to its starting position through its own weight or through a pressure spring 9. In Fig. 1 the piston 7 is shown in raised position so that the air under pressure passes from the air reservoir 4 through the control valve into a massage means connected to the latter.

The massage means consists essentially of an elastic hollow body. Its form and size depends upon the part of the body to be massaged. In Fig. 1 the massage means is illustrated for an extremity, for instance an arm or a leg. The hollow body consists of an elastic inner partition, for instance of rubber, 10 and a less flexible outer cover 11. The massage means is placed around the extremity 12 shown in cross section and fastened to the same in a manner similar to the known collars, which are used for measuring blood pressure. 15 is a control means, which lead the impulses of the heart of the patient over the leads 14. The control means 15 comprises

3

a manually operable knob 24, which adjusts the function of a time relay 24a, which in turn permits the variation of the delay of the moment of imparting the compression with respect to the actuating heart impulses received by the clamps 14. A second knob 25 adjusts the actuation of another device such as a time relay 25a, by which the duration of the sending impulses to the said coil and also the duration of the compression in the massage means can be changed. A third knob 26 actuates a pressure regulating valve which is formed similar to the pressure regulating valve 5. The arrangement according to Fig. 1 operates as follows:

The motor 1 drives the compressor 2, air is sucked from the atmosphere through the pipe 3 into the air reservoir 4. The pressure in the air reservoir is regulated by the regulating valve 5 or by the knob 26. Over the control means 15 arrive the heart impulses going from the leads 14, over the lead 23 to the electromagnet 8, which attracts the control piston 7. In raised position of the control piston 7 the air under pressure leaves the air reservoir 4 through the blow-off valve 6 and passes into the massage means 10, 11 and exerts a pressure on a part of the body. Upon return of the piston 7, the admission of air under pressure to the massage means is interrupted and the air escapes through an opening 7A into the atmosphere. If the action currents of the heart are employed for steering and control of the apparatus then a pair of electrodes 13 are applied to a part of the body of the patient in a similar manner as for electrocardiographs, the pair of electrodes being connected to the leads 14 of the control apparatus 15 which act as the amplifier. If the heart tone is employed for controlling the heart action, then a microphone 16 (Fig. 3) is employed, which is applied to the breast of the patient over the position of the heart, or over an artery of the neck, or an arm, or a radial artery, and with the clamps 14 of the control device 15.

If the blood pressure fluctuation is employed for control, then an India rubber cuff 17 (Fig. 2) is employed, such as one usual for measuring blood pressure. The India rubber cuff 17 is connected with a contact manometer 18, which reacts with the oscillation of the blood pressure. In the moment of the highest blood pressure, the manometer closes for a short time the circuit which is fed by a battery 19 and it includes a voltage divider consisting of the resistances 20 and 21. The circuit is connected to the clamps 14 of the controlling device 15.

Fig. 4 represents the above-mentioned variation comprising a cuff 27 fixed on a pulsating part of the body, the inner room of the cuff 27 is connected with a casing 28, in which are placed a piezo-crystal 29 with two electrodes 30 and 31. This crystal is able to transform the rhythmical pressure resulting from the heart action into electrical energy, which may be suitably amplified by at least one amplifier valve 32 and used for controlling the rhythm of the pressure transmitting device.

What I claim is:

1. A massage apparatus comprising in combination, an amplifier for heart impulses, an electromagnet control means including said amplifier, said control means operating with the rhythmical heart impulses which are provided by the heart action of the patient, a pressure transmitting device, said control means controlling the operation of the pressure transmitting device op-

4

erating the massage by means of the received impulses so that pressures are exerted on the part of the body to be treated in heart rhythm with the patient by means of the pressure transmitting device operated by the heart action, and means for regulating the duration of the compression impulses released rhythmically by the heart action and for regulating the height of the pressure of each of these compressions as well as the delay of the moment of imparting the compression with respect to the actuating heart impulses.

2. A massage apparatus comprising in combination, an amplifier for heart impulses, an electromagnet control means including said amplifier, said control means operating with the rhythmical heart impulses which are provided by the heart action of the patient, a pressure transmitting device, said control means controlling the operation of the pressure transmitting device operating the massage by means of the received impulses so that pressures are exerted on the part of the body to be treated in heart rhythm of the patient by means of the pressure transmitting device operated by the heart action, means for regulating the duration of the compression impulses released rhythmically by the heart action and for regulating the height of the pressure of each of these compressions as well as the delay of the moment of imparting the compression with respect to the actuating heart impulses, massage means, a conduit for admitting air from said pressure transmitting device into said massage means.

3. A massage apparatus comprising in combination, an amplifier for heart impulses, an electromagnet control means including said amplifier, said control means operating with the rhythmical heart impulses which are provided by the heart action of the patient, a pressure transmitting device, said control means controlling the operation of the pressure transmitting device operating the massage by means of the received impulses so that pressures are exerted on the part of the body to be treated in heart rhythm of the patient by means of the pressure transmitting device operated by the heart action, and means for regulating the duration of the compression impulses released rhythmically by the heart action and for regulating the height of the pressure of each of these compressions as well as the delay of the moment of imparting the compression with respect to the actuating heart impulses.

4. A massage apparatus comprising in combination, an amplifier for heart impulses, an electromagnet control means including said amplifier, said control means operating with the rhythmical heart impulses which are provided by the heart action of the patient, a pressure transmitting device, said control means controlling the operation of the pressure transmitting device operating the massage by means of the received impulses so that pressures are exerted on the part of the body to be treated in heart rhythm of the patient by means of the pressure transmitting device operated by the heart action, means for regulating the duration of the compression impulses released rhythmically by the heart action and for regulating the height of the pressure of each of these compressions as well as the delay of the moment of imparting the compression with respect to the actuating heart impulses, leads to the control means, and electrodes connected to the leads to transmitting the action current of the heart for controlling the apparatus.

5. A massage apparatus comprising in com-

5

5 bination, an amplifier for heart impulses, an
 10 electromagnet control means including said am-
 plifier, said control means operating with the
 15 rhythmical heart impulses which are provided
 by the heart action of the patient, a pressure
 transmitting device, said control means control-
 ling the operation of the pressure transmitting
 device operating the massage by means of the
 received impulses so that pressures are exerted
 on the part of the body to be treated in heart
 rhythm of the patient by means of the pressure
 transmitting device operated by the heart action,
 means for regulating the duration of the com-
 pression impulses released rhythmically by the
 heart action and for regulating the height of
 the pressure of each of these compressions as
 well as the delay of the moment of imparting the
 compression with respect to the actuating heart
 impulses, clamps in the control means, a micro-
 phone connected to the leads of the control means
 for transmitting the heart tone for actuating
 and controlling the apparatus.

6. A massage apparatus comprising in com-
 bination, an amplifier for heart impulses, an
 electromagnet control means including said am-
 plifier, said control means operating with the
 rhythmical heart impulses which are provided
 by the heart action of the patient, a pressure
 transmitting device, said control means control-
 ling the operation of the pressure transmitting
 device operating the massage by means of the
 received impulses so that compressions are ex-
 30 erted on the part of the body to be treated in
 heart rhythm of the patient by means of the
 pressure transmitting device operated by the
 heart action, means for regulating the duration
 of the compression impulses released rhythmical-
 ly by the heart action and for regulating the
 height of the pressure of each of these compres-
 sions as well as the delay of the moment of im-
 40 parting the compression with respect to the ac-
 tuating heart impulses, massage means a control
 valve in the pressure transmitting device, the
 control means being operated by means of an
 amplifier for increasing the impulses of the elec-
 trocardiogram of the patient, and for further

6

conducting these amplified impulses in the same
 rhythm to the control valve and to fill the mas-
 sage means in the same rhythm with air under
 pressure, and for discharging the same in equal
 5 rhythm.

7. A massage apparatus comprising in com-
 bination, an amplifier for heart impulses, an
 electromagnet control means including said am-
 plifier, said control means operating with the
 rhythmical heart impulses which are provided
 by the heart action of the patient, a pressure
 transmitting device, said control means control-
 ling the operation of the pressure transmitting
 device operating the massage by means of the
 received impulses so that pressures are exerted
 on the part of the body to be treated in heart
 rhythm of the patient by means of the pressure
 transmitting device operated by the heart ac-
 15 tion, means for regulating the duration of the
 compression impulses released rhythmically by
 the heart action and for regulating the height
 of the pressure of each of these compressions
 as well as the delay of the moment of imparting
 the compression with respect to the actuating
 heart impulses, massage means a control valve
 in the pressure transmitting device, the control
 means being operated by means of an amplifier
 for increasing the impulses of the electrocardio-
 gram of the patient, and for further conducting
 20 these amplified impulses in the same rhythm to
 the control valve and to fill the massage means
 in the same rhythm with air under pressure,
 and for discharging the same in equal rhythm, a
 container in the pressure transmitting device
 having a medium under pressure, an electromag-
 35 net in the control means actuating in rhythm
 with the heart, and a blow-off valve connected to
 a junction between the pressure transmitting
 means and the massage means.

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