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ELECTRIC VIBRATOR AND HEATER

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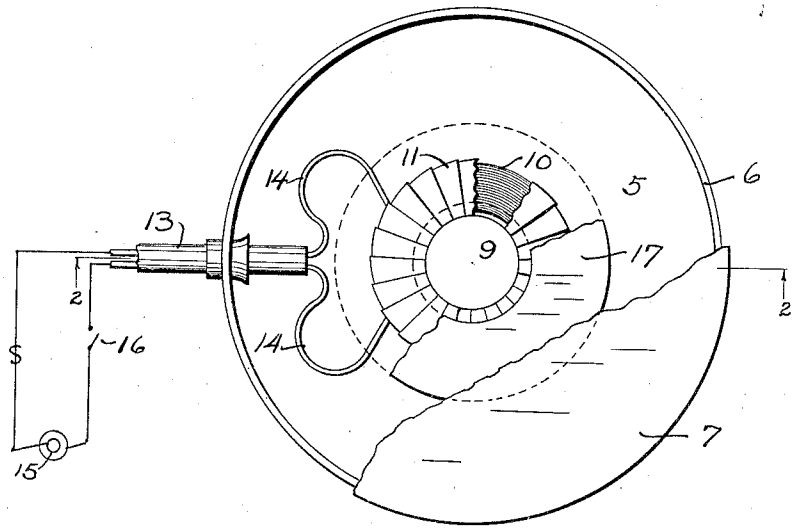


FIG. 1

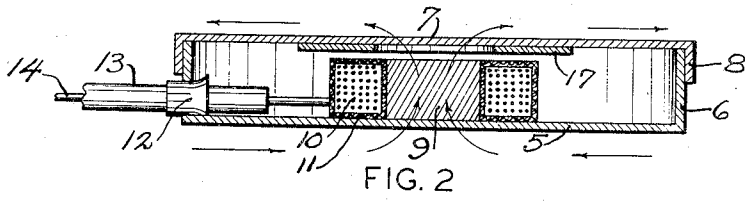


FIG. 2

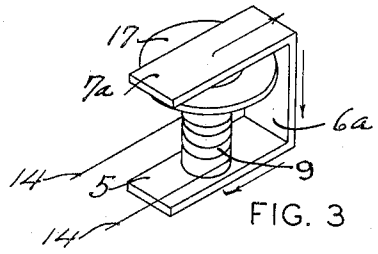


FIG. 3

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ELECTRIC VIBRATOR AND HEATER

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3 Claims. (Cl. 128—24.2)

This invention relates to improvements in electric therapeutic apparatus and has reference more particularly to a combined vibrator and heater.

In many instances various discomforts and ailments may be alleviated and sometimes remedied by the application of gentle vibrations, especially if these are accompanied by a suitable amount of heat. Vibrators of different kinds have been invented and sold, but in many cases they leave much to be desired, and as far as I am advised, no vibrator has been produced that also generates heat.

In practically every part of our country, the commercial lighting and power systems employ alternating current, usually sixty cycles per second, and this can be considered as the standard frequency and type of electrical distribution systems.

Alternating current, as is well known, reverses its polarity periodically and during each cycle the voltage passes through zero and the voltage curve is generally as near as possible to a sine curve.

When an electromagnet is energized by an alternating current, the flux is reversed each cycle. If an armature is placed near one pole of an alternating current magnet and has the proper period of vibration, it will be vibrated in response to the flux variations.

It is also well understood that if a closed circuit, as for example, a metal ring, is so positioned that the flux from an alternating current magnet passes through it, elctrical currents will be set up in the ring which functions as a closed secondary of an ordinary transformer.

This invention, briefly described, is a device for producing heat and electric vibration by the use of an alternating current magnet properly positioned with respect to a resilient magnetic circuit and a closed secondary circuit.

In order to describe the invention so that it can be readily understood, reference will be had to the accompanying drawing in which the invention has been illustrated in its preferred form and in which:

Figure 1 is a top plan view of the device which forms the subject of this invention, parts being broken away to better disclose the construction;

Figure 2 is a section taken on line 2—2 Fig. 1; and

Figure 3 is a diagrammatic view showing the invention in a simplified form.

In the drawing reference numeral 5 designates the bottom of a round iron box having a circular wall 6. A cover 7 is provided with a circular flange 8 that fits against the wall 6 and the two parts when assembled form a round box of usual construction. The metal of which it is made is preferably soft steel or iron, and it must be made of magnetic material. Secured to the inner surface of the bottom 5 is a core 9 of soft iron. This core may be spot welded to the bottom or secured thereto in any other suitable way. Surrounding the core is a solenoid 10 formed from a large number of turns of enameled wire. This solenoid is wrapped with suitable insulating tape 11 and is so proportioned that it will fit snugly about the outside of the core. Wall 6 is provided with an opening which contains a metal bushing 12 through which the electric conductor 13 passes. Conductor 13 contains a pair of wires 14 that are connected to the ends of the solenoid 10. The conductors 14 are connected with a suitable source of alternating current 15 and one of the conductors is provided with a switch 16. Secured to the inner surface of the cover is a ring 17 which is preferably made of copper or some good electric conductor. This ring may be spot welded or otherwise secured to the cover and is so positioned that it is concentric with the core 9.

Let us now assume that the apparatus described and illustrated is connected with the alternating current source 15. A current will flow through the coil 10 and this will set up a magneto motive force which produces a magnetic flux that flows through the core and through the material of the box in the manner indicated by arrows in Fig. 2. At each reversal of the magnetizing current, the direction of the flux will reverse. It will be observed that the major portion of the flux passes through the opening in ring 17 and therefore sets up in the ring an electromotive force proportional to the rate of change of the flux. Due to the electromotive force thus produced, a heavy current will circulate in ring 17 and this current will produce heat in a proportion that varies as the product of the resistance and the square of the current. Since magnetic lines of force will attract magnetic material, it is evident that the cover will be subjected twice during each cycle to an attractive force that will tend to move it towards the opposing end of the core. The cover will be set in vibration by the action of the alternating flux and the frequency of this vibration will correspond to the frequency of the alternating current unless the natural period of vibration of the cover is greater than that of the flux, but the size of the box is so proportioned that it can vibrate at the required frequency.

Due to the heat produced by the current flow-

ing through the coil 10 and by the secondary current flowing through the ring 11, the whole assembly becomes hot, but since the heat is mostly due to the induced current in the ring 11 it is limited and there is therefore no danger of the apparatus becoming so hot that it will cause burns or start fires.

In Figure 3 the several elements have been indicated in a diagrammatic manner and the box bottom and cover have been shown as connected by a single wall 6a. It is evident that if the magnetic circuit is resilient, the cover part 7a will vibrate at a rate corresponding to the current frequency.

From the above it will be apparent that the device described is extremely simple and compact and well adapted to produce both vibration and heat. The boxlike member can be enclosed in a suitable fabric bag and used for the alleviation of pain and wherever vibration and heat are indicated.

Having described the invention what it claimed as new is:

1. An electric therapeutic apparatus for producing heat and vibration, comprising in combination, a magnetic circuit formed in part of a resilient member, an air gap in the circuit, one side of the air gap being formed by the resilient member, a solenoid surrounding the magnetic circuit, and a closed ring of non-magnetic conductive material surrounding the flux path, whereby when the coil is energized by a variable electric current the resilient portion of the magnetic circuit will be vibrated and whereby an alternating current will be induced in the ring for producing heat.

2. An electric therapeutic apparatus comprising a box formed from resilient magnetic material, the box having a removable cover, a core of magnetic material attached to the bottom of the box, a solenoid surrounding the core, the inner surface of the box cover being spaced a short distance from the free end of the core to form an air gap, and a ring of non-magnetic conductive material positioned in the box and enclosing the flux path, said ring forming a closed secondary of low resistance, whereby a large current will be caused to flow in the ring, and the sides of the box to vibrate when an alternating current is flowing through the solenoid, thereby producing heat and vibration.

3. A combined electric vibrator and heater, comprising a round box-like magnetic circuit having a removable cover formed from resilient magnetic material, a soft iron core attached to the inner surface of the bottom and terminating a short distance from the inner surface of the cover whereby an air gap is formed, a magnetizing coil surrounding the core, and a closed ring of non-magnetic conducting material attached to the inside of the cover and positioned to surround the flux path whereby an electric current will be induced in the ring when the coil is traversed by an alternating electric current.

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