April 18, 1939. L. J. ANDRES 2,154,427

ELECTRIC VIBRATOR

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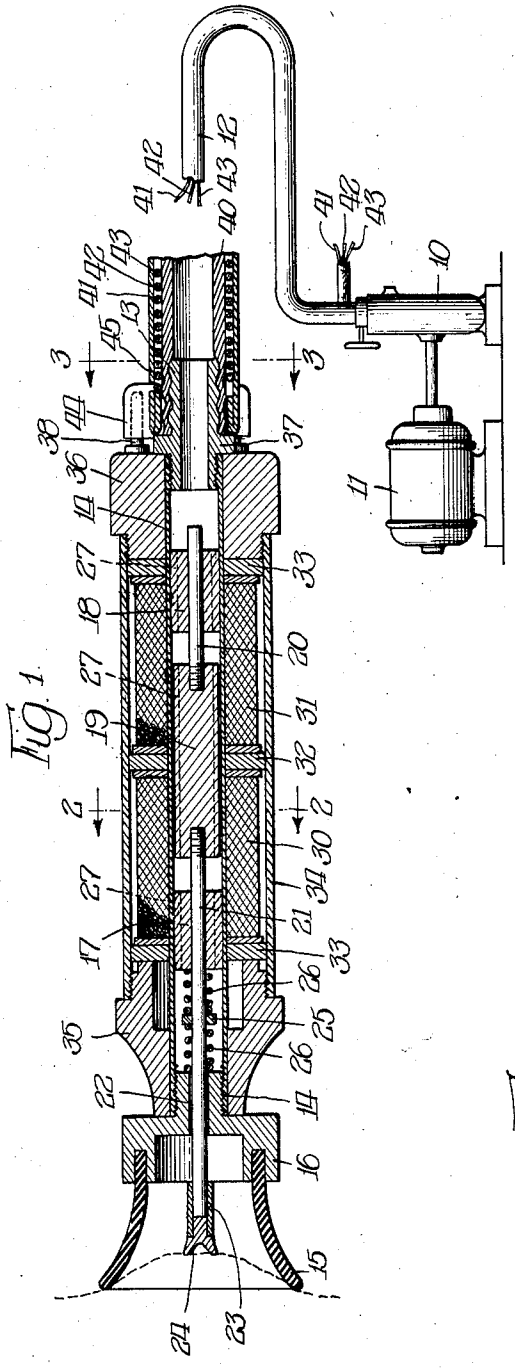


Fig. 1.

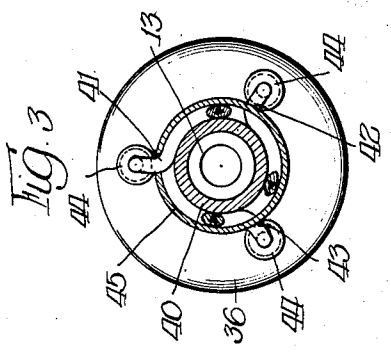


Fig. 3

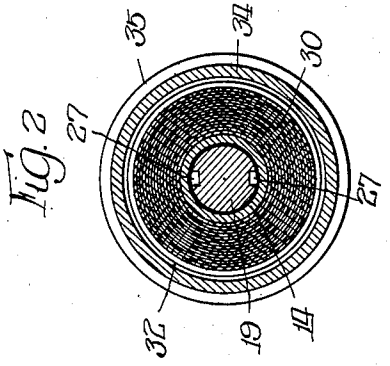


Fig. 2

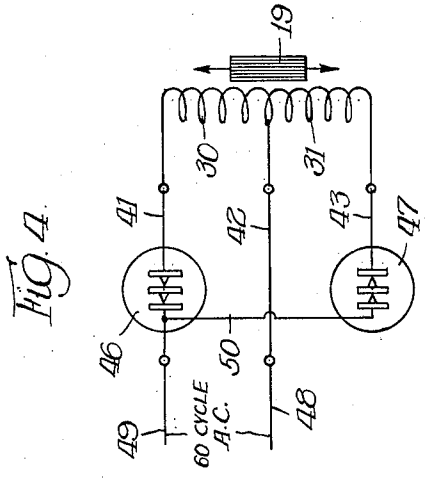


Fig. 4

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ELECTRIC VIBRATOR

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10 Claims. (Cl. 128—55)

The invention relates in general to an electric vibrator for use with alternating current and has more particular reference to a single plunger, double solenoid type of vibrator used with alternating current and a pair of one-way current rectifiers to effect vibration.

An important object of the invention is in the provision of an alternating current electric vibrator which is actuated in both directions by the current pulses by means of two coils, each connected in series and in reverse polarity with respect to two rectifier units so that the plunger is pulled in opposite directions by the two solenoids.

Other objects of the invention will appear hereinafter and although a vibrator of this kind has particular application in connection with electric bells, gongs, and signals, because it eliminates the usual make and break contacts, it may also be used as a self-contained electric pump for liquid injectors, portable sprayers and many other uses, but is more particularly illustrated and described as used in connection with a vacuum massage applicator.

In the accompanying drawing,

Fig. 1 is a sectional view of a massage applicator showing also its connection to a vacuum pump;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 1; and

Fig. 4 is a diagrammatic view of the electrical connections for a vibrator of this kind.

This invention is described in connection with a massage applicator of the suction cup type having a vacuum pump 10 operated by a motor 11 and drawing or sucking air through a flexible hose 12 which is connected to a hand applicator device by means of a stem 13 threaded into one end of a metal tube 14 which has a suction cup 15 secured to the other end of the tube by a holder 16.

Mounted within the tube 14 are fixed guides 17 and 18 and a movable metal plunger 19 having end rods 20 and 21 extending therefrom through the guides 18 and 17 respectively and the outer rod 21 also extending through a larger bore 22 in the holder 16 and into the suction cup 15. At the end of the rod 21 in the cup 15 is a retaining ferrule 23 with a flexible contact member 24 of rubber or the like retained therein.

A centering device consisting of a collar 25 is attached to the rod 21 and between this collar and the guide 17 and the holder 16 are spring sections 26 which tend to hold the plunger 19 in a central position.

In order to provide an air passage between the ends of the tube 14, the guides 17 and 18 and the plunger are provided with one or more longitudinal grooves 27 and the rod 21 fits loosely in the opening 22 of the holder 16 so that any suction applied by the pump 10 will be unobstructed through the tube 14, the cup 15 being applied as desired to the skin or any other surface.

On the outside of the tube 14 are two magnet windings 30 and 31 spaced apart by a disc 32 and having end discs 33 of iron or other magnetic metal, all encased in a metal tube 34 which is also of iron or other magnetic metal so that when either of the solenoid windings 30 or 31 is energized a magnetic path will be made by way of the tube 14, discs 32 and 33 and outer shell 34. These windings 30 and 31 are so located with respect to the core 19 that one winding will pull the core in one direction and the other winding will pull the core in the other direction from a central position when each one is energized. In mounting and spacing the windings on the outside of the tube 14, bearing blocks 35 and 36 are threaded into the ends of the outer shell 34 with inward extensions pressing against the end discs 33 and binding the intermediate parts together between a shoulder 37 of the stem 13 at one end and the enlarged portion of the holder 16 at the other end. These end blocks are preferably of fiber or other insulating material and the one adjacent the stem 13 is provided with three contact terminals 38 connected to the ends of the coil windings 30 and 31 so that they may be separately energized.

In order to form a neat appearance and construction the hose 12 may consist of an inner tube 40 of rubber or other suitable airtight material about which are wound three conductors 41, 42 and 43, each terminating in a socket 44 which is connection to a corresponding terminal 38, and the wires being surrounded on the outside by a protective flexible covering 45 of fabric or other suitable material.

In operation the windings 30 and 31 of the solenoid are oppositely connected by the conductors 41, 42 and 43 with copper oxide or current rectifiers 46 and 47 and with a source of alternating current supply represented as diagrammatically shown in Fig. 4. As the plunger 19 is actuated by the winding 30 which receives current only from one half of the cycle through its rectifier, the plunger will be moved in one direction and when the cycle of current is re-

versed the other coil will be energized and the plunger drawn in the other direction. Thus the plunger moves through the desired distance for each complete cycle of the alternating current.

The circuit for coil 30 is from the main 48, conductor 42, coil 30, conductor 41, current rectifier 46 back to the other main 49, while the circuit for coil 31 is from the current main 49 through a conductor 50, current rectifier 47 and conductor 43, to coil 41 thence through conductor 42 to the other main 48.

In the operation of this device with a suction cup, the cup 15 is placed over the area to be massaged and vacuum is applied by means of the pump 10. This causes a small area of the flesh to be drawn into the suction cup with the skin surfaces, pores, tissues and muscles expanded. The electric vibrator is then energized which causes the plunger 19 to reciprocate and the applicator or flexible contact member 24 to massage the flesh which is drawn into the suction cup. The amplitude of this massage action may be controlled by a rheostat (not shown) and the degree of suction may be controlled by a suitable valve located in a convenient position on or near the vacuum pump. The benefits derived from the flesh areas massaged in this manner are nerve stimulation, increased circulation of blood and elimination of wrinkles existing in the skin surfaces.

Although this invention is particularly described in connection with a vacuum massage applicator, the electric vibrator may also be used in a variety of other ways because of the elimination of make and break circuits and contacts where two coils are used and may be used with only one coil in connection with a retracting spring rather than the centering springs 26 as shown.

I claim:

1. A magnetic vibrator having coil windings, an armature core movably mounted therein, mounting rods at the ends of the core, fixed guides through which the rods extend, and resilient centering means in connection with one of the rods which tends to return the core to an intermediate position, the core having projecting means forming a contact massage applicator, and a massage cup in which the applicator is movable.

2. The combination with a magnetic vibrator having a pair of windings and a core movable centrally therein and projecting therefrom to provide a contact applicator, of an alternating current source of supply for the windings, and current rectifying means in connection with the source of supply to the windings so that each winding is energized only by its corresponding half cycle of current the vibrator having a massage cup in which the applicator is movable.

3. The combination of a hand massage applicator having a suction cup and a suction tube, of a magnet winding surrounding the tube and an armature core movable in the tube with a stem projecting from the core into the suction cup.

4. In a hand massage applicator comprising a suction cup and a supporting suction tube, a pair of magnet windings surrounding the tube, an armature core in the tube energized alternately in opposite directions by the windings, and a stem extending from the core through the tube into the suction cup.

5. In an electric massage device, a hand applicator comprising a suction cup and a hollow tube extending therefrom, an electric vibrator comprising coils mounted on the tube, an armature core movable in the tube, and a stem extending from the core into the cup, suction means applied to the end of the tube opposite the cup and comprising a flexible hose having electric conducting wires fabricated about the outside of the hose and connected at the ends of the hand applicator to the ends of the coils for supplying current thereto.

6. In an electric massage applicator according to claim 5, guides mounted in the tube at the ends of the core and the core and the guides being provided with peripheral grooves to allow free passage of air therethrough.

7. In an electric massage hand applicator, a suction cup and a suction tube secured thereto, a pair of coil windings mounted upon the tube, metal washers intermediate and at the ends of the coil windings, and a metal sleeve covering the coils and engaging the washers, the inner tube, the outer sleeve and the washers being of magnetic material, a magnetic core mounted in the tube and actuated in opposite directions by energizing the windings alternately, and a stem extending from the core into the suction cup to engage flesh drawn into the cup.

8. A vacuum cup, a vacuum chamber connected thereto with pump to induce the vacuum, a relief valve for controlling the extent of the vacuum, a vibrating applicator centrally disposed within the cup, a plunger for supporting the same for axial reciprocation and vibration, a solenoid, and adjusting means for the solenoid to vary the vibration.

9. A vacuum cup, a vacuum chamber connected thereto, a vibrating applicator centrally disposed within the cup, a plunger for supporting the same for axial reciprocation and vibration, a solenoid, and adjusting means for the solenoid to vary the vibration.

10. A vacuum cup, a vacuum chamber connected thereto, a vibrating applicator centrally disposed within the cup, a plunger for supporting the same for axial reciprocation and vibration, and means to vibrate said applicator.

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