United States Patent [19]

Albach et al.

[11] **3,841,321**

[45] **Oct. 15, 1974**

[54] **HAND MANIPULATED BODY MASSAGER**

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[21] Appl. No.: **372,609**

[52] **U.S. Cl.** **128/36**

[51] **Int. Cl.** **A61h 1/00**

[58] **Field of Search** 128/24.2, 32–36, 128/41

[56] **References Cited**

UNITED STATES PATENTS

2,674,994	4/1954	Murphy	128/36
3,096,757	7/1963	Berard	128/36
3,115,139	12/1963	Schneider	128/36 UX
3,363,623	1/1968	Atwell	128/36

Primary Examiner—Lawrence W. Trapp

Attorney, Agent, or Firm—Reuben T. Carlson

[57] **ABSTRACT**

A therapeutic massage unit having an enclosed casing for massage application to the body which presents a container forming cylindrical body wall and hemispherical end wall which is vibrated by a gyratory motor pocketed therein. The other end of the container part is closed by a cover part which presents a cylindrical rim which is attachably secured to the container part and a tapered nose extension to which facial or scalp massage attachments may be removably applied. The speed of motor rotation and character of the massage vibrations are controlled by adjustable elements accessibly mounted on the cover part and which manipulate solid state circuitry compactly mounted within the cover part. A cooling air propelling and circulation arrangement is incorporated in the unit whereby the motor control circuitry and motor parts subject to heating during operation are washed in a stream of cooling air and maintained in the desired temperature range.

12 Claims, 13 Drawing Figures

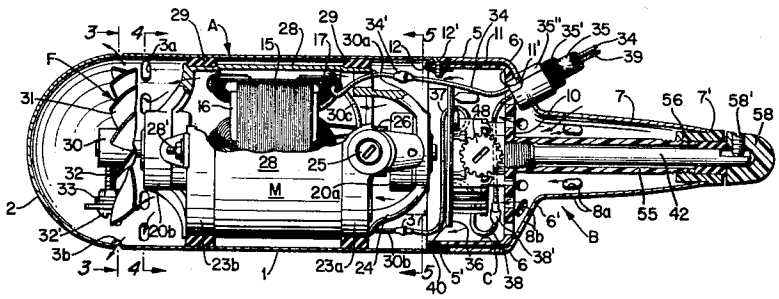
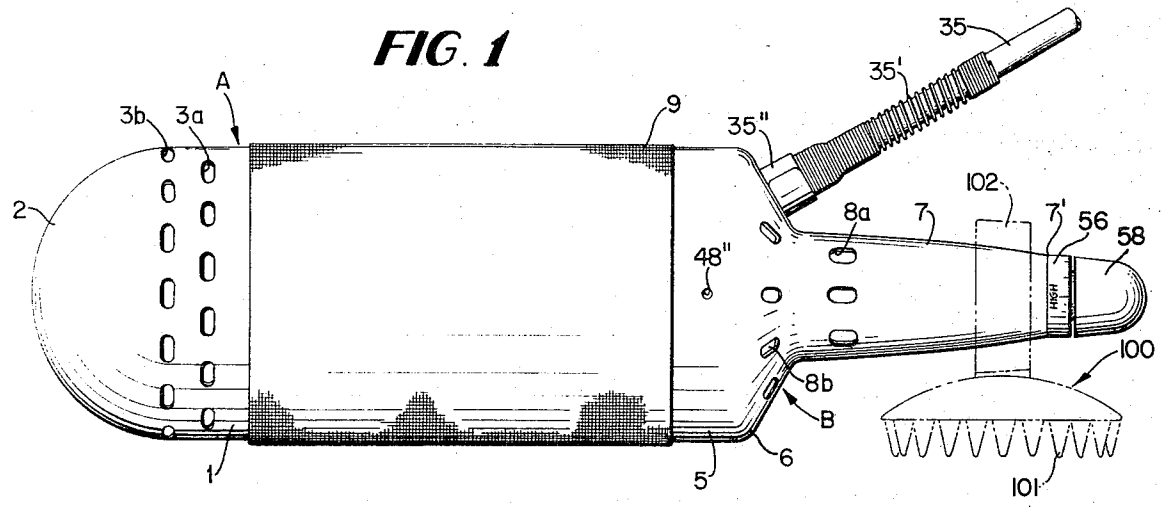


FIG. 1



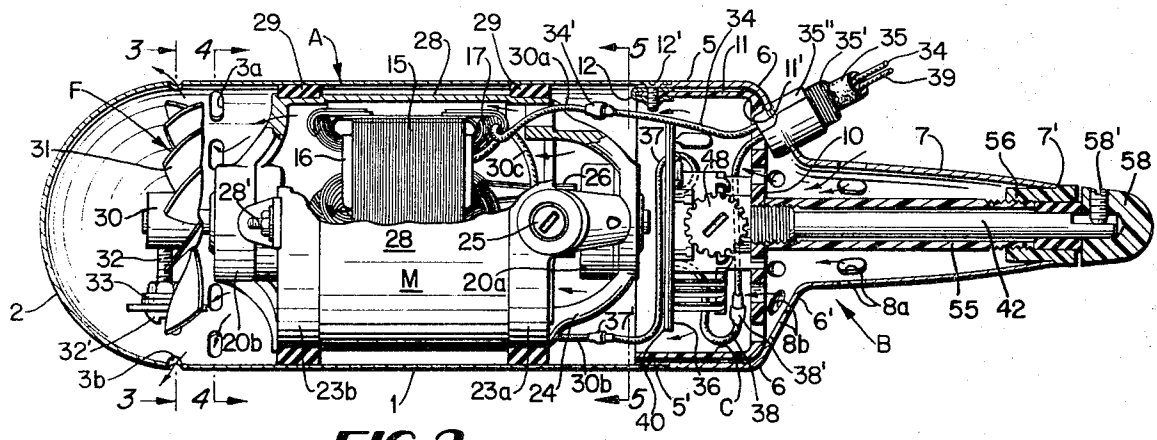


FIG. 2

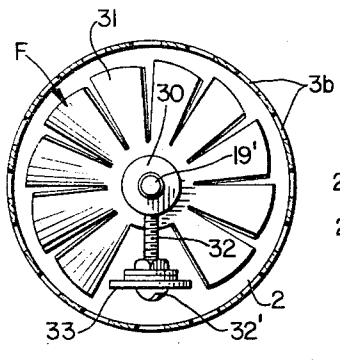


FIG. 3

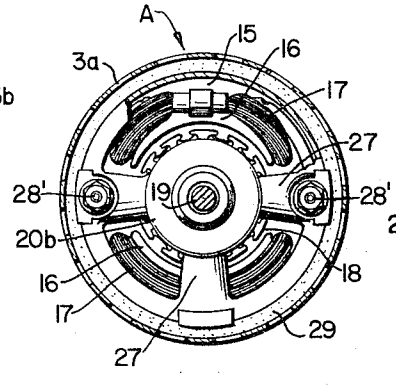


FIG. 4

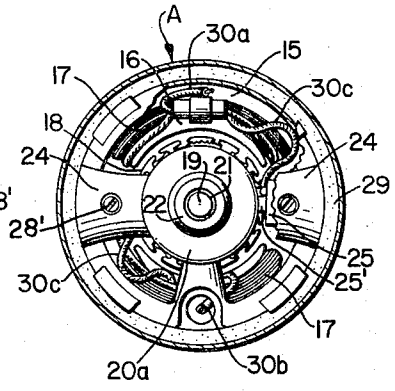


FIG. 5

FIG. 6

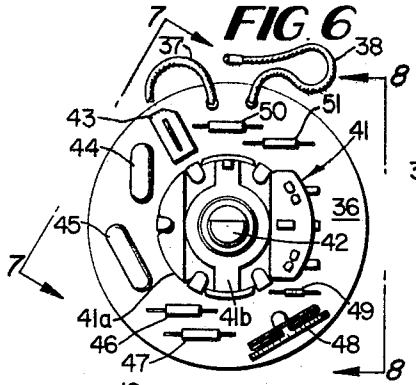


FIG. 7

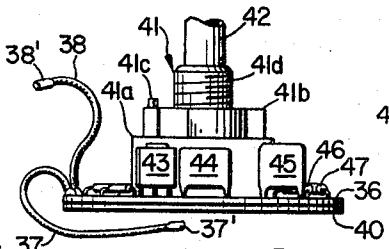
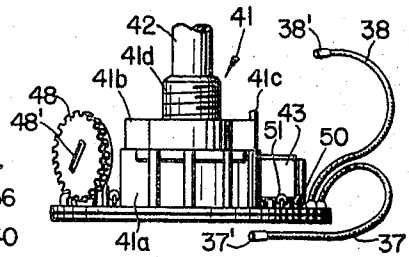


FIG. 8



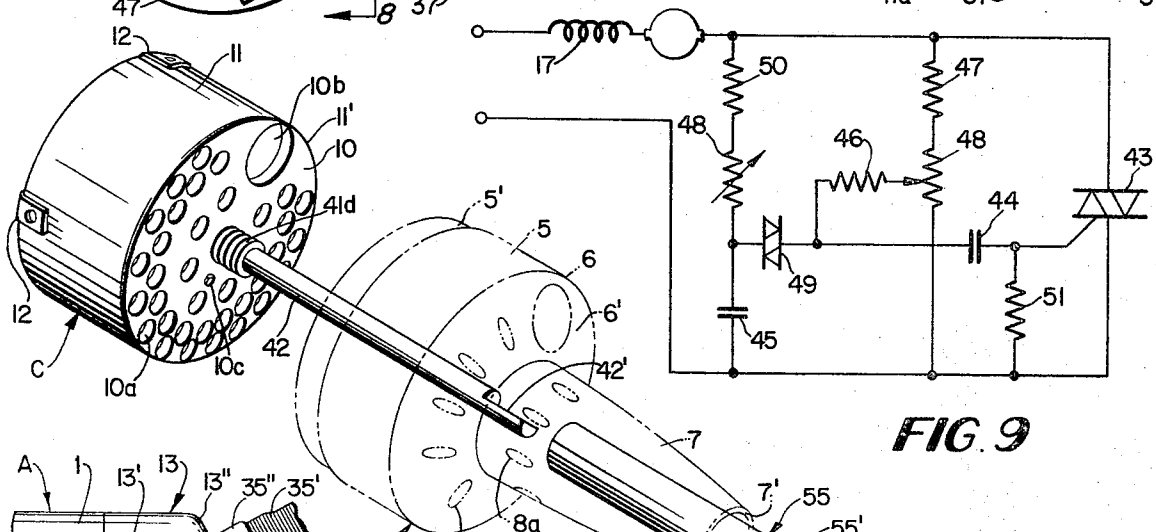


FIG. 9

FIG. 10

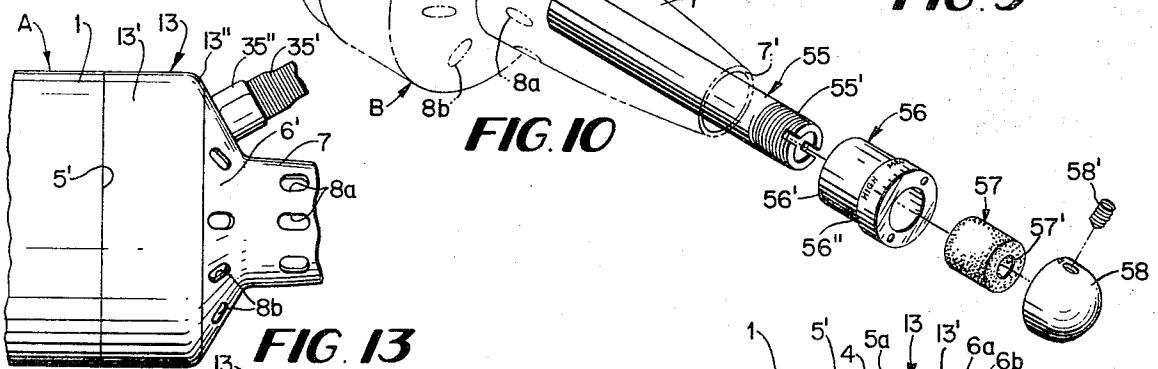


FIG. 13

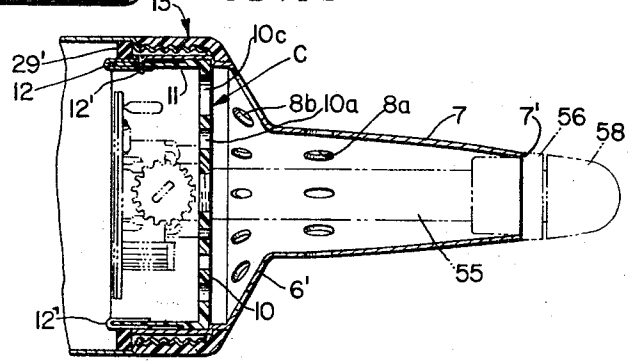


FIG. 11

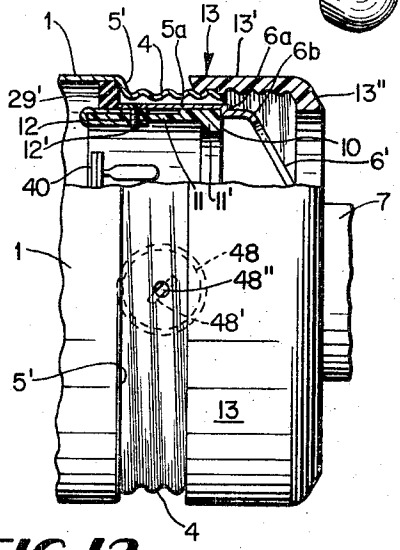


FIG. 12

HAND MANIPULATED BODY MASSAGER

This invention embraces certain important advances and improvements over the hand held body massager shown in Murphy U.S. Pat. No. 2,674,994. The Murphy Patent shows a flip switch **36** for starting and stopping the motor, but no means are provided for adjusting or regulating the motor speed. In a later development, the power cord leading to the gyratory motor in the body massager was equipped with a speed control device such as a rheostat box or speed control meter shown in the upper part of FIG. **1** of Eiden U.S. Pat. No. 3,019,785. While hand applied body massagers, such as shown in this Murphy Patent, and whose power cord was equipped with a motor speed control rheostat box, have been and continue to be in extensive use, experience has indicated the need for important improvements.

For example, a person who is seated in a chair or is lying in a bed, often finds it very cumbersome to manipulate the speed of the gyratory motor by means of a rheostat box spaced from the massage instrument. Furthermore, no means have heretofor been provided for calibrating and trimming motor speeds so that all massagers have uniform preformance characteristics, particularly at low speeds which are often preferred in therapeutic treatments. Also massagers of the type shown in the Murphy Patent sometimes become excessively heated when run for a period of time so that the massaging surfaces of the casing cannot be comfortably applied to the human body. Such overheating often results from a lack of direction of the cooling air into and through the unit, and the propulsion of an air stream through the motor unit and out of the casing in sufficient volume and at sufficient velocity to remove the heat as formed.

An object of this invention is to provide an improved hand manipulated body massager whose vibration producing gyratory motor is entirely housed within and supported by the cylindrical body wall of the container part, and whose cover part contains electronic speed control circuitry whose solid state components can be compactly assembled and mounted in the cover part prior to attachment of the cover part to the container part.

An object of this invention is to provide a body massager sized for convenient hand manipulation and whose vibration producing gyratory motor is entirely housed within and supported by the cylindrical wall of the container part, means for mounting in compact arrangement within said cover part the electronic circuitry for controlling the operation of said gyratory motor, and means for detachably connecting the leads from the motor and power supply in series with the leads associated with the speed control circuitry.

A further object of this invention is to provide a cover part for closing the tubular massage container, said cover part presenting a tubular flange which emerges into a circular shoulder and terminates in a tubular nose extension, a bracing member seating against said shoulder and which supports and electronic motor speed control assembly, and means for connecting said electronic assembly and bracing member to the outer end of said nose extension.

A further object of this invention is to provide a hand manipulated body massager which includes a container part housing a vibration producing motor, a closure part containing motor speed control circuitry, air circulation passages in said cover part and container part for directing a stream of air through and around the components of said control circuitry and through said gyratory motor, and means for propelling the directed air stream at sufficient velocity to thereby remove undesired heat and maintain the surfaces of the massager at acceptable massaging temperature.

For a better understanding of the present invention and the objectives thereof, reference is made to the accompanying drawings and the following description.

DESCRIPTION OF DRAWINGS:

FIG. **1** is a side elevational view of the hand manipulated body massager made in accordance with this invention and a diagrammatic outline of a massaging attachment applied to the nose extension of the massager.

FIG. **2** is a longitudinal section of the body massager shown in FIG. **1** and which shows the gyratory motor and suction fan as housed within the container part of the massager; this view also shows the cover part as detachably secured to the container part and the electronic circuitry as mounted within the cover part and by means of which the speed of rotation of the gyratory motor and the vibrating characteristics of the instrument may be controlled by an adjusting knob conveniently accessible at the terminal end of the nose section.

FIG. **3** is a transverse section of the massager as the same would appear when viewed in the direction of the arrows along line **3—3** on FIG. **2**, this view illustrating further details of the suction fan and the warm air discharge ports in the surrounding casing.

FIG. **4** is another transverse section of the massager as it would appear when viewed in the direction of the arrows along the line **4—4** of FIG. **2**, this view showing the outside face of the adjacent spider end wall of the motor with certain parts broken away to reveal the open passages between the motor stator and rotor through which cooling air is drawn longitudinally through the motor at considerable velocity and volume by the suction fan for radial ejection through the adjacent warm air ports in the massage casing.

FIG. **5** is another transverse section of the massager as the same would appear when viewed in the direction of the arrows along line **5—5** of FIG. **2**, this view showing the open character of the adjacent spider end wall and the open passages between the motor stator and rotor at the commutator end of the motor.

FIG. **6** is a top plan view of a collection of solid state components which are joined by printed circuitry to provide an electronic circuit for controlling the speed of the gyratory motor, this view showing the compact arrangement of the solid state components on a circular circuit board of limited diameter which can be mounted and supported within the cover part with ample circulation of cooling air around all components.

FIG. **7** is an elevational view of the electronic components which form the motor speed control circuitry mounted on the circuit board and as the same would appear when viewed along line **7—7** of FIG. **6**, only the lower end portion of the potentiometer manipulating stem being here shown.

FIG **8.** is another elevational view of the electronic components which form the motor speed control cir-

cuitry and as the same would appear when viewed in the direction of the arrows along line 8—8 of FIG. 6.

FIG. 9 is a schematic diagram of the motor speed control circuitry which may be conveniently used.

FIG. 10 is an exploded perspective view of the various components for mounting and securing the speed control circuitry within the cover part of the massager.

FIG. 11 is a fragmentary longitudinal section showing a modified arrangement for detachably securing the cover part containing the motor speed control circuitry to the open end of the container part in which the gyratory motor is housed.

FIG. 12 is a fragmentary view of the modified construction shown in FIG. 11 and in which the threaded lock ring which secures the cover part to the adjacent open end of the container part is partially backed off to expose a hole into which a tool can be inserted and access thereby attained to the motor speed trimmer of the control circuitry for the purpose of adjusting the trimmer to the lower limit of rotative speed of the gyratory motor.

FIG. 13 is a fragmentary view of the modified construction shown in FIGS. 11 and 12 as the same would appear when the lock ring is in closed position.

Similar reference characters refer to similar parts throughout the drawing figures and this specification.

The therapeutic massage instrument of this invention presents a relatively rigid body massaging shell as shown in FIGS. 1 and 2 having an overall length of approximately eight to ten inches and a diameter of two and one half to two and three fourths inches, and is thus adapted to be conveniently held in the hand and stroked over selected areas of the person's body. The body massaging shell is formed in two separable parts; a container forming part A and a cover part B. The container part A presents a cylindrical body wall 1 closed at one end by a hemispherical shaped end wall 2 and is designed to completely house a vibration producing motor M inserted into the container part A through the open end thereof. The container part A may be formed by a deep drawing operation from a blank of metal such as aluminum, or may be shaped or formed from a strong, tough and lasting plastic material.

The cover part B as shown in FIGS. 1, 2 and 10, may also be formed by deep drawing a metal blank or by drawing, forming, or molding a suitable plastic compound and as formed presents a cylindrical flange 5 whose outer surface forms a planular continuation of the outer surface of the cylindrical body wall 1 of the container part. The cylindrical flnage portion 5 may terminate in a depressed lip portion 5' as shown in FIGS. 2 and 10 over which the free terminal edge of the container body wall 1 may overlap. The cylindrical flange portion 5 of the cover part merges into a rounded shoulder portion 6 whose base forms an outwardly flared end wall portion 6' which merges into a tapered tubular nose extension 7 ending in a square cut end 7' for purpose hereafter described.

Electronic motor control circuitry is compactly arranged and supported by a cup member C as shown in FIGS. 2 and 10 which may be molded from a plastic material and which presents a relatively thick and stiff bottom wall 10 joined to a cylindrical body wall 11 which together define a bottom rim 11' which snugly seats against the inside face of the rounded shoulder portion 6. The cylindrical body wall 11 of the mounting cup C may overlap the depressed lip portion 5' of the cylindrical cover flange 5, and three equally spaced lock nuts 12 may be telescoped over the perimeter thereof as shown in FIGS. 2 and 10. Companion flat-headed screws 12' may each extend through aligned holes formed in the terminal edge in the container body wall 1, the depressed rim portion 5' of the cover part and wall 11 of the mounting cup C and secured in position by the lock nut 12.

The hemispherical shaped end wall 2 and cylindrical body wall 1 as well as a portion of the cylindrical flange 5 of the cover part provide exterior surfaces for massage application to the human body. If desired a blanket or sleeve 9 of soft fabric or rubber may be applied around a major part of the body wall 1 of the container part and the cylindrical flange 5 of the cover part for massage application to the body and covers the jointure therebetween. The nose extension 7 provides support for various massage attachments such as rubber facial or scalp massager pads 100 presenting flexible massage prongs 101 and equipped with a ring portion 102 designed to be removably telescoped into massage position over the free end of the nose extension 7.

For the most effective massage treatment, the outer body contacting surfaces of the container part A and cover part B should be vibrated with an elliptical motion and along all three axis of the ellipse. The cycle of vibrations should also be adjustable over a wide range to obtain various desired therapeutic effects, and may range from 1,200 cycles per minute to over 6,000 cycles per minute. For many treatments the lower scale cycle of vibration in the range of 1,500 cycles per minute is often desired since at this speed the massage treatment has a soothing effect on many persons. The wide range of cyclic vibrations which should be achieved requires a vibration producing motor of particular structural characteristics. It is additionally desirable that the body contacting surfaces of the massage casing be comfortably warmed to slightly above room temperature but not overheated. While most vibration producing motors become heated when used for a period of time, this invention embraces a cooling arrangement whereby cooling air is forcibly drawn through and around the components of the electronic speed control circuit and then through the gyratory motor in such volume and at such velocity that the warmed air is drawn off and expelled from the casing before it has become heated to an undesired temperature.

The preferred form of motor M is a fractional horsepower open ended alternating current motor designed to permit a free flow of cooling air between the stator and rotor. The stator presents an outer stator core 15 of generally tubular form and a pair of inner stator core sections 16 together presenting spaced arcuate shaped inner surfaces between which the squirrel cage rotor 18 rotates. The rotor is supported by a rotor shaft 19 whose ends extend into sturdy hub portions 20*a* and 20*b* at opposite ends of the motor. Each hub portion 20*a* and 20*b* contains a self-lubricating bearing sleeve 21 in which the ends of the shaft 19 are journalled, and each bearing sleeve 21 is supported by a resilient sleeve mounting 22 which permits the opposite ends of the shaft 19 to gyrate during rotation when one end of the shaft is unbalanced by an off-center counterweight.

The hub portion **20***a* at one end of the motor is connected to a motor housing ring frame **23***a* by four equally spaced radial spokes **24** with ample space between the spokes for the inflow of cooling air between the rotor **18** and the inner stator core sections **16.** Two of the diametrically opposite radial spokes **24** each contain an adjustable plunger **25** which supports a commutator brush **25'** at the end thereof, and which rides on the cylindrical surface of a commutator **26** fixed to the rotor shaft **19.** The hub portion **20***b* at the other end of the rotor is similarly supported by four radially extending spokes **27** whose upper ends are joined by a sturdy motor housing ring frame **23***b*. Thus cooling air forced at a considerably velocity between the surface of the rotor **18** considerable the adjacent surfaces of the inner core sections **16** escapes from the motor through the open spaces provided between the radial spokes **27.** The motor housing ring frame **23***b* is provided with a tubular housing extension **28** whose free end interlocks with the opposite ring frame **23***a* and covers the motor body. The outer stator core **15** and the inner stator core sections **16** joined thereto are supported by a pair of clamp bolts **28'** which extend between and connect the housing ring frames **23***a* and **23***b* in assembled relationship, as indicated in FIGS. **2** and **4.**

A stator winding **17** as shown in FIGS. **2, 4** and **5** is wound between the outer stator core **15** and each of the inner stator core sections **16.** The end portion **30***a* of one of the stator windings **17** extends outside of the motor and terminates in a separable connecter **34'**, and the other end portion **30***c* of this winding is connected to one of the two commutator brushes **25'** as shown in FIGS. **2** and **5.** The companion winding **17** has one of its leads **30***b* extending outside of the motor and terminates in a connector **37'** and its other lead **30***c* is connected to the other commutator brush **25'** of the motor.

A suction fan F of special design is provided to draw a high quantity of cooling air at high velocity around speed control circuitry contained in the cover part B and through the gyratory motor for lateral expulsion from a row of ports **3***a* and **3***b* in the casing A. As shown in FIGS. **2** and **3,** the fan F has a total of 10 blades **31** secured to a hub **30** fixed to the projecting end **19'** of the motor shaft **19.** The blades **31** of the fan have an inclination of approximately 45° and are sized and shaped to draw a large volume of cooling air at substantial velocity through the motor and particularly through the space between the inner stator core sections **16** and the rotor **18** where heat is most likely to develop. Thus the volume of air moving horizontally through the operating motor travels at such a velocity under the influence of the suction fan that the traveling air does not have an opportunity to become heated to more than slightly above room temperature, and the fan blades **31** are so shaped as to eject the warmed air through the two rows **3***a* and **3***b* of air outlet holes formed in the casing A adjacent the outer ends of the fan blades.

The motor M and suction fan F assembly are supported by a pair of resilient rubber bands **29** which may be adhesively bonded to the outer surface of the ring frames **23***a* and **23***b* of the motor. The assembly is then inserted through the open end of the container part A with the entire motor housed therein and with only the leads **30***a* and **30***b* from the paired motor windings **17** accessible at the open end of the container part for subsequent wiring connections.

A counterweight bolt **32** is secured to the hub portion **30** of the fan and its bolt head **32'** supports counterweights **33.** The counterweight bolt **32** and its counterweight load **33** causes the rotor shaft **19** to gyrate during rotation and the gyratory action thus produced is transmitted through the motor body, rubber bands **29** and to the container part A and cover part B of the instrument for body massage application.

The assembly of a series of solid state components in an operating circuit for controlling the speed of rotation of an alternating current motor or a direct current motor is well developed in the art. FIG. **9,** for example, illustrates a circuit diagram for controlling the speed of an alternating current motor and which is connected in series between one of the input leads of the power supply and a lead to one of the stator windings of the motor. The principle solid state components forming the alternating current motor speed control circuit is a speed control potentiometer **41,** a triac **43,** a capacitor **44** connected to the gate of the triac, a diac **49,** a second capacitor **45,** three line connected resistors **47, 50,** and **51,** and a leveling potentiometer represented by the resistor **48** and the adjustable resistor **46.**

An important feature of this invention is the arrangement of the various components forming the speed control circuit, and the mounting of these components within the limit of space provided within the cover part B of the instrument, and yet provide for necessary access and cooling of those components which are subject to heating in use. It has been found that a circuit board **36** of circular shape, with a diameter of approximately only 1⅞ inches has been sufficient in size to support all components and still leave a space of a good one fourth inch between its periphery and the tubular wall **11** of the cup C within which it is mounted, as shown in FIG. **2,** for the free flow of cooling air.

In the arrangement shown in FIGS. **6, 7,** and **8,** the pot **41***a* of the speed control potentiometer has a diameter of approximately seven-eights to 1 inch, at its area of attachment to the center of the circuit board **36,** and which leaves a space of approximately ½ inch between the outer periphery of the pot **41** and the periphery of the circuit board **36,** and which provides a ledge of sufficient width for the support components. The preferred type of potentiometer used presents a hub portion **41***b* at the top thereof which presents a flat seating face with an upwardly projecting lock stud **41***c* at one end thereof. Projecting centrally from the hub portion **41***b* is a collar extension **41***d* which is externally threaded and provides a journal which receives the spindle shaft **42.** Contained within the pot **41***a* is a section which presents a fixed arcuate contact of approximately 270° in length and a movable contact associated with the lower end of the shaft **42** which forms a rheostat type of switch connected to the circuit and by means of which the current supplied to the motor is controlled.

FIGS. **6, 7,** and **8** illustrate a desirable arrangement of the companion solid state components which support the effective operation of the speed control potentiometer **41.** The tail wire **37** has one end connected to a post on the upper side of the board **36** and its other end has a connector **37'** for connection to the lead **30***b* from one of the core windings **17** of the motor. Preceding counterclockwise around the perimeter of the cir-

cuit board **36** as shown in FIG. **6**, the triac **43** is mounted adjacent the tail **37**, then the capacitor **44**, then the capacitor **45**, then the resistor **46**, then the resistor **47** and then the circular shaped leveling potentiometer **48** which is close to the edge of the circular board **36** and presents a tool receiving slot **48'** for adjusting its resistance. Continuing clockwise around the circuit board as shown in FIG. **6**, we have the diac **49**, followed by the resistors **50** and **51** adjacent input tail wire **38** which is connected to a post on the top side of the circuit board and which has a detachable connection **38'** for connection to the power lead **39** as shown in FIG. **2**.

When all of the solid state components shown in FIGS. **6**, **7**, and **8** have been connected by a printed circuit applied to the backside of the circuit board **36**, insulating backing sheet **40** as shown in FIGS. **2**, **7**, and **8**, is bonded to the underside of the circuit board to protect the printed circuit against possible short circuit contact with the motor M or any other part of the assembly. The electronic control assembly as shown in FIGS. **6**, **7**, and **8**, can then be inserted within the retainer cup C with the threaded collar **41***d* of the potentiometer extending through a conformed hole in the center of the bottom wall **10** of the cup C. The flat upper face of the potentiometer hub portion **41***b* will snugly seat against the inside face of the cup bottom wall **10** and the lock stud **41***c* will extend through the lug hole **10***c* provided in the cup bottom wall to hold not only the speed control potentiometer but the circuit board **36** and all components mounted thereon in rigid position. A tubular sleeve **55** as shown in FIG. **10** presents an internal thread at its lower end which is telescoped over the potentiometer spindle shaft **42** and connected to the threaded collar **41***d* projecting through the bottom wall **10** of the cup and which thus binds the speed control assembly and cup in rigid assembly.

The shaft **42** and tubular sleeve **55** may then be inserted into the nose section **7** of the cover part B, and a seating cap **56** then applied to the outer end of the nose secton **7**. The seating cap **56** presents an internally threaded barrel portion **56'** which snugly telescopes into the end of the nose portion **7** and is screwed onto the external threads **55'** of the sleeve **55**. The seating cap **56** presents a flared shoulder **56''** designed to seat against the free edge **7'** of the nose section **7**, and when the seating cap **56** is tightened, the cup C and the speed control assembly supported therein to securely locked in position within the cover part B. To facilitate rotative manipulation of the potentiometer shaft **42**, a tubular rubber cushion **57** is inserted into the seating cap **56**, its bore **57'** is telescoped over the end of the shaft **42**, and the ends of the cushion **57** seat against the end of the tubular sleeve **55** and against the innerface of a manipulating knob **58** which telescopes over the projecting end **42'** of the spindle **42**. The adjusting knob **58** may be removably secured to the shaft **42** by the provision of a set screw **58'** designed to grip the flat face **42'** of the spindle.

A power cable **35** carrying the usual power supply lines **34** and **39** as shown in FIGS. **1** and **2**, and equipped with the usual coil sleeve **35'**, terminates in an end clamp **35''** which secures the end of the cable in a hole provided in the end wall portion **6'** of the cover part B and as may be necessary in a corresponding hole **10***b* in the bottom wall **10** of the cup C. The power lead **39** may then be connected by a coupling **38'** to the tail lead **38** extending from the circuit board **36**. The tail lead **37** extending from the circuit board **36** is fixed by connector **37''** to the lead **30***b* from one of the core windings **17**, as shown in FIGS. **2** and **5**. The other power lead **34** is secured by connector **34'** to the lead **30a** extending directly from the other core winding of the motor, as shown in FIG. **2**. Thus, the entire speed control assembly of this invention is fully mounted in the cover part B and connections can be made to the motor M, before the cover part B is applied to the container part A.

In the form of the invention shown in FIG. **1**, the lock nuts **12** are first applied to the rim of the cylindrical body wall **11** of the cup C and the depressed lip portion **5'** of the cover flange **5** is telescoped under the free end of the container body wall **1**. The set screws **12'** are inserted into drilled holes which align with the lock nuts. The cover part B is thus rigidly bonded to the container part A and will not loosen during vibratory massage use.

It will be noted by referring to FIGS. **1** and **2**, that the adjusting slot **48'** in the leveling potentiometer **48** is positioned closely adjacent to the flange wall **5** of the cover part B. Thus a hole **48''** may be provided in the flange wall **5** as shown in FIG. **1** through which a tool may be inserted which reaches the adjusting slot **48'** so that the leveling potentiometer **48** may be adjusted to fix the lower speed limit of the vibratory motor to a uniform selected speed for all massagers. Measurements of the motor speed can be taken by the application of a measuring instrument to the casing of the massager.

FIGS. **11**, **12**, and **13**, illustrate a modified arrangement for securing the cover part B to the container part A of the instrument. As shown more particularly in FIGS. **11** and **12**, the cylindrical body wall **1** of the container part A terminates in a depressed threaded extension **4** of relatively limited length. The cover part B presents a cylindrical flange **5***a* which telescopes within the depressed threaded extension **4** of the container part A, and its inner end is designed to abut against a rubber abutment ring **29'** bonded to the inside face of the container wall **1** adjacent the inner face of an abutment shoulder **5'** formed by the depressed flange extension **4**. The cylindrical flange **5***a* of the cover part B merges into a depressed hip portion **6***a* defining a flat rim portion **6***b* which leads to the tapered end wall portion **6'** of the cover part B.

Three spaced lock nuts **12** may be applied to the rim of the cylindrical body wall **11** of the cup C. Lock screws **12'** extending through the cylindrical flange **5***a*, cup wall **11** and lock nut **12** secures the assembly together. If desired, the screws **12'** may also be lengthened to extend through the depressed threaded flange extension **4** of the container part A. The depressed threaded flange extension **4** is normally covered and concelaed by a lock ring **13** having a cylindrical body wall portion **13'** internally threaded and whose free end can be screwed into abutment against the shoulder abutment **5'** of the container part. The lock rim **13** also presents an abutment rim **13''** which rides onto the rim seat **6***b* and abuts the depressed portion **6***a* of the cover part to lock the nose part B to the container part A and also to provide a smooth and finished joint **5'** therebetween as shown in FIG. **13**. In this assembly, the adjusting hole **48'** in the speed leveling potentiometer **48** is accessible for manipulation by providing an aligned

hole 48'' in the depressed container flange 4 and to which a tool may be applied, when the lock ring 13 is backed off as shown in FIG. 12. In this arrangement the socket hole for tool application is not in evidence when the lock ring 13 is in closed position as shown in FIG. 13, thus avoiding improper or unauthorized tampering with the motor speed.

Effective cooling of all components of the speed control circuit as well as the motor itself is affected and assured by the cooling system of this invention. By referring to FIGS. 1, 2, 10, 11 and 13, a series of air inlet holes 8*a* are provided in the tapered nose extension 7 of the cover part B, and if desired, spaced air inlet holes 8*b* may also be provided in the tapered end wall portion 6' of the cover part. The only place for the entering air to escape is from the holes 3*a* and 3*b* in the container section A adjacent the hemispherical end 2 thereof.

Since air entry ports 8*a* and 8*b* have an overall air entry area of less than one-half the air exit area of the ports 3*a* and 3*b* from which the warmed air escapes, it will be appreciated that by using a suction fan F having a capacity to move more than twice the amount of air as compared to fans previously used in hand massagers, that the admitted air flows through the electronic speed control assembly and the center of the motor at substantial velocity for ejection by the fan blades laterally through the ports 3*a* and 3*b*.

As is more particularly evident by referring to FIGS. 2, 4, 5, 10 and 11, the air entering the ports 8*a* and 8*b* flows through the numerous air holes 10*a* formed in the bottom wall 10 of the cup C, with the inflowing air washing over and around the speed control potentiometer 41 and the various solid state supporting components to effectively cool all components before the air splashes over the rim of the circular circuit board 36 and joins additionally air flowing through the ports 10a and the space between the cup wall 11 and the perimeter of the circuit board. This air flowing at rather high velocity has no means of escape except to be drawn through the center of the motor M and particularly between the outer surface of its rotor 18 and the arcuate faces of the inner stator core sections 16 where heating is most likely to develop during operation of the motor. The air continues its velocity flow through the center of the motor until it reaches the fan blades 31 which operate to throw the warmed air laterally out of the casing A through the outlet ports 3*a* and 3*b*. Thus this velocity flow of air around all components of the electronic speed control assembly and around all components of the motor which are inclined to become heated during operation, rapidly removes the generated heat so that the outer surface of the casing A maintains a warmed but not overheated temperature which is most desirable for therapeutic massage.

Body massagers such as disclosed in this application preferably employ alternating current motors, but may employ direct current motors, designed to be plugged into available house current. However since voltage may differ in various sectional areas or in different countries, this factor is taken into account in selecting solid state components which have the necessary preformance characteristics to harmonize with the voltage of the input power source. The size and characteristics which the circuit components should embrace to satisfy the available input voltage can be determined by computation, and the suppliers of solid state components can usually furnish the components which are selectively adapted for particular power input voltage.

While certain novel features of this invention have been disclosed herein and pointed out in the claims, it will be understood that various omissions, substitutions, and changes may be made by those skilled in the art without departing from the spirit of this invention.

We claim:

1. A therapeutic massager adapted to be held in the hand and applied to selected portions of the human form which includes, a container part having a tubular body wall closed at one end by a hemispherical end wall, a vibration producing motor fully contained and supported within said container part; a separable cover part presenting a tubular nose extension having an outwardly flared end wall portion which merges through a shoulder portion into a tubular flange, a solid state motor speed control assembly contained in said cover part, means for supporting said speed control assembly within the tubular flange and tubular nose extension of said cover part, detachable leads for connecting said speed control assembly in series with one of the power input leads and one of the winding input leads from the motor, an element connected to said speed control assembly for controlling the speed of the motor and accessible for finger manipulation exteriorly of said nose extension; and means for rigidly securing the tubular flange of said cover part with the motor speed control circuit assembled therein, to the free end of said container part.

2. A therapeutic massager whose means for supporting said speed control assembly as defined in claim 1 is in the form of a sturdy plate contained within said tubular flange with the periphery of said plate braced against the inner surface of the shoulder portion of said cover part and upon which said speed control assembly is mounted.

3. A therapeutic massager adapted to be held in the hand and applied to selected portions of the human form which includes, a container part having a tubular body wall closed at one end by a hemispherical end wall, a vibration producing motor fully contained and supported within said container part; a separable cover part presenting a tubular nose extension having an outwardly flared end wall portion which merges through a shoulder portion into a tubular flange; a solid state motor speed control assembly supported by and assembled within said cover part and which includes a motor speed control potentiometer whose pot is connected to leads from said motor and power source, a manipulating stem extending from said pot into the nose extension of the cover part, and a finger manipulating element connected to said stem and accessible for finger manipulation exteriorly of said nose extension; and means for rigidly securing the tubular flange of said cover part, with the motor speed control assembly contained therein, to the free end of said container part.

4. A therapeutic massager as defined in claim 3 which is further characterized by a cup shaped member whose bottom rim is snugly seated against the inner face of the shoulder portion of said cover part and whose bottom wall supports the pot of the potentiometer.

5. A therapeutic massager adapted to be held in the hand and applied to selected portions of the human form which includes; a tubular container housing a vi-

bration producing motor; a separable cover part presenting a tubular nose extension having an outwardly flared end wall portion which merges through a shoulder portion into a tubular flange; a solid state motor speed control assembly presenting a speed control potentiometer having a pot secured to a circuit board contained within said tubular flange, a sturdy disc-shaped member having a rim which seats against the innerface of the shoulder portion of said cover part and against which the top side of the potentiometer pot is designed to seat, a tubular sleeve secured at one end thereof to a portion of said potentiometer pot and adjustably secured at the other end thereof to the terminal end of said nose extension, a shaft having one end thereof contained in said potentiometer pot and connected to resistance means for controlling the speed of the motor, and an adjusting knob secured to the other end of said shaft for manipulating said shaft; and means for detachably securing the flange portion of said cover part, with the motor speed control circuit packaged therein, to the terminal end of the tubular container.

6. A therapeutic massager as defined in claim **5** which includes a potentiometer pot whose topside also presents a tubular collar which extends through a conforming hole in the center of said disc-shaped member and which provides a journal for the potentiometer shaft extending therethrough, means for securing the lower end of said sleeve to said collar, and a seating cap adjustably secured to the other end of said tubular sleeve and presenting a shoulder which seats on the terminal end of said nose extension.

7. A therapeutic massager adpated to be held in the hand and applied to selected portions of the human form which includes; a tubular container housing a vibration producing motor; a separable cover part presenting a tubular nose extension having an outwardly flared end wall portion which merges through a shoulder portion into a tubular flange, a supporting cup contained within said tubular flange and presenting a bottom rim seating against the inner face of said shoulder portion, a solid state motor speed control assembly presenting a speed control potentiometer having a pot centrally mounted on a circular circuit board positioned within the tubular wall of said supporting cup, a series of auxiliary solid state components mounted on said circuit board in surrounding relation to said potentiometer pot, the top side of said potentiometer pot seating against the adjacent face of the bottom wall of said cup and presenting a collar portion extending through the bottom wall of said cup, a tubular sleeve secured at one end thereof to the collar portion of said potentiometer pot and adjustably secured at the other end thereof to the terminal end of said nose extension, a motor speed adjusting shaft having one end thereof journalled in said collar portion and extending through said sleeve, and an adjusting knob secured to the other end of said shaft for manipulating said shaft; and means for detachably securing the flange portion of said cover part, with the motor speed control assembly packaged therein, to the terminal end of the tubular container.

8. A therapeutic massager adapted to be held in the hand and applied to selected portions of the human form which includes, a container part having a tubular body wall closed at one end by a hemispherical end wall, a vibration producing motor fully contained and supported within said container part; a separable cover part presenting a tubular nose extension having an outwardly flared end wall portion which merges through a shoulder portion into a tubular flange, a supporting cup contained within said tubular flange and presenting a bottom rim seating against the inside face of said shoulder portion, a solid state motor speed control assembly presenting a circular circuit board contained within the tubular wall of said cup in spaced relation thereto and having the pot of a speed control potentiometer secured to the central area of said circuit board with a series of solid state support components secured to said board in surrounding relation to said pot, an externally threaded collar portion projecting from the upper face of said pot and through a conforming hole in the bottom wall of said cup, a tubular sleeve secured at one end thereof to the projecting collar portion of said potentiometer pot, a cap member having a barrel portion extending into the open end of said nose extension and internally threaded to the adjacent end of said tubular sleeve, said cap member presenting an abutment shoulder seating against the outer end of said nose extension to thereby secure said speed control assembly to said cover part, a motor speed adjusting shaft extending into said pot and through said sleeve and cap member and an adjusting knob secured to the outer end of said shaft; and means for detachably securing the flange portion of said cover part and the tubular wall of said cup to the terminal end of the tubular container.

9. A therapeutic massager adapted to be held in the hand and applied to selected portions of the human form which includes, a container part having a tubular body wall closed at one end by a hemispherical end wall, an alternating current vibration producing motor fully contained and supported within said container part; a separable cover part presenting a tubular nose extension having an outwardly flared end wall portion which merges through a shoulder portion into a tubular flange, a supporting cup contained within said tubular flange and presenting a bottom rim seating against the inside face of said shoulder portion, a solid state motor speed control assembly positioned within said cup and which present a circular circuit board whose perimeter is contained within and spaced from the tubular wall of said cup, air inlet holes in the nose extension of said cover part which lead to air inlet holes in the bottom wall of said cup, air outlet holes in the tubular body of said container part which present a larger air outlet area than the air inlet holes in the nose extension, a high capacity suction fan fixed to and driven by the shaft of the motor rotor and positioned adjacent said air outlet holes, said fan blades being of such shape and area as to draw outside air at considerable velocity through the air inlet holes in said nose extension, through the air passage holes in the bottom wall of said cup so that the incoming air washes all components of said motor speed control assembly and then escapes between the perimeter of the circuit board and the tubular wall of the cup, said cup guiding the air stream into the open end of the motor with sufficient velocity flow through the passage between the rotor and inner stator core sections to effectively remove undesired heat as generated during operation of the motor and its withdrawal from the motor for lateral expulsion by the suction fan through the air outlet ports in the tubular body wall of the container part.

10. A therapeutic massager adapted to be held in the hand and applied to selected portions of the human form which includes, a container part having a tubular

body wall closed at one end by a hemispherical end wall, a vibration producing motor fully contained and supported within said container part, a separable cover part presenting a tubular nose extension having an outwardly flared end wall portion which merges through a shoulder portion into a tubular flange, a depressed rim extending from said tubular flange and designed to underlie the free edge of the tubular body wall of the container part, a supporting cup contained within said tubular flange and presenting a bottom rim seating against the inside face of said shoulder portion and a tubular wall covering the inner face of said flange; a solid state motor speed control assembly positioned within and supported by said cup, means for detachably connecting said motor speed control assembly in circuit with power input leads and with the leads from said vibratory motor; and means for securing said cover part with the motor speed control assembly contained therein to the container part which includes, fasteners extending through the tubular wall of the cover part, through the tubular flange of the container part and through the tubular wall of the cup.

11. A therapeutic massager as defined in claim **10** which embraces the further feature of a tool access hole in the flange of said cover part which extends to a tuning potentiometer forming a part of said motor speed control assembly and contained in said cup, and whereby a selected tool may be applied thereto for setting the lowermost speed limit of the motor.

12. A therapeutic massager adapted to be held in the hand and applied to selected portions of the human form which includes, a container part having a tubular body wall closed at one end by a hemispherical end wall and at its other end presenting a depressed threaded flange extension, a vibration producing motor fully contained and supported within said container part, a separable cover part presenting a tubular nose extension having an outwardly flared end wall portion which merges through a shoulder portion into a raised hip portion and thence into a tubular flange, a supporting cup presenting a tubular wall within the tubular flange of the cover part and whose bottom wall presents a bottom rim seating against the inside face of said shoulder portion, a solid state motor speed control assembly positioned within and supported by said cup, means for detachably connecting said motor speed control assembly in circuit with the power input leads and with the leads from said vibratory motor, means for securing the tubular wall of said cup to the tubular flange of the cover part; and a lock ring having a threaded tubular section adapted to be applied to the depressed threaded flange extension of said container part, and a rounded hip portion adapted to be brought into abutment against the hip portion of said cover part.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,841,321 Dated October 15, 1974

Inventor(s) Robert W. Albach, Kenneth R. Mathers and Reuben T. Carlson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 60, change "emerges" to --merges--

Column 3, line 55, correct the spelling of "flange"

Column 5, line 15, change "considerable" to --and--

Signed and sealed this 31st day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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