# United States Patent

[11] **3,547,109**


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[45] Patented **Dec. 15, 1970**


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[54] **VIBRATORY MASSAGE APPARATUS**
**10 Claims, 10 Drawing Figs.**


[52] **U.S. Cl.** ..... **128/33**
[51] **Int. Cl.** ..... **A61h 1/00**
[50] **Field of Search** ..... 128/33, 24.2, 24



[56] **References Cited**

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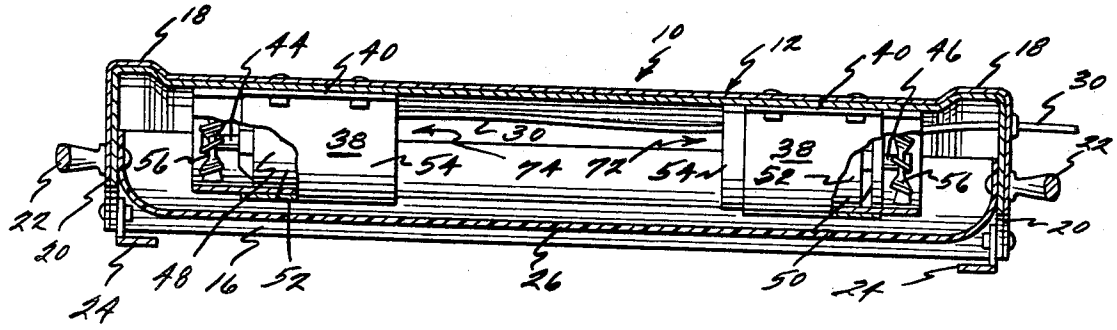
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*Primary Examiner*—L. W. Trapp
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**ABSTRACT:** An arched palette having a pair of vibratory electric motors mounted on the underside thereof, each motor having separate controls. Both motors carry an eccentric mass rotatable with the motor shaft and operative to transmit vibratory motion to the palette. One motor has at least two, and preferably three, constant speeds selected by the user through an outboard motor control; whereas, the second motor comprises a variable-speed unit separately controlled by a rheostat. The amplitude and frequency of the vibratory pulsations imparted to the palette are a function of the phasing of the two motors used in combination, the constant-speed unit being set at one of its constant speeds and the variable-speed unit being adjusted so as to phase the amplitude and frequency of the vibratory pulses in accordance with the wishes of the user. The variable-speed motor does not transmit the vibratory pulses generated by the eccentric mass carried by the fan-type impeller directly to the palette but, instead, does so indirectly in the form of a combination of "circular" and "wobble" motions due to the axial displacement of the eccentric mass through a pair of motor-mounting plates and an associated pair of rubber-grommetted rings, the points of attachment of which appear to significantly affect the amplitude of the pulses developed within the assembly to a level well above that possible with a direct coupling.

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SHEET 1 OF 2

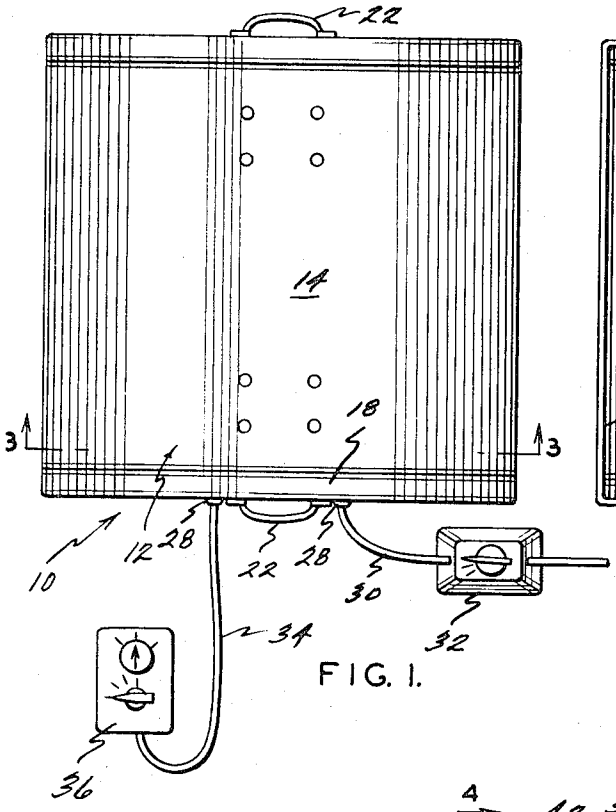



FIG. 1.

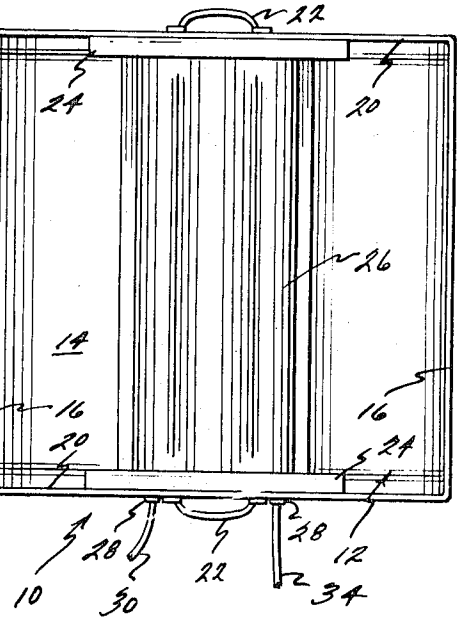



FIG. 2.

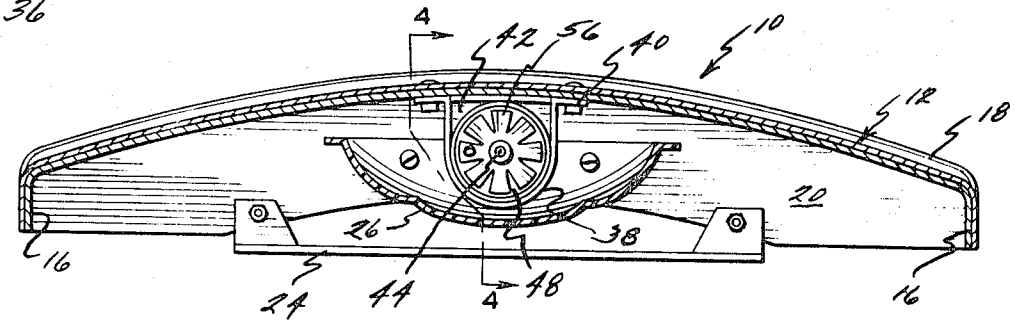



FIG. 3.

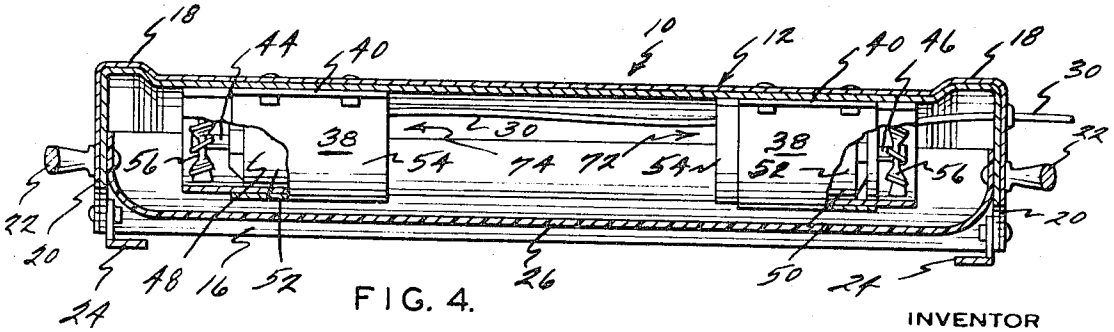



FIG. 4.

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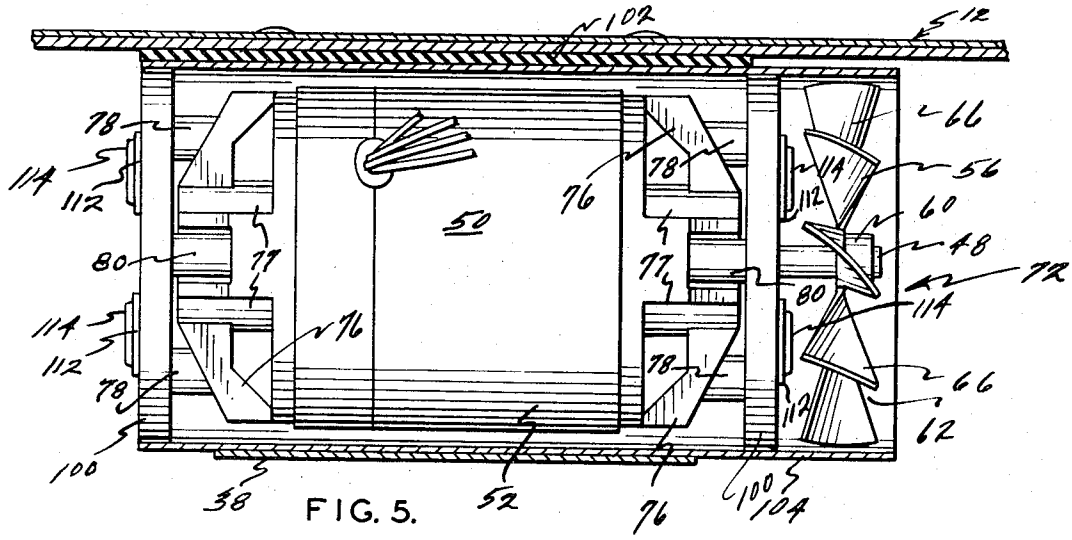


FIG. 5.

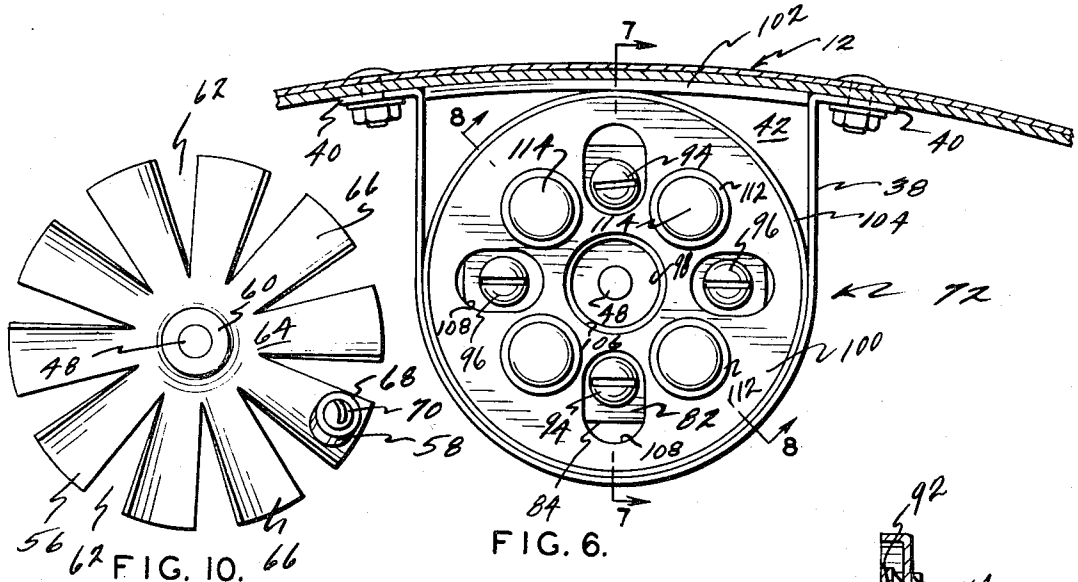


FIG. 10.

FIG. 6.

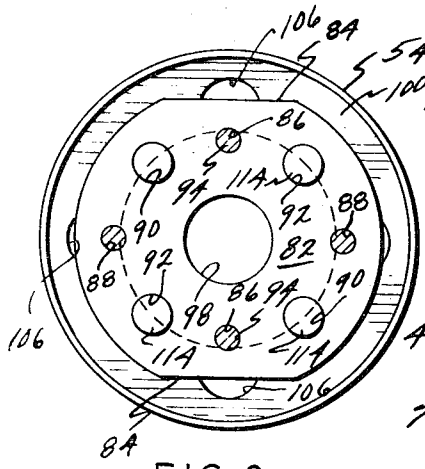


FIG. 9.

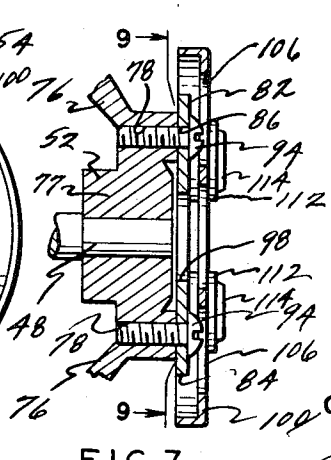


FIG. 7.

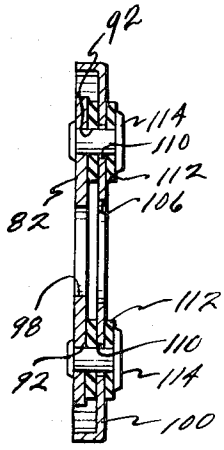


FIG. 8.

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# VIBRATORY MASSAGE APPARATUS

Over the last several years, vibratory massage devices have become increasingly popular as a means to relax and revitalize tired, aching muscles and, in some instances, for therapeutic purposes. For the most part, these prior art units relied strictly on a single eccentrically weighted electric motor, sometimes of the multiple-speed or variable-speed type, to generate the vibratory motion. Few, if any, however, have incorporated the principle of using two vibratory units in combination with one another, the relative speeds of which cooperate to develop pulses of considerably greater amplitude and lower frequency than is possible to achieve with a single motor alone. The low frequency high-amplitude pulsations more nearly approximate the beneficial massage techniques used by a skilled masseur. On the other hand, by phasing the two units properly at low speeds, a cooperative damping action can be achieved which is so gentle it becomes almost imperceptible. Even when synchronized, the amplitude of the vibratory pulsations is much improved, even though the frequency thereof can be made to approximate that of a single vibratory unit.

A further improvement in the vibratory action of the unit has been achieved by displacing the eccentric mass axially toward one end of the motor and mounting same in specially designed rubber-grommetted couplings that allow the motor to wobble about a point on its longitudinal axis. In addition, experiments have shown that interposing a solid metal plate between the motor and the grommetted disk and displacing the points of attachment of each onto circles of different radii greatly enhances the amplitude of the vibratory pulses engendered by the "wobble" motion or, possible, reduces the damping action inherent in a concentric mounting so that vibratory motion is passed onto the vibratory unit housing essentially undamped.

It is, therefore, the principal object of the present invention to provide a novel and improved vibratory massage apparatus.

A second objective is the provision of a unit of the type aforementioned which incorporates two vibrating units, one a multiple constant-speed electric motor and the other a variable-speed electric motor.

Another object of the invention herein disclosed and claimed is to provide an electric vibrator in which the relative speeds of the two vibrating motors can be adjusted so as to vary both the frequency and amplitude of the vibratory pulsations induced in the palette.

Still another objective is to provide at least one of the vibratory motor subassemblies with an axially displaced eccentric mass and mount same in a resilient mounting so that the unit produces a combination of circular motion around its longitudinal axis and a wobble motion about a point on said axis.

An additional objective is to provide the resiliently mounted vibratory unit or units with a specially designed coupling between the motor and palette that enhances, or at least does not appreciably damp, the vibratory motion transferred to the palette.

A further object is to provide a vibratory massage unit that is easy to operate, safe, rugged, versatile, relatively compact, incorporates adjustable pulse amplitude and frequency, and is decorative in appearance.

Other objects will be in part apparent and in part pointed out specifically hereinafter in connection with the description of the drawings that follows, and in which:

FIG. 1 is a top plan view of the vibratory massage apparatus and motor controls used to adjust the speeds of the motors;

FIG. 2 is a bottom plan view without the motor controls;

FIG. 3 is a vertical section to an enlarged scale taken along line 3–3 of FIG. 1;

FIG. 4 is a section taken along line 4–4 of FIG. 3;

FIG. 5 is a further enlarged fragmentary sectional detail showing the variable-speed vibratory subassembly including the motor, eccentrically weighted fan-type impeller, housing and resilient coupling therebetween;

FIG. 6 is an enlarged fragmentary sectional detail similar to FIG. 5 except that it shows the rear end of the subassembly rather than the side elevation thereof;



FIG. 7 is a fragmentary section taken along line 7–7 of FIG. 6;

FIG. 8 is a fragmentary section taken along line 8–8 of FIG. 6;

FIG. 9 is a section taken alone line 9–9 of FIG. 7; and,

FIG. 10 is a detail showing the fan-type impeller blade and eccentric mass carried thereby.

Referring now to the drawings for a detailed description of the present invention and, initially, to FIGS. 1 and 2 for this purpose, reference numeral 10 has been employed to designate the vibratory massage apparatus in its entirety and reference numeral 12 to similarly designate the body palette thereof. Palette 12 comprises an arched or convex molded plastic laminate having a top 14 terminating at opposite extremities in vertically disposed down-turned endwalls 16. Integrally formed raised ribs 18 border the side margins of the palette and adjoin side panels 20. Carrying handles 22 are attached to opposite side panels as shown.

The palette is formed to provide a relatively rigid smooth surface curved to conform generally with the back of an adult user. Fastened to the lower edges of the side panels are elongate horizontal supporting members 24 having upturned ears at their opposite extremities. These supports raise the palette slightly off the floor. A molded plastic shield 26 of generally concave cross section extends across the underside of the palette and the upturned endwalls of said shield fasten to the inside of the side panels as shown. This shield covers the electrical apparatus to be described presently so as to prevent injury from electrical shock or damage from the whirling impeller blades. It also serves to catch and retain any lubricants that might drip from the motors.

Emerging from one of the side panels through suitable rubber grommets 28 and is a power cord 30 having a combination "on-off" switch and multiple-speed motor control 32 wired therein. Power cord 30 is adapted for connection into a household wall plug wired to furnish 110V. AC current. A second cord 34 emerges from the side panel of the palette and carries a second motor control in the form of a rheostat 36.

Next, referring to FIGS. 3 and 4, it will be seen that a pair of elongate generally U-shaped motor mounts 38 with out-turned flanges 40 along the upper free margins thereof are bolted to the underside of the palette on the transverse centerline thereof and adjacent opposite side panels 20. The motor-receiving tunnels 42 defined by the open-ended mounts 38 are axially aligned, as are the shafts 44 and 46 of the electric motors 48 and 50 housed therein. The motors 48 and 50 are essentially identical to one another, although they are controlled and mounted differently. The cases 52 are cylindrical and that of motor 48 is enclosed in a tight-fitting tubular metal shield 54 covered by a relatively thick layer of rubber which is, in turn, encased in motor mount 38 which fits tightly therearound and holds same snuggly against the underside of the palette as shown in both FIGS. 3 and 4.

Motor 50, on the other hand, is resiliently mounted within motor mount 38 so as to enable the latter to wobble about a point on its longitudinal axis as will be explained in detail presently in connection with FIGS. 4—9, inclusive.

Each motor has mounted on the shaft thereof a fan-type impeller 56 that carries an eccentric mass 58 that has been illustrated most clearly in FIGS. 5 and 10 to which reference will now be made. The impeller 56 is of conventional design providing a hub 60 adapted to fasten onto motor shafts 44 and 46 with a set screw or similar fastener (not shown). Equiangularly spaced radial slits 62 separate a plain circular metal disk 64 into a plurality of vanes 66, each of which is twisted in the same direction about its longitudinal axis to define fan blades adapted to move the heated air away from the adjacent motor.

One of the blades 66 has fastened thereto near its free end the eccentric mass 58 which, in the particular form shown, comprises nothing more than a hollow cylindrical metal weight 68 and a bolt 70. Thus, two vibratory subassemblies indicated in a general way by reference numerals 72 and 74 transmit vibratory motion to the palette along the transverse

centerline thereof from a position immediately therebeneath. In the particular form of the invention illustrated herein, the vibratory motion induced by vibratory subassembly **74** is more nearly "circular" due to the minimal "wobble" motion permitted by rubber-covered shield **54** encased in mount **38**. The vibratory motion induced by vibratory subassembly **72**, on the other hand, is a combination of circular and substantial wobble motion that is achieved by the novel resilient mounting of motor **50** which will now be described in detail in connection with FIGS. **5—9**, inclusive, where it is most clearly revealed.

Integrally-formed radial ribs **76** form a part of the motor case **52** and they emanate from a hub **77** that journals the motor shaft. Four such radial flanges are provided on each end of the motor case spaced apart angularly 90°. Each of these flanges has as a part thereof an internally threaded integral boss, one pair **78** of which is arranged diametrically the same radial distance on opposite sides of the hub axis but at a shorter radial distance therefrom than the other diametrical pair of bosses **80** which lie at right angles thereto. A metal disk **82**, having parallel truncated edge portions **84** and four diametrically-located pairs of apertures **86**, **88**, **90** and **92**, is bolted to the bosses **78** and **80**. Apertures **86** are the same radial distance from the motor shaft axis as bosses **78** and they, therefore, receive the screws **94** that fasten same together. Apertures **88** have their centers the farthest from the motor shaft axis and they receive screws **96** that fasten said plate into bosses **80**. The remaining pairs of apertures **90** and **92** have their centers located on a common circle (dotted line in FIG. **9**) lying between the circles defined by aperture pairs **86** and **88**. Aperture pair **90** lies at right angles to its companion pair of apertures **92** and midway between apertures **86** and **88** to place same at 45° to the latter. Disk **82** also has a central opening **98** therethrough that passes the motor shaft. Discs **82** are fastened to the opposite ends of the motor **50**.

A pair of circumferentially flanged circular plates **100** are fastened to the disks **82** on opposite ends of motor **50**. The overall diameter of plates **100** is somewhat greater than that of the motor case **52** as the peripheral flanges thereof engage the inside of tubular motor housing **104** which, in turn, fastens inside motor mount **38** which holds said housing snuggly up against rubber pad **102** fastened to the underside of the palette as shown in FIG. **6**.

Now, plates **100** each have a central aperture **106** for the motor shaft and four large openings **108** located to provide access to the heads of screws **94** and **96**. Between the latter openings are two diametrically spaced pairs of openings **110** corresponding to apertures **90** and **92** in disc **82**. Rubber grommets **112** with central openings therein of the same size as apertures **90** and **92** are fastened inside openings **110** so as to provide resilient cushions between the plate and disc underneath the heads of rivets **114** that fasten said plate to the disc, and around the shanks of said rivets. Thus, motor **50** is supported on both ends by rubber grommets **112** and is, therefore, free to wobble about a point on its longitudinal axis due to the location of the rotating eccentric mass **58** well forward of the front end of motor **50** and with no counterbalancing mass on the rear end. The resultant vibratory motion of vibratory subassembly **72** is complex and a combination of the circular and wobble motion induced in the motor **50** by rapidly rotating eccentric mass **58** displaced forwardly along the motor shaft axis. Such motion is transmitted to the motor case through the shaft journal, thence to disks **82** through radial ribs **76** and the mounting screws, to plates **100** by means of the rivets **114**, from plate **100** to the motor housing **104**, and from the latter to the palette, both directly through pad **102** and through the medium of mount **38**. While pad **102** and grommets **112** undoubtedly damp out a portion of the vibratory motion produced in vibratory subassembly **72** before it reaches the palette, the wobble action that is made possible by the so-called "floating" motor mount for motor **50** is far superior to the motion produced by a rigid mount like that of motor **48**. Also, for some inexplicable reason, a much improved vibratory response is achieved by the simple, but unobvious, expedient of locating the circles defined by one pair of mounting studs **86** inside the grommet circle (**90**, **92**) and the other pair of mounting studs **88** outside thereof. Considerable damping of the vibratory motion in vibratory subassembly **72** occurred when the circles defined by the centers of mounting holes **86**, **88**, **90** and **92** were concentric.

Motor control **32** is connected to motor **48** and has "slow," "medium" and "fast" positions which, obviously, are operative to set the motor at any one of three fixed speeds. Rheostat **36**, on the other hand, is connected to motor **50** and provides means for varying the r.p.m. thereof continuously from nearly zero to maximum. It thus becomes possible to "phase" vibratory motion imparted to the palette by varying the relative speeds of the two motors. In other words, by setting motor **48** at one of its three speeds and carefully varying the speed of motor **50**, it becomes possible to almost damp out the vibratory motion by getting the respective eccentric masses 180° out of phase with one another. On the other hand, by synchronizing the motors and phasing the masses, strong frequent vibratory pulsations are induced. The preferred method of operating the unit is to adjust the motors at different speeds such that the amplitude of the pulses increases intermittently to a maximum as they approach the "in phase" relation and then diminish steadily before repeating again. By operating the motors at nearly the same speed, the frequency at which the pulses of maximum amplitude occur is relatively far apart. Conversely, a rapid buildup to maximum pulse amplitude is achieved through operating the motors at widely different speeds. By slowing down the motors, the maximum amplitude of the pulses is diminished and it is increased at high speeds. In between these extremes, one can achieve such things as alternating low and high amplitude pulses while varying both the maximum and minimum amplitude thereof as well as their frequency.

Having thus described the several useful and novel features of the vibratory massage apparatus of the instant invention, it will be seen that the several worthwhile objectives for which it was developed have been achieved. Although but a single specific embodiment has been illustrated, I realize that certain changes and modifications therein may well occur to those skilled in the art within the broad teaching hereof; hence, it is my intention that the scope of protection afforded hereby shall be limited only insofar as said limitations are expressly set forth in the appended claims.

I claim:

1. The vibratory massage apparatus which comprises: a palette having a relatively thin-walled top of arched configuration capable of supporting a human body lying thereon while transmitting induced vibratory motion to the latter; first vibratory means attached to the underside of the top near its transverse centerline and adjacent one side thereof, said vibratory means including an electric motor with a rotatable shaft projecting from one end thereof, a flywheel mounted on said shaft for rotation therewith, and a mass carried by said flywheel in eccentric relation to the shaft axis; first control means connected to the first vibratory means operative upon actuation to run the latter at least one fixed speed; second vibratory means in the form of an electric motor having a shaft projecting from one end thereof, a flywheel mounted on the shaft for rotation therewith, and a mass carried by said flywheel in eccentric relation to the shaft axis; motor mounting means resiliently fastening the second vibratory means to the underside of the top near its transverse centerline and adjacent the opposite side thereof, said mounting means including a pair of circular metal plates of a diameter greater than the maximum outside dimension of the motor resiliently mounted in concentric relation on opposite ends thereof so as to permit said motor to move in a restricted circular orbit about its shaft axis as well as wobble about a point on said axis, a tubular housing with inside diameter sized to engage the outside edges of said circular metal plates, and a generally U-shaped rigid bracket means fitted tightly around said housing in spaced relation to said motor, said bracket means being fastened to the under-

side of the palette top and adapted to hold said housing tightly thereagainst in tangential relation; and, second motor control means independently connected to said second vibratory means, said second motor control means comprising a rheostat operative upon actuation to vary the speed of said second vibratory means relative to said first vibratory means so as to vary the amplitude and frequency of the vibratory pulses induced in the palette due to the phase relation of the rotating eccentric masses.

2. The vibratory massage apparatus as set forth in claim 1 in which; a rubber pad is wrapped about the motor of the first vibratory means, and a generally U-shaped rigid bracket means fits around said rubber padded motor and holds same snuggly up against the underside of the palette top.

3. The vibratory massage apparatus as set forth in claim 1 in which: the first motor control means includes at least two operative positions, one capable of running the motor of the first vibratory means at one constant speed and the second operative to run said motor at another constant speed different from the first.

4. The vibratory massage apparatus as set forth in claim 1 in which: the flywheels in both the first and second vibratory means comprise bladed fan-type impellers.

5. The vibratory massage apparatus as set forth in claim 1 in which: a tubular metal shield is interposed between the motor of the first vibratory means and U-shaped bracket means of the motor mounting means.

6. The vibratory massage apparatus as set forth in claim 1 in which: the motor of the second vibratory means includes a casing having four motor-mounting bosses on each end thereof in axially aligned relation, said bosses being arranged in diametrical equiangularly spaced pairs about the motor shaft axis, the bosses of each diametrical pair thereof being spaced the same radial distance on opposite sides of said motor shaft axis; and, a metal disk rigidly fastened to the four bosses on each end of said motor casing and resiliently fastened to the circular metal plate adjacent thereto in face-to-face relation by means of four rubber-grommetted fasteners, said rubber-grommetted fasteners attaching to said plate at points intermediate the points of attachment of said disk to said motor casing bosses.

7. The vibratory massage apparatus as set forth in claim 6 in which: the diametrical distance separating the bosses of one diametrically arranged pair of bosses is less than the diametrical distance separating the other diametrical pair thereof.

8. The vibratory massage apparatus as set forth in claim 6 in which: the rubber-grommetted fasteners are arranged on a circle concentric with the motor shaft axis.

9. The vibratory massage apparatus as set forth in claim 8 in which: one pair of diametrically arranged bosses lies on a circle larger than that defined by the rubber-grommetted fasteners and the other pair of diametrically arranged bosses lie on a circle smaller than said circle defined by said rubber-grommetted fasteners.

10. The vibratory massage apparatus as set forth in claim 9 in which: the rubber-grommetted fasteners include circumferentially slit rubber grommets adapted to provide a resilient cushion between the fasteners and circular metal plate as well as between said plate and associated disc.