

Aug. 31, 1954

C. F. BRITTON ET AL

2,687,718

APPARATUS FOR PRODUCING MODULATED PULSATIONS

Filed Aug. 14, 1950

Fig. 1.

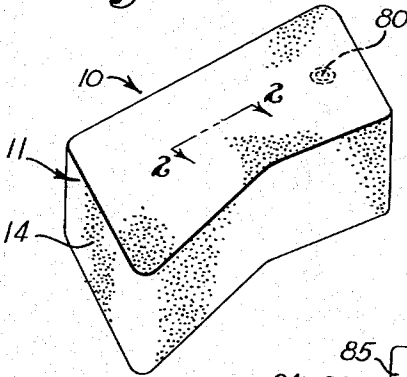


Fig. 3.

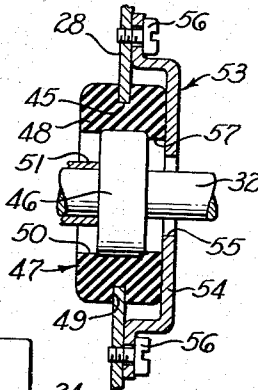


Fig. 4.

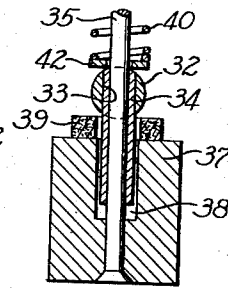


Fig. 2.

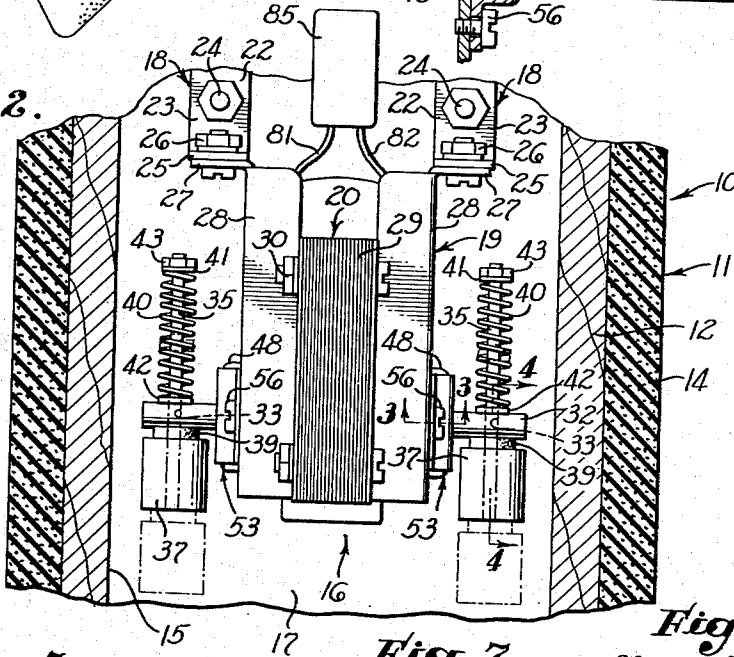


Fig. 5.

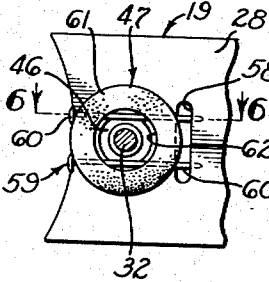


Fig. 6.

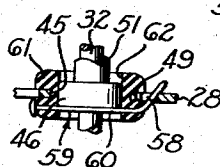


Fig. 7.

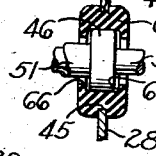
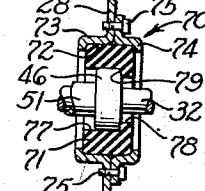


Fig. 8.



INVENTORS.

CHARLES F. BRITTON

JACK E. HARRIER

BY THEIR ATTORNEYS.

HARRIS, KIECH, FOSTER & HARRIS

BY *Fred W. Harris*

UNITED STATES PATENT OFFICE

2,687,718

APPARATUS FOR PRODUCING MODULATED PULSATIONS

Charles F. Britton and Jack E. Harrier,
Culver City, Calif.

Application August 14, 1950, Serial No. 179,186

9 Claims. (Cl. 128—36)

1

This invention relates to improvements in pulsation producing apparatus and more particularly to an apparatus of the type which is adapted to be utilized in massaging various portions of the human body.

Although we will describe our invention as embodied in an apparatus having a particular form and special mode of application for the purpose of illustrating the manner of construction and mode of operation thereof, it is obvious that the principles of our invention can be utilized in various shapes and types of similar devices and we, therefore, do not intend to be limited to the specific device which is described below.

Vibrators adapted to be used for therapeutic and massage purposes are well known in the prior art, such vibrators commonly incorporating an electric motor upon the shaft of which are rigidly mounted relatively heavy weights whose rotation by the motor creates a series of vibrations which is transmitted to the housing of the vibrator or to a vibrating pad or implement associated therewith. The vibrations produced by prior art devices are characterized by rapid changes in frequency and amplitude attributable to changes in position or in the manner in which applied, such changes being rather disconcerting when the vibrator is used upon those portions of the body, such as the face, where relatively uniform frequency pulsations of small amplitude rather than vibrations of varying frequency and large amplitude are desired.

It is, therefore, a primary object of our invention to provide an apparatus for producing modulated pulsations which includes pulsation producing means capable of producing high frequency pulsations characterized by a definite and substantially constant pattern.

A further object of our invention is the provision of a pulsation producing apparatus in which the pulsation producing means includes a motor having a shaft, said shaft having mounted upon the opposite end thereof rod members on the ends of which are secured weights for rotation upon the ends of said rod members by said shaft.

An additional object of our invention is the provision in a pulsation producing apparatus of the aforementioned type of pulsation producing means in which the above-described rod members are reciprocable in bores in the ends of the shaft of the motor and have associated therewith resilient means adapted to control the movement of the weights in their orbits. By permitting

2

movement of the weights due to the reciprocation of the rods in the bores in the ends of the shaft and by controlling such movement, pulsations characterized by a definite pattern and of substantially equal amplitude are obtained in contradistinction to vibrations of varying frequencies produced by prior art devices.

When a rheostat is used to reduce the speed of the motor of the pulsation producing means, the amplitude of the pulsations is reduced but the frequency thereof is substantially maintained, which is another important object of our invention.

Conventional vibrators are characterized by the production of excessive noise due to resonant frequencies excited in the housings thereof by the vibrations produced in the apparatus. Where such vibrators are utilized for therapeutic or massage purposes, the relatively high noise levels incident to the use of such vibrators can be disconcerting and tension producing thus, to a certain extent, deleteriously affecting the end sought to be achieved by the use of such vibrators.

An additional object of our invention is the provision of a pulsation producing apparatus which is characterized by extremely quiet operation and in which the motor and pulsation producing means are so suspended within the housing that the excitation therein of resonant frequencies is prevented.

Another object of our invention is the provision of a resilient mounting for the motor of the pulsation producing apparatus which absorbs any shock loads which would be transmitted through an ordinary rigid mounting, thus preventing the transmission of such shock loads through the mounting into the housing. If the housing of the apparatus should be attached to another object, such as a chair, for example, the motor may be rigidly mounted and the housing resiliently secured to the object.

A further object of our invention is the provision, in a pulsation producing apparatus of the aforementioned type, of vibration isolating bearing mounting means which prevents the transmission of resonant frequencies through the sheet metal frame in which the motor for driving the shaft is mounted.

A further object of our invention is the provision of a bearing mounting of the aforementioned type which permits bearings having relatively wide races to be mounted in openings in sheet metal frame members whose thickness is substantially less than the width of the races of the bearings.

Another object of our invention is the provision of a bearing mounting of the aforementioned type which permits the self-alignment of a bearing mounted therein with the shaft supported thereby.

Another object of our invention is the provision of a bearing mounting of the aforementioned type which includes resilient socket members insertable in the openings in the sheet metal frame members, said socket members defining sockets in which the bearings are receivable.

Another object of our invention is the provision of a bearing mounting of the aforementioned type in which the socket members are restrained against lateral movement in the openings by the provision of retaining means securing the socket members in the openings and also preventing the lateral movement of the bearings from the openings.

Other objects and advantages of our invention will be apparent from the following specification and the accompanying drawing, which is for the purpose of illustration only, and in which:

Fig. 1 is an isometric view showing the housing of the pulsation producing apparatus;

Fig. 2 is an elevational view taken on the broken line 2—2 of Fig. 1;

Fig. 3 is a transverse, partly sectional view taken on the broken line 3—3 of Fig. 2;

Fig. 4 is a vertical, partly sectional view taken on the broken line 4—4 of Fig. 2;

Fig. 5 is a fragmentary, side elevational view of an alternative embodiment of the bearing mounting means of our invention;

Fig. 6 is a transverse sectional view taken on the broken line 6—6 of Fig. 5;

Fig. 7 is a fragmentary, partly sectional view of another embodiment of the bearing mounting of our invention; and

Fig. 8 is a vertical, sectional view of another embodiment of the bearing mounting of our invention.

Referring to the drawings and particularly to Figs. 1 and 2 thereof, we show a pulsation producing apparatus 10 which includes a housing 11 of substantially rectangular configuration, said housing including a container 12 formed of wood, or some other material, completely sheathed in a layer 14 of resilient material, such as foam rubber. The container 12 defines a chamber 15 in which is disposed a pulsation producing means 16 constructed in accordance with our invention.

Secured to a wall 17 of the container 12 by resilient mounting means 18 is the frame 19 of a motor 20. The resilient mounting means 18 are constituted, in the present embodiment of our invention, by substantially L-shaped brackets 22, the legs 23 of which are secured to the wall 17 by means of fasteners 24. The bases 25 of the L-shaped brackets 22 are secured by means of fasteners 26 to flanges 27 formed on the ends of the sheet metal sides 28 of the motor frame 19. By mounting the motor 20 and its associated frame 19 on the resilient, L-shaped brackets 22, we prevent undue vibration and shock loads from being transmitted from the motor through the frame and into the wall 17 of the container 12, which is an important feature of our invention. The field 29 of the motor 20 is secured in the sides 28 of the frame 19 by means of fasteners 30.

The armature, not shown, of the motor 20 drives a shaft 32 which has formed in its opposite ends bores 33 whose axes are disposed transversely to the axis of rotation of the shaft. Sleeves 34

having their ends secured in the bores 33 project from the opposite ends of the shaft 32 and have mounted for reciprocation therein, rods 35. Fastened on the ends of the rods 35 are weights 37 which have internal recesses 38, as best shown in Fig. 4 of the drawing, adapted to receive the ends of the sleeves 34 as the weights 37 are reciprocated toward and away from the periphery of the shaft 32 by the reciprocation of the rods 35 in the sleeves 34. Annular washers 39, formed of felt or similar material, encompass the sleeves 34 and are interposed between the periphery of the shaft 32 and the bases of the weights 37 to limit the movement of the weights 37 toward the periphery of the shaft 32 and to prevent the creation of noise which would result if the bases of the weights 37 should contact the periphery of the shaft 32. The washers 39 also act as oil retainers to lubricate the shafts 32.

Disposed upon and encompassing the opposite ends of the rods 35 are compression springs 40 which serve as resilient means to control the movements of the weights 37 upon the ends of the rods 35 as permitted by the reciprocation of the rods 35 in the sleeves 34. The springs 40 have their opposite ends seated respectively on washers 41 and 42, the washers 41 being retained on the rods 35 by means of nuts 43 threadedly engaging the ends of said rods and the washers 42 engaging the periphery of the shaft 32.

When the weights 37 are rotated through their orbits upon the rods 35 by the rotation of the shaft 32, the reciprocation of the rods 35 in the sleeves 34 permits the weights to move in and out upon the rods 35, such movement being controlled by the springs 40. The manner in which the weights 37 are moved outwardly by centrifugal force to partially compress the springs 40 is graphically illustrated in phantom in Fig. 2 of the drawing. The springs 40, in addition to controlling the outward movement of the weights 37, act as cushions and serve to prevent the transmittance of sharp vibrations from the rods 35 into the shaft 32. Since the masses of the weights 37 are continually maintained in optimum position by the reciprocation of the rods 35 within the sleeves 34, a continuous series of pulsations characterized by a definite and substantially uniform pattern and of optimum amplitude is produced thus contributing to a pulsation producing apparatus which is able to provide gentler massage of a more penetrating character than has been previously attained by the use of conventional vibration apparatus.

The nuts 43 threadedly engaging the ends of the rods 35 permit the springs 40 to be adjusted so that the force of the pulsations delivered by the pulsation producing means 16 can be controlled within certain limits, it being understood that the springs 40 are so designed that they will never, at any time, be fully compressed by the outward movement of the weights 37 to cause the springs 40 to constitute rigid members through which shock loads and unwanted vibratory frequencies may be transmitted.

The sleeves 34 in the bores 33 provide extended bearing surfaces in which the rods 35 may reciprocate, thus eliminating the possibility that the rods 35 may wear the bores 33 oversize and the rods 35 will slack therein causing undesirable noise to be emitted from the pulsation producing means.

In order to reduce the over-all weight of the pulsation producing apparatus and to minimize the cost of producing the apparatus, we have uti-

5

lized a sheet metal motor frame constituted by sheet metal side members 28. Formed in the side members 28 are openings 45 through which pass the opposite ends of the shaft 32. To provide mounting means for bearings 46 we have devised resilient socket members 47 which are constituted by annuli 48 formed of rubber or an analogous resilient material.

The annuli 48 have peripheral grooves 49 formed therein adapted to receive the edges of the openings 45, thus facilitating the positioning and mounting of the annuli in the openings. The grooves 49 prevent the dislodgment of the annuli from the openings. The bores 50 of the annuli have a diameter which is less than the external diameter of the bearings 46 so that, when the bearings 46 are installed in the bores 50, the rubber will be compressed to hold the bearings within the bores.

Sleeves 51 encompassing the shaft 32 are interposed between the armature, not shown, and the inner races of the bearings 46 to prevent the inward and lateral movement of the bearings 46 after installation in the bores 50 of the annuli 48. The bores 50 of the annuli 48 constitute sockets in which the bearings 46 are receivable.

To prevent the lateral and outward movement of the sockets members 47 and the associated bearings 46, we provide retainer means 53 in the form of elongated straps 54 having centrally located apertures 55 through which the ends of the shaft 32 project, the opposite ends of the straps 54 being secured to the sheet metal sides 28 of the motor frame 19 by means of fasteners 56. As best seen in Fig. 3 of the drawing, the straps 54 deform the rubber of the annuli 48, as at 57, about the outer periphery of the bearings 46, to prevent the lateral and outward movement of the bearings from the annuli.

The provision of resilient socket members 47, in addition to materially prolonging the life of the bearings 46 and the shaft 32 mounted therein and facilitating the assembly of the bearings and the mounting thereof in the openings 45 in the side walls 28 of the motor frame 19, also serves to isolate the bearings 46 and the shaft 32 mounted therein from direct engagement with the side walls 28 thus preventing the transmittal through the side walls 28 and the bearings 46 of any undue shock loads or vibratory frequencies imposed upon the shaft 32. In addition, the socket members 47 permit the self-centering of the bearings 46 in the bores 50 which is an important feature of our invention.

Shown in Fig. 5 of the drawing is an alternative retainer construction for another type of resilient socket member. The retainer means 59 is exemplified as elongated fasteners 60 which penetrate the outer side of an annulus 61 and have their opposite ends in engagement with the inner side of the side wall 28 by passing through an elongated slot 58 formed in the side wall 28 in proximity to the opening 45 therein. It will be noted that the elongated fasteners 60 engage the side of the bearing 46 to retain it in the annulus 61. The annulus 61 has a bore 62 which is adapted to receive the bearing 46.

Shown in Fig. 7 of the drawing is a resilient annulus 65 whose construction is somewhat analogous to the construction of the annulus 61, the annulus 65 providing a first bore 66 and a second bore 67 which is centrally located and which constitutes a socket in which the outer race of the bearing 46 is receivable, thus centrally locating the bearing 46 without need of

6

fasteners, straps or sleeves to prevent outward lateral movement with reference to the vertical axis of the resilient annulus 65. The second bore 67 is wider than the bearing 46 to permit it to self-align therein.

An alternative mounting 70 for an alternative bearing socket member 71 is shown in Fig. 8 of the drawing. The socket member 71 has no peripheral groove 49 and is secured in the opening 72 in the side member 28 by an integral flange 73 formed on the member 28 and an annular retainer 74 secured to the outside of the member 28 by fasteners 75. The socket member has a first bore 77 to receive the bearing 46 and a second bore 78 providing a wall 79 to prevent the lateral movement of the bearing from the first bore 77.

As previously indicated, the container 12 is completely enclosed in a sheath 14 of resilient material such as foam rubber so that no excrescences or protrusions will exist on the surface of the container 12 which may engage the face or the body of the user of the apparatus. As best seen in Fig. 1 of the drawing, a switch 80 is mounted in a wall of the container 12 and is concealed under the resilient sheath 14 and cushioned thereby. The switch 80 is connected to the motor 20 by means of leads 81 and 82 and is adapted to energize the same when properly actuated.

If desired, a rheostat 85 can be incorporated in the circuit, as shown in Fig. 2, to cut down the current flow to the motor 20. When a rheostat 85 is used and is adjusted to cut the current flow, the pulsation producing means 16 substantially maintains the frequency of the pulsations while reducing the amplitude thereof. This is an important feature because cutting the current in conventional vibrators radically changes the frequency of the vibrations.

We thus provide by our invention a pulsation producing apparatus which is adapted to produce pulsations of a substantially constant frequency and whose operation is characterized by a relatively low noise level. Also of importance in our invention is the resilient mounting of the pulsation producing means of the apparatus within the container of the apparatus and the manner in which the bearings supporting the shaft of the pulsation producing means are mounted in the side walls of the motor frame. Most important of all, of course, is the manner in which the movement of the weights of the pulsation producing means through their orbits is controlled by mounting the weights on reciprocable rods whose reciprocation is controlled by resilient means associated therewith.

Although we have disclosed and described specific embodiments of our invention for the purpose of illustrating the construction and mode of operation thereof, it is obvious that changes, alterations and modifications may be made in the specific details of said construction and we, therefore, do not intend to be limited to such specific details but prefer, rather, to be afforded the full scope of the following claims.

We claim as our invention:

1. In an apparatus for producing modulated pulsations, the combination of: a housing; a resilient mounting secured to the interior of said housing; a motor supported upon said mounting, said motor having a shaft rotatable thereby, said shaft having formed in its opposite ends bores whose axes are normal to the axis of rotation of said shaft; and pulsation producing means se-

cured to the opposite end of said shaft for inducing modulated pulsations in said housing, said pulsation producing means including reciprocable rods disposed in said bores, each of said rods having a weight secured to one end thereof.

2. An apparatus as defined in claim 1 in which each of said rods has resilient means secured to that end which is opposite the weight-bearing end.

3. An apparatus as defined in claim 2 in which said resilient means are constituted by coil springs each of which has one end seated on the periphery of said shaft and its other end seated at the end of its associated rod.

4. In an apparatus for producing modulated pulsations, the combination of: a housing; a mounting secured to the interior of said housing; a motor supported upon said mounting, said motor having a shaft rotatable thereby, said shaft having formed in its opposite ends bores whose axes are normal to the axis of rotation of said shaft; and pulsation producing means positioned in said bores, said pulsation producing means including a rod reciprocable in each of said bores and a weight secured to one end of said rod.

5. An apparatus as defined in claim 4 in which each of said rods has resilient means disposed thereupon for controlling the reciprocation of said rods during the rotation of said shaft.

6. An apparatus as defined in claim 5 in which said resilient means are constituted by coil springs each of which has one end seated on the periphery of said shaft and its other end seated at the end of its associated rod.

7. In apparatus for producing modulated pulsations, the combination of: a housing; a resilient mounting secured to the interior of said housing; a motor frame secured to said resilient mounting, said frame having oppositely disposed openings formed in the sides thereof; resilient sockets positioned in said openings; bearings positioned in said sockets; a motor supported in said frame, said motor having a shaft whose opposite ends are journaled in said bearings; and pulsation producing means secured to the ends of said shaft, said pulsation producing means including reciprocable rods and weights secured to the ends of said rods, the ends of said shaft having formed therein bores whose axes are normal to the axis of rotation of said shaft, said rods being reciprocable in said bores, and there being resilient means disposed upon the ends of said rods opposite to the weight-bearing ends thereof for controlling the reciprocation of said rods in said bores.

8. In an apparatus for producing modulated pulsations, the combination of: a housing, a resilient mounting secured to the interior of said housing; a sheet metal motor frame rigidly se-

cured at one end to said resilient mounting, said frame having oppositely disposed openings formed in the sides thereof; annular resilient sockets positioned in said openings, said sockets having annular peripheral grooves receiving portions of said frame contiguous to said openings to maintain said sockets in said openings; bearings positioned in said sockets, said sockets including means for retaining said bearings therein; a motor disposed within said frame and having a shaft disposed transversely of the longitudinal axis of said housing, said shaft having its opposite ends journaled in said bearings; and pulsation producing means mounted in openings in the ends of said shaft, said pulsation producing means including reciprocable rods in said openings and spring biased weights secured to the ends of said rods.

9. In an apparatus for producing modulated pulsations, the combination of: a housing incorporated in a resilient sheathe; a resilient mounting secured to the interior of said housing, said mounting including a plurality of resilient laterally spaced brackets; a sheet metal frame rigidly secured to said brackets and having oppositely disposed openings formed in the sides thereof; resilient sockets positioned in said openings, said sockets having flanges formed integrally therewith engaging the sides of said openings to prevent the dislodgement of said sockets therefrom; bearings mounted in said sockets; a motor fixedly supported in said frame, said motor having a shaft extending transversely of the longitudinal axis of said housing and having its opposite ends journaled in said bearings; and pulsation producing means mounted in openings in said opposite ends of said shaft, said openings having elongated guide members mounted therein and said pulsation producing means including rods reciprocable in said guide members and weights secured to the ends of said rods.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
952,565	Fraser	Mar. 22, 1910
1,676,285	Prell	July 10, 1928
1,988,316	Jackson	Jan. 15, 1935
2,018,046	Wilson	Oct. 22, 1935
2,140,441	Clark	Dec. 13, 1938
2,352,049	Weaver	June 20, 1944
2,479,013	McCready	Aug. 16, 1949
2,483,693	Tompkins	Nov. 22, 1949
2,489,582	McCready	Nov. 29, 1949

FOREIGN PATENTS

Number	Country	Date
431,366	Great Britain	July 5, 1935