March 28, 1944. E. H. TOMPKINS 2,345,439

THERAPEUTIC DEVICE

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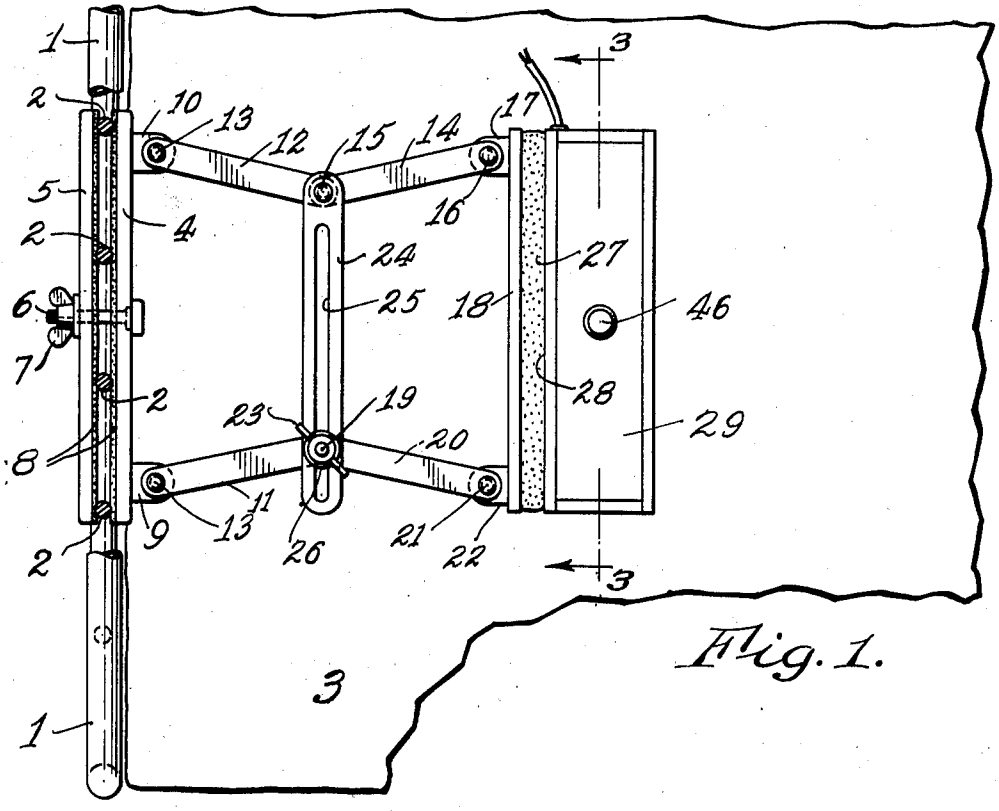

Fig. 1.

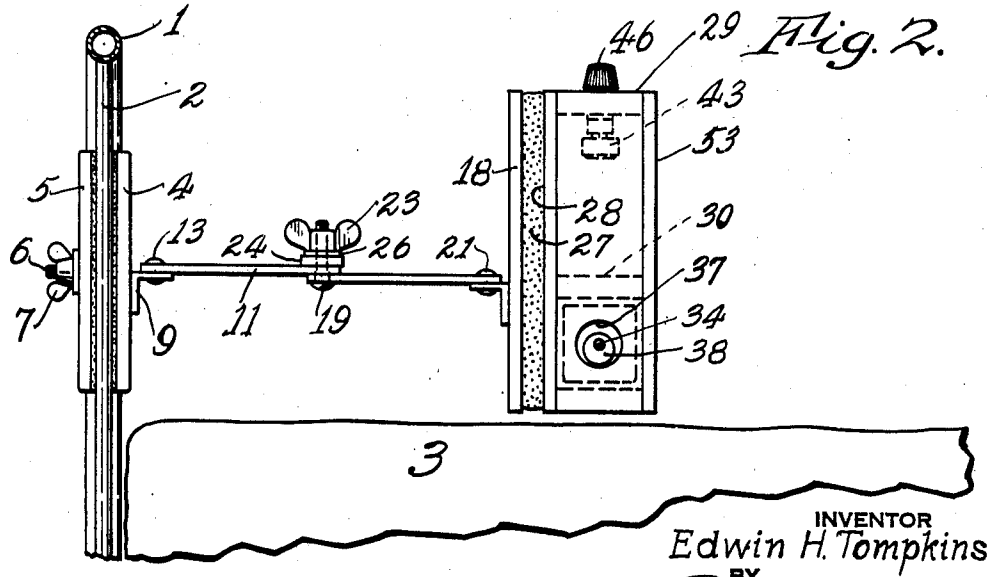

Fig. 2.

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Fig. 3.

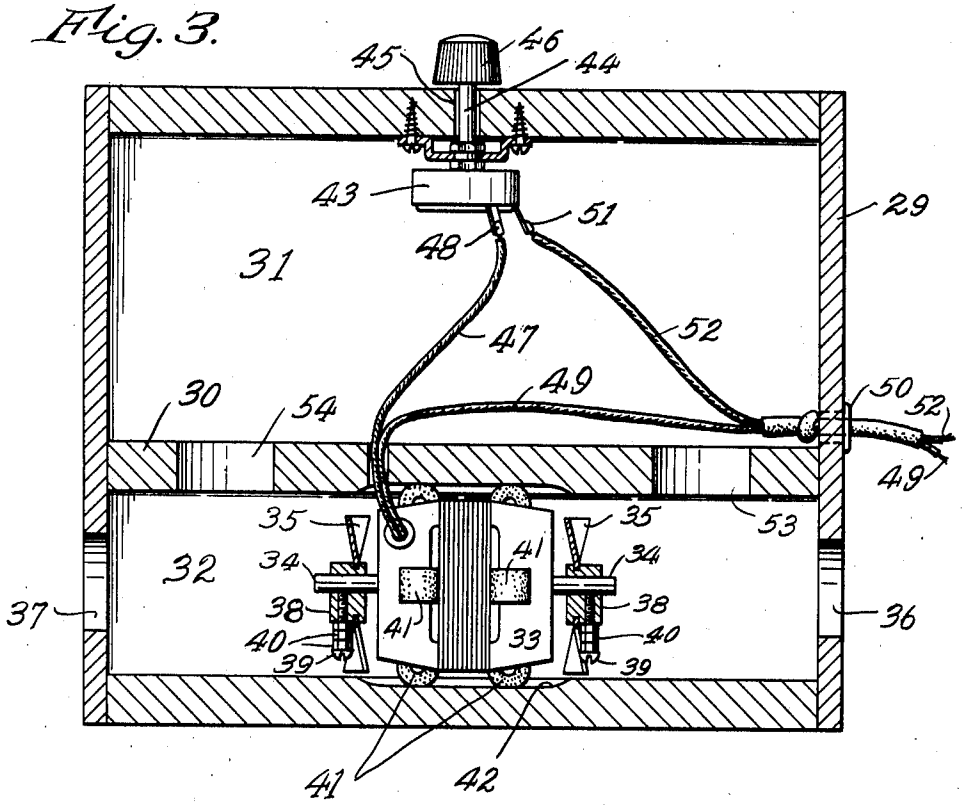
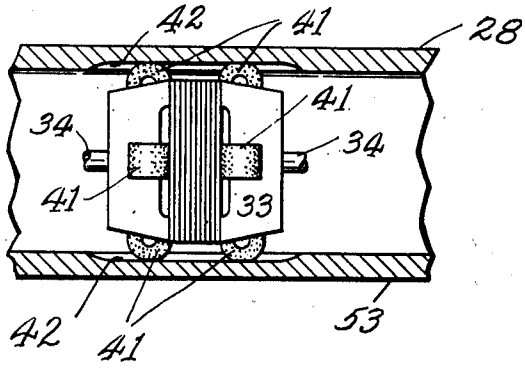


Fig. 4.



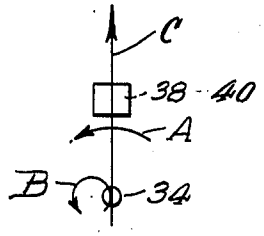


Fig. 5.

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UNITED STATES PATENT OFFICE

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THERAPEUTIC DEVICE

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5 Claims. (Cl. 128—45)

This invention relates to therapeutic devices of the type which may be removably attached to beds, so that a person resting upon the mattress of said bed may receive therapeutic treatments.

Various devices have been provided for imparting therapeutic, gyratory oscillations to a person resting or reposing upon a bed, but such devices have usually embodied a construction which was a permanent part of said bed or which require a special construction of bed or mattress.

An object of this invention is to provide an improved therapeutic device which may be attached to a standard bed frame in a position over a mattress, so that a person may, when reposing on said mattress and abutting said device, receive directly the benefits of said therapeutic device.

Another object of the invention is to provide an improved therapeutic device which may be removably attached to the frame of a bed; which may be adjusted to different distances from the end frame of the bed; which will impart therapeutic, gyratory movements to a person reposing on the mattress and abutting the device; with which a person may press against said device to a considerable extent without displacing said device; which will not cause objectionable or noisy movements of said bed, and which when not in use may be shifted into a compact position against an end frame of the bed, and which will be relatively simple, compact, effective, quiet, efficient and inexpensive.

Other objects and advantages will be apparent from the following description of an embodiment of the invention and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In said drawings:

Fig. 1 is a plan of one end portion of a bed to which a therapeutic device constructed in accordance with this invention has been applied;

Fig. 2 is a side elevation of the same with a portion of the bed frame broken away;

Fig. 3 is a sectional elevation through a housing in which the source of gyratory movement is mounted and showing the mounting between the motor and the housing, the section being taken approximately along the line 3—3 of Fig. 1;

Fig. 4 is a sectional plan through part of the housing, at right angles to the sectional plane of Fig. 3, to show details of the mounting of the motor in the housing; and

Fig. 5 is a diagram illustrating the principle by which the motor creates a gyratory motion in a closed loop path.

Referring first to Figs. 1 and 2, the improved device is shown as applied to a bed having an end post or frame 1 with a plurality of upright bars 2, and a mattress 3 at one side of the end frame. The bed is of any suitable construction, and only that portion thereof has been shown which is necessary in explaining the use of this improved device. A pair of clamping plates 4 and 5 are disposed on opposite sides of a plurality of the bars or upright rods 2, and are clamped thereto by a bolt 6 which passes through the plates and carries a wing nut 7 by which the plates may be drawn together in firmly clamped relation to the upright rods 2. The plates 4 and 5 have facings 8 of rubber or other resilient means to prevent marring of the rods 2 when the plates are clamped thereto.

The plate 4, which is secured against the inside face of the end frame 1, is provided adjacent opposite side edges thereof with angle members 9 and 10 which provide ears extending from the same face of the plate 4. Links 11 and 12 are hinged to the ears 9 and 10 respectively by pins 13. A link 14 is hinged by a pin 15 to the free end of the link 12, and at its other end by a pin 16 to an ear 17 extending from a plate 18. The free end of the link 11 is similarly hinged by a pin 19 to one end of a link 20, and the other end of the link 20 is pivotally connected by a pin 21 to an ear 22 also carried by the plate 18 adjacent the opposite side edge from the ear 17. The pin 19 is a bolt with a wing nut 23, so that the links 11 and 20 may be frictionally clamped together by tightening the wing nut 23 when relative movement of the links is not desired. A tie link 24 hinged at one end upon the pin 15 that connects the links 12 and 14, is provided with an elongated slot 25 through which the shank of the bolt 19 extends. A washer 26 beneath the wing nut 23 engages against the face of the tie link 24.

By tightening the wing nut 23, the link 24 is tightly clamped to the links 11 and 20, which unites the links 11, 12, 14 and 20 and plates 4 and 18, as a rigid frame. By loosening the nut 23, the plate 18 may be moved toward or from the plate 4 over a considerable range, so that the plate 18 may be positioned at any of a plurality of different distances from the end frame of the bed and above the mattress 3. The plate 18 may be secured in any of such positions by a tightening of the nut 23. The plate 18 is parallel to the plate 4, and in a plane normal to the upper surface of the mattress 3.

Cemented or otherwise secured to the outer face of plate 18 is an interponent mass or body

27 of soft, resilient material, preferably sponge rubber, and cemented or otherwise secured against the exposed face of this body 27 is an outside face 28 of the housing 29, so that the housing is secured to the plate 18 solely through the resilient body 27. There is no other connecting means between the housing and the plate 18, and this mass 27 of soft, resilient material, such as sponge rubber, need not be continuous over the entire face of the plate 18, but may, for example, be a band of this material extending around the periphery of the plate 18. While the mass 27 could extend over the entire face of the plate 18, this is unnecessary, since a marginal band only of this material will anchor the housing to the plate 18 adequately. If the sponge rubber is employed, for example, the marginal band may advantageously be from one-half to one inch in thickness, and two or more inches in width from the marginal edge.

The housing 29 may be a box formed of any suitable material, such as wood, metal or plastic material, and its interior is divided by a partition 30, see Fig. 3, into two chambers 31 and 32. This partition 30 is horizontal and generally parallel to the upper surface of the mattress 3 and normal to the plane of a face of the plate 18. Within the chamber or compartment 32 or the housing 29 is a motor 33 or other device for causing gyratory movements of small amplitude and high frequency of the housing. A small, standard electric motor is very suitable for this purpose, and it has an armature shaft or rotor 34 extending from both ends of the housing of the motor, horizontally and parallel to the upper face of the mattress 3. Each end of the shaft 34 carries a fan 35, and both fans cause movement of air in the same direction in the chamber 32. The end walls of the housing are provided with apertures 36 and 37 by which air may be moved through the housing from end to end under the propelling action of the fans 35.

The shaft 34 of the motor is provided with an axial unbalance on one side only thereof, so that as the shaft rotates, this unbalance will form a centrifugal force tending to pull the motor shaft in a closed loop, gyratory path with an amplitude depending upon the extent of the unbalance. In this particular example, the blades of the fan are mounted in blocks 38 which are eccentric to the shaft 34 and secured thereon by screws 39. The screws also carry weights 40 which give added unbalance to the blocks 38 and increase the axial unbalance of the rotor to the desired extent. The frame of the motor, of course, has openings at its ends and around its periphery through which air may pass in order to remove heat formed during the operation of the motor. Also arranged around the periphery of the frame of the motor are a plurality of cushions or resilient elements 41, there being preferably two of such cushions on each side of the motor frame, and engaging the adjacent wall of the chamber 32.

These cushions or elements 41 are of soft, resilient material, such as sponge or gum rubber, and I have found that soft, gum rubber tubing is very suitable for this purpose. Such tubing may be cut into short lengths and the lengths split in halves. The flat faces at the splits abut against the faces of the motor frame, with the convex surfaces of the tube sections abutting against the walls of the chamber 32. The walls 32 may have recesses or grooves 42 which receive the convex surfaces of cushions or elements 41. The distance between opposite walls of the chamber 32 is such that when the motor is placed in the chamber, the cushions or elements 41 will be under substantial compression, and because they are cemented or secured to the motor, will, through their engagement with the grooves 42, limit displacement of the motor in the chamber 32.

The cushions or elements serve as the sole support between the motor and the walls of the chamber 32, and are, in effect, a floating support for the motor. The motor is, of course, of less lateral dimensions than the distance between the opposite walls of the chamber 32, so that there will be no direct contact between the motor and any part of the housing 29.

Disposed within the chamber 31 of the housing 29 is a rheostat 43 with an operating stem or shaft 44 extending outwardly through an aperture 45 in the housing and carrying at its outer end an operating button 46. One of the lead wires 47 from the motor 33 is connected to one terminal 48 of the rheostat 43, and the other lead wire 49 of the motor extends outwardly through a tubular bushing 50 provided in an end wall of the housing 29. The other terminal 51 of the rheostat 43 is connected to a wire 52 which also extends exteriorly of the housing 29 through bushing 53. By connecting the wires 49 and 52 to a source of current, the motor 33 will be operated at a speed dependent upon the adjustment of the rheostat 43 through manipulation of the button 46. The partition 30 may have spaced apertures 53 and 54 therein, so that some of the air entering the chamber 32 may also pass through chamber 31 and remove any excess heat from the rheostat 43.

Referring now to the diagram of Fig. 5, the nature of the movement of the axially unbalanced motor shaft will be briefly explained. The unbalance of the shaft is shown by the weight reference characters 38—40, and when such weight is rotated with the shaft in the direction of the arrow A through operation of the motor 33, centrifugal forces will be created which are represented by the arrow C. The centrifugal forces tend to pull the shaft 34 in a closed circular path represented by the arrow B, which has a center of curvature that is eccentric to the axis of the shaft 34. This unbalance of weight 38—40 therefore tends to move or drag the motor bodily as a unit in a circular, gyratory, closed loop movement having an amplitude or path of movement depending upon the amount of unbalance and speed of rotation.

Since the motor is spaced from the walls of the chamber 32, this centrifugal force tending to drag the motor in this closed loop path is resisted approximately evenly in all directions by the cushions or elements 41, and it has been found that under such circumstances the bearings of the motor will not disintegrate, due to the unbalance. This movement of the motor, however, acts through the cushions or elements 41 upon the housing 29 and tends to cause similar gyratory movements thereof. Since the housing 29 is supported entirely or largely through the sponge rubber mass 27 on plate 18, the housing 29 may move in this gyratory closed path. While some of this movement of the housing 29 may be transmitted through the mass 27 to plate 18 and thence to the end frame 1 of the bed, the transmission to the end frame 1 will not be enough to cause objectionable noise or vibration of the frame of the bed. Such movement as is transmitted to the bed frame will be imparted to the

mattress 3 and through it to a person reposing thereon.

In the use of a device of this type, and with the device assembled in the manner shown in Figs. 1 and 2, the motor is placed in operation and a person then reposes upon the mattress 3 of the bed in contact with the exposed face 53 of the housing 29. For example, one may lie or sit on the bed with the bottoms of the feet resting against the upright face 53 of the housing 29, and then this gyratory movement of the housing 29 will be imparted to the bottoms of the feet. The result is something like a massage movement that tends to increase the circulation of the blood through the feet, relax the muscles of the feet and legs, and generally improve the health and condition of the person undergoing the treatment. The housing 29 may be adjusted back and forth toward and from the end frame of the bed so as to be most convenient for persons of different heights, or in different positions on the mattress.

In place of this manner of treatment of the feet, one may sit upon the mattress with his back abutting against the upright face 53 of the housing 29, and in such a case, the therapeutic action of the housing through its contact with the back of the patient will create an improved circulation of the blood in the back, will tend to relax the back muscles, and will generally improve the comfort and health of the patient. There are various other ways in which the device may be used advantageously, but the two examples given illustrate some of the uses to which it can be put. It will be understood that while the gyratory movements of the housing will be transmitted directly to the body of the patient by contact of the patient with the housing, some of these gyrations or movements of the housing may also be transmitted through the frame of the bed to the mattress, and thus to a much lesser extent to the entire body of the patient reposing on the mattress.

It will be understood that various changes in the details, materials and arrangement of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

I claim as my invention:

1. A therapeutic device for attachment to the frame of a bed which comprises a housing having a wall along one side thereof, a rigid plate disposed in parallel spaced relation to said wall, soft resilient means disposed between said plate and wall and connecting the same, a clamp for engagement with the end frame of a bed, means connecting said plate and clamping means for securing said housing to the end frame of the bed, said connecting means being adjustable to position and hold said housing at different distances from said end frame, an axially unbalanced motor within said housing, and resilient means disposed between said motor and housing, said motor being disposed within said housing for rotation about a horizontal axis.

2. A therapeutic device for attachment to a bed having an upstanding end frame and a mattress at one side of said end frame, a housing, a clamp for removable attachment to the end frame of said bed above said mattress, a plate, means connecting said plate to said clamping means and adjustable to position and hold said plate in an upright position at different distances from said end frame, soft, resilient means connecting said housing to said plate and forming the sole connection between them, an axially unbalanced motor disposed within said housing for rotation about a horizontal axis, and resilient means disposed between said motor and housing and forming the sole attachment between said motor and housing, whereby when a person reposes on said mattress with some part of the body against said housing, the gyratory movements of the housing will be transmitted to said person.

3. A therapeutic device for attachment to a bed having an upstanding end frame and a mattress at one side of said frame comprising clamping means removably engaging the end frame of said bed above said mattress, a plate, linkage connecting said plate with said clamping means and adjustable to position said plate at a plurality of different distances from said end frame, a housing, a body of soft, resilient material interposed between said plate and housing and forming the sole connection between the same, an electric motor disposed within said housing and having an armature shaft rotatable about a horizontal axis, said armature shaft having weights similarly placed on the same side of the shaft and creating an axial unbalance thereon, for causing the motor to move in a gyratory, closed loop path when said armature rotates, and soft, resilient means disposed between said motor and said housing on a plurality of different sides thereof so as to resist the movement of said motor in all directions in said gyratory path, whereby when a person reposes on said mattress, with some part of his body abutting said housing, the gyratory movements of the housing will be transmitted to said person by direct contact with said person, and to a lesser extent through said bed frame and mattress.

4. A therapeutic device for attachment to a bed having an upstanding end frame and a mattress at one side of said frame and comprising a housing, a support, a body of sponge rubber between and connecting said housing and support and constituting the sole connection between them, means attached to said support, adjustable in length, and at its free end formed for attachment to the end frame of said bed so as to position said housing at any of different distances from said end frame above said mattress, an axially unbalanced motor within said housing and floatingly mounted therein, with soft, resilient means forming the sole interponent between said motor and said housing, whereby the operation of said motor will by said axial unbalance, cause gyratory movement of said motor in a closed loop path within said housing and impart to said housing similar movements, so that when a person reposes on said mattress with some part of the body abutting the housing the gyratory movements of the housing will be transmitted to said person by direct contact and to a minor extent by said frame and mattress.

5. A therapeutic device for attachment to a bed having an upstanding end frame and a mattress at one side of said frame comprising a housing, a support spaced from one wall of and exteriorly of said housing, soft, resilient means interposed between said support and said housing and forming the sole connection between them, links hinged to said support, means for attachment to the end frame of said bed, links hinged to said last mentioned means, each of said links hinged to said support being hinged at its free end to the free end of the adjacent links on said

means for attachment to said end frame, whereby by the swinging of said links, said support may be positioned at different distances from said end frame above said mattress and said support will move through parallel positions in its movements toward and from said end frame, a tie link pivoted to the connection between one pair of connected links and having a slot through which the pivot of the other pair of connected links extends, and means cooperating with the slotted ends of said tie link for preventing relative movements of said tie link and said other pair of connected links, and thus preventing movement of said support, and a motor within said housing and having an axially unbalanced rotor rotatable about a horizontal axis parallel to the wall of said housing which is attached to said support, and soft, resilient means interposed between said motor and said housing, forming the sole and a floating support therebetween, whereby rotation of said rotor will impart to said housing gyratory movements of small amplitude in a closed loop path, and any person resting on said mattress and abutting said housing will receive gyratory movements of the housing directly through contact with said housing.

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