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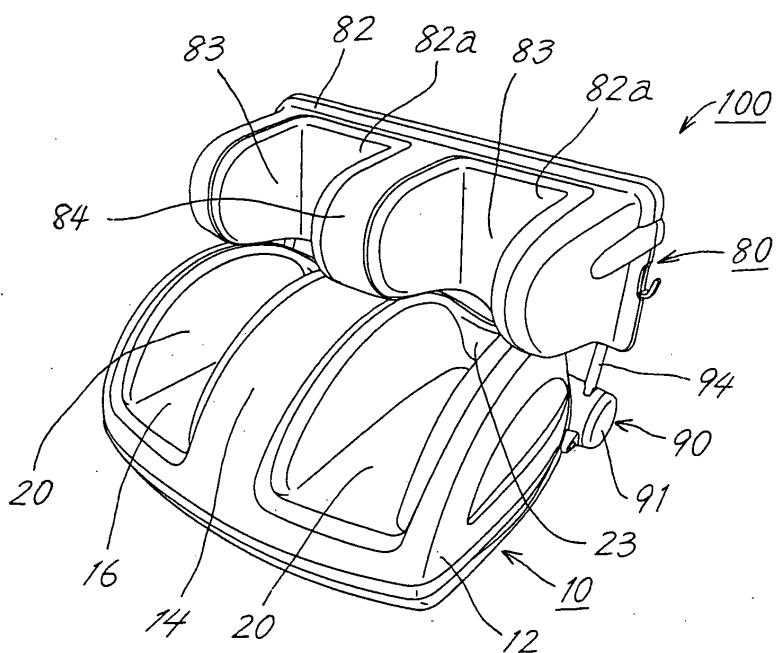
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(54) Leg massage unit

(57) A leg massage unit is provided which comprises a calf massage unit made tilttable and/or upwardly or downwardly slidable and which is thereby adapted to give an improved massage effect to the user. The leg massage unit comprises a foot massage unit (10) for massaging the feet of the user, and a calf massage unit (80) tiltably coupled to the base end of the foot massage

unit (10) by a connecting mechanism (90) and adapted to massage the calves of the user. The connecting mechanism (90) exerts torque acting to move the calf massage unit (80) toward an upright position relative to the foot massage unit (10). The connecting mechanism (90) also couples the calf massage unit (80) to the foot massage unit (10) upwardly or downwardly slidably relative to the unit (10).

F I G. 1



Description**TECHNICAL FIELD**

[0001] The present invention relates to leg massage units adapted to massage the feet and calves of the user.

BACKGROUND ART

[0002] Leg massage units are available which comprise a foot massage unit for the user to insert his or her feet thereinto for massaging the feet and a calf massage unit for inserting the calves thereinto for giving a massage to the calves so that the parts of the legs below the knees can be massaged (see, for example, the publication of JP-A No. 2002-238963).

[0003] The calf massage unit is fixed to the foot massage unit and can not therefore be positioned at varying angles or at varying levels as desired by the user. Accordingly the legs assuming an unnatural posture are likely to become tired during massaging, or a massage can not be given to the desired affected part to result in a lower massage effect.

DISCLOSURE OF THE INVENTION

[0004] An object of the present invention is to provide a leg massage unit comprising a calf massage unit which is made tilttable and/or slidable upward or downward so as to give an enhanced massage effect to the user.

[0005] To fulfill the above object, the present invention provides a leg massage unit comprising a foot massage unit for massaging the feet of the user, and a calf massage unit tiltably coupled to a base end of the foot massage unit by a connecting mechanism and adapted to massage the calves of the user. The connecting mechanism exerts torque acting to move the calf massage unit toward an upright position relative to the foot massage unit.

[0006] The calf massage unit is made tilttable relative to the foot massage unit, and the connecting mechanism couples the calf massage unit to the foot massage unit so as to exert torque acting to move the calf massage unit toward an upright position relative to the foot massage unit. Accordingly when the calf is moved, the calf massage unit follows the movement of the calf and tilts rearward. Since the calf massage unit is always held in intimate contact with the calf by the torque acting to move the calf massage unit toward an upright position, an enhanced calf massage effect is available.

[0007] The calf massage unit is positioned at a variable angle with the foot massage unit, so that the leg is unlikely to become tired during massaging.

[0008] For example when the user desires to have a massage while lying on the floor, the calf massage unit can be tilted rearward through a large angle merely by

lying on the floor with his or her legs placed into the calf massage unit without manipulating the unit in any way.

[0009] Preferably, the calf massage unit is upwardly or downwardly slidably connected to the foot massage unit by the connecting mechanism. The calf massage unit can then be positioned at the level of the calf of the user or a level desirable for the affected part to be massaged for the massage unit to give an effective massage.

10 BRIEF DESCRIPTION OF THE DRAWINGS**[0010]**

15 FIG. 1 is a perspective view of a leg massage unit of the invention.

FIG. 2 is a front view of the leg massage unit of the invention.

20 FIG. 3 is a side elevation of the leg massage unit of the invention.

FIG. 4 is a rear view of the leg massage unit of the invention.

25 FIG. 5 is a side elevation showing the leg massage unit in use.

FIG. 6 is aside elevation showing the leg massage unit in use.

30 FIG. 7 is a plan view of a foot massage unit.

FIG. 8 is a view in section taken along the line X1-X1 in FIG. 7.

35 FIG. 9 is a view in section taken along the line X2-X2 in FIG. 7.

FIG. 10 is a view in section taken along the line Y-Y in FIG. 7.

40 FIG. 11 is a front view partly in section and showing a calf massage unit.

FIG. 12 is a view in section taken along the line X-X in FIG. 11.

FIG. 13 is a view in section taken along the line Y-Y in FIG. 11.

45 FIG. 14 is a view showing on an enlarged scale the portion of FIG. 13 surrounded by a two-dot chain line.

FIG. 15 is an enlarged sectional view of a tilting portion.

50 FIG. 16 includes views in section taken along the line Y-Y in FIG. 15.

FIG. 17 is a front view of hose connectors of the calf massage unit.

FIG. 18 is a side elevation of the hose connector of the calf massage unit.

55 FIG. 19 is a front view showing hose connectors, according to a different embodiment, of the calf massage unit.

BEST MODE OF CARRYING OUT THE INVENTION

[0011] A description will be given with reference to a leg massage unit 100 which is adapted to give a mas-

sage to the feet and calves of the user.

[0012] FIG. 1 is a perspective view of the leg massage unit 100 of the invention, FIG. 2 is a front view of the same, FIG. 3 is a side elevation of the same, FIG. 4 is a rear view of the same, and FIGS. 5 and 6 are side elevations showing the massage unit 100 in use.

[0013] The leg massage unit 100 comprises a foot massage unit 10 for massaging the feet of the user, more specifically the parts of the legs below the ankles, and a calf massage unit 80 coupled to the base end of the foot massage unit 10 by a connecting mechanism 90 tiltably and slidably for massaging the calves of the user.

[0014] The foot massage unit 10, the calf massage unit 80 and the connecting mechanism 90 for the two units 10, 80 will be described below in this order.

[Foot Massage Unit 10]

[0015] With reference to FIG. 1, the foot massage unit 10 has a cover 12 made of a resin and having a pair of left and right recessed footrests 20, 20 each generally U-shaped in cross section for the user to insert his or her feet (the terminal ends of the legs below the ankles) thereinto. A center wall 14 is formed as a partition to provide the recessed footrests 20, 20 on opposite sides thereof as shown in FIGS. 1 and 2. The inner surface of the resin cover 12 providing the footrests 20 is covered with a cloth cover 16.

[0016] The connecting mechanism 90 for tiltably supporting the calf massage unit 80 to be described later has a tilting portion 91 (to be described later) provided on each of opposite side walls of the rear end of the resin cover 12.

[0017] FIG. 7 is a plan view showing the foot massage unit 10 with the cloth cover 16 removed, FIG. 8 is a view in section taken along the line X1-X1 in FIG. 7, FIG. 9 is a view in section taken along the line X2-X2 in FIG. 7, and FIG. 10 is a view in section taken along the line Y-Y in FIG. 7.

[0018] The opposite side walls of each recessed footrest 20 are provided with respective side air bags 21, 21, which are covered with the cloth cover 16 over the inner side surfaces thereof. The side air bags 21, 21 are held in communication by a connecting hose 65, which is connected by air supply hoses 64 to a solenoid valve 62 and a pump 60. The side air bags 21 are made by blow molding and have front and rear expansion portions 21a, 21b resembling pleats. Alternatively, the air bags can be made from a nylon fabric laminated with a urethane sheet.

[0019] With reference to FIGS. 7 and 8, the connecting hose 65 is disposed in a cavity 65a formed not on the heel side of the footrest 20 but in the front portion of the bottom wall of each footrest 20 (at a position where the hose will remain out of contact with the foot of common size and which is outside the range of movement of the acupressure rod 32 to be described later), and is

positioned so close to the heater 50 to be described later as to be subjected to heat exchange therewith through the bottom wall of the footrest 20. With the connecting hose 65 thus positioned, the compressed air to be supplied to the side air bags 21 through the hose 65 can be heated to ensure an improved thermotherapeutic effect. Further this arrangement makes it possible to heat the compressed air without reducing the thermotherapeutic effect on the soles of the user. On the other hand, if the connecting hose 65 is allowed to extend through a portion to be in contact with the sole or heel, the heat from the heater 50 will be blocked by the hose 65 and encounters difficulty in being transferred to the sole to result in an impaired thermotherapeutic effect. Accordingly, the arrangement described above is desirable.

[0020] Although the side air bag 21 is provided on each of opposite side walls of the recessed footrest 20 as illustrated, one of the side bags can be made from an elastic member, for example, of sponge, urethane or

like material having elasticity.

[0021] The bottom wall of the footrest 20 is so slanted that the front end thereof is at a high level with the rear end thereof positioned at a low level as shown in FIG. 8. This slope assures the foot of stability when the user places his or her foot into the recessed footrest 20. The footrest 20 is provided at its rear end with an upstanding wall 23 extending upward so as to prevent the foot from slipping off the footrest 20. The upstanding wall 23 is recessed toward the rear at the heel portion in conformity with the shape of the heel. Preferably, the upstanding wall 23 is 20 to 50 mm in height.

[0022] With reference to FIGS. 7, 8 and 10, the bottom wall of each recessed footrest 20 is provided with massage means 30 for massaging the sole of the user. The massage means 30 comprises, for example, means provided with illustrated acupressure rods 32, 32. The acupressure rods 32, 32 have their upper ends projecting upward through respective two slots 25, 25 formed in the bottom wall of the footrest 20. The slots 25, 25 extend longitudinally of the footrest 20. Ribs 26 projecting downward are formed along the inner peripheries of slots 25.

[0023] The heater 50 is attached to the rear side of the bottom wall of the footrest 20. The heater 50 comprises, for example, a heater wire enclosed with aluminum foil. As shown in FIGS. 7 and 10, the heater 50 can be disposed around the slots 25, 25. When the slot 25 is provided with the rib 26, the heater 50 will not be exposed directly to water or the like even if the user spills such a liquid over the foot massage unit 10 in error. The rib 26 provided for the slot 25 therefore serves to protect the heater 50 from water.

[0024] The massage means 30 is provided on the rear side of the bottom wall of the footrest 20 with the two acupressure rods 32, 32 made projectable from inside a case 36 as shown in FIGS. 8 and 10. Disposed inside the case 36 is a rectangular plate 33 provided with the two acupressure rods 32, 32 having a circular cross sec-

tion and extending upward therefrom. The plate 33 is placed on a bottom air bag 34 positioned in a lower portion of the case 36. The case 36 has an upper opening, which is closed with the mount plate 40 to be described below. The acupressure rods 32 extend upward through holes 42 formed in the mount plate 40. A spring 35 is provided between the mount plate 40 and the upper surface of the plate 33 for biasing the plate 33 downward. With the bottom air bag 34 contracted, the plate 33 is pushed downward to minimize the amount of projection of the acupressure rods 32, 32.

[0025] The bottom air bag 34 can be made, for example, from a nylon fabric laminated with a urethane sheet. As shown in FIG. 9, the bottom air bag 34 is connected by the air supply hose 64 to the solenoid valve 62 and the pump 60 which are arranged inside the foot massage unit 10. When compressed air is supplied from the pump 60 by actuating the solenoid valve 62, the bottom air bag 34 is inflated, moving the acupressure rods 32 upward. When the air is removed from the bag 34, the rods 32 are moved down by the force of the spring 35.

[0026] With reference to FIG. 10, the bottom wall of the resin cover 12 is raised upward at portions close to the left and right ends to form rail portions 28, 28 for slidably supporting the massage means 30. The rail portions 28 have their front parts positioned at a high level and their rear parts at a low level in conformity with the slope of the bottom walls of the recessed footrests 20.

[0027] As seen in FIG. 10, the mount plate 40 is made of a metal plate elongated in the left-right direction and is provided at opposite ends thereof with respective guides 41, 41 fitting to and slidable on the rail portions 28, 28. The cases 36, 36 for the left and right massage means 30 are fastened with screws to the mount plate 40, and the holes 42, 42 for the acupressure rods 32, 32 to project therethrough are formed in the mount plate 40. A feed nut 43 is secured to the center of the mount plate 40 on the upper surface thereof by a nut fixing member 44. The feed screw 45 to be described later extends through the feed nut 43 in screw-thread engagement therewith. The mount plate 40 is movable forward or rearward on the rail portions 28, 28 by the rotation of the feed screw 45, whereby the massage means 30, 30 mounted on the plate 40 are reciprocatingly movable forward or rearward.

[0028] The feed screw 45 extending forward or rearward for moving the massage means 30 forward or rearward is provided between the recessed footrests 20, 20, i.e., inside the center wall 14 of the resin cover 12 as shown in FIGS. 9 and 10. The feed screw 45 is supported by a frame 46 provided inside the resin cover 12 so as to be slanted in conformity with the slope of the bottom walls of the footrests 20 as shown in FIG. 9. A pulley 45a mounted on the rear end of the screw 45 is coupled to a pulley 47b on a motor 47 by a belt 47a for power transmission. The feed screw 45 is rotated forward or reversely by rotating the motor 47 forward or reversely, moving the nut 43 on the screw 45 to reciprocatingly

move the massage means 30, 30 forward and rearward.

[0029] With reference to FIGS. 3 and 4, a hose connector 85c for an air supply hose 85a for supplying compressed air to air bags of the calf massage unit 80 to be described later is attached to the rear end of the resin cover 12. The hose connector 85c has a connection open end projecting rearward from the resin cover 12 and bent downward. When thus shaped, the connection open end permits the air supply hose 85a to be joined thereto as curved along a large circular arc, with the result that the hose is prevented from flexing, expanding or contracting even if the calf massage unit 80 is tilted or slidably moved.

[0030] FIG. 11 is a front view of the calf massage unit 80 with a cloth cover 82a partly removed to show the unit 80 partly in section, FIG. 12 is a view in section taken along the line X-X in FIG. 11, and FIG. 13 is a view in section taken along the line Y-Y in FIG. 11.

[0031] With reference to FIGS. 1 and 2, the calf massage unit 80 has a pair of left and right leg-rests 83, 83 formed in a resin cover 82 for the user to insert his or her calves thereinto. A center wall 84 is disposed between the leg-rests 83, 83 to provide these portions 83 on opposite sides thereof as shown in FIGS. 1, 11 and 12. The cloth cover 82a covers the inner surface of each leg-rest 83.

[0032] With reference to FIGS. 11 to 13, each leg-rest 83 is provided on opposite side walls thereof with respective side air bags 85, 85, and the inner surfaces of the bags are covered with the cloth cover 82a. The side air bags 85, 85 are connected together by a bellows connecting hose 85f and connected to the common air supply hose 85a. The side air bags 85 are connected to the pump 60 provided for the foot massage unit 10 by the air supply hose 85a through a hose connector 85b (see FIG. 4) extending through the lower end of the resin cover 82, the hose connector 85c (see FIG. 4) provided on the rear wall of the foot massage unit 10 and the solenoid valve 62 (see FIG. 9).

[0033] Although the side air bags 85, 85 are arranged respectively on opposite side walls of the leg-rest 83, one of the side bags can be made from an elastic member, for example, of sponge, urethane or like material having elasticity.

[0034] An air bag 86 is disposed also on the bottom wall of the leg-rest 83. The bottom air bag 86 can be, for example, the one shown in FIG. 13 and provided with an acupressure projection 86a at the portion thereof to be brought into contact with the calf of the user. Like the air bags 85 described above, the bottom air bag 86 is also connected by an air supply hose 86b to the pump 60 for the foot massage unit 10 through hose connectors 86c, 86d and the solenoid valve 62. The acupressure projection 86a can be formed integrally with the bottom air bag 86 or attached to the bag 86 as by adhesion.

[0035] As shown in FIGS. 17 and 18, the hose connectors 85b, 86c extend downward and are bent rearward. Further as shown in FIG. 4, the hose connectors 85b, 86c are arranged preferably as shifted from the position of the hose connectors 85c, 86d on the foot massage unit 10 so as not to be in register therewith with respect to the vertical direction. When the hose connectors are thus arranged, the air supply hoses 85a, 86b interconnecting the hose connectors 85b, 85c and interconnecting the hose connectors 86c, 86d, respectively, can be made less likely to flex even when the calf massage unit 80 is tilted or slidably moved relative to the foot massage unit 10.

[Connecting Mechanism 90]

[0036] The calf massage unit 80 is coupled to the foot massage unit 10 by the connecting mechanism 90.

[0037] With reference to FIGS. 1, 2, etc., the connecting mechanism 90 can be composed of the tilting portions 91 (see FIGS. 15 and 16) provided at opposite sides of the rear end of the resin cover 12 of the foot massage unit 10, tilting rods 94, 94 (see FIGS. 13, 15 and 16) rotatably supported by the tilting portions 91, sliders 99 arranged on the calf massage unit 80 and supporting the upper ends of the respective tilting rods 94 slidably and positionably in place as shown in FIGS. 11 to 14, and a slide rail 97. The calf massage unit 80 is tiltable forward or rearward, slidably upward or downward and positionable in place by the connecting mechanism 90 relative to the foot massage unit 10.

[0038] With reference to FIGS. 2, 7, etc., the tilting portions 91 are arranged at opposite sides of the rear end of the resin cover 12 of the foot massage unit 10. Each tilting portion 91 comprises a generally U-shaped screw mount 93 attached to the resin cover 12 and a center pivot 92 secured to the mount 93 as shown in FIGS. 15 and 16. The tilting rod 94 has a base end forwardly or rearwardly tiltably fitted around the center pivot 92.

[0039] The tilting rod 94 has at its base end a mount plate 95 in the form of a generally elliptical flat plate, and is a metal tube having a circular cross section and extending continuously from the mount plate 95.

[0040] The mount plate 95 of the tilting rod 94 has a hole 95b formed in its center and fitting around the center pivot 92 as shown in FIGS. 13, 15 and 16. The mount plate 95 has formed in its peripheral surface a cutout 95a for an arm of the torsion spring 98 to be described later to fit in.

[0041] The torsion spring 98 is fitted around the center pivot 92. The torsion spring 98 has one arm fitting in the cutout 95a in the mount plate 95 and the other arm fitting in a cutout 93a in the U-shaped screw mount 93 and secured to the center pivot 92. The torsion spring 98 is adapted to bias the tilting rod 94 toward the front.

[0042] The resin cover 12 has a surrounding portion 12b for enclosing the tilting portion 91 therewith. Accord-

ing to the illustrated embodiment, the resin cover 12 has a groove 12a formed therein as shown in FIGS. 4, 7, 15 and 16 for permitting the tilting rod 94 to be tilted from an upwardly extending substantially vertically position 5 rearward through a specified angle, i.e., through about 90 degrees, to a fallen position when the foot massage unit 10 is placed in a horizontal position.

[0043] Because of the above construction, each tilting rod 94 is held in a substantially vertical upright position 10 relative to the foot massage unit 10 by the biasing force of the torsion spring 98 when free from any load. When a rearward load is applied to the tilting rod 94, the calf massage unit 80 tilts rearward along with the tilting rod 94 [see FIGS. 6 and 16(a)]. When relieved of the load, 15 the rod 14 returns the calf massage unit 80 to the vertical position by virtue of the biasing force of the torsion spring 98 [see FIGS. 5 and 16(b)].

[0044] The calf massage unit 80 is fitted to the upper 20 ends of the tilting rods 94, 94 slidably longitudinally of the rods 94 and positionably in place.

[0045] The tilting rods 94, 94 penetrate into the resin 25 cover 82 of the calf massage unit 80 through holes 87, 87 formed in opposite sides of the lower end of the resin cover 82.

[0046] The upper ends of the left and right tilting rods 94, 94 are interconnected by a mount plate 94a, which 30 has mounted thereon the sliders 99, 99 made of resin, positioned inwardly of the respective tilting rods 94, 94 and each having a hard ball 99a biased rearward by a spring 99b. As shown in FIGS. 11 to 14, the resin slider 99 is slidably fitted in the slide rail 97 which is fastened 35 with screws to a thick portion inside the resin cover 82. A plurality of positioning holes 97a, 97a are formed in the slide rail 97, as arranged longitudinally of the rail at equal intervals (see FIG. 14).

[0047] When positioned in register with one of the 40 positioning holes 97a in the slide rail 97, the hard ball 99a fits into the hole 97a by being biased by the spring 99b, preventing the tilting rod 94 and the calf massage unit 80 from moving relative to each other. Further when the user pulls up the unit 80 or pushes down the unit, the ball 99a slips out of the positioning hole 97a against the force of the spring 99b, rendering the massage unit 80 45 movable upward or downward until the ball fits into another lower or upper positioning hole 97a.

[0048] The calf massage unit 80 is coupled to the foot 50 massage unit 10 by the connecting mechanism 90 described, whereby the massage unit 80 is made tiltable relative to the foot massage unit 10 to move upward or downward and to be positioned in place relative to the unit 10.

[0049] When the user as seated in a chair places his or her legs into the leg massage unit 100, the calves bear on the bottom walls of the leg-rests 83 of the calf 55 massage unit 80 in a substantially vertical position relative to the foot massage unit 10 as shown in FIG. 5 and can be given a massage. Further if the user lying on the floor places his or her legs into the leg massage unit 100

with the knees drawn up, the calves force the calf massage unit 80 rearward, allowing the user to be given a massage, with the calf massage unit 80 rearwardly tilted relative to the foot massage unit 10 as shown in FIG. 6. Incidentally, the center of gravity of the foot massage unit 10 is positioned toward the front so that the foot massage unit 10 will not be positioned as raised off the floor even when the calf massage unit 80 is tilted to the rearmost position.

[0050] When inserting the legs into the leg massage unit 100, the user can move the calf massage unit 80 upward or downward in conformity with the position of the calves. Further a massage can be given to a wide range by moving the calf massage unit 80 upward and downward.

[0051] The leg massage unit 100 can be manipulated in any mode by using a control panel (not shown) provided at a suitable location on the massage unit 100 or in the form of a remote control. The massage unit 100 is controlled by control means 18 disposed inside the foot massage unit 10 (see FIGS. 9 and 10).

[Massage Operation]

[0052] The leg massage unit 100 of the construction described above is used by the person to be massaged by placing his or her feet into the recessed footrests 20 and his or her calves into the leg-rests 83.

[0053] The user places the feet into the footrests 20 and presses the heels against the upstanding walls 23. The feet of the user are securely held in the footrests 20 by the upstanding walls 23 and unlikely to move forward or rearward. Further because the calf massage unit 80 is biased into contact with the calves of the user by the springs 98, the calves are securely held to the leg-rests 83.

[0054] In this state, the user can be massaged in various modes by manipulating the control panel (not shown). An example of massage operation will be described below.

[0055] When the power source of the leg massage unit 100 is turned on by manipulating the control panel, the heaters 50 can be energized at the same time. The footrests 20 are heated up before the user places his or her feet into the recessed footrests 20. The footrests 20 are therefore unlikely to feel cold when the feet are inserted into the footrests. The heaters 50 may be so set that the passage of current therethrough will be completed upon lapse of a predetermined period of time (e.g., 15 minutes).

[0056] The user places his or her feet into the footrests 20 with the heaters 50 held in operation. For example when the user desires to warm his or her feet which feel cold before sleeping, the user may place the feet into the footrests with the heaters 50 only energized, whereby the soles of the user are warmed by a thermotherapeutic effect to result in improved circulation of the blood.

[Massage by Foot Massage Unit 10]

[0057] Foot massages include, for example, an acupressure massage by the acupressure rods 32 of the 5 massage means 30, a pressing massage by pressing the side parts of the feet from the end of each foot to the ankle with the side air bags 21, and a massage comprising the combination of these two modes of massages.

[0058] The pressing massage can be given by inflating and contracting the bottom air bag 34 and causing the acupressure rods 32 to project from and retract into the bottom wall of the recessed footrest 20. A highly effective acupressure massage can be given to the sole, 15 especially to the arch and the base parts of the toes, by causing the acupressure rods 32 to project and retract, and moving the rods 32 to a desired position or reciprocatingly moving the rods 32 (by applying a rolling massage) in combination with this movement of the rods 32.

[0059] By warming the foot of the user with the heater 50 during the acupressure massage, a thermotherapeutic effect and an acupressure therapeutic effect can be produced to give an enhanced therapeutic effect.

[0060] The bottom air bag 34 can be inflated and contracted by closing and opening the solenoid valve 62 and driving the pump 60. The acupressure rods 32 are movable forward and rearward by driving the motor 47.

[0061] The control panel may be provided with buttons for selecting different foot sizes for different users. 30 This enables the user to select his or her foot size to determine the range of movement of the acupressure rods 32 in accordance with the foot size for control when applying an acupressure massage to the arch or the base parts of the toes. Indicated at 29 in FIG. 7 are examples of contours of feet of users.

[0062] Since the acupressure massage pushes up the sole with the acupressure rods 32, the user's foot will be raised off the footrest 20. In giving the acupressure massage, therefore, it is desirable to inflate the side 40 air bags 21 to hold the foot between the side air bags 21, 21 and thereby prevent the foot from becoming raised.

[0063] The pressing massage is given by inflating and contracting the side air bags 21 and thereby holding the 45 side parts of the foot from the end thereof to the ankle between the side air bags 21, 21 to press the foot. The side air bags 21 can be inflated and contracted by closing and opening the solenoid valve 62 and driving the pump 60.

[0064] The connecting hose 65 for supplying compressed air to the side air bags 21 is in contact with the heater 50 and therefore heats the compressed air to be supplied, whereby warm air can be supplied to the side air bags 21. This gives a thermotherapeutic effect also 55 to the parts of the foot from the end thereof to the ankle in addition to the thermotherapeutic effect given to the sole by the heater 50.

[0065] The pressing massage produces the thermo-

therapeutic effect and a pressure therapeutic effect to thereby give an enhanced therapeutic effect.

[0065] When the acupressure massage and the pressing massage are to be given in combination for massaging, the above movements may be performed at the same time.

[Massage by Calf Massage Unit 80]

[0066] The calf can be massaged by an acupressure massage with the projection 86a of the bottom air bag 86, and a pressing massage with the side air bags 85, 85.

[0067] The acupressure massage can be given by inflating and contracting the bottom air bag 86 and pressing the projection 86a against the calf. The bottom air bag 86 can be inflated and contracted by closing and opening the solenoid valve 62 and driving the pump 60. A highly effective acupressure massage can be given by holding the side air bag 85, 85 inflated at this time since the user's calf is then unlikely to be pushed out of the leg-rest 83. The calf massage unit 80 is biased forward, i.e., toward the calf, by the spring 98, so that even if the calf is pushed forward by the projection 86a, the unit 80 follows this movement in intimate contact with the calf, consequently eliminating the likelihood that the foot massage unit 10 will be raised off the floor by the reaction exerted by the calf.

[0068] The pressing massage is given by inflating and contracting the side air bags 85, 85 and thereby holding the calf between the side air bags 85, 85 to press the calf. The side air bags 85 can be inflated and contracted by closing and opening the solenoid valve 62 and driving the pump 60. The pressing massage given to the calf results in improved circulation of the blood.

[0069] When the acupressure massage and the pressing massage are given in combination for massaging, the above operations are performed at the same time.

[0070] The massage by the foot massage unit 10 and the massage by the calf massage unit 80 may of course be given in combination.

[0071] For example, the acupressure massage, pressing massage and rolling massage by the foot massage unit 10, and the acupressure massage and pressing massage by the calf massage unit 80 can be given according to a suitably determined program.

[0072] In applying the rolling massage by the foot massage unit 10, smoothly varying acupresses are available by inflating the bottom air bag 34 with the start of movement of the acupressure rods 32 to cause the rods 32 to project progressively, that is, by causing the acupressure rods 32 to gradually project during the movement to obliquely press the sole, continuing the movement after the rods are held projected to a constant amount, and starting to conversely discharge the air from the bottom air bag 34 upon the rods almost reaching the position of completing the movement to progres-

sively retract the rods 32. The oblique pressing movement also gives an acupressure massage resembling kneading, providing a comfortable rolling massage. The same effect is available also by the return movement of the acupressure rods 32.

[0073] Preferably, the leg massage unit is so set as to automatically complete such various modes of massage upon lapse of a predetermined period of time.

[0074] The massage means 30 are not limited to those of the above embodiment but may comprise air bags only or means of the vibration type.

[0075] Alternatively, the leg massage unit 100 may be disposed at a low level in front of a chair for the user to sit in to provide a massage machine of the chair type.

[0076] When required, a various massage means can be provided at a backrest, a seat portion or the like of the chair.

[0077] FIG. 19 shows hose connectors 85b, 86c according to a different embodiment. The resin cover 82 has a recessed portion 82b, in which hose connectors 85b, 86c facing downward are arranged for joining thereto the air supply hoses 85a, 86b. The recessed portion 82b thus provided serves to render the air supply hoses 85a, 86b joined to the hose connectors 85b, 86c less likely to flex.

[0078] The leg massage unit of the invention comprises a calf massage unit made tiltable and/or upwardly or downwardly slidable, and is therefore useful for giving an enhanced massage effect to the user.

[0079] Apparently, the present invention can be altered or modified by one skilled in the art without departing from the spirit of the invention. Such modification is included within the scope of the invention as set forth in the appended claims.

Claims

1. A leg massage unit comprising a foot massage unit (10) for massaging the feet of the user, and a calf massage unit (80) tiltably coupled to a base end of the foot massage unit (10) by a connecting mechanism (90) and adapted to massage the calves of the user,

the leg massage unit being characterized in that the connecting mechanism (90) exerts torque

acting to move the calf massage unit (80) toward an upright position relative to the foot massage unit (10).

2. The leg massage unit according to claim 1 wherein the connecting mechanism (90) causes a spring (98) to bias the calf massage unit (80) toward the upright position relative to the foot massage unit (10). 5

3. The leg massage unit according to claim 1 or 2 wherein the connecting mechanism (90) couples the calf massage unit (80) to the foot massage unit (10) upwardly or downwardly slidably relative to the foot massage unit (10). 10 15

4. The leg massage unit according to any one of claims 1 to 3 wherein the connecting mechanism (90) is so disposed as to couple the calf massage unit (80) to left and right opposite sides of the foot massage unit (10). 20

5. The leg massage unit according to any one of claims 1 to 4 wherein the calf massage unit (80) comprises air bags (85), (86) for massaging the calf of the user, and the foot massage unit (10) comprises a pump (60) for supplying compressed air to the air bags (85), (86), air supply hoses (85a), (86b) connecting the air bags (85), (86) to the pump (60) being provided at a position different from the position of the connecting mechanism (90). 25 30

6. A leg massage unit comprising a foot massage unit (10) for massaging the feet of the user, and a calf massage unit (80) coupled to a base end of the foot massage unit (10) by a connecting mechanism (90) and adapted to massage the calves of the user, the leg massage unit being **characterized in that** the connecting mechanism (90) couples the calf massage unit (80) to the foot massage unit (10) upwardly or downwardly slidably relative to the foot massage unit (10). 35 40

7. The leg massage unit according to claim 6 wherein the connecting mechanism (90) is so disposed as to couple the calf massage unit (80) to left and right opposite sides of the foot massage unit (10). 45

8. The leg massage unit according to claims 6 or 7 wherein the calf massage unit (80) comprises air bags (85), (86) for massaging the calf of the user, and the foot massage unit (10) comprises a pump (60) for supplying compressed air to the air bags (85), (86), air supply hoses (85a), (86b) connecting the air bags (85), (86) to the pump (60) being provided at a position different from the position of the connecting mechanism (90). 50 55

9. A massage machine of the chair type **characterized in that** a leg massage unit (100) according to any one of claims 1 to 8 is disposed at a low level in front of a chair for the user to sit in.

FIG. 1

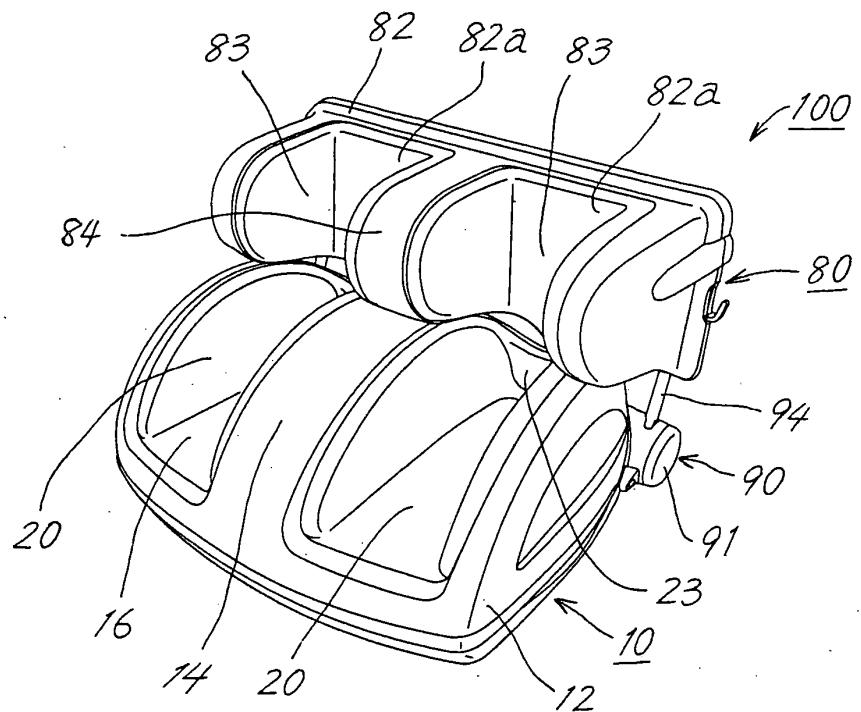


FIG. 2

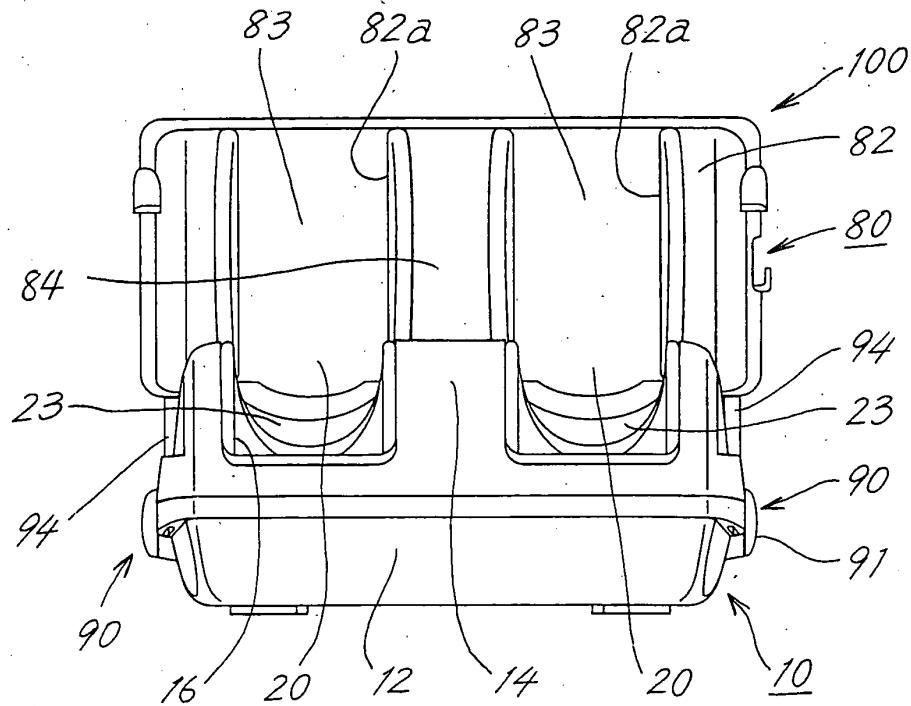


FIG. 3

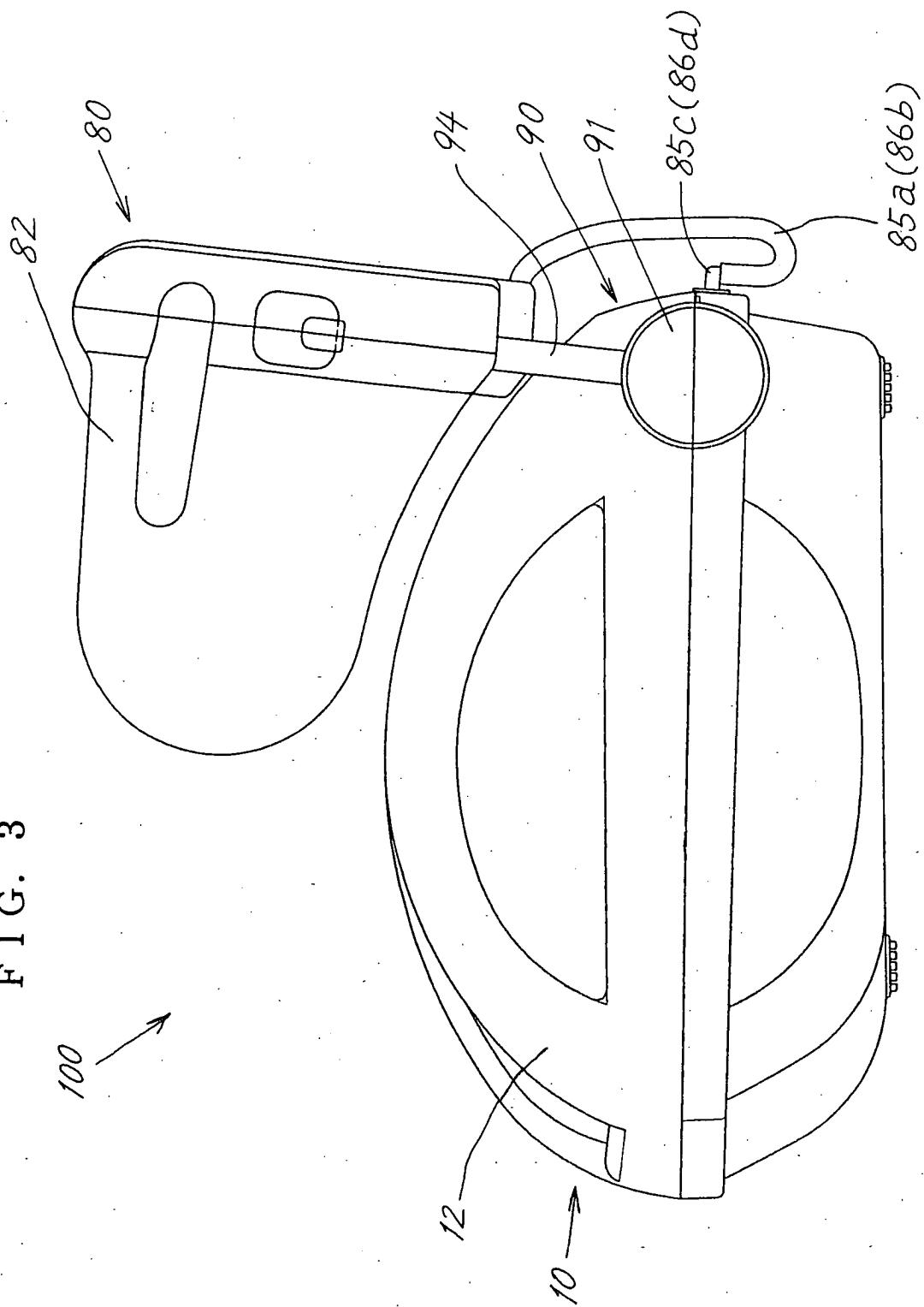
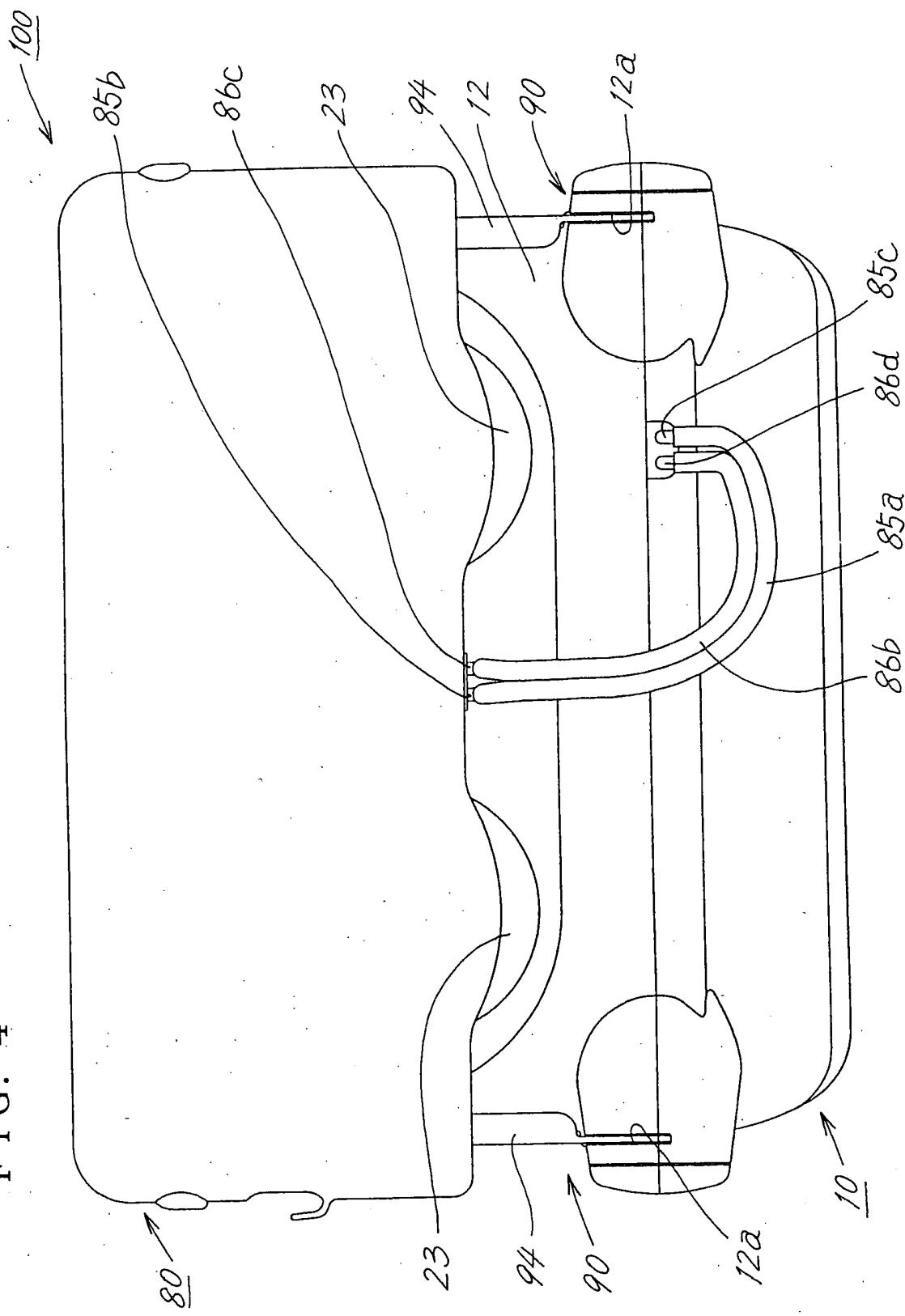
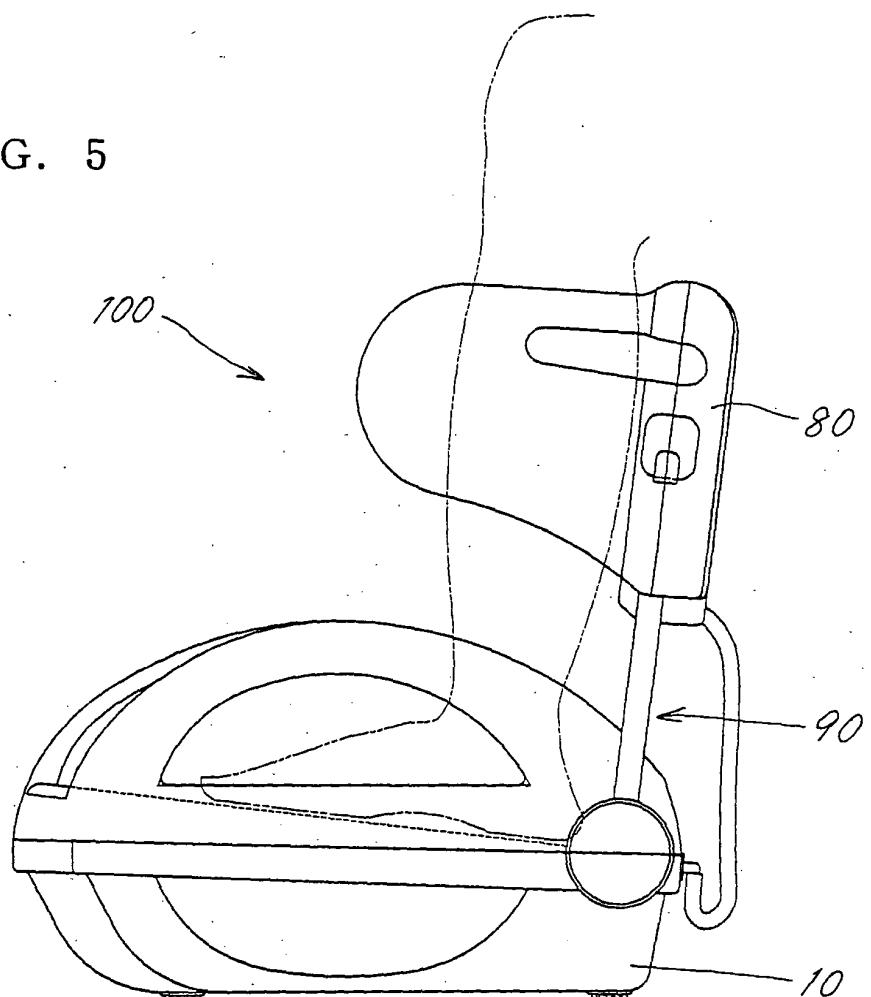


FIG. 4



F I G. 5



F I G. 6

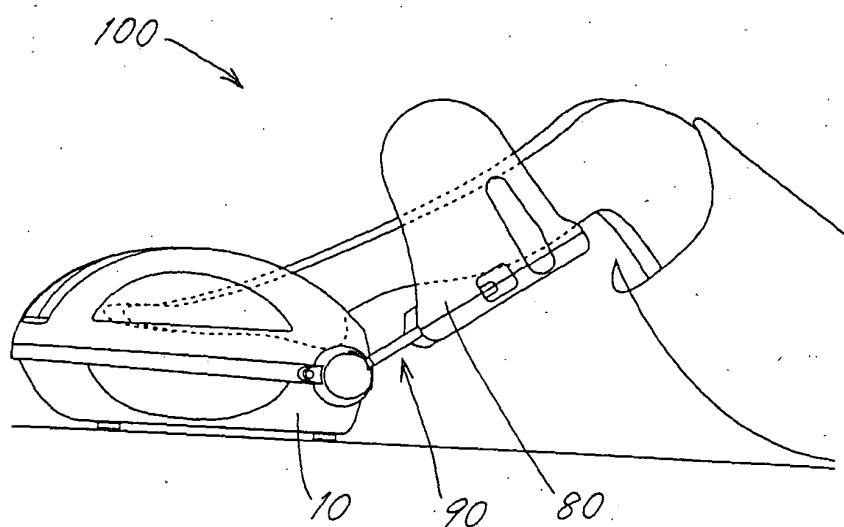
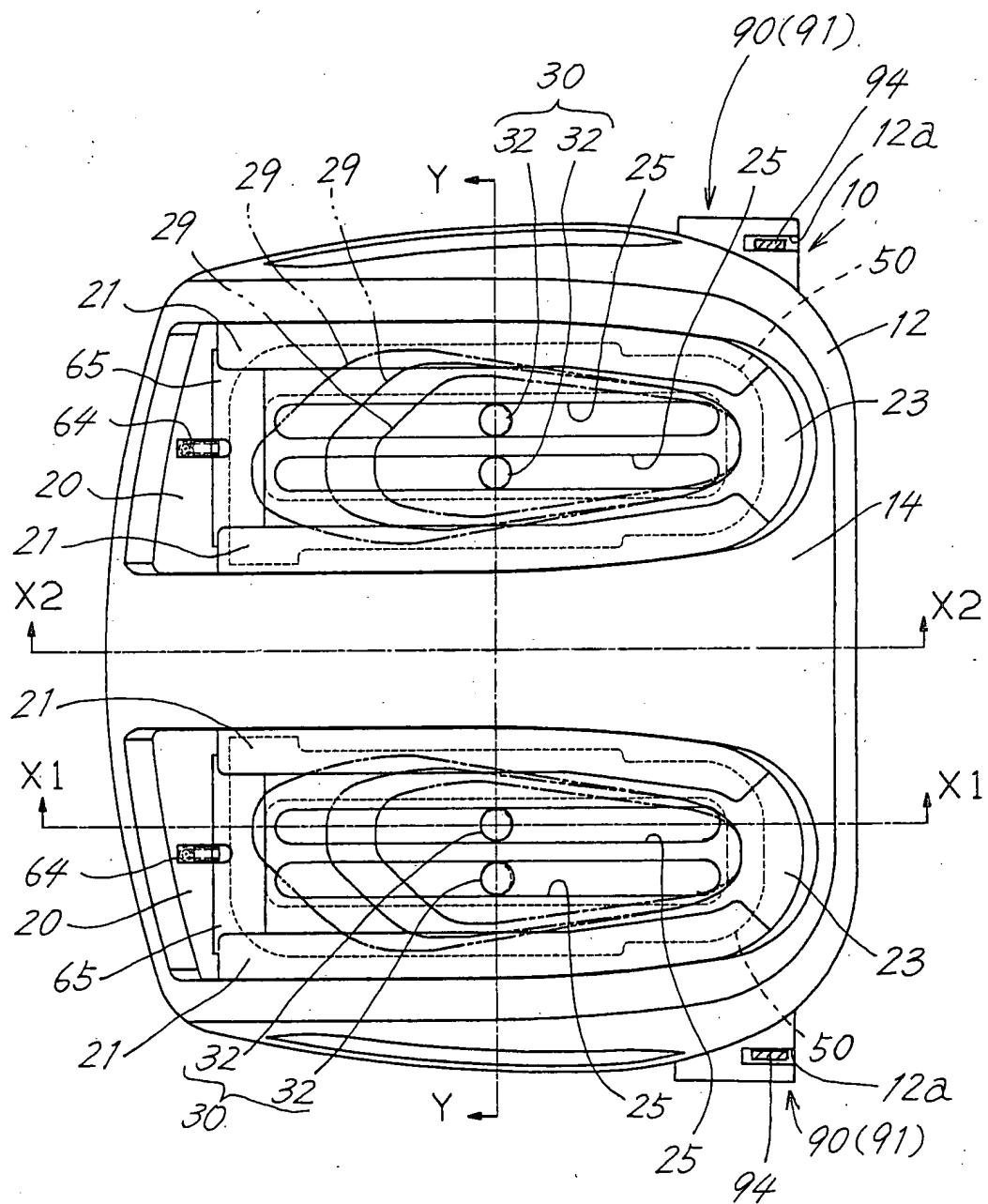


FIG. 7



F I G. 8

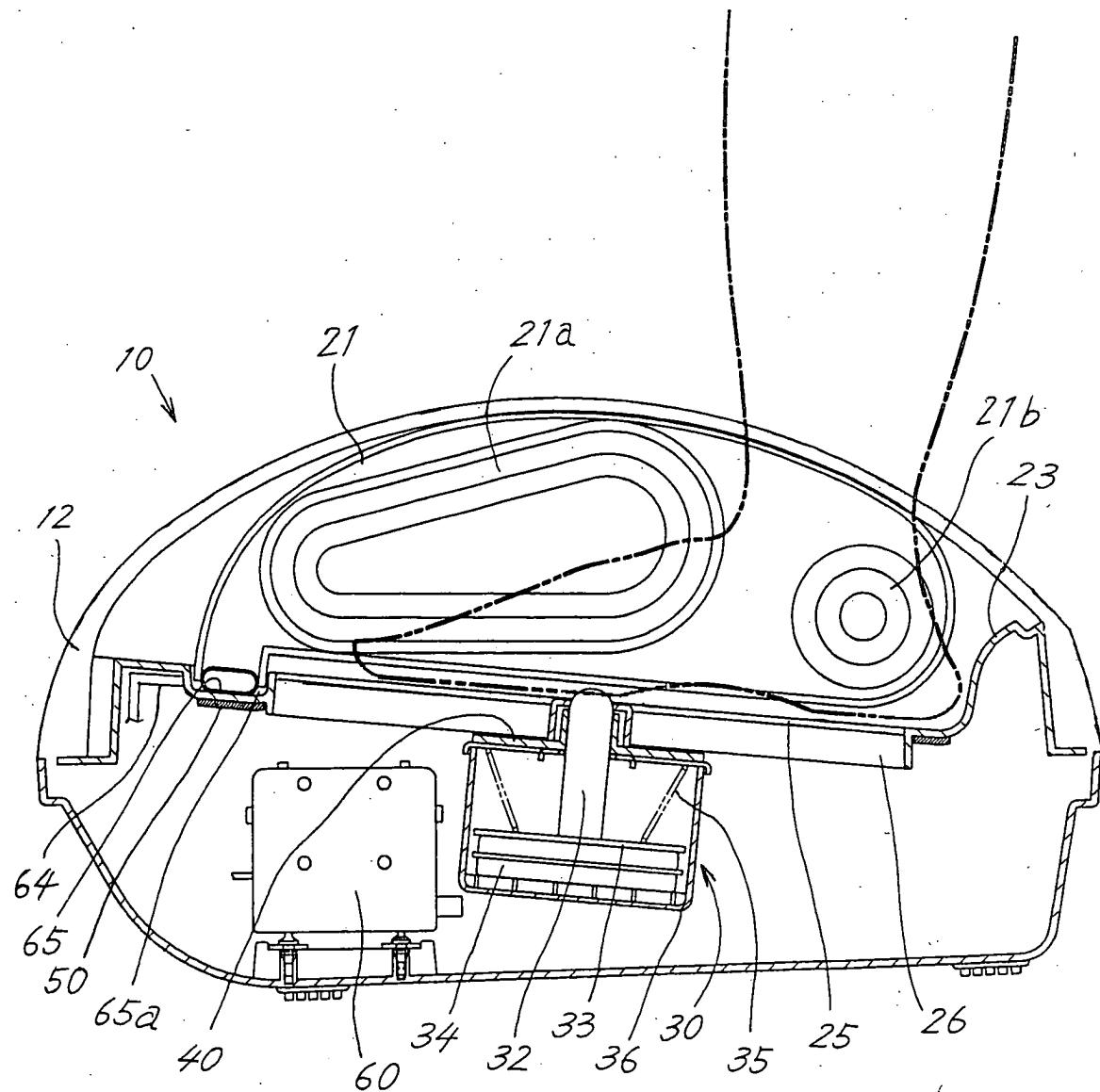


FIG. 9

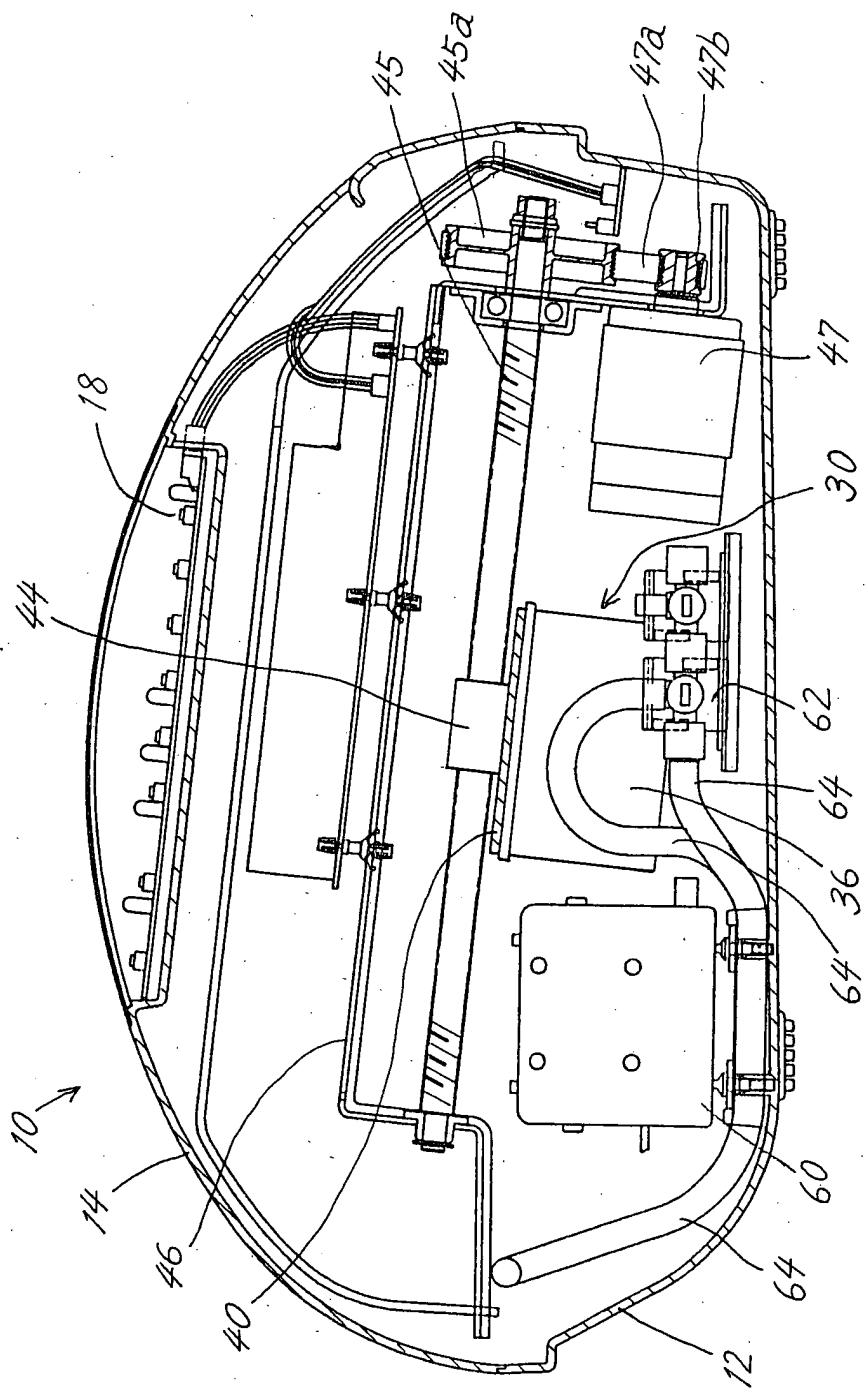


FIG. 10

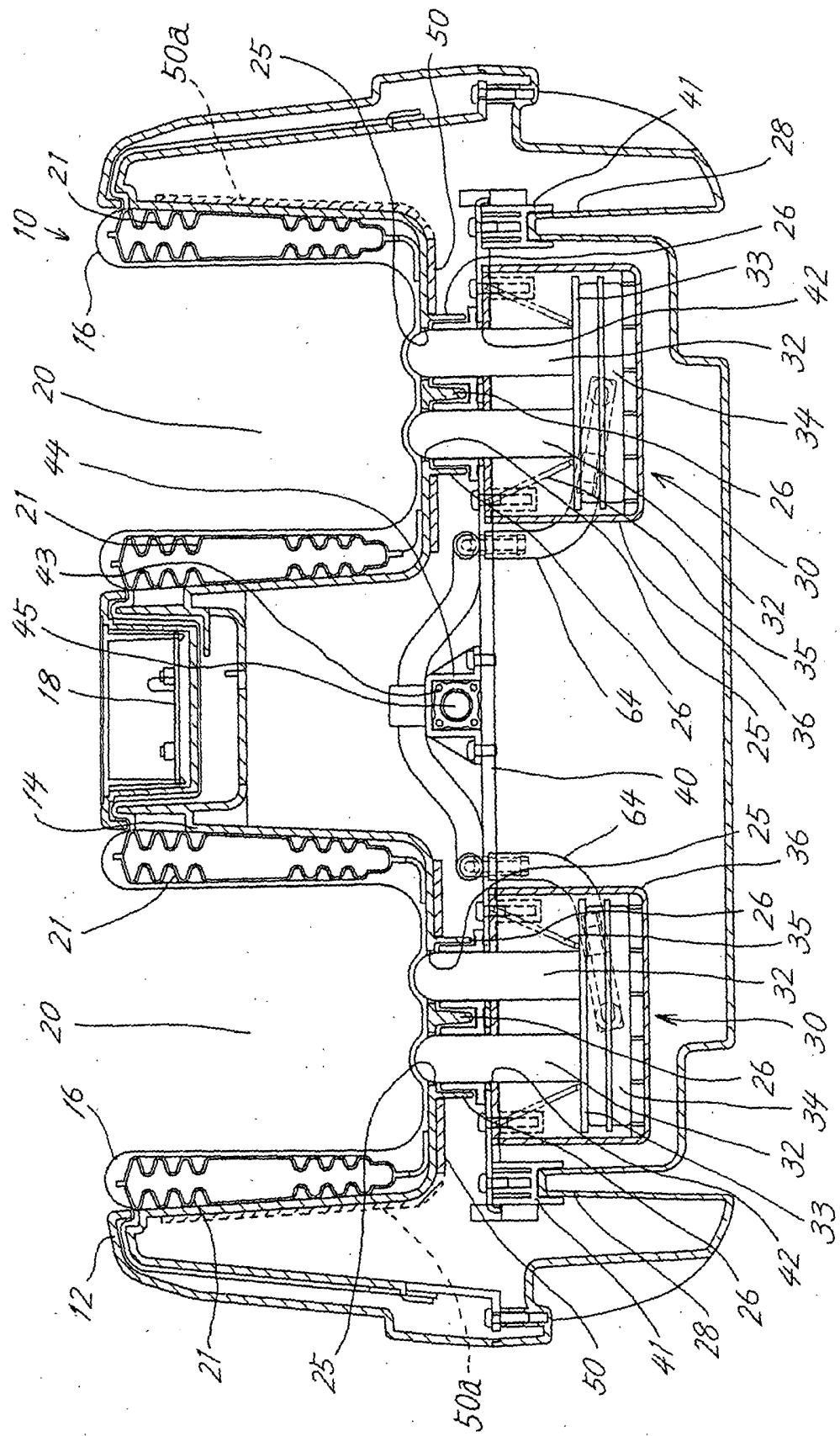


FIG. 11

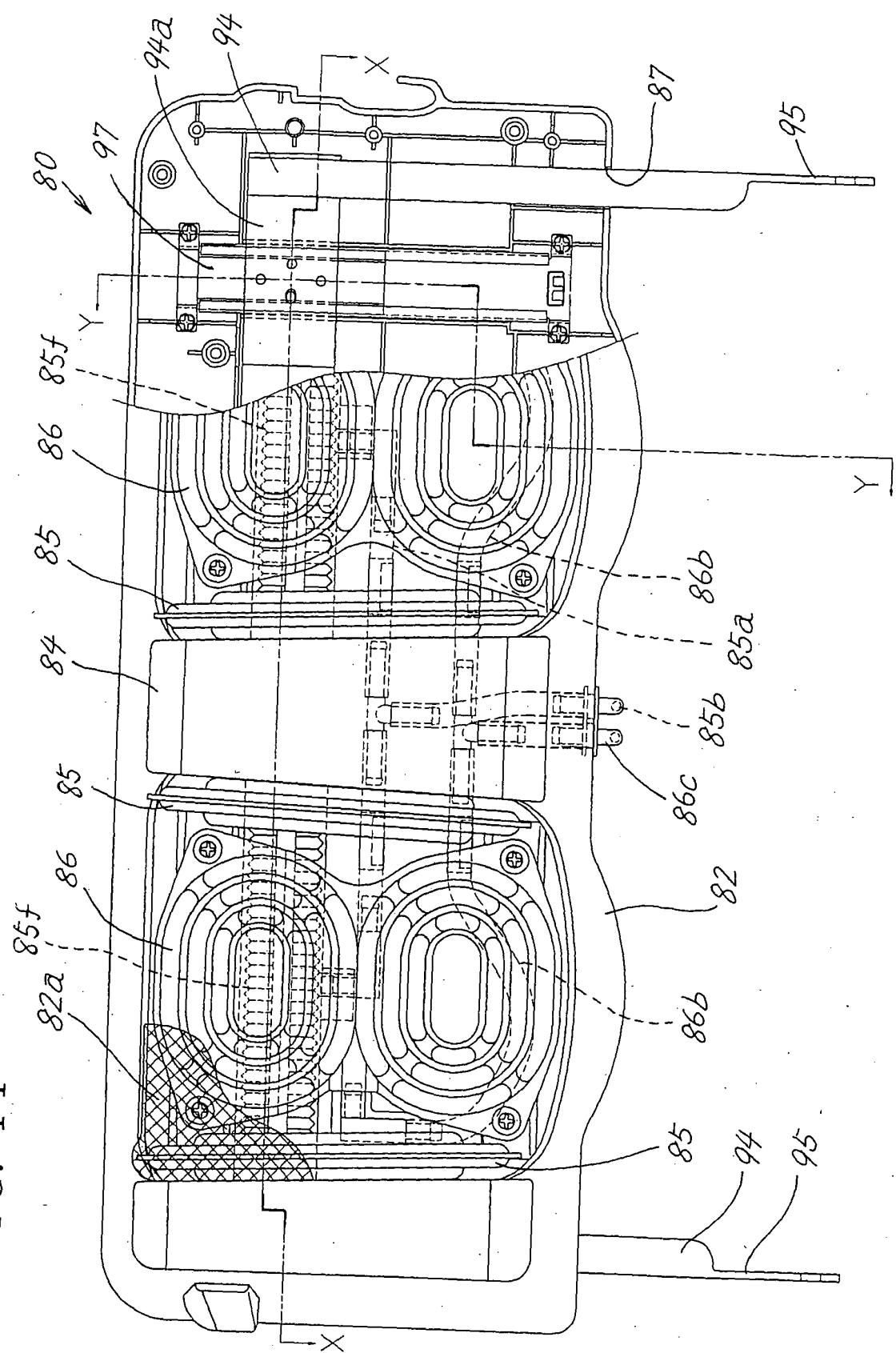
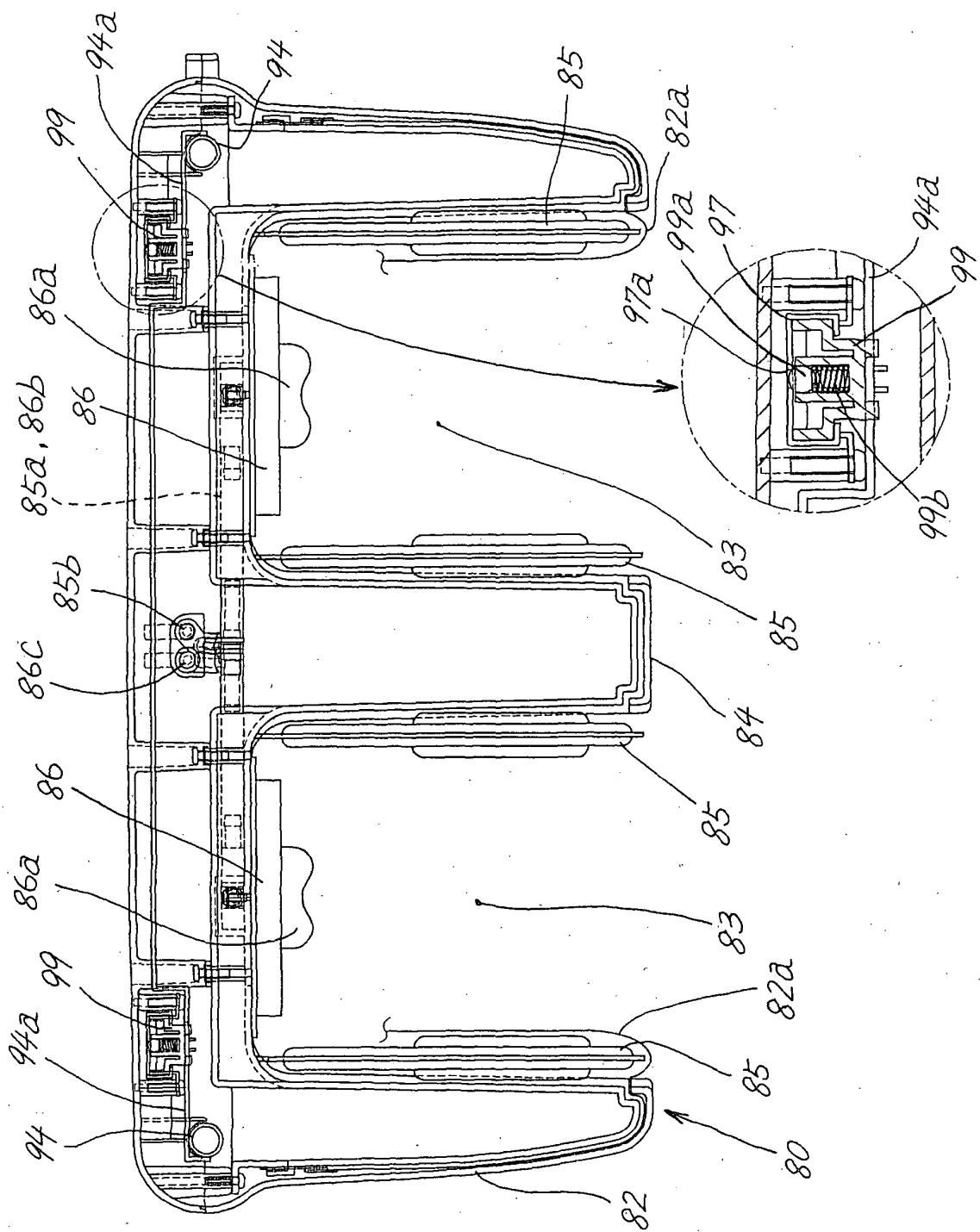
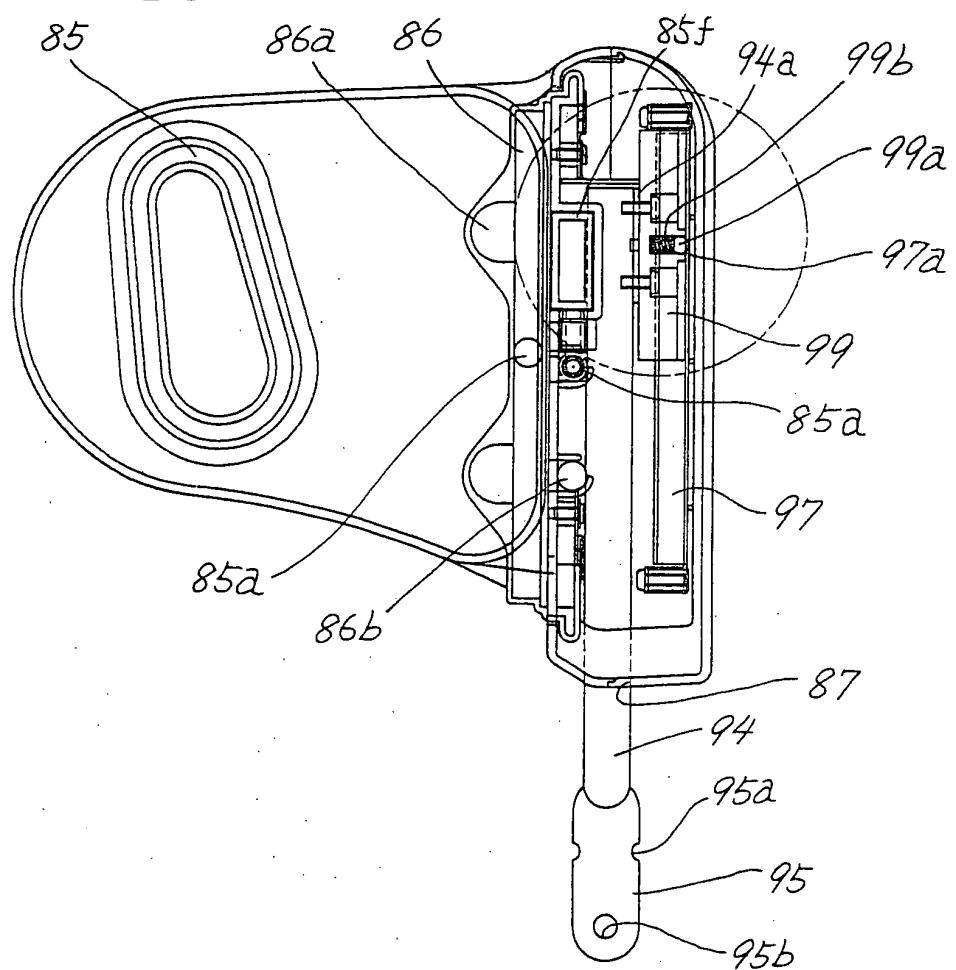


FIG. 12



F I G. 1 3



F I G. 1 4

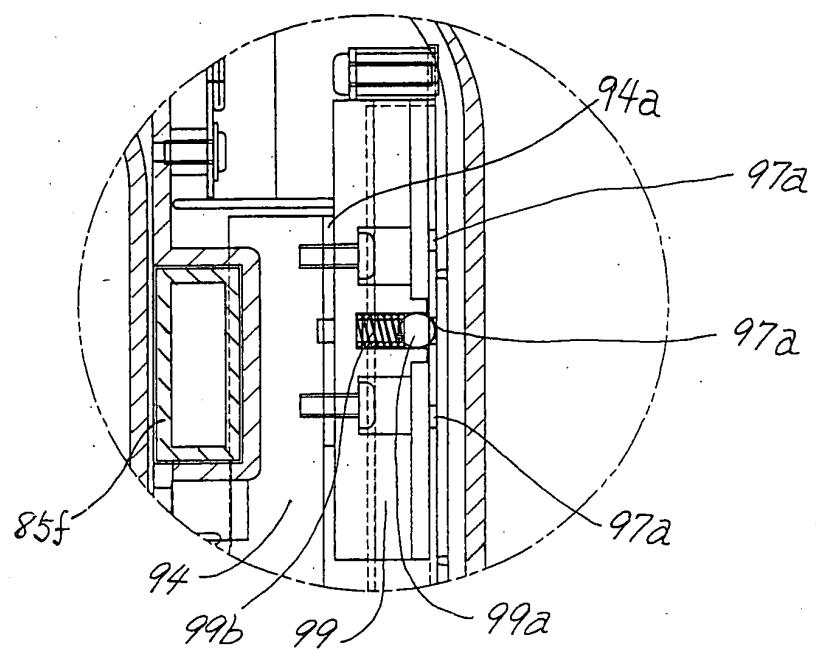


FIG. 15

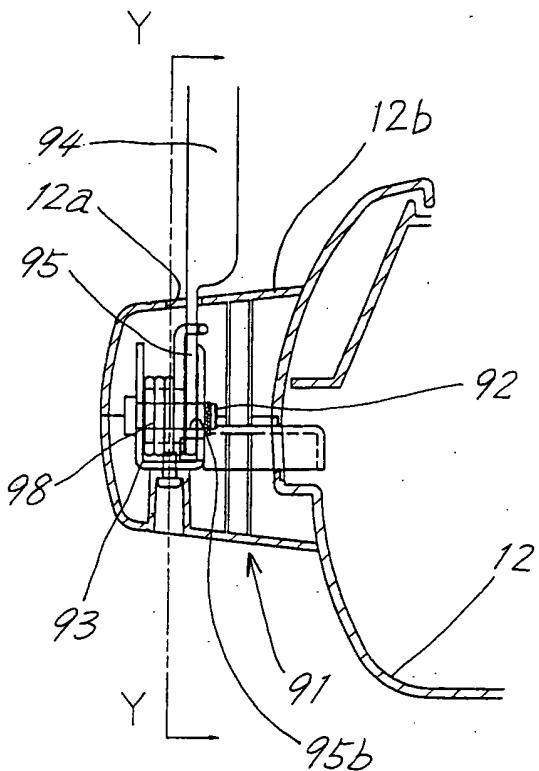


FIG. 16

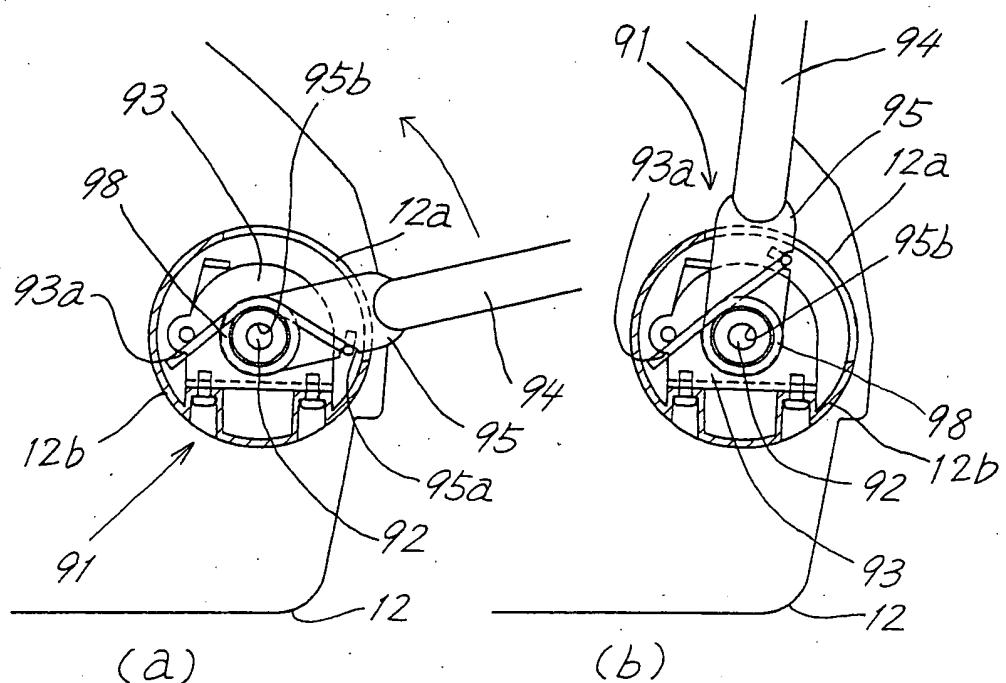


FIG. 17

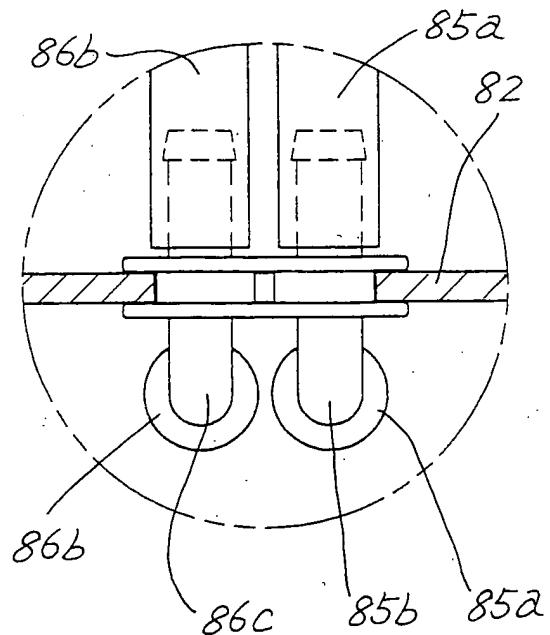
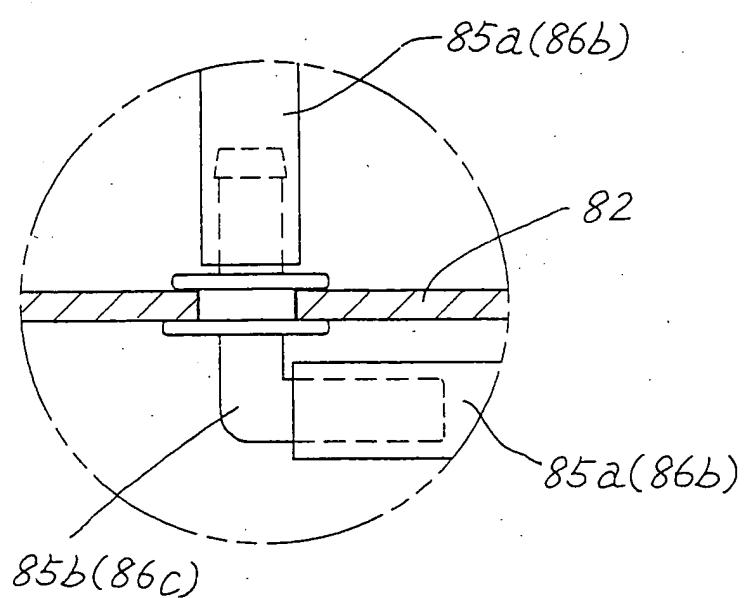
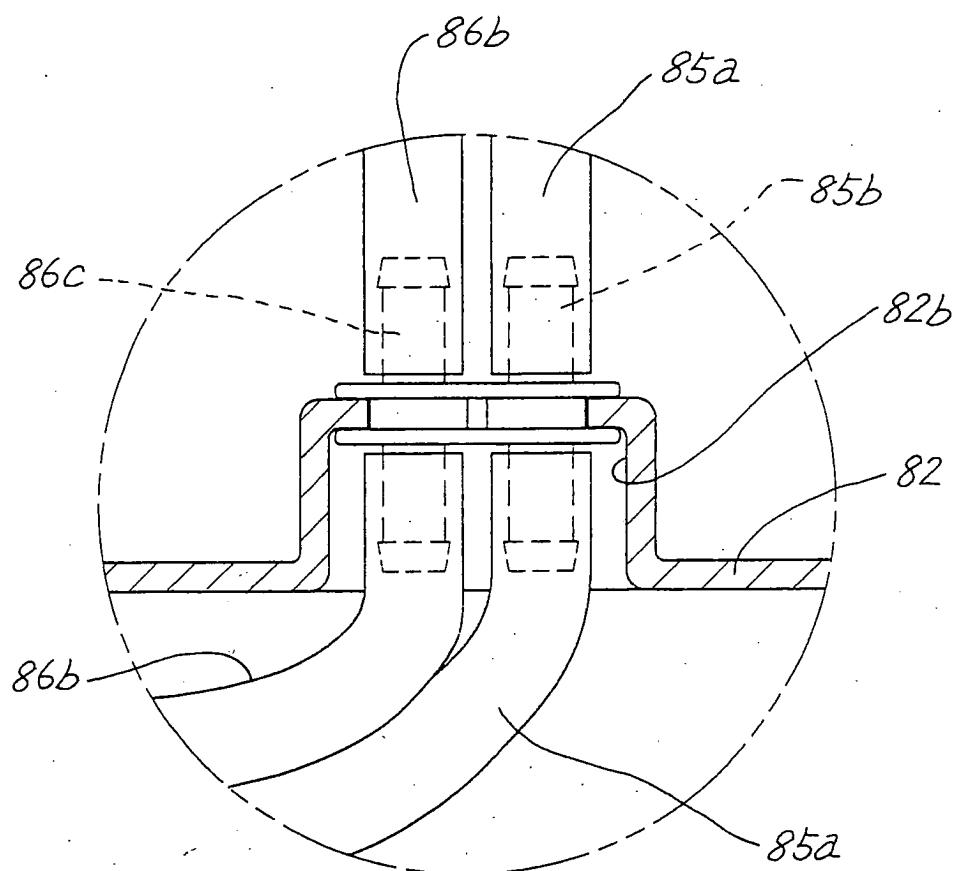


FIG. 18



F I G. 1 9





DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	US 2004/005972 A1 (SUGIYAMA TOSHIHIDE ET AL) 8 January 2004 (2004-01-08) * paragraphs [0049], [0050], [0053], [0066] - [0068]; figures 4A,9 * ----- X US 4 003 374 A (MIZRACHY ET AL) 18 January 1977 (1977-01-18) * figures 3,3a * ----- X,D JP 2002 238963 A (MATSUSHITA ELECTRIC WORKS LTD) 27 August 2002 (2002-08-27) * the whole document * -& PATENT ABSTRACTS OF JAPAN vol. 2002, no. 12, 12 December 2002 (2002-12-12) & JP 2002 238963 A (MATSUSHITA ELECTRIC WORKS LTD), 27 August 2002 (2002-08-27) * abstract * ----- X JP 2001 095867 A (TOSHIBA TEC CORP) 10 April 2001 (2001-04-10) * paragraphs [0013] - [0018], [0052], [0053], [0058]; figures * -& PATENT ABSTRACTS OF JAPAN vol. 2000, no. 21, 3 August 2001 (2001-08-03) & JP 2001 095867 A (TOSHIBA TEC CORP), 10 April 2001 (2001-04-10) * abstract * ----- A WO 03/017909 A (G-INTEK CO., LTD) 6 March 2003 (2003-03-06) * page 9, paragraphs 2,3 * -----	1,2,4,5,9 1,4 1,4,5,9 3 6-9 3 5	A61H23/04 TECHNICAL FIELDS SEARCHED (Int.Cl.7) A61H
10	The present search report has been drawn up for all claims		
Place of search		Date of completion of the search	Examiner
Munich		15 June 2005	Fischer, E
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1, 2, 4, 5, 9

A leg massage unit comprising a foot massage unit and a calf massage unit, whereby the calf massage unit is tiltably coupled to a base end of the foot massage unit, a connecting mechanism exerting torque acting to move the calf massage unit towards an upright position relative to the foot massage unit.

2. claims: 6-8, 3

A leg massage unit comprising foot massage unit and a calf massage unit, whereby a connecting mechanism couples the calf massage unit to the foot massage unit upwardly or downwardly slidably relative to the foot massage unit.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 00 4736

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-06-2005

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
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JP 2002238963	A	27-08-2002		NONE		
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