

DESCRIPTION

TITLE OF INVENTION: MESSAGE MECHANISM

TECHNICAL FIELD

[0001] The present invention relates to a message mechanism capable of performing effective message on treatment target areas.

BACKGROUND ART

[0002] Massagers customarily incorporate a message mechanism capable of performing message on treatment target areas of user's body. For example, neck-worn massagers incorporate a message mechanism to massage neck areas (i.e. nape) and shoulder areas. One example of such massagers is disclosed in Patent Literature 1. In addition, chair-type massagers incorporate message mechanisms, for example, a mechanism to apply kneading message to back areas, including shoulders and back, and a mechanism to massage buttocks and thighs. One example of such massagers is disclosed in Patent Literature 2.

PRIOR ART REFERENCE

CITATION LIST

[0003]

Patent Literature 1: Japanese Examined Patent Publication JP-B2
7049671

Patent Literature 2: Japanese Unexamined Patent Publication JP-A
2016-135191

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] The massager disclosed in Patent Literature 1 is capable of performing satisfactory and highly effective massage on target areas such as neck areas and shoulder areas. The massager disclosed in Patent Literature 2 is capable of performing satisfactory and highly effective kneading massage on back areas, including shoulders, back, and waist.

[0005] User demands for massagers recently include the capability of providing various kneading massage feelings and the capability of performing more effective massage treatment. For example, there is a demand for a massager that not only applies kneading massage to a treatment target area by kneading the area at predetermined periodic intervals (with rocking motion of constant phase) but also performs kneading massage while varying the range of the area to be kneaded, for example. Various massagers capable of highly effective massage such as those disclosed in Patent Literatures 1 and 2 have been commercially available to date.

[0006] However, the described user demands may not be met without using two or more different devices. This costwise burdens a user with purchase of two or more different devices, etc.

[0007] In view of the above problem, it is an object of the present invention to provide a massage mechanism which is

built as a single device, yet effectively performs various massage actions on treatment target areas of user's body, and hence achieves satisfactory massage with various kneading feelings.

SOLUTION TO PROBLEM

[0008] To achieve the above object, the present invention adopts the following technical means.

[0009] The present invention provides a massage mechanism comprising: a first massage unit including an upper treatment element and a lower treatment element that move toward and away from each other in a vertical direction to apply grasping and kneading massage to a treatment target area; a second massage unit which is mounted to be paired with the first massage unit, and includes an upper treatment element and a lower treatment element that move toward and away from each other in the vertical direction to apply grasping and kneading massage to another treatment target area; a first converter to convert a driving force into vertical movement and transmit the vertical movement to the first massage unit; and a second converter to convert a driving force into vertical movement and transmit the vertical movement to the second massage unit. In this construction, a sandwiching-holding action of the first massage unit in which the upper treatment element and the lower treatment element thereof move to sandwich and hold the corresponding treatment area therebetween and a sandwiching-holding action of the second massage unit in which the upper treatment element and the lower

treatment element thereof move to sandwich and hold the corresponding treatment target area therebetween are timed not to coincide with each other.

[0010] The massage mechanism may comprise a drive motor that includes an output shaft and outputs the driving force via the output shaft, and the first converter may include a delay mechanism to shift a timing of the sandwiching-holding action of the first massage unit so that the timing differs from a timing of the sandwiching-holding action of the second massage unit.

[0011] The delay mechanism may comprise a switcher to change a phase of the sandwiching-holding action of the first massage unit by switching rotation of the output shaft between forward rotation and backward rotation.

[0012] The switcher may be configured to switch between a first sandwiching-holding operation in which the first massage unit and the second massage unit perform their sandwiching-holding actions in the same phase, and a second sandwiching-holding operation in which the first massage unit performs its sandwiching-holding action in a delayed phase with respect to a phase of the sandwiching-holding action of the second massage unit.

[0013] The switcher may include a half-turn clutch mechanism to change the phase of the sandwiching-holding action of the first massage unit by, subsequent to a half-turn of a rotator about a shaft body in a direction of forward rotation

or in a direction of backward rotation, delaying the sandwiching-holding action of the first message unit with respect to the sandwiching-holding action of the second message unit.

[0014] The half-turn clutch mechanism may include a switching shaft formed with a hook part, and a hook groove part in which the hook part is slidably fitted.

[0015] The half-turn clutch mechanism may be configured such that, upon forward rotation of the rotator about the shaft body, the hook part is rotated a half-turn in a direction of forward rotation within the hook groove part, and subsequently engages one of terminal ends of the hook groove part within the hook groove part, and the engagement delays the action of the first message unit, with consequent phase change to allow the first message unit and the second message unit to perform their sandwiching-holding actions in the same phase for execution of the first sandwiching-holding operation.

[0016] The half-turn clutch mechanism may be configured such that, upon backward rotation of the rotator about the shaft body, the hook part is rotated a half-turn in a direction of backward rotation within the hook groove part, and subsequently engages another terminal end of the hook groove part within the hook groove part, and the engagement delays the action of the first message unit, with consequent phase change to cause the sandwiching-holding action of the first message unit to fall behind in phase with respect to the sandwiching-holding action

of the second massage unit.

[0017] The massage mechanism may be configured such that the first massage unit and the second massage unit can be switched by the switcher between a mode for the first sandwiching-holding operation and a mode for the second sandwiching-holding operation, that, in the first sandwiching-holding operation, a phase of vertical approaching-separating movement of the upper treatment element and the lower treatment element of the first massage unit is identical with a phase of vertical approaching-separating movement of the upper treatment element and the lower treatment element of the second massage unit, and that, in the second sandwiching-holding operation, the phase of vertical approaching-separating movement of the upper treatment element and the lower treatment element of the first massage unit differs from the phase of vertical approaching-separating movement of the upper treatment element and the lower treatment element of the second massage unit.

ADVANTAGEOUS EFFECTS OF INVENTION

[0018] The present invention provides a massage mechanism which is built as a single device, yet effectively performs various massage actions on treatment target areas of user's body, and hence achieves satisfactory massage with various kneading feelings.

BRIEF DESCRIPTION OF DRAWINGS

[0019]

FIG. 1 is a perspective view showing the general configuration of a massage mechanism according to a first embodiment of the present invention.

FIG. 2 is a front view of the general configuration of the massage mechanism embodying the present invention, illustrating switching between first sandwiching-holding operation (corresponding to forward rotation mode) and second sandwiching-holding operation (corresponding to backward rotation mode).

FIG. 3 is a front view of the interior of the massage mechanism embodying the present invention, illustrating switching between the first sandwiching-holding operation (forward rotation mode) and the second sandwiching-holding operation (backward rotation mode).

FIG. 4 is a front perspective view of the general configuration of the massage mechanism embodying the present invention, showing the general configuration of a switcher in disassembled condition in the forward rotation mode (with rocking motions of the same phase).

FIG. 5 is a rear perspective view of the general configuration of the massage mechanism embodying the present invention, showing the general configuration of the switcher in disassembled condition in the forward rotation mode (with rocking motions of the same phase).

FIG. 6 is a rear view of the massage mechanism, with a right-hand

first rotary boss part partially shown in section, performing the first sandwiching-holding operation (forward rotation mode) with rocking motions of the same phase under the operation of the switcher.

FIG. 7 is an enlarged view of the section of the right-hand first rotary boss part (forward rotation mode).

FIG. 8 is a front perspective view of the general configuration of the massage mechanism embodying the present invention, showing the general configuration of the switcher in disassembled condition in the backward rotation mode (with rocking motions of different phases).

FIG. 9 is a rear perspective view of the general configuration of the massage mechanism embodying the present invention, showing the general configuration of the switcher in disassembled condition in the backward rotation mode (with rocking motions of different phases).

FIG. 10 is a rear view of the massage mechanism, with the right-hand first rotary boss part partially shown in section, performing the second sandwiching-holding operation (backward rotation mode) with rocking motions of different phases under the operation of the switcher.

FIG. 11 is an enlarged view of the section of the right-hand first rotary boss part (backward rotation mode).

FIG. 12 is a perspective view showing the general configuration of a neck-worn massager incorporating the massage mechanism

embodying the present invention (second embodiment).

FIG. 13 is a front perspective view of the general configuration of the massage mechanism embodying the present invention, illustrating switching between the first sandwiching-holding operation and the second sandwiching-holding operation.

FIG. 14 is a front perspective view of the general configuration of the massage mechanism embodying the present invention, showing the general configuration of the switcher in disassembled condition (with rocking motions of the same phase).

FIG. 15 is a right side view of the massage mechanism, with the right-hand first rotary boss part shown in section, performing the first sandwiching-holding operation with rocking motions of the same phase under the operation of the switcher.

FIG. 16 is an enlarged view of the section of the right-hand first rotary boss part.

FIG. 17 is a rear perspective view of the general configuration of the massage mechanism embodying the present invention, showing the general configuration of the switcher in disassembled condition (with rocking motions of different phases).

FIG. 18 is a right side view of the massage mechanism, with the right-hand first rotary boss part shown in section, performing the second sandwiching-holding operation with rocking motions of different phases under the operation of the switcher.

FIG. 19 is an enlarged view of the section of the right-hand first rotary boss part.

FIG. 20 is a front perspective view of the general configuration of the massage mechanism, showing the general configuration of a left-hand converter in disassembled condition.

DESCRIPTION OF EMBODIMENTS

[0020] Embodiments of a massage mechanism 2 pursuant to the present invention will now be described with reference to the drawings.

[0021] The following embodiments are given by way of example of carrying the present invention into practice, and are not to be construed as limiting structural features of the present invention.

[0022] For example, the massage mechanism 2 (or a switcher 14) embodying the present invention may be installed in a wraparound massager (as a first embodiment), or in a neck-worn massager 1 (as a second embodiment).

[0023] The massage mechanism 2 (or the switcher 14) embodying the present invention may also be installed in a back-kneading massager for massaging shoulder areas, back areas, etc., or in a seat massager for massaging thighs, buttocks, etc. Moreover, the massage mechanism 2 embodying the present invention may be installed in a lower leg massager for massaging calves, feet, etc. That is, the massage mechanism 2 (or the switcher 14) embodying the present invention may be installed in a variety of massagers or exercise machines.

[0024]

[First Embodiment]

As exemplary of the massage mechanism 2 according to the first embodiment of the present invention, a massage mechanism of a type to be installed in a wraparound massager will be described.

[0025] For the description of this embodiment, the directions with respect to the massage mechanism 2 such as a front-rear direction and a right-left, or horizontal direction are as shown in the drawings. These directions coincide with those as viewed from a user wearing a belt massager incorporating the massage mechanism 2. The directions indicated in the drawings are used as the reference to explain the massage mechanism 2 embodying the present invention. In the drawings, some constituent components are not shown or are indicated by imaginary lines or the like for clarity of illustration.

[0026] For example, to have treatment target areas, e.g. neck areas, shoulder areas, or back areas massaged by the massager according to this embodiment, the user holds right and left flexible belt grips (not shown) of the massager in both hands, then presses treatment elements 4 of the massage mechanism against the target areas, and actuates the massage mechanism 2. To have waist massage, the user wraps the right and left belt grips around the waist so that the treatment elements 4 of the massage mechanism 2 abut against the waist, and actuates the massage mechanism.

[0027] Figures 1 through 11 are views showing the

configuration of the massage mechanism 2 according to this embodiment.

[0028] For example, the upper drawing in FIG. 2, the upper drawing in FIG. 3, FIG. 4, FIG. 5, FIG. 6, and FIG. 7 are views showing the massage mechanism, with left-hand upper and lower treatment elements 4d and 4f moving toward and away from each other in a vertical direction, and with right-hand upper and lower treatment elements 4a and 4c moving toward and away from each other in the vertical direction synchronously with the movement of the left-hand upper and lower treatment elements 4d and 4f. This operation allows concurrent sandwiching-holding massage, being hereinafter called squeezing massage, to be performed on treatment target areas. In this condition of operation, a left-hand rotary boss part 26L and a right-hand rotary boss part 26R are rotated in a normal direction (forward rotation).

[0029] For example, the lower drawing in FIG. 2, the lower drawing in FIG. 3, FIG. 8, FIG. 9, FIG. 10, and FIG. 11 are views showing the massage mechanism, with the right-hand upper and lower treatment elements 4a and 4c, due to being delayed in rotation, vertically moving toward and away from each other in timewise staggered relation (alternating relation) to the movement of the left-hand upper and lower treatment elements 4d and 4f. This operation allows alternate squeezing massage to be performed on treatment target areas.

[0030] In that condition of operation, the left-hand and right-hand rotary boss parts 26L and 26R reverse the direction of rotation. With the consequent change from the forward rotation to reverse rotation (backward rotation), the right-hand rotary boss part 26R is delayed in rotation by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L by the switcher 14, or specifically a half-turn clutch mechanism 14.

[0031] As shown in the drawings such as FIGs. 2 and 3, when viewed from the front, the right-hand rotary boss part 26R (the right-hand upper treatment element 4a) is rotated counterclockwise, and the left-hand rotary boss part 26L (the left-hand upper treatment element 4d) is rotated clockwise. This condition will be referred to as a "forward rotation" mode. Sandwiching-holding operation of massage units 12 in the forward rotation mode (corresponding to concurrent sandwiching-holding actions of the right-hand element pair and the left-hand element pair) will be defined as "first sandwiching-holding operation" in this embodiment.

[0032] Moreover, when viewed from the front, the left-hand rotary boss part 26L is rotated counterclockwise, and the right-hand rotary boss part 26R (the right-hand upper treatment element 4a) is rotated clockwise with a delay (shift) by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L (the left-hand upper treatment element 4d). This

condition will be referred to as a "backward rotation" mode. The sandwiching-holding operation of the massage units 12 in the backward rotation mode (corresponding to alternate sandwiching-holding actions of the right-hand element pair and the left-hand element pair) will be defined as "second sandwiching-holding operation" in this embodiment.

[0033] The characteristics of the massage mechanism 2 according to this embodiment will be described first.

[0034] A structural feature of the massage mechanism 2 according to this embodiment is that the approaching-separating movement (sandwiching-holding movement) of the right-hand upper treatment element 4a and the right-hand lower treatment element 4c provided in a right-hand massage unit 12R and the approaching-separating movement (sandwiching-holding movement) of the left-hand upper treatment element 4d and the left-hand lower treatment element 4f provided in a left-hand massage unit 12L can be timed not to coincide with each other (can be timewise staggered with respect to each other).

[0035] In this embodiment, a first converter 13R (i.e. right-hand converter 13R), which will be described later, includes a delay mechanism to cause a difference in timing of sandwiching-holding action between the right-hand massage unit 12R and the left-hand massage unit 12L by shifting the timing of the sandwiching-holding action of the right-hand massage unit 12R.

[0036] That is, in the massage mechanism 2 according to this embodiment, the right-hand upper treatment element 4a and the left-hand upper treatment element 4d are moved toward and away from each other in the horizontal direction while being eccentrically rotated in the same phase.

[0037] An additional feature of the massage mechanism 2 according to this embodiment is that, to achieve alternate squeezing massage (grasping and kneading massage), the vertical approaching-separating movement of the right-hand upper and lower treatment elements 4a and 4c provided in the right-hand massage unit 12R can be timed not to coincide with the same movement of the left-hand upper and lower treatment elements 4d and 4f provided in the left-hand massage unit 12L.

[0038] In the massage mechanism 2 according to this embodiment, the right-hand upper treatment element 4a and the left-hand upper treatment element 4d are moved closer to each other in an eccentrically rotating state so as to sandwich and hold a treatment target area for horizontal squeezing massage.

[0039] In addition, in the massage mechanism 2 according to this embodiment, the right-hand upper treatment element 4a and the right-hand lower treatment element 4c are moved closer to each other so as to sandwich and hold a treatment target area for vertical squeezing massage. Likewise, in the massage mechanism 2 according to this embodiment, the left-hand upper treatment element 4d and the left-hand lower treatment element

4f are moved closer to each other so as to sandwich and hold a treatment target area for vertical squeezing massage.

[0040] Moreover, the massage mechanism 2 according to this embodiment operates to stagger the timing of sandwiching-holding movement of the right-hand upper treatment element 4a and the right-hand lower treatment element 4c and the timing of the same movement of the left-hand upper treatment element 4d and the left-hand lower treatment element 4f. This allows alternate squeezing massage to be performed on treatment target areas.

[0041] That is, in the massage mechanism 2 according to this embodiment, the condition of sandwiching-holding action of the right-hand massage unit 12R can be changed by the switcher 14 (detailed later). This permits switching between an alternate squeezing (grasping-kneading) massage mode and a concurrent squeezing (grasping-kneading) massage mode. In the former mode, the right-hand upper and lower treatment elements 4a, 4c provided in the right-hand massage unit 12R and the left-hand upper and lower treatment elements 4d, 4f provided in the left-hand massage unit 12L sandwich and hold the corresponding treatment target areas in an alternating manner. In the latter mode, the treatment elements 4a, 4c and the treatment elements 4d, 4f sandwich and hold the corresponding treatment target areas in a concurrent manner.

[0042] In the massage mechanism 2 according to this embodiment, upon forward rotation of an output shaft 15a of a

drive motor 15 (detailed later), in the left-hand massage unit 12L, the left-hand upper treatment element 4d is eccentrically rotated (in a constant manner).

[0043] Meanwhile, upon forward rotation of the output shaft 15a, the right-hand massage unit 12R is changed in operating condition by the switcher 14 so that the right-hand upper treatment element 4a is eccentrically rotated in phase with the left-hand upper treatment element 4d, and the treatment elements 4a and 4d are then moved toward and away from each other.

[0044] Moreover, upon forward rotation of the output shaft 15a, while the left-hand lower treatment element 4f is vertically moved toward and away from the left-hand upper treatment element 4d, the right-hand lower treatment element 4c is vertically moved toward and away from the right-hand upper treatment element 4a synchronously with the treatment element 4f.

[0045] Thus, in the massage mechanism 2 according to this embodiment, upon forward rotation of the output shaft 15a, the horizontal approaching-separating movement of the right-hand upper treatment element 4a and the left-hand upper treatment element 4d, the vertical approaching-separating movement of the left-hand upper treatment element 4d and the left-hand lower treatment element 4f, and the vertical approaching-separating movement of the right-hand upper treatment element 4a and the right-hand lower treatment element 4c are timed to coincide with one another (effected in the same phase). This process permits

the "first sandwiching-holding operation".

[0046] That is, in the massage mechanism 2 according to this embodiment, upon forward rotation of the output shaft 15a, the right-hand and left-hand upper treatment elements 4a and 4d, while being eccentrically rotated, repeat a cycle of mutual approaching movement to sandwich and hold a treatment target area in the horizontal direction and mutual separating movement to relax the holding force horizontally acting on the treatment target area.

[0047] In addition, in the massage mechanism 2 according to this embodiment, upon forward rotation of the output shaft 15a, the left-hand lower treatment element 4f repeats a cycle of movement toward the left-hand upper treatment element 4d to sandwich and hold a left treatment target area in the vertical direction and movement away from the treatment element 4d to relax the holding force vertically acting on the treatment target area, and simultaneously the right-hand lower treatment element 4c repeats a cycle of movement toward the right-hand upper treatment element 4a to sandwich and hold a right treatment target area in the vertical direction and movement away from the treatment element 4a to relax the holding force vertically acting on the treatment target area.

[0048] That is, in the massage mechanism 2 according to this embodiment, while the right-hand and left-hand upper treatment elements 4a and 4d sandwich and hold the treatment

target area in the lateral direction, the right-hand upper and lower treatment elements 4a and 4c sandwich and hold the treatment target area in the vertical direction, and simultaneously the left-hand upper and lower treatment elements 4d and 4f sandwich and hold the treatment target area in the vertical direction. This process allows concurrent grasping and kneading massage to be performed on the target areas.

[0049] Moreover, in the massage mechanism 2 according to this embodiment, upon backward rotation of the output shaft 15a of the drive motor 15, in the left-hand massage unit 12L, the left-hand upper treatment element 4d is eccentrically rotated (in a constant manner).

[0050] Meanwhile, upon backward rotation of the output shaft 15a, the right-hand massage unit 12R is changed in operating condition by the switcher 14 so that the right-hand upper treatment element 4a is eccentrically rotated in a different phase. This results in a time delay in the rotation of the right-hand upper treatment element 4a with respect to the rotation of the left-hand upper treatment element 4d. That is, the right-hand upper treatment element 4a and the left-hand upper treatment element 4d are rotated in an alternating manner.

[0051] That is, in the massage mechanism 2 according to this embodiment, upon changing of the direction of rotation of a third gear 58R (rotator), under the operation of the switcher 14, the third gear 58R is rotated a half-turn about a second

shaft member 60R (shaft body), and the right-hand rotary boss part 26R is thereupon rotated with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L. This causes the right-hand lower treatment element 4c to move with a delay by a time of half turn with respect to the movement of the left-hand lower treatment element 4f. The right-hand lower treatment element 4c is thereupon vertically moved toward and away from the right-hand upper treatment element 4a in a time-wise staggered relation to the left-hand lower treatment element 4f.

[0052] That is, in the right-hand massage unit 12R, the right-hand lower treatment element 4c effects vertical approaching-separating movement with a 180 degrees phase shift with respect to the same movement of the left-hand lower treatment element 4f (the right-hand unit is phase-adjustable).

[0053] Thus, in the massage mechanism 2 according to this embodiment, the left-hand upper treatment element 4d and the right-hand upper treatment element 4a are eccentrically rotated in an alternating manner, and the approaching-separating movement of the right-hand upper and lower treatment elements 4a and 4c occurs with a time delay with respect to (occurs in a different phase from) the same movement of the left-hand upper and lower treatment elements 4d and 4f. This process permits the "second sandwiching-holding operation".

[0054] That is, in the massage mechanism 2 according to

this embodiment, upon backward rotation of the output shaft 15a, while the left-hand upper and lower treatment elements 4d and 4f are moved closer to each other to sandwich and hold the left treatment target area in the vertical direction, the right-hand upper and lower treatment elements 4a and 4c are moved away from each other to relax the holding force vertically acting on the right treatment target area sandwiched between them.

[0055] After that, while the left-hand upper and lower treatment elements 4d and 4f are moved away from each other to relax the holding force vertically acting on the left treatment target area, the right-hand upper and lower treatment elements 4a and 4c are moved closer to each other to sandwich and hold the right treatment target area in the vertical direction. Thus, the left-hand element pair and the right-hand element pair repeat the movement cycle differently from each other.

[0056] That is, in the massage mechanism 2 according to this embodiment, while the left-hand upper and lower treatment elements 4d and 4f effect constant approaching-separating movement, the right-hand upper and lower treatment elements 4a and 4c effect, due to being subjected to a phase change by the switcher 14, time-delayed vertical approaching-separating movement. With the time shift (delay) in the approaching-separating movement of the right-hand upper and lower treatment elements 4a and 4c, the right-hand upper and lower treatment elements 4a, 4c and the left-hand upper and lower

treatment elements 4d, 4f sandwich and hold the corresponding treatment target areas in the vertical direction in an alternating manner (i.e. in a timewise staggered manner). This allows alternate grasping and kneading massage to be performed on the target areas.

[0057] The massage mechanism 2 according to this embodiment will now be concretely described.

[0058] As shown in FIGs. 1 to 11, the massage mechanism 2 according to this embodiment comprises: a driver 10, disposed on a base mount 9, for producing a driving force; the massage units 12 horizontally arranged to be paired on the base mount 9, each of which includes a plurality of treatment elements 4; and the switcher 14 that changes the phase relation between the sandwiching-holding actions of the massage units 12 by switching the rotation derived from the driving force outputted from the driver 10 between forward rotation and backward rotation.

[0059] In this embodiment, the switcher 14 is disposed toward the right-hand massage unit 12R. That is, the phase of sandwiching-holding action of the right-hand massage unit 12R is changed with respect to the phase (constant phase) of sandwiching-holding action of the left-hand massage unit 12L.

[0060] Figures 2 and 3 are front views showing the general configuration of the massage mechanism 2 in the forward rotation mode, as well as in the backward rotation mode. Figure 4 is an exploded view showing the switcher 14 mounted to the right-hand

massage unit 12R in the forward rotation mode, as seen from the front. Figure 5 is an exploded view showing the switcher 14 mounted to the right-hand massage unit 12R in the forward rotation mode, as seen from the rear.

[0061] Figure 6 is a rear view of the massage mechanism 2, with the right-hand rotary boss part 26R partially shown in section. In this view, the massage mechanism 2 is performing the first sandwiching-holding operation by operating the switcher 14 to produce sandwiching-holding actions of the same phase (corresponding to the forward rotation mode). Figure 7 is an enlarged view of the section of the right-hand rotary boss part 26R shown in FIG. 6 (corresponding to the forward rotation mode).

[0062] Figure 8 is an exploded view showing the switcher 14 mounted to the right-hand massage unit 12R in the backward rotation mode, as seen from the front. Figure 9 is an exploded view of the switcher 14 mounted to the right-hand massage unit 12R in the backward rotation mode, as seen from the rear.

[0063] Figure 10 is a rear view of the massage mechanism 2, with the right-hand rotary boss part 26R partially shown in section. In this view, the massage mechanism 2 is performing the second sandwiching-holding operation by operating the switcher 14 to produce alternate sandwiching-holding actions of different phases (in the backward rotation mode). Figure 11 is an enlarged view of the section of the right-hand rotary

boss part 26R shown in FIG. 10 (in the backward rotation mode).

[0064] As shown in the drawings such as FIGs. 4 through 11, the driver 10 comprises: the drive motor 15 that outputs a rotational driving force (driving force); and a gear case 16 that reduces the speed on the outputted rotational driving force to a predetermined level.

[0065] The drive motor 15 is a reversible motor capable of both forward rotation and reverse rotation, or specifically a dual-axis motor having output shafts 15a and 15b for outputting rotational driving force mounted one at each side of it. The drive motor 15 is located centrally of the base mount 9, and has the output shaft 15a directed rightward in a horizontally oriented position, and has the output shaft 15b directed leftward in a horizontally oriented position. The drive motor 15 can be controlled in the direction of rotation, speed, etc. by the operation of an operating panel (not shown).

[0066] The driver 10 in this embodiment comprises: a right-hand drive mechanism 10R that drives the right-hand massage unit 12R using the rotational driving force outputted from the right-hand output shaft 15a; and a left-hand drive mechanism 10L that drives the left-hand massage unit 12L using the rotational driving force outputted from the left-hand output shaft 15b. The right-hand drive mechanism 10R will be described first. Figures 4, 5, 8, and 9 are exploded views showing the right-hand drive mechanism 10R, the right-hand converter 13R

(the first converter 13R), and the switcher 14.

[0067] As shown in the drawings such as FIGs. 4, 5, 8, and 9, the right-hand drive mechanism 10R comprises a plurality of gears as set forth hereinbelow. The right-hand output shaft 15a has a worm gear mounted thereon, and is placed inside the gear case 16. The right-hand worm gear 15a has a meshing engagement with a first gear 56R placed inside the gear case 16. The right-hand first gear 56R is located above the worm gear 15a.

[0068] The first gear 56R is constructed of a disk-shaped gear having a centrally located through hole 56a. The through hole 56a of the first gear 56R receives a first shaft member 59R mounted to the base mount 9. A second gear 57R is situated forward of the first gear 56R.

[0069] The right-hand second gear 57R is smaller in diameter than the first gear 56R, and formed with a centrally located through hole 57a. The through hole 57a of the second gear 57R communicates in coaxial relation with the through hole 56a of the first gear 56R. The first shaft member 59R mounted to the base mount 9 is inserted in the through holes 57a and 56a. That is, the first gear 56R and the second gear 57R constitute a unitary two-step gear in flanged form, which is rotatably supported by the first shaft member 59R.

[0070] The third gear 58R is disposed on the upper side of the second gear 57R. The right-hand third gear 58R has a

meshing engagement with the second gear 57R. The third gear 58R is constructed of a disk-shaped gear which is larger in diameter than the second gear 57R. The third gear 58R is formed with a centrally located through hole 58a. The through hole 58a of the third gear 58R receives the second shaft member 60R mounted to the base mount 9. That is, the third gear 58R is rotatably supported by the second shaft member 60R.

[0071] The rotational driving force exerted by the drive motor 15 is transmitted from the worm gear 15a to the first gear 56R, and from there to the third gear 58R through the second gear 57R mounted for unitary rotation with the first gear 56R.

[0072] The massage mechanism 2 embodying the present invention includes the delay mechanism to stagger the timing of sandwiching-holding action of the right-hand massage unit 12R and the timing of sandwiching-holding action of the left-hand massage unit 12L. The delay mechanism, which is mounted to the right-hand converter 13R (the first converter 13R), includes the switcher 14 that changes the phase relation between the sandwiching-holding actions of the right-hand and left-hand massage units 12.

[0073] As shown in the drawings such as FIGs. 4 to 11, in this embodiment, the switcher 14 is disposed toward the base end of the right-hand massage unit 12R. The switcher 14 may alternatively be disposed toward the base end of the left-hand massage unit 12L.

[0074] The switcher 14 changes the phase of sandwiching-holding action (periodic action) of the right-hand massage unit 12R with respect to the phase (constant phase) of sandwiching-holding action of the left-hand massage unit 12L by switching the rotation of the output shafts 15a, 15b of the drive motor 15 between forward rotation and backward rotation.

[0075] As shown in FIGs. 2 and 3, the switcher 14 in this embodiment is configured to permit switching between the "first sandwiching-holding operation" and the "second sandwiching-holding operation". In the first sandwiching-holding operation, the paired right-hand and left-hand massage units 12 perform sandwiching-holding actions in the same phase. In the second sandwiching-holding operation, subsequent to operation of one of the right-hand and left-hand massage units 12 (i.e. the left-hand massage unit 12L in this embodiment), the other massage unit 12 (i.e. the right-hand massage unit 12R in this embodiment) is allowed to perform sandwiching-holding action in a delayed phase with respect to the phase of sandwiching-holding action of the one massage unit 12 (the left-hand massage unit 12L).

[0076] In this embodiment, the switcher 14 performs switching to the "first sandwiching-holding operation" in response to the forward rotation of the rotary boss part 26, and performs switching to the "second sandwiching-holding operation" in response to the backward rotation of the rotary

boss part 26.

[0077] The switcher 14 permits switching between the first sandwiching-holding operation and the second sandwiching-holding operation by delay operation to shift (delay) the start of operation of the right-hand converter 13R from the start of operation of a left-hand converter 13L (i.e. second converter 13L).

[0078] Preferably, the switcher 14 includes a "rotation clutch mechanism". In this mechanism, after a rotator is rotated at a predetermined angle, and more specifically, for example, rotated a quarter turn, a one-third turn, or a half-turn (one-half turn), about a shaft body in the direction of forward rotation or in the direction of backward rotation, the right-hand massage unit 12R is subjected to a delay in operation by a time of rotation of the rotator. The time delay causes a change in phase relation between the sandwiching-holding actions of the massage units 12. The rotator corresponds to a member mounted with a hook part 51 which will be described later. In this embodiment, the third gear 58R serves as the rotator. Moreover, in this embodiment, the second shaft member 60R serves as the shaft body.

[0079] This embodiment adopts a "half-turn clutch mechanism" as the switcher 14. In this mechanism, subsequent to a half turn of the third gear 58R (i.e. switching shaft 53) about the axis of the second shaft member 60R (shaft body) in the direction of forward rotation or in the direction of backward

rotation, the operation of the right-hand massage unit 12R is delayed with a 180 degrees phase shift with respect to the operation of the left-hand massage unit 12L. This results in a change in phase in the sandwiching-holding action of the right-hand massage unit 12R.

[0080] That is, in this embodiment, in the delay operation of the half-turn clutch mechanism 14 provided for the right-hand rotary boss part 26R and the right-hand third gear 58R, the rotation of the right-hand rotary boss part 26R is delayed by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L. This results in phase change so that the sandwiching-holding action of the right-hand massage unit 12R falls behind in phase with respect to the sandwiching-holding action of the left-hand massage unit 12L. Note that the term "half-turn clutch mechanism 14" may comprehend other clutch mechanisms than a half-turn (180 degrees-turn) clutch mechanism, for example, a 120 degrees-turn clutch mechanism and a 90 degrees-turn clutch mechanism.

[0081] As shown in the drawings such as FIGs. 4 to 11, the half-turn clutch mechanism 14 (the switcher 14) in this embodiment comprises: the hook part 51 for switching between the first sandwiching-holding operation and the second sandwiching-holding operation; a hook groove part 52 in which the hook part 51 is slidably fitted; and the switching shaft 53 mounted with the hook part 51.

[0082] In this embodiment, the hook part 51 is mounted to the third gear 58R, that is; the third gear 58R serves as the switching shaft 53. The third gear 58R is rotated a half-turn in the direction of forward rotation or in the direction of backward rotation relative to the second shaft member 60R, with subsequent rotation of the right-hand rotary boss part 26R.

[0083] The hook part 51 in this embodiment is disposed on the front side of the third gear 58R (rotator) so as to protrude frontward. The hook part 51 is constructed of a platelike member which protrudes frontward in the direction of the axis of the second shaft member 60R (shaft body), and extends curvilinearly along the outer periphery of the second shaft member 60R. In other words, the hook part 51 is made in the form of a curved protuberant piece shaped in conformance with the shape of the hook groove part 52 which will be described later.

[0084] The hook part 51 is a curved member comprising: a side wall of arcuate shape coincident with the arc subscribed by the outer periphery of the second shaft member 60R; and two terminal end walls 51a and 51b. One of the terminal end walls, namely the first terminal end wall 51a is a wall face which engages a first rotation switching part 54 of the hook groove part 52 upon forward rotation of the shaft. The other terminal end wall, namely the second terminal end wall 51b is a wall face which engages a second rotation switching part 55 of the hook groove part 52 upon backward rotation of the shaft.

[0085] That is, the hook part 51 is shaped so that it can fit in the hook groove part 52, and is made substantially equal in length in the front-rear direction (i.e. height) to the hook groove part 52. The hook part 51 slidably moves about the axis of the second shaft member 60R within the hook groove part 52.

[0086] The hook groove part 52 in this embodiment is formed as a rearwardly opening groove in the rear side of the right-hand rotary boss part 26R. The hook groove part 52 comprises a crescent-shaped (i.e. C-shaped) track groove running around the outer periphery of the second shaft member 60R, as viewed in section from the rear. The hook groove part 52 is formed as a groove which extends along the outer periphery of the second shaft member 60R and is elongated (i.e. deep) in the direction of the axis of the second shaft member 60R.

[0087] That is, the hook groove part 52 is formed as a curved groove of arcuate shape coincident with the arc subscribed by the outer periphery of the hook part 51. The hook groove part 52 is formed as a curved groove shaped in conformance with the shape of the hook part 51. Thus configured, the hook groove part 52 receives the hook part 51 with a fit, and has a length in the front-rear direction (i.e. depth) substantially equal to the height of the hook part 51.

[0088] The hook groove part 52 comprises an arcuately-shaped groove running along the outer periphery of the second shaft member 60R. The groove defines a trackway with

two terminal end walls. The two terminal end walls, namely a side wall 54 and a side wall 55 serve as the rotation switching part 54 and the rotation switching part 55, respectively, for changing the direction of rotation of the third gear 58R supported by the second shaft member 60R.

[0089] Upon forward rotation or backward rotation of the third gear 58R supported by the second shaft member 60R, the rotation switching part 54, 55 is engaged with the hook part 51 which has been rotated a half-turn. The engagement delays the operation of the right-hand converter 13R (detailed later), which results in a change in the condition of sandwiching-holding action of the right-hand massage unit 12R.

[0090] In this embodiment, one of the terminal end walls formed in the semicircular hook groove part 52, namely the first terminal end wall 54 serves as the first rotation switching part 54. The first rotation switching part 54 is provided to synchronize operations between the left-hand converter 13L and the right-hand converter 13R upon forward rotation of the third gear 58R supported by the second shaft member 60R.

[0091] That is, upon forward rotation of the third gear 58R (the switching shaft 53), the hook part 51 of the third gear 58R is rotated a half-turn about the axis of the second shaft member 60R in the direction of forward rotation. The first terminal end wall 51a of the hook part 51 subsequently engages the first rotation switching part 54. The right-hand rotary

boss part 26R is thereupon rotated together with the left-hand rotary boss part 26L. With consequent synchronization in operation between the left-hand converter 13L and the right-hand converter 13R, the right-hand massage unit 12R is switched to an operating condition corresponding to the "first sandwiching-holding operation".

[0092] Moreover, the other terminal end wall formed in the semicircular hook groove part 52, namely the second terminal end wall 55 serves as the second rotation switching part 55. The second rotation switching part 55 is provided to delay the operation of the right-hand converter 13R with respect to the operation of the left-hand converter 13L upon backward rotation of the third gear 58R supported by the second shaft member 60R.

[0093] That is, upon backward rotation of the third gear 58R (the switching shaft 53), the hook part 51 of the third gear 58R is rotated a half-turn about the axis of the second shaft member 60R in the direction of backward rotation. The second terminal end wall 51b of the hook part 51 subsequently engages the second rotation switching part 55. The right-hand rotary boss part 26R is thereupon rotated with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L. With consequent delayed operation of the right-hand converter 13R with respect to the operation of the left-hand converter 13L, the right-hand massage unit 12R (detailed later) is switched to an operating condition

corresponding to the "second sandwiching-holding operation".

[0094] As shown in the drawings such as FIGs. 4 to 7, under the operation of the half-turn clutch mechanism 14 (the switcher 14) in this embodiment, the third gear 58R (the switching shaft 53) supported by the second shaft member 60R is rotated a half-turn about the axis of the second shaft member 60R in the direction of forward rotation, and this causes the first terminal end 51a of the hook part 51 to engage the first rotation switching part 54 (the first terminal end 54) within the hook groove part 52. The right-hand converter 13R is thereupon rotated with a time delay, and the operation of the right-hand converter 13R is synchronized with the operation of the left-hand converter 13L. This results in phase change so that the right-hand massage unit 12R and the left-hand massage unit 12L perform their sandwiching-holding actions in the same phase for execution of the first sandwiching-holding operation (corresponding to massage treatment in the forward rotation mode).

[0095] As shown in the drawings such as FIGs. 8 to 11, under the operation of the half-turn clutch mechanism 14 in this embodiment, the third gear 58R (the switching shaft 53) supported by the second shaft member 60R is rotated a half-turn about the axis of the second shaft member 60R in the direction of backward rotation, and this causes the second terminal end 51b of the hook part 51 to engage the second rotation switching part 55 (the second terminal end 55) within the hook groove part 52.

The right-hand converter 13R is then operated with a time delay with respect to the operation of the left-hand converter 13L, with consequent delayed action of the right-hand massage unit 12R. This results in phase change so that the sandwiching-holding action of the right-hand massage unit 12R falls behind in phase with respect to the sandwiching-holding action of the left-hand massage unit 12L to achieve the second sandwiching-holding operation (corresponding to massage treatment in the backward rotation mode).

[0096] During the time the hook part 51 is reaching the first rotation switching part 54 or the second rotation switching part 55 for mutual engagement (i.e. during the interval that the third gear 58R [the switching shaft 53] is being rotated a half-turn), the left-hand rotary boss part 26L is in a rotating state, whereas the right-hand rotary boss part 26R is at a standstill. That is, during this period of time, the left-hand massage unit 12L (i.e. left-hand massage member 24L) is in motion for sandwiching-holding action, whereas the right-hand massage unit 12R (i.e. right-hand massage member 24R) is at a standstill.

[0097] As shown in the drawings such as FIGs. 4, 5, 8, and 9, the right-hand rotary boss part 26R is a member situated at the upper portion of the right-hand massage member 24R. The right-hand rotary boss part 26R comprises: a disk-shaped cylindrical member located toward the rear (i.e. rear cylindrical part 36R); and a cylindrical member of smaller diameter situated

forward of the rear cylindrical part 36R (i.e. front cylindrical part 37R). That is, the right-hand rotary boss part 26R is made in the form of a flanged member.

[0098] The rear cylindrical part 36R is formed at the axial center (corresponding to the center of the right-hand rotary boss part 26R) with a hole part 38R in which the second shaft member 60R is inserted. In addition, the rear cylindrical part 36R has the hook groove part 52 formed in it so as to extend around the outer circumference of the hole part 38R.

[0099] The front cylindrical part 37R is disposed forward of the rear cylindrical part 36R. The front cylindrical part 37R is off-centered with respect to the center of the rear cylindrical part 36R. That is, the axis of the front cylindrical part 37R pointing in the front-rear direction is positioned in offset relation to the axis of the rear cylindrical part 36R pointing in the front-rear direction.

[0100] The front cylindrical part 37R is provided at the front side with a star-shaped engagement part 37a for securing the right-hand upper treatment element 4a (the upper treatment element 4a). As shown in the drawings such as FIGs. 1 and 2, the right-hand upper treatment element 4a, constructed of a reasonably long, rectangular round (oblong)-shaped member, has a base end secured to the engagement part 37a. The right-hand upper treatment element 4a is eccentrically rotated about the engagement part 37a. The right-hand upper treatment element

4a is provided at the tip with a plurality of pressing parts for pressing treatment target areas.

[0101] The front cylindrical part 37R is inserted in a through hole 24a formed in the base end of the right-hand massage member 24R. This allows the right-hand massage member 24R to be rotatably mounted to the right-hand rotary boss part 26R. Moreover, a star-shaped fitting part (not shown) formed inside the right-hand upper treatment element 4a has a meshing engagement with the engagement part 37a protruding from the through hole 24a. This allows the right-hand upper treatment element 4a to be secured to the right-hand rotary boss part 26R. Thus, the right-hand rotary boss part 26R is rotated with accompanying rotation of the right-hand upper treatment element 4a.

[0102] The hook part 51 of the third gear 58R is slidably fitted in the hook groove part 52 of the rear cylindrical part 36R. Upon rotation of the third gear 58R, the hook part 51 is engaged in the hook groove part 52, and, while the rear cylindrical part 36R is rotated about the axis of the second shaft member 60R, the front cylindrical part 37R is rotated eccentrically with respect to the second shaft member 60R. Thus, the right-hand rotary boss part 26R is rotated eccentrically with respect to the second shaft member 60R, and the right-hand upper treatment element 4a is thereupon eccentrically rotated about the axis directed in the front-rear direction. This imparts vertical and horizontal sandwiching-holding movement to the right-hand

massage member 24R.

[0103] The massage units 12 include the right-hand massage unit 12R for performing massage on the right treatment target area, and the left-hand massage unit 12L for performing massage on the left treatment target area. The right-hand massage unit 12R will be described first. Figures 4, 5, 8, and 9 are exploded views showing the right-hand drive mechanism 10R, the right-hand massage unit 12R, the right-hand converter 13R, and the switcher 14.

[0104] As shown in the drawings such as FIGs. 4, 5, 8, and 9, the right-hand massage unit 12R is provided at the base end side with the right-hand converter 13R to convert a rotational driving force into sandwiching-holding action (i.e. vertical rocking motion), and transmits the action to the right-hand massage unit 12R. The right-hand converter 13R in this embodiment corresponds to the right-hand rotary boss part 26R. The right-hand converter 13R converts, with the eccentric rotation of the right-hand rotary boss part 26R, the rotation of the third gear 58R into sandwiching-holding action (vertical rocking motion) of the right-hand massage member 24R.

[0105] The right-hand massage unit 12R includes the right-hand massage member 24R to massage the right treatment target area. The right-hand massage member 24R is formed as a vertically elongated arm member. The right-hand massage member 24R is provided at the base end with the through hole

24a in which the front cylindrical part 37R of the right-hand rotary boss part 26R is inserted. The inside diameter of the through hole 24a is substantially equal to the outside diameter of the front cylindrical part 37R. The right-hand massage member 24R is provided intermediate its lengthwise ends with a vertically elongated restraint groove 24b.

[0106] The restraint groove 24b restrains the right-hand massage member 24R from rotating together with the front cylindrical part 37R. The restraint groove 24b receives a restraint pin (not shown) for free sliding motion. The restraint pin is secured to the tip of the first shaft member 59R by screws.

[0107] Upon eccentric rotation of the right-hand rotary boss part 26R, the restraint pin slides substantially vertically in the restraint groove 24b. This restrains the right-hand massage member 24R from rotating together with the right-hand rotary boss part 26R. The right-hand massage member 24R is thus allowed to perform vertical rocking motion. The right-hand massage member 24R and the right-hand rotary boss part 26R constitute a slider-crank mechanism.

[0108] As shown in the drawings such as FIGs. 1 and 2, the right-hand massage member 24R has a front end slightly bent outwardly. The bent shape enables the right-hand massage member 24R to move not only in the vertical direction but also in the horizontal direction for sandwiching-holding action. The front end of the right-hand massage member 24R is provided with a mount

part 24c for mounting of the right-hand lower treatment element 4c (the lower treatment element 4c).

[0109] The right-hand lower treatment element 4c is mounted on the mount part 24c for free rotational movement about the axis directed in the front-rear direction. The right-hand lower treatment element 4c is constructed of a member having a spherically shaped front end, the spherical surface of which is mounted with a plurality of pressing parts to press treatment target areas.

[0110] That is, upon rotation of the third gear 58R, the right-hand rotary boss part 26R (the right-hand converter 13R) is rotated eccentrically with respect to the second shaft member 60R for conversion into sandwiching-holding action (vertical rocking motion). The right-hand massage member 24R is thereupon rocked vertically and horizontally with accompanying vertical and horizontal rocking motions of the right-hand lower treatment element 4c.

[0111] The left-hand drive mechanism 10L will now be described. The left-hand drive mechanism 10L is configured similarly in mirror image relation to the right-hand drive mechanism 10R in the horizontal direction, and hence no mention will be made of the details of the drive mechanism 10L.

[0112] As shown in the drawings such as FIGs. 4, 5, 8, and 9, the left-hand drive mechanism 10L comprises a plurality of gears as set forth hereinbelow. The left-hand output shaft 15b

has a worm gear mounted thereon, and is placed inside the gear case 16. The left-hand worm gear 15b has a meshing engagement with a first gear 56L situated above it.

[0113] The left-hand first gear 56L is constructed of a disk-shaped gear having a centrally located through hole 56b. The through hole 56b receives a first shaft member 59L mounted to the base mount 9. A second gear 57L is situated forward of the first gear 56L.

[0114] The left-hand second gear 57L is formed with a centrally located through hole 57b. The through hole 57b communicates in coaxial relation with the through hole 56b. The first shaft member 59L is inserted in the through holes 57b and 56b. The first gear 56L and the second gear 57L constitute a unitary two-step gear in flanged form, which is rotatably supported by the first shaft member 59L.

[0115] A left-hand third gear 58L has a meshing engagement with the second gear 57L situated below it. The third gear 58L is constructed of a disk-shaped gear which is larger in diameter than the second gear 57L, and formed with a centrally located through hole 58b. The through hole 58b receives a second shaft member 60L mounted to the base mount 9.

[0116] The third gear 58L is rotatably supported by the second shaft member 60L. The rotational driving force exerted by the drive motor 15 is transmitted from the worm gear 15b to the first gear 56L, and from there to the third gear 58L through

the second gear 57L mounted for unitary rotation with the first gear 56L.

[0117] As shown in the drawings such as FIGs. 4, 5, 8, and 9, the left-hand rotary boss part 26L is a member situated at the upper portion of the left-hand massage member 24L. The left-hand rotary boss part 26L in this embodiment is made in the form of a flanged member having the third gear 58L integral therewith.

[0118] The left-hand rotary boss part 26L comprises: a disk-shaped rear cylindrical part 36L; and a front cylindrical part 37L of smaller diameter situated forward of the rear cylindrical part 36L. The rear cylindrical part 36L is formed at the axial center (corresponding to the center of the left-hand rotary boss part 26L) with a hole part 38L in which the second shaft member 60L is inserted. The front cylindrical part 37L is off-centered with respect to the center of the rear cylindrical part 36L.

[0119] The front cylindrical part 37L is provided at the front side with a star-shaped engagement part 37b for securing the left-hand upper treatment element 4d (upper treatment element 4d). The left-hand upper treatment element 4d has a base end secured to the engagement part 37b, and is eccentrically rotated about the engagement part 37b.

[0120] The left-hand upper treatment element 4d is substantially identical in shape with the right-hand upper

treatment element 4a. The front cylindrical part 37L is inserted in a through hole 24b formed in the base end of the left-hand massage member 24L. This allows the left-hand massage member 24L to be rotatably mounted to the left-hand rotary boss part 26L.

[0121] Moreover, a star-shaped fitting part (not shown) formed inside the left-hand upper treatment element 4d has a meshing engagement with the engagement part 37b protruding from the through hole 24b. This allows the left-hand upper treatment element 4d to be secured to the left-hand rotary boss part 26L.

[0122] As the left-hand rotary boss part 26L is rotated, the left-hand upper treatment element 4d is rotated correspondingly. Upon rotation of the third gear 58L, the left-hand rotary boss part 26L is rotated eccentrically with respect to the second shaft member 60L. The left-hand upper treatment element 4d is thereupon eccentrically rotated about the axis directed in the front-rear direction with accompanying vertical and horizontal rocking motions of the left-hand massage member 24L.

[0123] Next, the left-hand massage unit 12L will be described. The left-hand massage unit 12L is configured similarly in mirror image relation to the right-hand massage unit 12R in the horizontal direction, and hence no mention will be made of the details of the massage unit 12L.

[0124] As shown in the drawings such as FIGs. 4, 5, 8, and

9, the left-hand massage unit 12L is provided at the base end side with the left-hand converter 13L to convert a rotational driving force into sandwiching-holding action (i.e. vertical rocking motion), and transmits the action to the left-hand massage unit 12L.

[0125] The left-hand converter 13L in this embodiment corresponds to the left-hand rotary boss part 26L. The left-hand converter 13L converts, with the eccentric rotation of the left-hand rotary boss part 26L, the rotation of the third gear 58L into sandwiching-holding action (vertical rocking motion) of the left-hand massage member 24L.

[0126] The left-hand massage unit 12L includes the left-hand massage member 24L to massage the right treatment target area. The left-hand massage member 24L is formed as a vertically elongated arm member. The left-hand massage member 24L is provided at the base end with the through hole 24d in which the front cylindrical part 37L of the left-hand rotary boss part 26L is inserted.

[0127] The left-hand massage member 24L is provided intermediate its lengthwise ends with a vertically elongated restraint groove 24e. The restraint groove 24e restrains the left-hand massage member 24L from rotating together with the front cylindrical part 37L. Upon eccentric rotation of the left-hand rotary boss part 26L, a restraint pin slides substantially vertically in the restraint groove 24e. This

restrains the left-hand massage member 24L from rotating together with the left-hand rotary boss part 26L. The left-hand massage member 24L is thus allowed to perform vertical rocking motion.

[0128] Upon rotation of the left-hand rotary boss part 26L, the front cylindrical part 37L is eccentrically rotated with respect to the second shaft member 60L with accompanying vertical rocking motion of the left-hand massage member 24L. That is, the left-hand massage member 24L and the left-hand rotary boss part 26L constitute a slider-crank mechanism.

[0129] The left-hand massage member 24L has a front end slightly bent outwardly. The front end is provided with a mount part 24f to which the left-hand lower treatment element 4f (the lower treatment element 4f) is rotatably mounted. The left-hand lower treatment element 4f is substantially identical in shape with the right-hand lower treatment element 4c.

[0130] That is, upon rotation of the third gear 58L, the left-hand rotary boss part 26L (the left-hand converter 13L) is rotated eccentrically with respect to the second shaft member 60L for conversion into sandwiching-holding action (vertical rocking motion). The left-hand massage member 24L is thereupon rocked vertically and horizontally with accompanying vertical and horizontal rocking motions of the left-hand lower treatment element 4f.

[0131]

[Operation Modes]

The following describes the modes of operating the massage mechanism 2 according to this embodiment with reference to the drawings.

<First Sandwiching-Holding Operation (Forward Rotation Mode)>

Figure 4 is a perspective view showing the massage mechanism 2 according to this embodiment in the forward rotation mode, as viewed from the front. Figure 5 is a perspective view showing the massage mechanism 2 according to this embodiment in the forward rotation mode, as viewed from the rear. Figure 6 is a rear view of the massage mechanism 2 according to this embodiment in the forward rotation mode, with the right-hand rotary boss part 26R partially shown in section.

[0132] Figures 4 to 6 are views showing the massage mechanism in the first sandwiching-holding operation (corresponding to squeezing massage in the forward rotation mode). At this time, the third gear 58R is rotated forward. Under the operation of the half-turn clutch mechanism 14 (the switcher 14), subsequent to a half-turn of the third gear 58 in the direction of forward rotation, the right-hand rotary boss part 26R is rotated forward. This results in phase change so that the left-hand massage unit 12L and the right-hand massage unit 12R are rotated with rocking motion of the same phase. FIG. 7 is an enlarged view of the section of the right-hand rotary boss part 26R shown in FIG. 6.

[0133] For example, the user wraps right and left belts

(not shown) attached to the massage mechanism 2 around the waist so that the right-hand upper and lower treatment elements 4a and 4c, and the left-hand upper and lower treatment elements 4d and 4f abut on the waist. The user then operates an operating panel (not shown) mounted to the massage mechanism 2 to instruct the massage mechanism 2 to perform, for example, the first sandwiching-holding operation corresponding to massage in the forward rotation mode. In accordance with the instruction, the driver 10 drives the right-hand drive mechanism 10R and the left-hand drive mechanism 10L.

[0134] As shown in the drawings such as FIGs. 4 to 7, the left-hand drive mechanism 10L transmits a rotational driving force having a component of the direction of forward rotation, being hereinafter called a forward-rotation component, which has been outputted via the left-hand output shaft 15b of the drive motor 15, to the left-hand rotary boss part 26L. At this time, the drive motor 15, while outputting the rotational driving force via the left-hand output shaft 15b, outputs a rotational driving force having a forward-rotation component via the right-hand output shaft 15a simultaneously.

[0135] The rotational driving force having a forward-rotation component is transmitted from the left-hand output shaft 15b to the left-hand first gear 56L, thus causing the two-step gear constituted by the first gear 56L and the second gear 57L to rotate. The rotational driving force having a

forward-rotation component is then transmitted from the second gear 57L to the third gear 58L, thus causing the third gear 58L to rotate in the direction of forward rotation, or specifically rotate outwardly toward the left of the device (i.e. rotate counterclockwise when viewed in the rear elevation of FIG. 6). Upon the forward rotation of the third gear 58L, the left-hand rotary boss part 26L provided integrally with the third gear 58L is unitarily rotated in the direction of forward rotation.

[0136] The left-hand converter 13L performs conversion into vertical rocking motion of constant phase, and the left-hand massage member 24L (the left-hand massage unit 12L) is thus allowed to perform sandwiching-holding action of constant phase. The left-hand upper treatment element 4d is, while being eccentrically rotated outwardly toward the left of the device, moved closer to the left-hand lower treatment element 4f for sandwiching-holding action.

[0137] On the other hand, the right-hand drive mechanism 10R transmits a rotational driving force having a forward-rotation component, which has been outputted via the right-hand output shaft 15a of the drive motor 15, to the right-hand rotary boss part 26R. The rotational driving force having a forward-rotation component is transmitted from the right-hand output shaft 15a to the right-hand first gear 56R, thus causing the two-step gear constituted by the first gear 56R and the second gear 57R to rotate.

[0138] The rotational driving force having a forward-rotation component is transmitted from the second gear 57R to the third gear 58R (rotator), thus causing the third gear 58R to rotate in the direction of forward rotation (i.e. rotate outwardly toward the right of the device). Upon the forward rotation of the third gear 58R, the hook part 51 is allowed to perform sliding motion in the circumferential direction of forward rotation (i.e. clockwise direction when viewed in the rear elevation of FIG. 6) within the hook groove part 52 of the right-hand rotary boss part 26R, and then rotated a half-turn about the axis of the second shaft member 60R (shaft body) in the direction of forward rotation.

[0139] In the right-hand converter 13R, under the operation of the half-turn clutch mechanism 14 (the switcher 14), upon a half-turn of the third gear 58R about the axis of the second shaft member 60R in the direction of forward rotation, the right-hand rotary boss part 26R is rotated in the direction of forward rotation with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L.

[0140] That is, in the right-hand converter 13R, the third gear 58R turns in a freewheeling condition by half turn in the direction of forward rotation. The right-hand converter 13R is subsequently rotated in synchronization with the left-hand converter 13L, and the right-hand massage unit 12R performs sandwiching-holding action in phase with the left-hand massage

unit 12L accordingly.

[0141] Specifically, upon rotation of the third gear 58R in the direction of forward rotation, the hook part 51 is allowed to perform sliding motion in the circumferential direction of forward rotation within the semicircular hook groove part 52. The third gear 58R then turns in a freewheeling condition by half turn about the axis of the second shaft member 60R in the direction of forward rotation.

[0142] Upon a half-turn of the third gear 58R (the switching shaft 53) in the direction of forward rotation, under the operation of the half-turn clutch mechanism 14, the first terminal end wall 51a of the hook part 51 engages the first rotation switching part 54 (the first terminal end wall 54) within the hook groove part 52. The right-hand rotary boss part 26R is thereupon rotationally moved with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L. Thus, the right-hand rotary boss part 26R is rotated forward with the forward rotation of the third gear 58R just as with the third gear 58R.

[0143] When delayed in operation, the right-hand converter 13R is allowed to perform conversion into vertical rocking motion of constant phase just as with the left-hand converter 13L. This enables the right-hand massage member 24R (the right-hand massage unit 12R) to perform sandwiching-holding action of constant phase. The right-hand upper treatment element 4a is, while being

eccentrically rotated outwardly toward the right of the device, moved closer to the right-hand lower treatment element 4c for sandwiching-holding action.

[0144] During the time the hook part 51 is reaching the first rotation switching part 54 for mutual engagement (i.e. during the interval that the third gear 58R serving as the switching shaft 53 is being rotated a half-turn in the direction of forward rotation), the left-hand massage unit 12L (the left-hand massage member 24L) is in motion for sandwiching-holding action, whereas the right-hand massage unit 12R (the right-hand massage member 24R) is at a standstill.

[0145] Under the operation of the half-turn clutch mechanism 14, the right-hand rotary boss part 26R is rotated for sandwiching-holding action in phase with the left-hand rotary boss part 26L. That is, the left-hand converter 13L and the right-hand converter 13R synchronously perform conversion to produce rocking motions of the same phase, and the right-hand massage member 24R and the left-hand massage member 24L are allowed to perform their movements in the same phase accordingly. This results in phase change so that the right-hand massage unit 12R and the left-hand massage unit 12L perform sandwiching-holding actions in the same phase for execution of the first sandwiching-holding operation.

[0146] That is, the half-turn clutch mechanism 14 achieves synchronization between conversion movement of the left-hand

rotary boss part 26L (the left-hand converter 13L) for the left-hand massage unit 12L and conversion movement of the right-hand rotary boss part 26R (the right-hand converter 13R) for the right-hand massage unit 12R. This results in phase change so that the left-hand massage unit 12L and the right-hand massage unit 12R perform sandwiching-holding actions in the same phase for execution of the first sandwiching-holding operation.

[0147] Thus, the left-hand and right-hand massage members 24L and 24R are rocked for sandwiching-holding actions in the same phase. The right-hand massage member 24R applies massage to the upper-right treatment target area of the user by the right-hand upper treatment element 4a in a condition of eccentrically rotating outwardly and rightwardly. In addition, the right-hand massage member 24R applies massage to the lower-right treatment target area of the user by the right-hand lower treatment element 4c in a condition of rocking vertically and horizontally.

[0148] On the other hand, the left-hand massage member 24L applies massage to the upper-left treatment target area of the user by the left-hand upper treatment element 4d in a condition of eccentrically rotating outwardly and leftwardly. In addition, the left-hand massage member 24L applies massage to the lower-left treatment target area of the user by the left-hand lower treatment element 4f in a condition of rocking vertically and horizontally.

[0149]

<SecondSandwiching-HoldingOperation (BackwardRotationMode)>

Figure 8 is a perspective view showing the massage mechanism 2 according to this embodiment in the backward rotation mode, as viewed from the front. Figure 9 is a perspective view showing the massage mechanism 2 according to this embodiment in the backward rotation mode, as viewed from the rear. Figure 10 is a rear view showing the massage mechanism 2 according to this embodiment in the backward rotation mode, with the right-hand rotary boss part 26R partially shown in section.

[0150] Figures 8 to 10 are views showing the massage mechanism in the second sandwiching-holding operation. Under the operation of the half-turn clutch mechanism 14 (the switcher 14), subsequent to a half-turn of the third gear 58 in the direction of backward rotation, the right-hand rotary boss part 26R is rotated backward. This results in phase change so that the sandwiching-holding action of the right-hand massage unit 12R falls behind in phase with respect to the sandwiching-holding action of the left-hand massage unit 12L. Figure 11 is an enlarged view of the section of the right-hand rotary boss part 26R shown in FIG. 10.

[0151] The user performs switching operation to select the second sandwiching-holding operation corresponding to massage in the backward rotation mode by using the operating panel mounted to the massage mechanism 2. In accordance with the switching instruction, the driver 10 changes the rotation direction to

the direction of backward rotation, and drives the right-hand drive mechanism 10R and the left-hand drive mechanism 10L.

[0152] As shown in the drawings such as FIGs. 8 to 11, upon switching to the backward rotation mode under the switching instruction, the left-hand drive mechanism 10L transmits a rotational driving force having a component of the direction of backward rotation, being hereinafter called a backward-rotation component, which has been outputted via the left-hand output shaft 15b of the drive motor 15, to the left-hand rotary boss part 26L. At this time, the drive motor 15, while outputting the rotational driving force via the left-hand output shaft 15b, outputs a rotational driving force having a backward-rotation component via the right-hand output shaft 15a simultaneously.

[0153] The rotational driving force having a backward-rotation component is transmitted from the left-hand output shaft 15b to the left-hand first gear 56L, thus causing the two-step gear constituted by the first gear 56L and the second gear 57L to rotate. The rotational driving force having a backward-rotation component is then transmitted from the second gear 57L to the third gear 58L, thus causing the third gear 58L to rotate backward, or specifically rotate inwardly toward the right of the device (i.e. rotate clockwise when viewed in the rear elevation of FIG. 10).

[0154] Upon the backward rotation of the third gear 58L,

the left-hand rotary boss part 26L provided integrally with the third gear 58L is unitarily rotated in the direction of backward rotation. The left-hand converter 13L performs conversion into vertical rocking motion of constant phase, and the left-hand massage member 24L (the left-hand massage unit 12L) is thus allowed to perform sandwiching-holding action of constant phase. The left-hand upper treatment element 4d is, while being eccentrically rotated inwardly toward the right of the device, moved closer to the left-hand lower treatment element 4f for sandwiching-holding action.

[0155] On the other hand, upon switching to the backward rotation mode under the switching instruction, the right-hand drive mechanism 10R transmits a rotational driving force having a backward-rotation component, which has been outputted via the right-hand output shaft 15a of the drive motor 15, to the right-hand rotary boss part 26R. The rotational driving force having a backward-rotation component is transmitted from the right-hand output shaft 15a to the right-hand first gear 56R, thus causing the two-step gear constituted by the first gear 56R and the second gear 57R to rotate.

[0156] The rotational driving force having a backward-rotation component is transmitted from the second gear 57R to the third gear 58R (rotator), thus causing the third gear 58R to rotate in the direction of backward rotation (i.e. rotate inwardly toward the left of the device). Upon the backward

rotation of the third gear 58R, the hook part 51 is allowed to perform sliding motion in the circumferential direction of backward rotation (i.e. counterclockwise direction when viewed in the rear elevation of FIG. 10) within the hook groove part 52 of the right-hand rotary boss part 26R, and then rotated a half-turn about the axis of the second shaft member 60R (shaft body) in the direction of backward rotation.

[0157] In the right-hand converter 13R, under the operation of the half-turn clutch mechanism 14 (the switcher 14), upon a half-turn of the third gear 58R about the axis of the second shaft member 60R in the direction of backward rotation, the right-hand rotary boss part 26R is rotated in the direction of backward rotation with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L.

[0158] That is, in the right-hand converter 13R, the third gear 58R turns in a freewheeling condition by half turn in the direction of backward rotation. The right-hand converter 13R is subsequently rotated differently from the left-hand converter 13L, and the right-hand massage unit 12R performs sandwiching-holding action in a different phase from the left-hand massage unit 12L accordingly.

[0159] Specifically, upon rotation of the third gear 58R in the direction of backward rotation, the hook part 51 is allowed to perform sliding motion in the circumferential direction of backward rotation within the semicircular hook groove part 52.

The third gear 58R then turns in a freewheeling condition by half turn about the axis of the second shaft member 60R in the direction of backward rotation.

[0160] Upon a half-turn of the third gear 58R (the switching shaft 53) in the direction of backward rotation, under the operation of the half-turn clutch mechanism 14, the second terminal end wall 51b of the hook part 51 engages the second rotation switching part 55 (the second terminal end wall 55) within the hook groove part 52. The right-hand rotary boss part 26R is thereupon rotationally moved with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L. Thus, the right-hand rotary boss part 26R is rotated backward with the backward rotation of the third gear 58R just as with the third gear 58R.

[0161] When delayed in operation, the right-hand converter 13R is allowed to perform conversion into vertical rocking motion of different phase as contrasted to the left-hand converter 13L. This enables the right-hand massage member 24R (the right-hand massage unit 12R) to perform sandwiching-holding action of different phase.

[0162] The right-hand upper treatment element 4a is, while being eccentrically rotated inwardly toward the left of the device, moved closer to the right-hand lower treatment element 4c to effect sandwiching-holding movement with a time delay with respect to the sandwiching-holding movement of the left-hand

upper treatment element 4d and the left-hand lower treatment element 4f. In a sense, the sandwiching-holding movement of the right-hand upper and lower treatment elements 4a and 4c seems to be effected first, that is; the sandwiching-holding movement of the left-hand upper and lower treatment elements 4d and 4f is delayed.

[0163] During the time the hook part 51 is reaching the second rotation switching part 55 for mutual engagement (i.e. during the interval that the third gear 58R serving as the switching shaft 53 is being rotated a half-turn in the direction of backward rotation), the left-hand massage unit 12L (the left-hand massage member 24L) is in motion for sandwiching-holding action, whereas the right-hand massage unit 12R (the right-hand massage member 24R) is at a standstill.

[0164] Under the operation of the half-turn clutch mechanism 14, the right-hand rotary boss part 26R is moved with a delay with respect to the movement of the left-hand rotary boss part 26L, and rotated in a phase different from the phase of rotation of the left-hand rotary boss part 26L. That is, the right-hand converter 13R performs conversion to produce rocking motion of delayed phase as contrasted to the conversion operation of the left-hand converter 13L. Thus, the right-hand massage member 24R is rocked with a delay with respect to the rocking motion of the left-hand massage member 24L. This results in phase change so that the right-hand massage unit 12R and the

left-hand massage unit 12L perform sandwiching-holding action in different phases for execution of the second sandwiching-holding operation.

[0165] That is, the half-turn clutch mechanism 14 performs delayed conversion operation to delay the conversion operation of the right-hand rotary boss part 26R (the right-hand converter 13R) for the right-hand massage unit 12R with respect to the conversion operation of the left-hand rotary boss part 26L (the left-hand converter 13L) for the left-hand massage unit 12L. This permits switching to the second sandwiching-holding operation in which the sandwiching-holding action of the right-hand massage unit 12R falls behind in phase with respect to the sandwiching-holding action of the left-hand massage unit 12L.

[0166] With the right-hand massage member 24R being operated to effect sandwiching-holding movement in a different phase from the left-hand massage member 24L (i.e. delayed grasping and kneading movement), the right-hand upper treatment element 4a is eccentrically rotated differently from the left-hand upper treatment element 4d. More specifically, while the left-hand upper treatment element 4d is eccentrically rotated inwardly and rightwardly, the right-hand upper treatment element 4a is eccentrically rotated inwardly and leftwardly with a delay by a time of half-circle rotation with respect to the rotation of the left-hand upper treatment element 4d. This allows massage

to be performed on the upper-right treatment target area of the user.

[0167] Moreover, in the right-hand massage member 24R, the right-hand lower treatment element 4c effects vertical and horizontal rocking motion for approaching-separating action differently from (with a delay with respect to) the left-hand lower treatment element 4f. This allows massage to be performed on the lower-right treatment target area of the user.

[0168] In the left-hand massage member 24L, the left-hand upper treatment element 4d is eccentrically rotated inwardly and rightwardly. This allows massage to be performed on the upper-left treatment target area of the user. In addition, the left-hand lower treatment element 4f is rocked vertically and horizontally. This allows massage to be performed on the lower-left treatment target area of the user.

[0169] That is, the right-hand massage unit 12R applies pressing massage to a body area from a lower part of the right side of the back to the right side of the waist, for example. The left-hand massage unit 12L applies pressing massage to a body area from a lower part of the left side of the back to the left side of the waist, for example. Thus, the half-turn clutch mechanism 14 permits switching between the first sandwiching-holding operation and the second sandwiching-holding operation by changing the direction of rotation of the third gear 58R (the switching shaft 53) between

the forward direction and the backward direction.

[0170] In the massage mechanism 2 according to this embodiment, during massage operation with the third gear 58R being rotated forward or backward, the right-hand upper and lower treatment elements 4a and 4c, as well as the left-hand upper and lower treatment elements 4d and 4f, are moved so as to sandwich and hold a treatment target area. At this time, each treatment element, which is made of an elastic material (e.g. a material which deforms when pressed firmly), is appropriately changed in shape. This allows comfortable massage to be performed on the treatment target areas.

[0171] For example, as shown in FIG. 1, the right-hand upper treatment element 4a and the left-hand upper treatment element 4d each have a front end made of a rubber-like material. Furthermore, the front end of each of the right-hand and left-hand upper treatment elements 4a and 4d is preferably thinned at its thicker portion (internally recessed to form a space with the addition of a raised rib) for resilient flexure upon target area-holding motion of the upper treatment element 4a, 4d and the lower treatment element 4c, 4f, with adequate strength maintained.

[0172] That is, preferably, each of the right-hand and left-hand upper treatment elements 4a and 4d has a front end covered with a rubber-like member, and some space is left within that portion of the element which is abutted on the treatment

target area for adequate deformation. In addition, the right-hand lower treatment element 4c and the left-hand lower treatment element 4f are preferably made of an elastic material.

[0173] In sum, under the operation of the half-turn clutch mechanism 14 in this embodiment, upon forward rotation of the third gear 58R serving as the switching shaft 53, the first terminal end wall 51a of the hook part 51 engages the first rotation switching part 54 within the hook groove part 52. The engagement delays the rotation of the right-hand rotary boss part 26R by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L, with consequent synchronization in rotation between the right-hand rotary boss part 26R and the left-hand rotary boss part 26L. This results in phase change so that the right-hand massage unit 12R and the left-hand massage unit 12L perform sandwiching-holding actions in the same phase ("in-phase" relation).

[0174] Thus, the left-hand massage member 24L and the right-hand massage member 24R are capable of massaging the waist by effecting sandwiching-holding movements in the same phase.

[0175] Moreover, under the operation of the half-turn clutch mechanism 14 in this embodiment, upon backward rotation of the third gear 58R serving as the switching shaft 53, the second terminal end wall 51b of the hook part 51 engages the second rotation switching part 55 within the hook groove part 52. This delays the rotation of the right-hand rotary boss part

26R by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L for delayed action of the right-hand massage unit 12R. This results in phase change so that the sandwiching-holding action of the right-hand massage unit 12R falls behind in phase with respect to the sandwiching-holding action of the left-hand massage unit 12L ("delayed-phase" relation)

[0176] Thus, the right-hand massage member 24R is capable of massaging the right side of the waist of the user with sandwiching-holding action in a different phase from the left-hand massage member 24L. That is, the left-hand massage unit 12L (the left-hand massage member 24L) applies pressing massage to a body area from a lower part of the left side of the back to the left side of the waist, and the right-hand massage unit 12R (the right-hand massage member 24R) applies pressing massage to a body area from a lower part of the right side of the back to the right side of the waist.

[0177] That is, under the operation of the switcher 14 (the half-turn clutch mechanism 14) according to this embodiment, upon a half-turn of the third gear 58R (the switching shaft 53) serving as a rotator about the axis of the second shaft member 60R serving as a shaft body in one of the direction of forward rotation and the direction of backward rotation, the hook part 51 mounted to the third gear 58R engages the terminal end wall 54, 55 (the first rotation switching part 54 or the second rotation

switching part 55) within the hook groove part 52 provided in the right-hand rotary boss part 26R. The right-hand rotary boss part 26R is thereupon rotated with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L. This causes changing of the phase of the sandwiching-holding action of the right-hand massage unit 12R.

[0178] That is, a pair of horizontally arranged massage units 12 include a first massage unit 12R (i.e. the right-hand massage unit 12R) and a second massage unit 12L (i.e. the left-hand massage unit 12L).

[0179] The first massage unit 12R comprises the right-hand upper treatment element 4a and the right-hand lower treatment element 4c that are moved toward and away from each other in the vertical direction for applying grasping and kneading massage to a treatment target area. The second massage unit 12L comprises the left-hand upper treatment element 4d and the left-hand lower treatment element 4f, each mounted to be paired with the corresponding treatment element of the first massage unit 12R. The treatment elements 4d and 4f are vertically moved toward and away from each other for applying grasping and kneading massage to another treatment target area.

[0180] The first massage unit 12R and the second massage unit 12L can be switched between a mode for the first sandwiching-holding operation and a mode for the second sandwiching-holding operation by the switcher 14 (the half-turn

clutch mechanism 14).

[0181] In the first sandwiching-holding operation, the approaching-separating movement of the right-hand upper treatment element 4a and the right-hand lower treatment element 4c of the first massage unit 12R is equal in phase to the approaching-separating movement of the left-hand upper treatment element 4d and the left-hand lower treatment element 4f of the second massage unit 12L. That is, in the first sandwiching-holding operation, the paired left-hand and right-hand massage units 12L and 12R simultaneously perform repeated grasping-kneading massage actions.

[0182] In the second sandwiching-holding operation, the approaching-separating movement of the right-hand upper treatment element 4a and the right-hand lower treatment element 4c of the first massage unit 12R differs in phase from the approaching-separating movement of the left-hand upper treatment element 4d and the left-hand lower treatment element 4f of the second massage unit 12L. That is, in the second vertical-movement operation, for example, subsequent to grasping-kneading massage action of the second massage unit 12L, the first massage unit 12R performs delayed grasping-kneading massage action. That is, the massage units perform repeated actions in a timewise staggered manner. The massage mechanism 2 according to this embodiment not only changes the phase relation between the left-hand and right-hand massage units 12 but also

causes a difference in timing of approaching-separating movement between the upper and lower treatment elements 4 in the left-hand massage unit 12 and the upper and lower treatment elements 4 in the right-hand massage unit 12.

[0183]

[Second Embodiment]

As exemplary of the second embodiment of the present invention, a neck-worn massager 1 incorporating the massage mechanism 2 embodying the present invention will be described. For the description of this embodiment, the directions with respect to the massager 1, including a front-rear direction and a right-left, or horizontal direction, are as shown in the drawings. These directions coincide with those as viewed from a user wearing the massager 1 around the neck-to-shoulder area, for example. In the following description, the directions indicated in the drawings are used as the reference to explain the neck-worn massager 1 incorporating the massage mechanism 2 embodying the present invention. In the drawings, some constituent components are not shown or are indicated by imaginary lines or the like for clarity of illustration.

[0184] The characteristics of the massage mechanism 2 according to this embodiment will be described first.

[0185] A structural feature of the massage mechanism 2 according to this embodiment is that the approaching-separating movement (sandwiching-holding movement) of right-hand upper

treatment elements 4a, 4b in a set and a right-hand lower treatment element 4c provided in a right-hand massage unit 12R and the approaching-separating movement (sandwiching-holding movement) of left-hand upper treatment elements 4d, 4e in a set and a left-hand lower treatment element 4f provided in a left-hand massage unit 12L can be timed not to coincide with each other (can be timewise staggered with respect to each other).

[0186] That is, in the massage mechanism 2 according to this embodiment, the right-hand upper treatment elements 4a, 4b and the left-hand upper treatment elements 4d, 4e are moved toward and away from each other in the horizontal direction, and also, the right-hand lower treatment element 4c is moved toward and away from the right-hand upper treatment elements 4a, 4b, and the left-hand lower treatment element 4f is moved toward and away from the left-hand upper treatment elements 4d, 4e.

[0187] An additional feature of the massage mechanism 2 according to this embodiment is that, to achieve alternate squeezing massage (grasping and kneading massage), the vertical approaching-separating movement of the right-hand upper treatment elements 4d, 4e and the right-hand lower treatment element 4f provided in the right-hand massage unit 12R can be timed not to coincide with the same movement of the left-hand upper treatment elements 4a, 4b and the left-hand lower treatment element 4c provided in the left-hand massage unit 12L.

[0188] That is, in the massage mechanism 2 according to this embodiment, the condition of sandwiching-holding action of the right-hand massage unit 12R can be changed by the switcher 14 (detailed later). This permits switching between an alternate squeezing (grasping-kneading) massage mode and a concurrent squeezing (grasping-kneading) massage mode. In the former mode, the right-hand upper treatment elements 4a, 4b and the right-hand lower treatment element 4c provided in the right-hand massage unit 12R and the left-hand upper treatment elements 4d, 4e and the left-hand lower treatment element 4f provided in the left-hand massage unit 12L sandwich and hold the corresponding treatment target areas in an alternating manner. In the latter mode, the treatment elements 4a, 4b and the treatment element 4c in the right-hand massage unit 12R and the treatment elements 4d, 4e and the treatment element 4f in the left-hand massage unit 12L sandwich and hold the corresponding treatment target areas in a concurrent manner.

[0189] In the massage mechanism 2 according to this embodiment, upon forward rotation of an output shaft 15a of a drive motor 15 (detailed later), in the left-hand massage unit 12L, the left-hand upper treatment elements 4d and 4e are rocked in the horizontal direction, and the left-hand lower treatment element 4f is moved toward and away from the left-hand upper treatment elements 4d and 4e in the vertical direction (in a constant manner).

[0190] Meanwhile, upon forward rotation of the output shaft 15a, the right-hand massage unit 12R is changed in operating condition by the switcher 14. The right-hand upper treatment elements 4a, 4b are horizontally rocked for movement toward and away from the left-hand upper treatment elements 4d, 4e in the horizontal direction. The right-hand lower treatment element 4c is vertically moved toward and away from the right-hand upper treatment elements 4a, 4b.

[0191] Thus, in the massage mechanism 2 according to this embodiment, the horizontal approaching-separating movement of the left-hand upper treatment elements 4d, 4e and the right-hand upper treatment elements 4a, 4b, the vertical movement of the left-hand lower treatment element 4f toward and away from the left-hand upper treatment elements 4d, 4e, and the vertical movement of the right-hand lower treatment element 4c toward and away from the right-hand upper treatment elements 4a, 4b are timed to coincide with one another (effected in the same phase). This process permits the "first sandwiching-holding operation".

[0192] That is, in the massage mechanism 2 according to this embodiment, upon forward rotation of the output shaft 15a, the right-hand upper treatment elements 4a, 4b and the left-hand upper treatment elements 4d, 4e repeat a cycle of mutual approaching movement to sandwich and hold a treatment target area in the horizontal direction and mutual separating movement

to relax the holding force horizontally acting on the treatment target area.

[0193] In addition, in the massage mechanism 2 according to this embodiment, upon forward rotation of the output shaft 15a, the left-hand lower treatment element 4f repeats a cycle of movement toward the left-hand upper treatment elements 4d, 4e to sandwich and hold a treatment target area in the vertical direction and movement away from the treatment elements 4d, 4e to relax the holding force vertically acting on the treatment target area, and simultaneously the right-hand lower treatment element 4c repeats a cycle of movement toward the right-hand upper treatment elements 4a, 4b to sandwich and hold a treatment target area in the vertical direction and movement away from the treatment elements 4a, 4b to relax the holding force vertically acting on the treatment target area.

[0194] That is, in the massage mechanism 2 according to this embodiment, while the right-hand upper treatment elements 4a, 4b and the left-hand upper treatment elements 4d, 4e sandwich and hold the treatment target area in the horizontal direction, the right-hand upper treatment elements 4a, 4b and the right-hand lower treatment element 4c sandwich and hold the treatment target area in the vertical direction, and simultaneously the left-hand upper treatment elements 4d, 4e and the left-hand lower treatment element 4f sandwich and hold the treatment target area in the vertical direction. This process allows concurrent grasping

and kneading massage to be performed on the target areas.

[0195] Moreover, in the massage mechanism 2 according to this embodiment, upon backward rotation of the output shaft 15a of the drive motor 15, in the left-hand massage unit 12L, the left-hand upper treatment elements 4d, 4e are rocked in the horizontal direction, and the left-hand lower treatment element 4f is moved toward and away from the left-hand upper treatment elements 4d, 4e in the vertical direction (in a constant manner).

[0196] Meanwhile, upon backward rotation of the output shaft 15a, the right-hand massage unit 12R is changed in operating condition by the switcher 14 so that the right-hand upper treatment elements 4a, 4b are horizontally rocked, and the left-hand upper treatment elements 4d, 4e are horizontally rocked, too.

[0197] Upon changing of the direction of rotation of a rotary drive shaft 11, under the operation of the switcher 14, a switching shaft 53 (i.e. rotator) is rotated a half-turn about the rotary drive shaft 11 (i.e. shaft body), and a right-hand first rotary boss part 26R and a right-hand second rotary boss part 46R are thereupon rotationally moved with a delay by a time of half turn with respect to the rotation of a left-hand first rotary boss part 26L and a left-hand second rotary boss part 46L. This causes the right-hand lower treatment element 4c to move with a delay by a time of half turn with respect to the movement of the left-hand lower treatment element 4f. The right-hand lower treatment

element 4c is thereupon vertically moved toward and away from the right-hand upper treatment elements 4a, 4b in timewise staggered relation to the left-hand lower treatment element 4f.

[0198] That is, in the right-hand massage unit 12R, the right-hand lower treatment element 4c is vertically rocked with a 180 degrees phase shift with respect to the rocking motion of the left-hand lower treatment element 4f (the right-hand unit is adjustable in operating condition).

[0199] Thus, in the massage mechanism 2 according to this embodiment, the left-hand upper treatment elements 4d, 4e and the right-hand upper treatment elements 4a, 4b are horizontally rocked, and the vertical movement of the right-hand lower treatment element 4c toward and away from the right-hand upper treatment elements 4a, 4b occurs with a time delay with respect to (occurs in a different phase from) the vertical movement of the left-hand lower treatment element 4f toward and away from the left-hand upper treatment elements 4d, 4e. This process permits the "second sandwiching-holding operation".

[0200] Thus, in the massage mechanism 2 according to this embodiment, upon backward rotation of the output shaft 15a, while the left-hand lower treatment element 4f is moved closer to the left-hand upper treatment elements 4d, 4e to sandwich and hold a treatment target area in the vertical direction, the right-hand lower treatment element 4c is moved away from the right-hand upper treatment elements 4a, 4b to relax the holding force

vertically acting on a treatment target area sandwiched between them.

[0201] After that, in the massage mechanism 2, while the left-hand lower treatment element 4f is moved away from the left-hand upper treatment elements 4d, 4e to relax the holding force vertically acting on the treatment target area, the right-hand lower treatment element 4c is moved closer to the right-hand upper treatment elements 4a, 4b to hold the treatment target area in the vertical direction. Thus, the left-hand element set and the right-hand element set repeat the movement cycle differently from each other.

[0202] That is, in the massage mechanism 2 according to this embodiment, the left-hand upper treatment elements 4d, 4e and the left-hand lower treatment element 4f effect constant approaching-separating movement. Meanwhile, due to the phase-changing operation of the switcher 14 on the right-hand massage unit 12R, the approaching-separating movement of the right-hand upper treatment elements 4a, 4b and the right-hand lower treatment element 4c falls behind in phase with respect to (is timed not to coincide with) the same movement of the left-hand upper and lower treatment elements. Thus, the right-hand upper treatment elements 4a, 4b and the right-hand lower treatment element 4c, and the left-hand upper treatment elements 4d, 4e and the left-hand lower treatment element 4f sandwich and hold the corresponding treatment target areas in

the vertical direction in an alternating manner (in a timewise staggered manner). This allows alternate grasping and kneading massage to be performed on the target areas.

[0203] The concrete descriptions of the massage mechanism 2 according to this embodiment will be given below.

[0204] Figure. 12 is a front perspective view showing the general configuration of the neck-worn massager 1 incorporating the massage mechanism 2 embodying the present invention (the second embodiment).

[0205] As shown in FIG. 12, the massager 1 according to this embodiment comprises a massager body 3 including the built-in massage mechanism 2. At the front side of the massager body 3, a plurality of treatment elements 4 are situated in protruding fashion. In this embodiment, there are provided three treatment elements 4 on each side of the massager body, or a total of six treatment elements 4 in all.

[0206] The massager body 3 is provided at the right side with a frontwardly extended right-hand grip part 5R. The right-hand grip part 5R has a right-hand belt grip 6R mounted on it in hanging-down fashion. The massager body 3 is also provided at the left side with a frontwardly extended left-hand grip part 5L. The left-hand grip part 5L has a left-hand belt grip 6L mounted on it in hanging-down fashion.

[0207] To receive massage, the user holds the left-hand grip part 5L and the right-hand grip part 5R in both hands, presses

the treatment elements 4 of the massager body 3 against treatment target areas, e.g., neck areas, shoulder areas, back areas, or waist areas, and actuates the massage mechanism 2. The treatment elements 4 can be pressed more firmly against the treatment target areas by pulling the left-hand and right-hand belt grips 6L and 6R downward with hands.

[0208] The massager 1 according to this embodiment comprises the massager body 3 in which the massage mechanism 2 is installed, and the grip parts 5 elongated to provide a grip for a user. Each grip part 5 has the pendent belt grip 6. The massager body 3 is constructed of a hollow housing made of, for example, synthetic resin. The massager body 3 comprises: a front cover body 3a of rearwardly-curved concave shape; and a rear cover body 3b of rearwardly-curved convex shape. The massage mechanism 2 is housed in an internal space defined by the front cover body 3a and the rear cover body 3b in their assembled condition.

[0209] The front face of the front cover body 3a (i.e. the front face of the massager body 3) is formed with a frontwardly opened opening part 7. The treatment elements 4 of the massage mechanism 2 are mounted so as to protrude frontward through the opening part 7. At the opening part 7, a flexible cloth material (not shown) is provided to cover the treatment elements 4. The cloth material reduces the strength of pressing force from the treatment elements 4. This allows comfortable massage to be

performed on treatment target areas.

[0210] The massager body 3 has a tapered left end extending obliquely leftwardly toward the front. The tip of the extended left end (i.e. left front end) is mounted with the frontwardly elongated right-hand grip part 5R. Likewise, the massager body 3 has a tapered right end extending obliquely rightwardly toward the front. The tip of the extended right end (i.e. right front end) is mounted with the frontwardly elongated left-hand grip part 5L. The left-hand and right-hand grip parts 5L and 5R are tapered frontward to provide an easy grip to a user.

[0211] The left-hand grip part 5L is internally provided with a controller to control the massaging operation of the massage mechanism 2. An operating panel 8 for operation of the controller is disposed on the upper surface of the left-hand grip part 5L. The user can carry out switching of massage modes by the switcher 14 installed in the massage mechanism 2, and also selection of massage conditions (e.g. massage strength level) by operating the operating panel 8 so that the controller issues corresponding commands to a driver 10 (described later). To use the massager 1 according to this embodiment, for example, the user may wear it around the neck-to-shoulder area, or may apply it to the waist area, by holding the left-hand and right-hand grip parts 5L and 5R in both hands.

[0212] Next, the massage mechanism 2 incorporated in the massager body 3 will be described in detail.

[0213] Figures. 12 to 20 are views showing the structure of the massage mechanism 2 according to this embodiment.

[0214] The upper drawing in FIG. 13, FIG. 14, FIG. 15, FIG. 16, etc. are views showing the massage mechanism, with the treatment elements 4a to 4f of the left-hand and right-hand massage units performing grasping massage. Concurrent grasping-kneading massage actions of the right-hand treatment elements 4a to 4c and the left-hand treatment elements 4d to 4f may be sometimes called "two-handed grasping massage".

[0215] The lower drawing in FIG. 13, FIG. 17, FIG. 18, FIG. 19, FIG. 20, etc. are views showing the massage mechanism, with a right-hand lower massage member 25R mounted with the right-hand lower treatment element 4c in a down position. In this condition, the left-hand treatment elements 4d to 4f are performing grasping-kneading massage, and the right-hand treatment elements 4a to 4c are performing delayed grasping-kneading massage.

[0216] The grasping-kneading massage action of the left-hand treatment elements 4d to 4f and the delayed grasping-kneading massage action of the right-hand treatment elements 4a to 4c, that is; alternate grasping-kneading massage actions, may be sometimes called "one-handed grasping massage".

[0217] The massage mechanism 2 according to this embodiment comprises: a driver 10, disposed on a base mount 9, for producing a driving force; the rotary drive shaft 11 to be rotated by the

driving force, which is disposed on the base mount 9, with its axis directed in the horizontal direction; the massage units 12 horizontally arranged to be paired on the base mount 9, each of which is provided at the front end with the treatment elements 4; a converter 13, mounted to the rotary drive shaft 11, for converting the driving force into sandwiching-holding action (i.e. vertical rocking motion) and transmitting the motion to the massage unit 12; and the switcher 14 that changes the phase relation between the sandwiching-holding actions of the massage units 12 by switching the rotation of the rotary drive shaft 11 between forward rotation and backward rotation.

[0218] In this embodiment, the switcher 14 is disposed toward the right-hand massage unit 12R. That is, the phase of sandwiching-holding action of the right-hand massage unit 12R is changed with respect to the phase (constant phase) of sandwiching-holding action of the left-hand massage unit 12L.

[0219] As shown in the drawings such as FIGs. 14, 17, and 20, the driver 10 comprises: the drive motor 15 that outputs a rotational driving force (i.e. driving force); and a gear case 16 that reduces the speed on the outputted rotational driving force to a predetermined level. The drive motor 15 is a reversible drive motor capable of both forward rotation and reverse rotation. The drive motor 15 can be controlled in the direction of rotation, speed, etc. by the operation of the operating panel 8.

[0220] The drive motor 15, which is situated at the rear

side of the base mount 9, is a single-axis motor having one output shaft 15a for outputting a rotational driving force. The output shaft 15a faces rightward in a horizontally oriented position. The output shaft 15a has a worm gear mounted thereon, and is inserted in the gear case 16. The worm gear 15a has a meshing engagement with a worm wheel 17 placed inside the gear case 16. The worm wheel 17 is mounted to the rear side of a transmission shaft 18.

[0221] The transmission shaft 18 is disposed on the base mount 9, with its axis directed in the front-rear direction. The transmission shaft 18 is rotatably supported via a bearing. A worm gear 20 is mounted to the front side of the transmission shaft 18. The worm gear 20 has a meshing engagement with a worm wheel 21 mounted to the rotary drive shaft 11.

[0222] That is, the driver 10 operates so that the rotational driving force produced by the drive motor 15 is subjected to speed reduction by the gear case 16, and then transmitted to the rotary drive shaft 11. At the lower portion of the base mount 9, a long cylindrical battery 22 is disposed in a horizontally oriented position. The battery 22 for use has enough capacity for actuation of the drive motor 15 and yet is made compact. The battery 22 may be constructed of, but not limited to, a lithium-ion battery.

[0223] The rotary drive shaft 11 is mounted so as to pass through the base mount 9 (the gear case 16), with its axis directed

in the horizontal direction (i.e. oriented in a horizontal position). The rotary drive shaft 11, constructed of a long shaft member in round bar form, is supported by a bearing 23 so that it can be freely changed in rotation direction. The rotary drive shaft 11 is arranged in parallel with the output shaft 15a of the drive motor 15. The worm wheel 21 is attached to the right side of the rotary drive shaft 11.

[0224] The rotary drive shaft 11 is provided at the right end side with a right-hand converter 13R (i.e. first converter 13R) to convert a rotational driving force into sandwiching-holding action (vertical rocking motion). The rotary drive shaft 11 is also provided at the left end side with a left-hand converter 13L (i.e. second converter 13L) to convert a rotational driving force into sandwiching-holding action (vertical rocking motion).

[0225] That is, the rotary drive shaft 11 is provided intermediate its lengthwise ends with the driver 10, provided at the left end with the left-hand massager unit 12L, and provided at the right end with the right-hand massager unit 12R. The rotary drive shaft 11 transmits the rotational driving force outputted from the drive motor 15 to each of the paired left-hand and right-hand massager units 12L and 12R in a distributive manner.

[0226] For the rotation of the rotary drive shaft 11, in this embodiment, a rotation in a direction from the rear to the front through the top (i.e. clockwise rotation as viewed in FIG.

15) is defined as "forward (normal) rotation", and a rotation in a direction from the front to the rear through the top (i.e. counterclockwise rotation as viewed in FIG. 18) is defined as "backward (reverse) rotation". However, the meanings of the forward rotation and the backward rotation may be replaced with each other.

[0227] As shown in the drawings such as FIGs. 14, 17, and 20, the massage units 12 include: the right-hand massage unit 12R configured to apply massage to a right treatment target area; and the left-hand massage unit 12L configured to apply massage to a left treatment target area. The massage unit 12 includes massage members 24 and 25 arranged to be paired in the vertical direction.

[0228] Moreover, the massage unit 12 is provided at the base end side with the converter 13 to convert a rotational driving force into sandwiching-holding action, and transmit the action to the massage unit 12. The converter 13 comprises: a rotary boss part 26, 46 mounted to the rotary drive shaft 11 for unitary rotation with the rotary drive shaft 11; an annular fitting part 27, 40 disposed at the base end of the massage member 12 so as to fit on the outer edge (corresponding to cam surface 30, 50) of the rotary boss part 26, 46; and a restraint part 28 that restrains the massage unit 12 from rotating together with the rotary drive shaft 11.

[0229] The rotary boss parts 26 and 46 in this embodiment

include a first rotary boss part 26 and a second rotary boss part 46. Moreover, the annular fitting parts 27 and 40 include a first annular fitting part 27 and a second annular fitting part 40.

[0230] The right-hand massage unit 12R will be described first. Figures 14 and 17 are exploded views showing the right-hand massage unit 12R, the right-hand converter 13R, and the switcher 14.

[0231] As shown in the drawings such as FIGs. 14 and 17, the right-hand massage unit 12R comprises: a right-hand upper massage member 24R for massaging an upper-right treatment target area; and a right-hand lower massage member 25R for massaging a lower-right treatment target area.

[0232] In this embodiment, the upper massage member 24 is configured to perform "kneading massage", whereas the lower massage member 25 is configured to perform "grasping massage". That is, the upper massage member 24 and the lower massage member 25 effect different massage movements.

[0233] As shown in the drawings such as FIGs. 14 and 17, the right-hand upper massage member 24R (i.e. right-hand first massage member 24R) comprises: a frontwardly extended right-hand upper arm member 29R; and a right-hand first annular fitting part 27R externally fitted to the right-hand first rotary boss part 26R (described later). The right-hand upper massage member 24R is configured in axisymmetric relation to a left-hand upper

massage member 24L (described later) in the horizontal direction.

[0234] The right-hand upper arm member 29R is shaped to have a base end located toward the rotary drive shaft 11, and a front end extending frontward away from the rotary drive shaft 11. The front end side of the right-hand upper arm member 29R is bifurcated to provide an upper portion and a lower portion. The upper portion of the right-hand upper arm member 29R is provided at the tip with a first treatment element 4a (i.e. upper treatment element 4a), and the lower portion of the arm member 29R is provided at the tip with a second treatment element 4b (i.e. upper treatment element 4b).

[0235] In this embodiment, the right-hand upper treatment element corresponds to two treatment elements, namely the first treatment element 4a and the second treatment element 4b provided in the right-hand upper massage member 24R, and the right-hand lower treatment element corresponds to a third treatment element 4c provided in the right-hand lower massage member 25R.

[0236] Moreover, the left-hand upper treatment element corresponds to two treatment elements, namely a left-hand upper treatment element 4d and a left-hand intermediate treatment element 4e provided in the left-hand upper massage member 24L, and the left-hand lower treatment element corresponds to a left-hand lower treatment element 4f provided in the left-hand lower massage member 25L.

[0237] The first treatment element 4a is attached to the

tip of the upper one of the bifurcated ends of the right-hand upper arm member 29R. The first treatment element 4a (the right-hand upper treatment element 4a), constructed of a cylindrical member having a rounded tip, is mounted for free rotational movement about the axis directed in the vertical direction.

[0238] The second treatment element 4b is attached to the tip of the lower one of the bifurcated ends of the right-hand upper arm member 29R. The second treatment element 4b (the right-hand intermediate treatment element 4b), constructed of a substantially rectangular round (oblong)-shaped member having a rounded pressing portion, is secured to the front end of the lower portion of the right-hand upper arm member 29R so as to face slightly upwardly toward the front. That is, the first treatment element 4a and the second treatment element 4b are arranged facing each other, with the right-hand upper arm member 29R lying in between, in the vertical direction.

[0239] The first treatment element 4a and the second treatment element 4b are rocked in the horizontal direction. The third treatment element 4c (described later) is moved toward and away from the first treatment element 4a and the second treatment element 4b in the vertical direction. The first treatment element 4a and the second treatment element 4b are allowed to perform their movements to apply massage (kneading massage) to the upper-right treatment target area when the

right-hand upper massage member 24R is rocked by the rotational driving force exerted by the rotary drive shaft 11.

[0240] The right-hand upper arm member 29R is provided at the base end side with the right-hand first annular fitting part 27R constituting the right-hand converter 13R. The right-hand first annular fitting part 27R is configured in axisymmetric relation to a left-hand first annular fitting part 27L (described later) in the horizontal direction. The right-hand first annular fitting part 27R is configured to fit to a right-hand first cam surface 30R of the right-hand first rotary boss part 26R.

[0241] That is, the inside diameter of the right-hand first annular fitting part 27R is substantially equal to the outside diameter of the right-hand first cam surface 30R. With the right-hand first annular fitting part 27R externally fitted to the right-hand first rotary boss part 26R, the right-hand upper massage member 24R is allowed to perform rotational movement about the axis of the right-hand first rotary boss part 26R.

[0242] A right-hand coupler 31R is disposed below the right-hand first annular fitting part 27R. The right-hand coupler 31R is mounted so as to protrude inward in the width direction. The right-hand coupler 31R is inserted in a right-hand coupling hole 42R formed in the right-hand lower massage member 25R, and provides connection between the right-hand upper massage member 24R and the right-hand lower

massage member 25R.

[0243] The right-hand coupler 31R enables the right-hand lower massage member 25R to rock in operative connection with the right-hand upper massage member 24R. That is, the right-hand upper massage member 24R and the right-hand lower massage member 25R are coupled to each other for free rotational movement about the axis of the right-hand coupler 31R.

[0244] A flat-shaped material 32R is disposed below the junction between the right-hand upper arm member 29R and the right-hand first annular fitting part 27R. The inner side surface of the flat-shaped material 32R is formed with a groove part 33. The groove part 33 guides a right-hand support shaft 44R that provides connection between a right-hand lower arm member 39R and a right-hand ring member 40R (i.e. right-hand second annular fitting part 40R).

[0245] As the right-hand upper massage member 24R is moved in the horizontal direction by the switching operation of the switcher 14, or specifically half-turn clutch mechanism 14 (described later), the right-hand support shaft 44R is moved vertically along the groove part 33 formed in the inner side surface of the flat-shaped material 32R of the right-hand upper massage member 24R.

[0246] The right-hand first annular fitting part 27R has a right-hand restraint part 28R to restrain the right-hand upper massage member 24R from rotating together with the right-hand

first rotary boss part 26R. The right-hand restraint part 28R comprises: a right-hand restraint pin 34R disposed toward the base end of the right-hand first annular fitting part 27R (the right-hand massage member 24R); and a right-hand restraint groove 35R in which the right-hand restraint pin 34R is slidably fitted.

[0247] The right-hand restraint pin 34R is mounted so as to protrude rearward from the outer periphery (i.e. rear side) of the right-hand first annular fitting part 27R. The right-hand restraint groove 35 is positioned face to face with the right-hand restraint pin 34, and formed as a horizontally elongated groove. The right-hand restraint pin 34 horizontally slides in the right-hand restraint groove 35, thereby restraining the right-hand upper massage member 24R from rotating together with the rotary drive shaft 11.

[0248] As shown in the drawings such as FIGs. 14 and 17, the first rotary boss parts 26 include the right-hand first rotary boss part 26R disposed at the right end of the rotary drive shaft 11, and the left-hand first rotary boss part 26L disposed at the left end of the rotary drive shaft 11. The right-hand first rotary boss part 26R and the left-hand first rotary boss part 26L are configured in axisymmetric relation to each other in the horizontal direction.

[0249] The right-hand first rotary boss part 26R is a member provided in the right-hand upper massage member 24R. The right-hand first rotary boss part 26R comprises: an outer

disk-shaped cylindrical member (i.e. right-hand outer cylindrical part 36R); and a cylindrical member of smaller diameter situated inwardly of the right-hand outer cylindrical part 36R (i.e. right-hand inner cylindrical part 37R).

[0250] That is, the right-hand first rotary boss part 26R is made in the form of a horizontally stepped cylindrical member (i.e. flanged member). The right-hand first rotary boss part 26R has a right-hand through hole 38R formed through the right-hand outer cylindrical part 36R and the right-hand inner cylindrical part 37R.

[0251] The right-hand through hole 38R receives the right end of the rotary drive shaft 11. In this embodiment, the right-hand outer cylindrical part 36R of the right-hand first rotary boss part 26R has its inner side surface inclined relative to its outer side surface. The inclined inner side surface of the right-hand outer cylindrical part 36R is formed with the right-hand inner cylindrical part 37R.

[0252] Moreover, the right-hand inner cylindrical part 37R is off-centered with respect to the right-hand through hole 38R. That is, the right-hand first rotary boss part 26R is mounted in offset relation to the rotary drive shaft 11.

[0253] The outer periphery of the right-hand inner cylindrical part 37R is formed with the right-hand first cam surface 30R inclined relative to the axis of the rotary drive shaft 11. The right-hand first cam surface 30R is configured

in axisymmetric relation to a left-hand first cam surface 30L (described later) in the horizontal direction.

[0254] The right-hand first cam surface 30R is configured to be fitted with the right-hand first annular fitting part 27R of the right-hand upper massage member 24R. Thus configured, the right-hand first rotary boss part 26R functions as an inclined rotary boss part.

[0255] Moreover, the right-hand inner cylindrical part 37R is mounted with its axis located in a position offset from the axis of the right-hand outer cylindrical part 36R. Thus configured, the right-hand first rotary boss part 26R functions as an eccentric rotary boss part. That is, the right-hand first rotary boss part 26R is rotated at an incline, as well as is rotated eccentrically, with respect to the axis of the rotary drive shaft 11.

[0256] As shown in the drawings such as FIGs. 14 and 17, the right-hand lower massage member 25R (i.e. right-hand second massage member 25R) is constructed of two combined members, namely the right-hand lower arm member 39R and the right-hand ring member 40R. The right-hand lower massage member 25R is configured in axisymmetric relation to the left-hand lower massage member 25L (described later) in the horizontal direction.

[0257] The right-hand lower arm member 39R is a member situated toward the front end of the right-hand lower massage member 25R. The right-hand lower arm member 39R has a lengthwise

intermediate portion bent downwardly into a substantially L-shaped bend, and has a front end bent frontwardly. The right-hand lower arm member 39R is provided at the front end with the third treatment element 4c (the right-hand lower treatment element 4c). The third treatment element 4c (the right-hand lower treatment element 4c) is substantially identical in shape with the first treatment element 4a, and mounted for free rotational movement about the axis directed in the front-rear direction.

[0258] The third treatment element 4c is vertically moved toward and away from the first treatment element 4a and the second treatment element 4b. That is, the first treatment element 4a and the second treatment element 4b are rocked in the horizontal direction, whereas the third treatment element 4c is rocked in the vertical direction.

[0259] The lengthwise intermediate portion (i.e. L-shaped bend) of the right-hand lower arm member 39R is formed with a right-hand through hole 41R having a horizontally directed axis. The right-hand through hole 41R receives the right-hand support shaft 44R that permits connection to the right-hand ring member 40R (described later).

[0260] The right-hand through hole 41R is brought into alignment with a right-hand through hole 45R of the right-hand ring member 40R to permit insertion of the right-hand support shaft 44R. The right-hand lower arm member 39R and the right-hand

ring member 40R are coupled to each other for free rotational movement about the axis of the right-hand support shaft 44R inserted in the right-hand through hole 41R and the right-hand through hole 45R.

[0261] The right-hand lower arm member 39R is provided at the base end side with the right-hand coupling hole 42R having a horizontally directed axis. The right-hand coupling hole 42R receives the right-hand coupler 31R of the right-hand upper massage member 24R. The right-hand upper massage member 24R and the right-hand lower massage member 25R are coupled to each other for free rotational movement about the axis of the right-hand coupler 31R inserted in the right-hand coupling hole 42R.

[0262] The right-hand ring member 40R is a member disposed on the base end side of the right-hand lower massage member 25R. The right-hand ring member 40R is configured in axisymmetric relation to a left-hand ring member 40L (described later) in the horizontal direction. The right-hand ring member 40R is ring-shaped for a fit at the outside of the right-hand second rotary boss part 46R (described later). That is, the right-hand ring member 40R corresponds to the right-hand second annular fitting part 40R.

[0263] The right-hand second annular fitting part 40R is provided at the outer periphery with a right-hand projecting part 43R. The right-hand projecting part 43R is formed so as

to protrude in a triangular shape, as seen in side view. The front end of the right-hand projecting part 43R is formed with the right-hand through hole 45R in which the right-hand support shaft 44R is inserted. The lengthwise intermediate portion of the right-hand lower arm member 39R is supported for free rotational movement about the axis of the right-hand support shaft 44R.

[0264] As shown in the drawings such as FIGs. 14 and 17, the second rotary boss parts 46 include the right-hand second rotary boss part 46R disposed inwardly of the right-hand first rotary boss part 26R on the rotary drive shaft 11, and the left-hand second rotary boss part 46L disposed inwardly of the left-hand first rotary boss part 26L on the rotary drive shaft 11. The right-hand second rotary boss part 46R and the left-hand second rotary boss part 46L are configured in axisymmetric relation to each other in the horizontal direction.

[0265] The right-hand second rotary boss part 46R is a member provided in the right-hand lower mass member 25R. The right-hand second rotary boss part 46R comprises: an inner disk-shaped cylindrical member (i.e. right-hand inner cylindrical part 47R); and a cylindrical member of smaller diameter situated outwardly of the right-hand inner cylindrical part 47R (i.e. right-hand outer cylindrical part 48R). That is, the right-hand second rotary boss part 46R is made in the form of a horizontally stepped cylindrical member (i.e. flanged

member)

[0266] The right-hand second rotary boss part 46R has a right-hand through hole 49R formed through the right-hand outer cylindrical part 48R and the right-hand inner cylindrical part 47R. The right-hand through hole 49R receives the right end of the rotary drive shaft 11. Moreover, the right-hand outer cylindrical part 48R is off-centered with respect to the right-hand through hole 49R. That is, the right-hand second rotary boss part 46R is mounted in offset relation to the rotary drive shaft 11.

[0267] In this embodiment, the right-hand inner cylindrical part 47R of the right-hand second rotary boss part 46R has its outer side surface inclined relative to its inner surface. The angle of inclination of the outer side surface of the right-hand inner cylindrical part 47R of the right-hand second rotary boss part 46R is equal to the angle of inclination of the inner side surface of the right-hand outer cylindrical part 36R of the right-hand first rotary boss part 26R.

[0268] That is, the outer side surface of the right-hand inner cylindrical part 47R and the inner side surface of the right-hand outer cylindrical part 36R are parallel to each other. The inclined outer side surface of the right-hand inner cylindrical part 47R is formed with the right-hand outer cylindrical part 48R. The outer periphery of the right-hand outer cylindrical part 48R is formed with a right-hand second

cam surface 50R inclined relative to the axis of the rotary drive shaft 11.

[0269] The right-hand second cam surface 50R is configured to be fitted with the right-hand second annular fitting part 40R (the right-hand ring member 40R) of the right-hand lower massage member 25R. The angle of inclination of the right-hand second cam surface 50R is equal to the angle of inclination of the right-hand first cam surface 30R relative to the axis of the rotary drive shaft 11. Thus configured, the right-hand second rotary boss part 46R functions as an inclined rotary boss part.

[0270] Moreover, the right-hand outer cylindrical part 48R is mounted with its axis located in a position offset from the axis of the right-hand inner cylindrical part 47R. Thus configured, the right-hand second rotary boss part 46R functions as an eccentric rotary boss part. That is, the right-hand second rotary boss part 46R is rotated at an incline, as well as is rotated eccentrically, with respect to the axis of the rotary drive shaft 11.

[0271] The right-hand converter 13R in this embodiment has a divided structure comprising: a set of the right-hand first rotary boss part 26R and the right-hand first annular fitting part 27R that enable the right-hand upper massage member 24R to rock; and a set of the right-hand second rotary boss part 46R and the right-hand second annular fitting part 40R that enable

the right-hand lower massage member 25R to rock.

[0272] The massage mechanism 2 embodying the present invention includes the switcher 14 to change the phase relation between the sandwiching-holding actions of the left-hand and right-hand massage units 12.

[0273] Figure 13 is a perspective view showing the general configuration of the massage mechanism 2 in operation to perform the first sandwiching-holding operation, as well as to perform the second sandwiching-holding operation. Figure 14 is an exploded view showing the right-hand converter 13R and the switcher 14 during the first sandwiching-holding operation. Figure 15 is a right side view in section of the right-hand first rotary boss part 26R during the first sandwiching-holding operation. Figure 16 is an enlarged view of the section of the right-hand first rotary boss part 26R shown in FIG. 15.

[0274] Figure 17 is an exploded view showing the right-hand converter 13R and the switcher 14 during the second sandwiching-holding operation. Figure 18 is a sectional view showing the right-hand first rotary boss part 26R during the second sandwiching-holding operation. Figure 19 is an enlarged view of the section of the right-hand first rotary boss part 26R shown in FIG. 18.

[0275] As shown in the drawings such as FIGs. 13 to 19, a structural feature of the massage mechanism 2 according to this embodiment is that the sandwiching-holding action of the

right-hand massage unit 12R and the sandwiching-holding action of the left-hand massage unit 12L can be timed not to coincide with each other (can be timewise staggered with respect to each other).

[0276] The right-hand converter 13R (the first converter 13R) includes a delay mechanism to cause a difference in timing of sandwiching-holding action between the right-hand massage unit 12R and the left-hand massage unit 12L by shifting the timing of the sandwiching-holding action of the right-hand massage unit 12R.

[0277] The delay mechanism includes the switcher 14 that changes the phase relation between the sandwiching-holding actions of the right-hand and left-hand massage units 12. The switcher 14 may be mounted to the left-hand converter 13L of the left-hand massage unit 12L.

[0278] The switcher 14 in this embodiment changes the phase of sandwiching-holding action (periodic action) of the right-hand massage unit 12R with respect to the phase (constant phase) of sandwiching-holding action of the left-hand massage unit 12L by switching the rotation of the rotary drive shaft 11 between forward rotation and backward rotation.

[0279] As shown in FIG. 13, the switcher 14 is configured to permit switching between the "first sandwiching-holding operation" (corresponding to two-handed grasping massage) and the "second sandwiching-holding operation" (corresponding to

one-handed grasping massager). In the first sandwiching-holding operation, the paired right-hand and left-hand massager units 12 perform sandwiching-holding actions in the same phase. In the second sandwiching-holding operation, subsequent to operation of one of the right-hand and left-hand massager units 12 (i.e. the left-hand massager unit 12L in this embodiment), the other massager unit 12 (i.e. the right-hand massager unit 12R in this embodiment) performs sandwiching-holding action in a delayed phase with respect to the phase of sandwiching-holding action of the one massager unit 12 (the left-hand massager unit 12L).

[0280] In this embodiment, the switcher 14 permits switching to the "first sandwiching-holding operation" in response to forward rotation of the rotary drive shaft 11, and permits switching to the "second sandwiching-holding operation" in response to backward rotation of the rotary drive shaft 11.

[0281] The switcher 14 permits switching between the first sandwiching-holding operation and the second sandwiching-holding operation by delay operation to shift (delay) the start of operation of the right-hand converter 13R from the start of operation of a left-hand converter 13L.

[0282] Preferably, the switcher 14 includes a "rotation clutch mechanism". In this mechanism, after a rotator is rotated at a predetermined angle, and more specifically, for example, rotated a quarter turn or a one-third turn, or a half-turn

(one-half turn), about a shaft body in the direction of forward rotation or in the direction of backward rotation, the right-hand massage unit 12R is subjected to a delay in operation by a time of rotation of the rotator. The time delay causes a change in phase relation between the sandwiching-holding actions of the massage units 12. The rotator corresponds to a member mounted with a hook part 51 which will be described later. In this embodiment, the switching shaft 53 serves as the rotator. Moreover, in this embodiment, the rotary drive shaft 11 serves as the shaft body.

[0283] This embodiment adopts a "half-turn clutch mechanism" as the switcher 14. In this mechanism, subsequent to a half turn of the switching shaft 53 mounted to the rotary drive shaft 11 in the direction of forward rotation or in the direction of backward rotation, the right-hand massage unit 12R is delayed in action. This results in a change in phase in the sandwiching-holding action of the right-hand massage unit 12R.

[0284] That is, in this embodiment, in the delay operation of the half-turn clutch mechanism 14, the rotations of the right-hand first rotary boss part 26R and the right-hand second rotary boss part 46R disposed to the right of the rotary drive shaft 11 are delayed by a time of half turn with respect to the rotations of the left-hand first rotary boss part 26L and the left-hand second rotary boss part 46L, respectively. This results in phase change so that the sandwiching-holding action

of the right-hand massage unit 12R falls behind in phase with respect to the sandwiching-holding action of the left-hand massage unit 12L.

[0285] Note that the term "half-turn clutch mechanism 14" may comprehend other clutch mechanisms than a half-turn (180 degrees-turn) clutch mechanism, for example, a 120 degrees-turn clutch mechanism and a 90 degrees-turn clutch mechanism.

[0286] As shown in the drawings such as FIGs. 14 to 19, the half-turn clutch mechanism 14 (the switcher 14) in this embodiment comprises: the hook part 51 disposed on the rotary drive shaft 11; a hook groove part 52 in which the hook part 51 is slidably fitted; and the switching shaft 53 mounted with the hook part 51.

[0287] The switching shaft 53 in this embodiment is made in the form of a cylindrical member mounted so as to cover the right end of the rotary drive shaft 11. The switching shaft 53 is rotated together with the rotary drive shaft 11. The switching shaft 53 (rotator) is rotated a half-turn in the direction of forward rotation or in the direction of backward rotation relative to the rotary drive shaft 11 (shaft body), with subsequent rotation of the right-hand first rotary boss part 26R and the right-hand second rotary boss part 46R.

[0288] The inside diameter of the switching shaft 53 is substantially equal to the outside diameter of the rotary drive shaft 11, and the outside diameter of the switching shaft 53

is substantially equal to the inside diameter of each of the right-hand through holes 38R and 49R. The switching shaft 53 is provided at the outer periphery with the hook part 51 extended radially outwardly.

[0289] The hook part 51 in this embodiment is constructed of a platelike member elongated in the direction of the axis of the switching shaft 53, and disposed along the outer periphery of the switching shaft 53. In other words, the hook part 51 is made in the form of a curved protuberant piece shaped in conformance with the shape of the hook groove part 52 which will be described later.

[0290] The hook part 51 is a curved member comprising: a side wall of arcuate shape coincident with the arc subscribed by the outer periphery of the switching shaft 53; and two terminal end walls 51a and 51b. One of the terminal end walls, namely the first terminal end wall 51a is a wall face which engages a first rotation switching part 54 of the hook groove part 52 upon forward rotation of the shaft. The other terminal end wall, namely the second terminal end wall 51b is a wall face which engages a second rotation switching part 55 of the hook groove part 52 upon backward rotation of the shaft.

[0291] That is, the hook part 51 is shaped so that it can fit in the hook groove part 52, and is made substantially equal in length in the front-rear direction (i.e. height) to the hook groove part 52. The hook part 51 slidably moves about the axis

of the switching shaft 53 (i.e. the axis of the rotary drive shaft 11) within the hook groove part 52.

[0292] The hook groove part 52 in this embodiment comprises a crescent-shaped (i.e. C-shaped) track groove running around the outer periphery of the switching shaft 53 (the rotary drive shaft 11) when viewed in section from the side. The hook groove part 52 is formed as a groove which extends along the outer periphery of the switching shaft 53, and is elongated (i.e. deep) in the direction of the axis of the switching shaft 53 (the rotary drive shaft 11).

[0293] That is, the hook groove part 52 is formed as a curved groove of arcuate shape coincident with the arc subscribed by the outer periphery of the hook part 51. The hook groove part 52 is formed as a curved groove shaped in conformance with the shape of the hook part 51. Thus configured, the hook groove part 52 receives the hook part 51 with a fit, and has a length in the front-rear direction (i.e. depth) substantially equal to the height of the hook part 51.

[0294] The hook groove part 52 in this embodiment comprises: a hook groove part 52a formed within the right-hand through hole 38R of the right-hand first rotary boss part 26R; and a hook groove part 52b formed within the right-hand through hole 49R of the right-hand second rotary boss part 46R. The hook groove part 52a and the hook groove part 52b are identical in shape. That is, when the right-hand first rotary boss part 26R and the

right-hand second rotary boss part 46R are in their assembled condition, the hook groove part 52a and the hook groove part 52b are in communication with each other.

[0295] The hook groove part 52 comprises an arcuately-shaped groove running along the outer periphery of the switching shaft 53. The groove defines a trackway with two terminal end walls. The two end walls, namely a side wall 54 and a side wall 55, serve as the rotation switching part 54 and the rotation switching part 55, respectively, for changing the direction of rotation of the rotary drive shaft 11.

[0296] Upon forward rotation or backward rotation of the rotary drive shaft 11, the rotation switching part 54, 55 is engaged with the hook part 51 which has been rotated a half-turn. The engagement delays the operation of the right-hand converter 13R, which results in a change in the condition of sandwiching-holding action of the right-hand massage unit 12R.

[0297] In this embodiment, one of the terminal ends of the semicircular hook groove part 52, namely the first terminal end 54 serves as the first rotation switching part 54. The first rotation switching part 54 is provided to synchronize operations between the left-hand converter 13L and the right-hand converter 13R upon forward rotation of the rotary drive shaft 11.

[0298] That is, upon forward rotation of the rotary drive shaft 11, the hook part 51 of the switching shaft 53 is rotated a half-turn about the axis of the rotary drive shaft 11 in the

direction of forward rotation. The first terminal end 51a of the hook part 51 subsequently engages the first rotation switching part 54. The right-hand rotary boss parts 26R, 46R are thereupon rotated together with the left-hand rotary boss parts 26L, 46L. With consequent synchronization in operation between the left-hand converter 13L and the right-hand converter 13R, the right-hand massage unit 12R is switched to an operating condition corresponding to the "first sandwiching-holding operation".

[0299] Moreover, the other terminal end of the semicircular hook groove part 52, namely the second terminal end 55 serves as the second rotation switching part 55. The second rotation switching part 55 is provided to delay the operation of the right-hand converter 13R with respect to the operation of the left-hand converter 13L upon backward rotation of the rotary drive shaft 11.

[0300] That is, upon backward rotation of the rotary drive shaft 11, the hook part 51 of the switching shaft 53 is rotated a half-turn about the axis of the rotary drive shaft 11 in the direction of backward rotation. The second terminal end 51b of the hook part 51 subsequently engages the second rotation switching part 55. The right-hand rotary boss parts 26R, 46R are thereupon rotated with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss parts 26L, 46L. With consequent delayed operation of the right-hand converter 13R with respect to the operation of the left-hand

converter 13L, the right-hand massage unit 12R is switched to an operating condition corresponding to the "second sandwiching-holding operation".

[0301] That is, under the operation of the half-turn clutch mechanism 14 (the switcher 14), upon forward rotation of the rotary drive shaft 11, the switching shaft 53 is rotated a half-turn about the axis of the rotary drive shaft 11 in the direction of forward rotation. During this period of time, the right-hand massage unit 12R is at a standstill. Following the half-turn, the first end 51a of the hook part 51 engages the first rotation switching part 54 (the first terminal end 54) within the hook groove part 52. The right-hand massage unit 12R at rest is thereupon started in operation (delayed operation), with consequent synchronization between the operation of the left-hand converter 13L and the operation of the right-hand converter 13R. This results in phase change so that the right-hand massage unit 12R and the left-hand massage unit 12L perform sandwiching-holding actions in the same phase for execution of the first sandwiching-holding operation (corresponding to two-handed grasping massage).

[0302] Moreover, under the operation of the half-turn clutch mechanism 14, upon backward rotation of the rotary drive shaft 11, the switching shaft 53 is rotated a half-turn about the axis of the rotary drive shaft 11 in the direction of backward rotation. During this period of time, the right-hand massage

unit 12R is at a standstill. Following the half-turn, the second end 51b of the hook part 51 engages the second rotation switching part 55 (the second terminal end 55) within the hook groove part 52. The message unit 12R at rest is thereupon started in operation (delayed operation). This results in phase change so that the sandwiching-holding action of the right-hand message unit 12R falls behind in phase with respect to the sandwiching-holding action of the left-hand message unit 12L for execution of the second sandwiching-holding operation (corresponding to one-handed grasping message).

[0303] During the time the hook part 51 is reaching the first rotation switching part 54 or the second rotation switching part 55 for mutual engagement (i.e. during the interval that the switching shaft 53 is rotating a half-turn), the left-hand first rotary boss part 26L and the left-hand second rotary boss part 46L are in a rotating state, whereas the right-hand first rotary boss part 26R and the right-hand second rotary boss part 46R are at a standstill.

[0304] That is, during this period of time, the left-hand message unit 12L (the left-hand upper message member 24L and the left-hand lower message member 25L) is in motion for sandwiching-holding action, whereas the right-hand message unit 12R (the right-hand upper message member 24R and the right-hand lower message member 25R) is at a standstill.

[0305] The left-hand message unit 12L will now be described.

The left-hand massage unit 12L is configured similarly in mirror image relation to the right-hand massage unit 12R in the horizontal direction, and hence no mention will be made of the details of the massage unit 12L.

[0306] Figure 20 is an exploded view of the left-hand massage unit 12L and the left-hand converter 13L. As shown in FIG. 20, the left-hand massage unit 12L comprises: the left-hand upper massage member 24L for massaging an upper-left treatment target area; and the left-hand lower massage member 25L for massaging a lower-left treatment target area.

[0307] The left-hand upper massage member 24L (i.e. left-hand first massage member 24L) comprises: a frontwardly extended left-hand upper arm member 29L; and the left-hand first annular fitting part 27L externally fitted to the left-hand first rotary boss part 26L (described later). The left-hand upper massage member 24L is configured in axisymmetric relation to the right-hand upper massage member 24R in the horizontal direction.

[0308] The left-hand upper arm member 29L is identical in shape with the right-hand upper arm member 29R. The bifurcated front ends of the left-hand upper arm member 29L are provided with the left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e, respectively. The left-hand upper treatment element 4d is identical in shape with the first treatment element 4a. The left-hand intermediate treatment

element 4e is identical in shape with the second treatment element 4b.

[0309] The left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e are rocked in the horizontal direction. The left-hand lower treatment element 4f (described later) is moved toward and away from the left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e in the vertical direction. The left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e are allowed to perform their movements to apply massage to the upper-left treatment target area when the left-hand upper massage member 24L is rocked by the rotational driving force exerted by the rotary drive shaft 11.

[0310] The left-hand upper arm member 29L is provided at the base end side with the left-hand first annular fitting part 27L constituting the left-hand converter 13L. The left-hand upper arm member 29L is configured in axisymmetric relation to the right-hand upper arm member 29R in the horizontal direction. The left-hand first annular fitting part 27L is configured to fit to the left-hand first cam surface 30L of the left-hand first rotary boss part 26L. In addition, a left-hand coupler 31L is disposed below the left-hand first annular fitting part 27L.

[0311] The left-hand coupler 31L is inserted in a left-hand coupling hole 42L formed in the left-hand lower massage member 25L, and provides connection between the left-hand upper massage

member 24L and the left-hand lower massage member 25L. As is the case with the right-hand upper massage member 24R, a flat-shaped material 32L is disposed below the junction between the left-hand upper arm member 29L and the left-hand first annular fitting part 27L. The inner side surface of the flat-shaped material 32L is formed with a groove part to guide a left-hand support shaft 44L.

[0312] The left-hand first annular fitting part 27L has a left-hand restraint part 28L to restrain the left-hand upper massage member 24L from rotating together with the left-hand first rotary boss part 26L. The left-hand restraint part 28L comprises a left-hand restraint pin 34L and a left-hand restraint groove 35L.

[0313] The left-hand first rotary boss part 26L is a member provided in the left-hand upper massage member 24L. The left-hand first rotary boss part 26L is configured in axisymmetric relation to the right-hand first rotary boss part 26R in the horizontal direction. The left-hand first rotary boss part 26L comprises: a disk-shaped left-hand outer cylindrical part 36L; and a left-hand inner cylindrical part 37L of smaller diameter situated inwardly of the outer cylindrical part 36L.

[0314] The left-hand first rotary boss part 26L has a left-hand through hole 38L formed therethrough. The left-hand through hole 38L receives the left end of the rotary drive shaft 11. The outer periphery of the left-hand inner cylindrical part

37L is formed with the left-hand first cam surface 30L inclined relative to the axis of the rotary drive shaft 11. Moreover, the left-hand first rotary boss part 26L is off-centered with respect to the axis of the rotary drive shaft 11. The left-hand first rotary boss part 26L is rotated at an incline, as well as is rotated eccentrically, with respect to the axis of the rotary drive shaft 11.

[0315] As shown in FIG. 20, the left-hand lower massage member 25L (i.e. left-hand second massage member 25L) is constructed of two combined members, namely a left-hand lower arm member 39L and the left-hand ring member 40L. The left-hand lower massage member 25L is configured in axisymmetric relation to the right-hand lower massage member 25R in the horizontal direction.

[0316] The left-hand lower arm member 39L is a member situated toward the front end of the left-hand lower massage member 25L. The left-hand lower arm member 39L is provided at the front end with the left-hand lower treatment element 4f. The left-hand lower treatment element 4f is substantially identical in shape with the third treatment element 4c.

[0317] The left-hand lower treatment element 4f is moved toward and away from the left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e. That is, the left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e are rocked in the horizontal

direction, whereas the left-hand lower treatment element 4f is rocked in the vertical direction.

[0318] The L-shaped bend of the left-hand lower arm member 39L is formed with a left-hand through hole 41L in which the left-hand support shaft 44L is inserted. The left-hand lower arm member 39L and the left-hand ring member 40L are coupled to each other for free rotational movement about the axis of the left-hand support shaft 44L inserted in the left-hand through hole 41L and a left-hand through hole 45L.

[0319] The left-hand lower arm member 39L is provided at the base end side with the left-hand coupling hole 42L in which the left-hand coupler 31L is inserted. The left-hand upper massage member 24L and the left-hand lower massage member 25L are coupled to each other for free rotational movement about the axis of the left-hand coupler 31L inserted in the left-hand coupling hole 42L.

[0320] The left-hand ring member 40L, which is situated toward the base end of the left-hand lower massage member 25L, corresponds to a left-hand second annular fitting part 40L which fits onto the left-hand second rotary boss part 46L. The left-hand second annular fitting part 40L is configured in axisymmetric relation to the right-hand second annular fitting part 40R in the horizontal direction.

[0321] In addition, the left-hand second annular fitting part 40L is provided at the outer periphery with a left-hand

projecting part 43L. The left-hand projecting part 43L is formed with the left-hand through hole 45L in which the left-hand support shaft 44L is inserted. The lengthwise intermediate portion of the left-hand lower arm member 39L is supported for free rotational movement about the axis of the left-hand support shaft 44L.

[0322] The left-hand second rotary boss part 46L is a member provided in the left-hand lower mass member 25L. The left-hand second rotary boss part 46L is configured in axisymmetric relation to the right-hand second rotary boss part 46R in the horizontal direction. The left-hand second rotary boss part 46L comprises: a disk-shaped left-hand inner cylindrical part 47L; and a left-hand outer cylindrical part 48L of smaller diameter situated outwardly of the inner cylindrical part 47L.

[0323] The left-hand second rotary boss part 46L has a left-hand through hole 49L formed therethrough. The left-hand through hole 49L receives the left end of the rotary drive shaft 11. The outer periphery of the left-hand outer cylindrical part 48L is formed with a left-hand second cam surface 50L inclined relative to the axis of the rotary drive shaft 11.

[0324] The left-hand second cam surface 50L is configured in axisymmetric relation to the right-hand second cam surface 50R in the horizontal direction. Moreover, the left-hand second rotary boss part 46L is off-centered with respect to the axis

of the rotary drive shaft 11. The left-hand second rotary boss part 46L is rotated at an incline, as well as is rotated eccentrically, with respect to the axis of the rotary drive shaft 11.

[0325] The left-hand converter 13L in this embodiment has a divided structure comprising: a set of the left-hand first rotary boss part 26L and the left-hand first annular fitting part 27L that enable the left-hand upper massage member 24L to rock; and a set of the left-hand second rotary boss part 46L and the left-hand second annular fitting part 40L that enable the left-hand lower massage member 25L to rock.

[0326]

[Operation Modes]

The following describes the modes of operating the massager 1 incorporating the massage mechanism 2 according to this embodiment with reference to the drawings.

[0327]

<First Sandwiching-Holding Operation>

Figure 15 is a view of the massage mechanism 2 according to this embodiment as seen from the right side, with the right-hand first rotary boss part 26R partially shown in section. Figure 16 is an enlarged view of the section of the right-hand first rotary boss part 26R shown in FIG. 15.

[0328] Figure 15 is a view showing the massage mechanism in the first sandwiching-holding operation (corresponding to

two-handed grasping massage). At this time, the rotary drive shaft 11 is rotated forward. Under the operation of the half-turn clutch mechanism 14 (the switcher 14), subsequent to a half-turn of the switching shaft 53 in the direction of forward rotation, the right-hand rotary boss part 26R is rotated forward. This results in phase change so that the left-hand massage unit 12L and the right-hand massage unit 12R are rotated with rocking motion in the same phase.

[0329] For example, the user holds the left-hand and right-hand grip parts 5L and 5R in both hands, applies the massager 1 to the upper side of the back such as the shoulder area, or the lower side of the back such as the waist area, and operates the operating panel 8 mounted to the left-hand grip part 5L. For example, the user presses an operation button to select the two-handed grasping massage (concurrent squeezing massage) mode corresponding to the first sandwiching-holding operation.

[0330] As shown in the drawings such as FIGs. 15 and 16, upon actuation of the driver 10, the rotary drive shaft 11 is rotated forward by the rotational driving force from the drive motor 15. The forward rotation of the rotary drive shaft 11 causes the left-hand converter 13L to rotate, thereby enabling the left-hand massage unit 12L to perform vertical sandwiching-holding action in a constant phase.

[0331] Under the operation of the half-turn clutch mechanism 14 (the switcher 14), upon a half-turn of the switching

shaft 53 in the direction of forward rotation, the right-hand converter 13R is rotated with a delay by a time of half turn. That is, in the right-hand converter 13R, the rotary drive shaft 11 turns in a freewheeling condition by half turn in the direction of forward rotation. The right-hand converter 13R is subsequently rotated in synchronization with the left-hand converter 13L, and the right-hand massage unit 12R performs horizontal and vertical sandwiching-holding action in phase with the left-hand massage unit 12L accordingly.

[0332] Specifically, upon forward rotation of the rotary drive shaft 11, the switching shaft 53 is rotated in the direction of forward rotation. The hook part 51 is thereupon allowed to perform sliding motion in the circumferential direction of forward rotation (i.e. clockwise direction when viewed in the side elevation of FIG. 16) within the semicircular hook groove part 52, and then rotated a half-turn about the axis of the rotary drive shaft 11 in the direction of forward rotation. That is, the switching shaft 53 turns in a freewheeling condition by half turn in the direction of forward rotation (i.e. direction toward the front of the massager 1).

[0333] Upon a half-turn of the switching shaft 5 in the direction of forward rotation, under the operation of the half-turn clutch mechanism 14, the first end 51a of the hook part 51 engages the first rotation switching part 54 (the first terminal end wall 54) within the hook groove part 52.

[0334] In the right-hand converter 13R, under the operation of the half-turn clutch mechanism 14 (the switcher 14), upon a half-turn of the switching shaft 53 (rotator) about the axis of the rotary drive shaft 11 (shaft body) in the direction of forward rotation, the right-hand rotary boss part 26R, 46R is rotated in the direction of forward rotation with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L, 46R. The right-hand first rotary boss part 26R and the right-hand second rotary boss part 46R are rotated forward with the forward rotation of the rotary drive shaft 11 just as with the rotary drive shaft 11.

[0335] During the time the hook part 51 is reaching the first rotation switching part 54 for mutual engagement (i.e. during the interval that the switching shaft 53 is being rotated a half-turn in the direction of forward rotation), the left-hand massage unit 12L (the left-hand upper massage member 24L and the left-hand lower massage member 25L) is in motion for vertical sandwiching-holding action, whereas the right-hand massage unit 12R (the right-hand upper massage member 24R and the right-hand lower massage member 25R) is at a standstill.

[0336] Thus, the right-hand first rotary boss part 26R and the right-hand second rotary boss part 46R are rotated for sandwiching-holding action in phase with the left-hand first rotary boss part 26L and the left-hand second rotary boss part 46L. That is, the left-hand converter 13L and the right-hand

converter 13R synchronously perform conversion to produce rocking motions of the same phase. This results in phase change so that the right-hand massage unit 12R and the left-hand massage unit 12L are vertically rocked in the same phase for execution of the first sandwiching-holding operation.

[0337] Thus, the left-hand upper and lower massage members 24L, 25L and the right-hand upper and lower massage members 24R, 25R effect horizontal and vertical sandwiching-holding movements in the same phase for execution of the first sandwiching-holding operation.

[0338] That is, in the massage mechanism 2 according to this embodiment, the first treatment element 4a and the second treatment element 4b in the right-hand upper massage member 24R and the left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e in the left-hand upper massage member 24L are horizontally moved toward and away from each other so as to squeeze the central part of the shoulder area (or the central part of the waist area) of the user in the horizontal direction. This allows kneading massage to be performed.

[0339] Moreover, in the massage mechanism 2 according to this embodiment, the third treatment element 4c of the right-hand lower massage member 25R is vertically moved toward and away from (i.e. closer to) the first treatment element 4a and the second treatment element 4b of the right-hand upper massage member 24R so as to grasp, sandwich, and hold the shoulder-to-back area

on the center-to-right side of the back (or the right waist area) of the user in the vertical direction. This allows grasping and kneading massage to be performed.

[0340] In addition, in the massage mechanism 2 according to this embodiment, the left-hand lower treatment element 4f of the left-hand lower massage member 25L is vertically moved toward and away from the left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e of the left-hand upper massage member 24L so as to grasp, sandwich, and hold the shoulder-to-back area on the center-to-left side of the back (or the left waist area) of the user in the vertical direction. This allows grasping and kneading massage to be performed.

[0341] That is, the right-hand massage unit 12R and the left-hand massage unit 12L are capable of applying massage to the left, right, and central shoulder-to-back areas (or the waist area).

[0342]

<Second Sandwiching-Holding Operation>

Figure 18 is a view of the massage mechanism 2 according to this embodiment as seen from the right side, with the right-hand first rotary boss part 26R partially shown in section. Figure 19 is an enlarged view of the section of the right-hand first rotary boss part 26R shown in FIG. 18.

[0343] Figure 18 is a view showing the massage mechanism

in the second sandwiching-holding operation (corresponding to one-handed grasping massage). At this time, the rotary drive shaft 11 is rotated backward. Under the operation of the half-turn clutch mechanism 14 (the switcher 14), subsequent to a half-turn of the switching shaft 53 in the direction of backward rotation, the right-hand rotary boss part 26R is rotated backward. This results in phase change so that the sandwiching-holding action of the right-hand massage unit 12R falls behind in phase with respect to the sandwiching-holding action of the left-hand massage unit 12L.

[0344] The user performs switching operation to select the one-handed grasping massage (i.e. alternate grasping-kneading massage) mode corresponding to the second sandwiching-holding operation by using the operating panel 8.

[0345] As shown in the drawings such as FIGs. 18 and 19, upon actuation of the driver 10, the rotary drive shaft 11 is rotated backward by the rotational driving force from the drive motor 15. The backward rotation of the rotary drive shaft 11 causes the left-hand converter 13L to rotate, thereby enabling the left-hand massage unit 12L to perform vertical sandwiching-holding action in a constant phase.

[0346] Meanwhile, under the operation of the half-turn clutch mechanism 14 (the switcher 14), upon a half-turn of the switching shaft 53 in the direction of backward rotation, the right-hand converter 13R is rotated with a delay by a time of

half turn. That is, in the right-hand converter 13R, the rotary drive shaft 11 turns in a freewheeling condition by half turn in the direction of backward rotation (i.e. direction toward the rear of the massager 1). The right-hand converter 13R is subsequently rotated differently from the left-hand converter 13L, and the right-hand massage unit 12R performs vertical sandwiching-holding action in a different phase from the left-hand massage unit 12L accordingly.

[0347] Specifically, upon backward rotation of the rotary drive shaft 11, the switching shaft 53 is rotated in the direction of backward rotation. The hook part 51 is thereupon allowed to perform sliding motion in the circumferential direction of backward rotation (i.e. counterclockwise direction when viewed in the side elevation of FIG. 19) within the semicircular hook groove part 52, and then rotated a half-turn about the axis of the rotary drive shaft 11 in the direction of backward rotation. That is, the switching shaft 53 turns in a freewheeling condition by half turn in the direction of backward rotation.

[0348] Upon a half-turn of the switching shaft 53 in the direction of backward rotation, under the operation of the half-turn clutch mechanism 14, the second end 51b of the hook part 51 engages the second rotation switching part 55 (the second terminal end wall 55) within the hook groove part 52.

[0349] In the right-hand converter 13R, under the operation of the half-turn clutch mechanism 14 (the switcher 14), upon

a half-turn of the switching shaft 53 (rotator) about the axis of the rotary drive shaft 11 (shaft body) in the direction of backward rotation, the right-hand rotary boss part 26R, 46R is rotated in the direction of backward rotation with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L, 46R. The right-hand first rotary boss part 26R and the right-hand second rotary boss part 44R are rotated backward with the backward rotation of the rotary drive shaft 11.

[0350] During the time the hook part 51 is reaching the second rotation switching part 55 for mutual engagement (i.e. during the interval that the switching shaft 53 is being rotated a half-turn in the direction of backward rotation), the left-hand massage unit 12L (the left-hand upper massage member 24L and the left-hand lower massage member 25L) is in motion for vertical sandwiching-holding action, whereas the right-hand massage unit 12R (the right-hand upper massage member 24R and the right-hand lower massage member 25R) is at a standstill.

[0351] Thus, the right-hand first rotary boss part 26R and the right-hand second rotary boss part 44R are rotated in a different rotation phase from the left-hand first rotary boss part 26L and the left-hand second rotary boss part 44L. That is, the right-hand converter 13R operates for conversion into rocking motion of delayed phase with respect to the rocking motion resulting from conversion by the left-hand converter 13L.

[0352] Under the operation of the half-turn clutch mechanism 14, the right-hand converter 13R is delayed in operation with respect to the operation of the left-hand converter 13L, and the right-hand upper massage member 24R is delayed in motion with respect to the rocking motion of the left-hand upper massage member 24L accordingly. Likewise, the right-hand lower massage member 25R is delayed in motion with respect to the rocking motion of the left-hand lower massage member 25L.

[0353] The half-turn clutch mechanism 14 performs delayed conversion operation to delay the conversion operation of the right-hand converter 13R for the right-hand massage unit 12R with respect to the conversion operation of the left-hand converter 13L for the left-hand massage unit 12L. This causes the vertical sandwiching-holding action of the right-hand massage unit 12R to fall behind in phase with respect to the vertical sandwiching-holding action of the left-hand massage unit 12L for execution of the second sandwiching-holding operation.

[0354] Thus, the right-hand upper and lower massage members 24R and 25R effect delayed vertical sandwiching-holding movement in a different phase from the left-hand upper and lower massage members 24L and 25L for execution of the second sandwiching-holding operation.

[0355] That is, in the massage mechanism 2 according to this embodiment, the left-hand lower treatment element 4f of

the left-hand lower massage member 25L is vertically moved toward and away from the left-hand upper treatment element 4d and the left-hand intermediate treatment element 4e of the left-hand upper massage member 24L so as to grasp, sandwich, and hold the shoulder-to-back area on the center-to-left side of the back (or the left waist area) of the user in the vertical direction. This allows grasping and kneading massage to be performed.

[0356] Meanwhile, in the massage mechanism 2 according to this embodiment, the third treatment element 4c of the right-hand lower massage member 25R is vertically moved toward and away from the first treatment element 4a and the second treatment element 4b of the right-hand upper massage member 24R with a 180 degrees phase shift with respect to the movement of the left-hand lower treatment element 4f toward and away from the left-hand upper treatment elements 4d and 4e so as to grasp, sandwich, and hold the shoulder-to-back area on the center-to-right side of the back (or the right waist area) of the user in the vertical direction. This allows grasping and kneading massage to be performed.

[0357] Thus, the half-turn clutch mechanism 14 permits switching of the operation mode of the right-hand massage unit 12R and the left-hand massage unit 12L between the first sandwiching-holding operation (corresponding to two-handed grasping massage) mode and the second sandwiching-holding operation (corresponding to one-handed grasping massage) mode

by changing the rotation of the rotary drive shaft 11 between forward rotation and backward rotation.

[0358] In sum, under the operation of the half-turn clutch mechanism 14, with the rotary drive shaft 11 being rotated forward, the switching shaft 53 is rotated a half-turn in the direction of forward rotation. The first terminal end wall 51a of the hook part 51 thereupon engages the first rotation switching part 54 within the hook groove part 52. The engagement delays the operation of the right-hand massage unit 12R by a time of half turn, with consequent synchronization with the operation of the left-hand massage unit 12L. This results in phase change so that the right-hand massage unit 12R and the left-hand massage unit 12L perform vertical sandwiching-holding actions in the same phase ("in-phase" relation).

[0359] Thus, the left-hand upper massage member 24L and the left-hand lower massage member 25L apply massage to the left shoulder area and the left side of the back, respectively, with vertical sandwiching-holding movement in the in-phase relation to the right-hand unit for execution of the first sandwiching-holding operation.

[0360] Moreover, the right-hand upper massage member 24R and the right-hand lower massage member 25R apply massage to the right shoulder area and the right side of the back, respectively, with vertical sandwiching-holding movement in the in-phase relation to the left-hand unit for execution of the

first sandwiching-holding operation.

[0361] In addition, under the operation of the half-turn clutch mechanism 14, with the rotary drive shaft 11 being rotated backward, the switching shaft 53 is rotated a half-turn in the direction of backward rotation. The second terminal end wall 51b of the hook part 51 thereupon engages the second rotation switching part 55 within the hook groove part 52. The engagement delays the operation of the right-hand massage unit 12R by a time of half turn. This results in phase change so that the vertical sandwiching-holding action of the right-hand massage unit 12R falls behind in phase with respect to the vertical sandwiching-holding action of the left-hand massage unit 12L ("delayed-phase" relation).

[0362] Thus, the right-hand upper massage member 24R applies massage to the right shoulder area of the user with vertical sandwiching-holding movement of different phase from the same movement of the left-hand upper massage member 24L for execution of the second sandwiching-holding operation.

[0363] Moreover, the right-hand lower massage member 25R effects vertical sandwiching-holding movement in a phase different from that of the same movement of the left-hand lower massage member 25L. That is, while the left-hand lower massage member 25L is in a raised position, the right-hand lower massage member 25R is in a lowered position. This causes a time shift in the vertical movement of the right-hand lower massage member

25R to massage the right side of the back for execution of the second sandwiching-holding operation.

[0364] That is, in mutually different phases, the left-hand massage unit 12L performs grasping massage on the left shoulder-to-back area, and the right-hand massage unit 12R subsequently performs kneading massage on the right shoulder-to-back area.

[0365] That is, under the operation of the switcher 14 (the half-turn clutch mechanism 14) embodying the present invention, upon a half-turn of the switching shaft 53 serving as a rotator about the axis of the rotary drive shaft 11 serving as a shaft body in one of the direction of forward rotation and the direction of backward rotation, the hook part 51 mounted to the switching shaft 53 engages the terminal end 54, 55 (the first rotation switching part 54 or the second rotation switching part 55) within the hook groove part 52 provided in the right-hand rotary boss part 26R, 46R. The right-hand rotary boss part 26R, 46R is thereupon started in rotation with a delay by a time of half turn with respect to the rotation of the left-hand rotary boss part 26L, 46L. This results in a change in the phase of vertical sandwiching-holding action of the right-hand massage unit 12R.

[0366] As thus far described, the massage mechanism 2 embodying the present invention comprises the switcher 14 (the half-turn clutch mechanism 14) to change the phase relation between vertical sandwiching-holding actions of the right-hand

message unit 12 and the left-hand message unit 12. Thus, the message mechanism 2 is built as a single device, yet is capable of effectively performing various massage operations on treatment target areas of a user (e.g. neck area [i.e. nape], shoulder area, and waist area), and hence achieves satisfactory massage to give feelings of various kneading actions to the user. That is, the message mechanism 2 embodying the present invention is capable of performing effective massage on treatment target areas while varying the way of kneading actions.

[0367] It should be understood that the embodiments as disclosed herein are considered in all respects as illustrative only and not restrictive. In particular, for such matters as not explicitly specified in the disclosure of the embodiments, for example, working conditions, operating conditions, and the dimensions, weights, etc. of the constituent components, those that do not depart from the practical range to be normally complied with by persons skilled in the art and that conform to matters of common knowledge among the skilled persons are adopted herein.

[0368] For example, the described design conditions, such as the lengths, shapes, etc. of the upper massage member 24 and the lower massage member 25 provided in the message mechanism 2, the angles of inclination of the upper massage member 24 (the first rotary boss part 26 [the first cam surface 30]) and the lower massage member 25 (the second rotary boss part 46 [the second cam surface 50]) relative to the rotary drive shaft 11,

the spacing between the right-hand and left-hand massage units 12 in the horizontal direction, and the spacing between the upper massage member 24 and the lower massage member 25 in the vertical direction, may be suitably changed in accordance with the range of areas to be massaged.

[0369] Moreover, for example, the difference in phase between the sandwiching-holding actions (vertical rocking motions) of the massage units 12 resulting from the operation of the switcher 14, and the relationship between the hook part 51 of the switching shaft 53 and the hook groove part 52 of the right-hand rotary boss part 26R, 46R (e.g. the configurations of the hook part 51 and the hook groove part 52 [the range of sliding movement]), are not limited to those as exemplified herein, and may be changed as needed. For a period of time that the hook part 51 is reaching the first rotation switching part 54 or the second rotation switching part 55 (the terminal end wall 54 or the terminal end wall 55 of the hook groove part 52) for mutual engagement, the angle of rotation of the switching shaft 53 during this time period may either correspond to a half-turn or be set at any other suitable angle.

Reference Signs List

[0370]

- 1 Massager
- 2 Massage mechanism
- 3 Massager body

4	Treatment element
4a	Upper treatment element
4c	Lower treatment element
9	Base mount
10	Driver
10R	Right-hand drive mechanism
10L	Left-hand drive mechanism
11	Rotary drive shaft
12	Massage unit
12R	Right-hand massage unit (First massage unit)
12L	Left-hand massage unit (Second massage unit)
13	Converter
13R	Right-hand converter (First converter)
13L	Left-hand converter (Second converter)
14	Switcher (Half-turn clutch mechanism)
15	Drive motor
15a	Right-hand output shaft (Right-hand worm gear)
15b	Left-hand output shaft (Left-hand worm gear)
24	Massage member (Upper massage member)
24R	Right-hand massage member (Right-hand upper massage member)
24L	Left-hand massage member (Left-hand upper massage member)
25	Lower massage member
25R	Right-hand lower massage member
25L	Left-hand lower massage member

26 Rotary boss part (First rotary boss part)
 26R Right-hand rotary boss part (Right-hand first rotary boss part)
 26L Left-hand rotary boss part (Left-hand first rotary boss part)
 27 First annular fitting part
 27R Right-hand first annular fitting part
 27L Left-hand first annular fitting part
 30R Right-hand first cam surface
 30L Left-hand first cam surface
 40 Ring member (Second annular fitting part)
 40R Right-hand ring member (Right-hand second annular fitting part)
 40L Left-hand ring member (Left-hand second annular fitting part)
 46 Second rotary boss part
 46R Right-hand second rotary boss part
 46L Left-hand second rotary boss part
 50R Right-hand second cam surface
 50L Left-hand second cam surface
 51 Hook part
 51a First end
 51b Second end
 52 Hook groove part
 52a Hook groove part

52b	Hook groove part
53	Switching shaft
54	First rotation switching part
55	Second rotation switching part
56R	First gear (Right-hand first gear)
56L	First gear (Left-hand first gear)
57R	Second gear (Right-hand second gear)
57L	Second gear (Left-hand second gear)
58R	Third gear (Right-hand third gear)
58L	Third gear (Left-hand third gear)
59R	First shaft member
59L	First shaft member
60R	Second shaft member
60L	Second shaft member

CLAIMS

1. A massage mechanism, comprising:

a first massage unit including an upper treatment element and a lower treatment element that move toward and away from each other in a vertical direction to apply grasping and kneading massage to a treatment target area;

a second massage unit which is mounted to be paired with the first massage unit, and includes an upper treatment element and a lower treatment element that move toward and away from each other in the vertical direction to apply grasping and kneading massage to another treatment target area;

a first converter to convert a driving force into vertical movement and transmit the vertical movement to the first massage unit; and

a second converter to convert a driving force into vertical movement and transmit the vertical movement to the second massage unit,

wherein a sandwiching-holding action of the first massage unit in which the upper treatment element and the lower treatment element thereof move to sandwich and hold the corresponding treatment target area therebetween and a sandwiching-holding action of the second massage unit in which the upper treatment element and the lower treatment element thereof move to sandwich and hold the corresponding treatment target area therebetween

are timed not to coincide with each other.

2. The message mechanism according to claim 1, further comprising:

a drive motor that includes an output shaft and outputs the driving force via the output shaft, wherein

the first converter includes

a delay mechanism to shift a timing of the sandwiching-holding action of the first message unit so that the timing differs from a timing of the sandwiching-holding action of the second message unit.

3. The message mechanism according to claim 2, wherein

the delay mechanism comprises a switcher to change a phase of the sandwiching-holding action of the first message unit by switching rotation of the output shaft between forward rotation and backward rotation.

4. The message mechanism according to claim 3, wherein

the switcher is configured to switch between

a first sandwiching-holding operation in which the first message unit and the second message unit perform their sandwiching-holding actions in the same phase, and

a second sandwiching-holding operation in which the first message unit performs its sandwiching-holding action in a delayed

phase with respect to a phase of the sandwiching-holding action of the second message unit.

5. The message mechanism according to claim 4, wherein the switcher includes a half-turn clutch mechanism to change the phase of the sandwiching-holding action of the first message unit by, subsequent to a half-turn of a rotator about a shaft body in a direction of forward rotation or in a direction of backward rotation, delaying the sandwiching-holding action of the first message unit with respect to the sandwiching-holding action of the second message unit.

6. The message mechanism according to claim 5, wherein the half-turn clutch mechanism includes a switching shaft formed with a hook part, and a hook groove part in which the hook part is slidably fitted.

7. The message mechanism according to claim 6, wherein the half-turn clutch mechanism is configured such that, upon forward rotation of the rotator about the shaft body, the hook part is rotated a half-turn in a direction of forward rotation within the hook groove part, and subsequently engages one of terminal ends of the hook groove part within the hook groove part, and the engagement delays the action of the first message unit, with consequent phase change to allow the first message

unit and the second message unit to perform their sandwiching-holding actions in the same phase for execution of the first sandwiching-holding operation.

8. The message mechanism according to claim 6, wherein the half-turn clutch mechanism is configured such that, upon backward rotation of the rotator about the shaft body, the hook part is rotated a half-turn in a direction of backward rotation within the hook groove part, and subsequently engages another terminal end of the hook groove part within the hook groove part, and the engagement delays the action of the first message unit, with consequent phase change to cause the sandwiching-holding action of the first message unit to fall behind in phase with respect to the sandwiching-holding action of the second message unit.

9. The message mechanism according to claim 4, wherein the first message unit and the second message unit can be switched by the switcher between a mode for the first sandwiching-holding operation and a mode for the second sandwiching-holding operation,

in the first sandwiching-holding operation, a phase of vertical approaching-separating movement of the upper treatment element and the lower treatment element of the first message unit is identical with a phase of vertical approaching-separating

movement of the upper treatment element and the lower treatment element of the second massage unit, and

in the second sandwiching-holding operation, the phase of vertical approaching-separating movement of the upper treatment element and the lower treatment element of the first massage unit differs from the phase of vertical approaching-separating movement of the upper treatment element and the lower treatment element of the second massage unit.