

MESSAGE UNIT AND CHAIR-TYPE MESSAGE MACHINE

TECHNICAL FIELD

[0001]

The present disclosure relates to a massage unit and a chair-type massage machine.

The present application claims priority to Chinese Patent Application No. 202411873863X filed on December 18, 2024, the entire disclosure of which is hereby incorporated by reference.

BACKGROUND ART

[0002]

A massage machine disclosed in Patent Literature 1 and a massage apparatus disclosed in Patent Literature 2, which have conventionally been known, include a massage unit including an arm portion and a plurality of treatment elements disposed on a distal end of the arm portion.

[0003]

In the massage machine of Patent Literature 1, the massage unit includes a first massage member (a kneading arm member) and a grabbing arm member configured to massage the neck and shoulders of a user sitting in a chair and leaning against a backrest portion of the chair, and a second massage member configured to massage the back of the user from top to bottom (i.e., from the shoulders to the waist of the user). The kneading arm member has on its distal end an upper kneading treatment element and a lower kneading treatment element.

[0004]

The massage machine of Patent Literature 1 also includes an angle changer configured to change an inclination angle of a pillow body. The protrusion amount and the position of each kneading treatment element are changeable by the angle changer. The upper kneading treatment element protrudes forward as the pillow body is inclined obliquely forward and

downward, and the lower kneading treatment element protrudes forward as the pillow body is inclined obliquely forward and upward. In other words, the massage unit of Patent Literature 1 is capable of changing a state in which the upper kneading treatment element is pressed against a treatment target, a state in which the lower kneading treatment element is pressed against the treatment target, and a state in which both the upper and lower kneading treatment elements are pressed against the treatment target.

[0005]

The massage apparatus of Patent Literature 2 includes a massage mechanism (a massage unit) configured to perform treatment on a treatment target. The massage apparatus includes one drive motor capable of changing a rotating direction forward and backward, a first massage mechanism configured to apply a kneading massage to a treatment target of a user, and a power transmission mechanism capable of transmitting a rotational driving force of a driver to the first massage mechanism.

[0006]

In the massage apparatus of Patent Literature 2, the first massage mechanism is configured to apply a kneading massage exclusively and includes a kneading treatment element configured to apply a kneading massage to treatment targets (e.g., shoulders, back, waist) of a user. Specifically, the first massage mechanism of Patent Literature 2 includes, as with the massage unit of Patent Literature 1, a kneading arm member and an upper kneading treatment element and a lower kneading treatment element each disposed on a distal end of the kneading arm. That is, the massage apparatus of Patent Literature 2 is capable of changing contact states of the upper and lower kneading treatment elements with treatment targets in accordance with the treatment targets.

CITATION LIST

[PATENT LITERATURE]

[0007]

PATENT LITERATURE 1: Japanese Laid-Open Patent Publication No. 2020-195713

PATENT LITERATURE 2: Japanese Laid-Open Patent Publication No. 2018-029722

SUMMARY OF THE INVENTION

[TECHNICAL PROBLEM]

[0008]

In the massage machine of Patent Literature 1 and the massage apparatus of Patent Literature 2, the upper kneading treatment element and the lower kneading treatment element each have an outer peripheral surface the outer appearance of which is smooth and cylindrical. If the kneading treatment elements having the smooth and wide surface are pressed against a treatment target of a user, a feeling of massage is soft, and a strong feeling of massage is given with difficulty. Since the upper kneading treatment element and the lower kneading treatment element are almost equal in outer appearance to each other, the massage machine and the massage apparatus are incapable of giving a wide variety of feelings of massage in accordance with treatment targets.

[0009]

Recently, there are increasing needs to largely change the strength of a feeling of massage in accordance with a treatment target. For example, users have requested to experience a strong feeling of massage in getting massages on a waist and the like although a feeling of massage to be given in getting massages on shoulders and a back is soft.

[0010]

With regard to this request, the massage machine of Patent Literature 1 and the massage apparatus of Patent Literature 2 are incapable of changing the strength of a sensation (a feeling

of massage) on a user since there is almost no difference between a feeling of massage upon contact of the upper kneading treatment element with a treatment target of the user and a feeling of massage upon contact of the lower kneading treatment element with the treatment target.

[0011]

The present disclosure has been made in view of the foregoing problem, and an object of the present disclosure is to provide a massage unit and a chair-type massage machine each capable of changing the strength of a feeling of massage in accordance with a treatment target.

[SOLUTION TO PROBLEM]

[0012]

A massage unit according to an aspect of the present disclosure includes: a pair of left and right massage members disposed on a base; and a drive mechanism configured to perform kneading operation on a treatment target by bringing or separating the pair of left and right massage members close to or from each other, the drive mechanism includes: a rotary shaft to be rotationally driven about an axis extending horizontally; a driver configured to rotationally drive the rotary shaft; and a kneading operation conversion portion configured to convert rotating motion of the rotary shaft into swinging motion in a left-right direction, the pair of left and right massage members each include: an arm portion having a proximal end supported by the kneading operation conversion portion; and a treatment element disposed on a distal end of the arm portion, the treatment element includes: a first treatment element disposed on an upper side of the distal end of the arm portion; and a second treatment element disposed on a lower side of the distal end of the arm portion, the first treatment element on the distal end of the arm portion has a first contact surface that is curved around a first axis crossing a longitudinal direction of the arm portion and is contactable with the treatment target, the second treatment element on the distal end of the arm portion has a second contact surface that is curved around a second axis

crossing the longitudinal direction of the arm portion and is contactable with the treatment target, and the first contact surface is larger in area than the second contact surface.

[ADVANTAGEOUS EFFECTS OF THE INVENTION]

[0013]

According to the present disclosure, it is possible to change the strength of a feeling of massage in accordance with a treatment target.

BRIEF DESCRIPTION OF DRAWINGS

[0014]

FIG. 1 is a perspective view of a chair-type massage machine of the present embodiment, and illustrates the front of the chair-type massage machine seen from the left.

FIG. 2 is a perspective view of a massage unit of the present embodiment, and illustrates the front of the massage unit seen from the lower left.

FIG. 3 is a perspective view of a massage mechanism in the massage unit of the present embodiment.

FIG. 4 is an exploded view of a left massage member and a drive mechanism.

FIG. 5A is an exploded view of the left massage member seen from the right.

FIG. 5B is an exploded view of the left massage member seen from the front.

FIG. 6A is a bottom view of a second treatment element seen from below.

FIG. 6B is a sectional view of the second treatment element taken along line X-X in FIG. 6A.

FIG. 7 is a conceptual view of a comparison between how a treatment element is pressed against a back as a treatment target and how the treatment element is pressed against a waist as a treatment target.

DETAILED DESCRIPTION

[0015]

<Outline of embodiments of the present disclosure>

An outline of below-listed embodiments of the present disclosure is described.

[0016]

(1) A massage unit according to the present embodiment includes: a pair of left and right massage members disposed on a base; and a drive mechanism configured to perform kneading operation on a treatment target by bringing or separating the pair of left and right massage members close to or from each other, the drive mechanism includes: a rotary shaft to be rotationally driven about an axis extending horizontally; a driver configured to rotationally drive the rotary shaft; and a kneading operation conversion portion configured to convert rotating motion of the rotary shaft into swinging motion in a left-right direction, the pair of left and right massage members each include: an arm portion having a proximal end supported by the kneading operation conversion portion; and a treatment element disposed on a distal end of the arm portion, the treatment element includes: a first treatment element disposed on an upper side of the distal end of the arm portion; and a second treatment element disposed on a lower side of the distal end of the arm portion, the first treatment element on the distal end of the arm portion has a first contact surface that is curved around a first axis crossing a longitudinal direction of the arm portion and is contactable with the treatment target, the second treatment element on the distal end of the arm portion has a second contact surface that is curved around a second axis crossing the longitudinal direction of the arm portion and is contactable with the treatment target, and the first contact surface is larger in area than the second contact surface.

[0017]

(2) In (1) described above, the first contact surface may be smooth, the first treatment

element may apply a massage to the treatment target with the first contact surface pressed against the treatment target, the second treatment element may include one or more protrusions disposed on the second contact surface, and the second treatment element may apply a massage to the treatment target with the one or more protrusions pressed against the treatment target.

[0018]

(3) In (2) described above, the first axis may be inclined forward and upward, and the second axis may be inclined rearward and downward.

[0019]

(4) In (2) described above, the first axis and the second axis may cross each other so as to be directed differently in the left-right direction.

[0020]

(5) In (2) described above, a number of the protrusions may be at least two or more, and the at least two or more protrusions may be arranged around the second axis.

[0021]

(6) In (2) described above, a line representing a protruding direction of each protrusion extending from an intersection point where a line passing a center of the second treatment element and extending in an up-down direction and an upper surface of the second treatment element cross each other, toward a tip of the protrusion and the upper surface of the second treatment element may form an angle that is larger than 0 degrees and smaller than 90 degrees.

[0022]

(7) In (2) described above, the massage unit may further include a pair of left and right grabbing massage members respectively disposed below the pair of left and right massage members and configured to apply a grabbing massage to the treatment target in cooperation with the second treatment elements, the drive mechanism may include a grabbing operation conversion portion configured to convert rotating motion of the rotary shaft into swinging

motion in an up-down direction, the pair of left and right grabbing massage members each may include a grabbing arm portion having a proximal end supported by the grabbing operation conversion portion, and a grabbing treatment element disposed on a distal end of the grabbing arm portion, and the second axis may be directed to the grabbing treatment element.

[0023]

(8) A chair-type massage machine according to the present embodiment may include: a seat portion; a backrest portion; the massage unit described in any one of (1) to (7), the massage unit being disposed in the backrest portion; and a guide mechanism configured to guide the massage unit to a part of a user ranging from a shoulder to a waist.

[0024]

(9) A massage unit according to the present embodiment includes: a pair of left and right massage members disposed on a base; and a drive mechanism configured to perform kneading operation on a treatment target by bringing or separating the pair of left and right massage members close to or from each other, the drive mechanism includes: a rotary shaft to be rotationally driven about an axis extending horizontally; a driver configured to rotationally drive the rotary shaft; and a kneading operation conversion portion configured to convert rotating motion of the rotary shaft into swinging motion in a left-right direction, the pair of left and right massage members each include: an arm portion having a proximal end supported by the kneading operation conversion portion; and a treatment element disposed on a distal end of the arm portion, the treatment element includes: a first treatment element disposed on an upper side of the distal end of the arm portion; and a second treatment element disposed on a lower side of the distal end of the arm portion, the first treatment element on the distal end of the arm portion has a first contact surface that is curved around a first axis crossing a longitudinal direction of the arm portion and is contactable with the treatment target, the second treatment element on the distal end of the arm portion has a second contact surface that is curved around a second axis

crossing the longitudinal direction of the arm portion and is contactable with the treatment target, the first contact surface of the first treatment element is smooth, and the second treatment element includes one or more protrusions disposed on the second contact surface.

[0025]

(10) In (9) described above, the first contact surface may be larger in area than the second contact surface.

[0026]

<Details of embodiments of the present disclosure>

Details of embodiments of the present invention are described below with reference to the drawings. It should be noted that at least some of the embodiments described below may be arbitrarily combined with each other.

[0027]

FIG. 1 schematically illustrates a chair-type massage machine 2 including a massage unit 1 of the present embodiment.

[0028]

The chair-type massage machine 2 of the present embodiment is a seat-type massage machine for massaging a user, the seat-type massage machine being placed on a seat of a chair with a backrest, such as a sofa, and located between the user and the seat of the chair and between the user and the backrest of the chair. The massage unit 1 of the present embodiment is incorporated in a backrest portion 3 of the seat-type massage machine.

[0029]

The chair-type massage machine 2 of the present disclosure may be not only a seat-type massage machine, but also a chair-type massage machine 2 commonly known as, for example, a massage chair. The massage chair-type massage machine has a chair structure and includes a backrest portion against which a user leans and in which a massage mechanism is incorporated.

Therefore, the massage unit 1 of the present disclosure may be used as a massage mechanism to be incorporated in the backrest portion of the massage chair-type massage machine.

[0030]

Some massage chair-type massage machines include a seat portion massage mechanism disposed in a seat portion and configured to massage the lower limbs of a user U. The massage unit 1 of the present disclosure can also be used as a seat portion massage mechanism or the like of such a massage chair-type massage machine. In addition, the massage unit 1 of the present disclosure may be used as a massage mechanism of a placement-type massage machine usable on, for example, a floor.

[0031]

As illustrated in FIG. 1, the chair-type massage machine 2 of the present embodiment includes the backrest portion 3 and a seat portion 4. The backrest portion 3 includes the massage unit 1 configured to massage treatment targets such as the neck, shoulders, back, waist, and buttocks of the user U, and a guide mechanism 5 configured to guide the massage unit 1 to the treatment target of the user U ranging from the neck to the buttocks.

[0032]

In the following description, the “left-right direction”, the “front-rear direction”, and the “up-down direction” seen from the user U sitting in the chair-type massage machine 2 are defined as the “left-right direction”, the “front-rear direction”, and the “up-down direction” to be used when the description is given of the massage unit 1 and the chair-type massage machine 2. In representative ones of the drawings, the “left-right direction”, the “front-rear direction”, and the “up-down direction” are indicated by arrows.

[0033]

The seat portion 4 is constituted of a combination of angular rod-shaped members. The entire seat portion 4 is covered with a casing 13, a sheet, or the like, and has on its upper

surface a cushioning member.

[0034]

The backrest portion 3 is a member disposed on the rear of the seat portion 4, and has a flat plate shape that is thick to an extent that the user is able to lean against the backrest portion 3. The backrest portion 3 includes a back massage mechanism configured to massage the back of the user. The chair-type massage machine 2 of the present embodiment includes the massage unit 1 of the present disclosure as the back massage mechanism.

[0035]

As illustrated in FIG. 1, the guide mechanism 5 includes a guide rail 6 disposed in the backrest portion 3 along the up-down direction. In the present embodiment, one guide rail 6 is disposed on the right of the backrest portion 3. The guide rail 6 includes a plurality of rack portions 7 arranged in the direction along which the guide rail 6 extends, and the massage unit 1 includes a travelling gear 8 (a pinion gear) meshing with the rack portions 7. Rotationally driving the travelling gear 8 in the forward and reverse directions using a travelling motor 9 allows the massage unit 1 to move upward and downward in the direction along which the guide rail 6 extends (up-down direction). The guide rail 6 extends from an upper end to a lower end of the backrest portion 3, and the guide mechanism 5 is capable of guiding the massage unit 1 to the treatment target (ranging from the shoulders to the waist) of the user.

[0036]

Although the rack and pinion-type guide mechanism is exemplified in the present embodiment, a ball screw-type guide mechanism can be used in the chair-type massage machine 2 of the present disclosure.

[0037]

As illustrated in FIG. 2, the massage unit 1 includes a pair of left and right massage members 11 disposed on a base 10, and a drive mechanism 12 configured to perform kneading

operation on the treatment target by bringing or separating the pair of left and right massage members 11 close to or from each other in the left-right direction. In the present embodiment, the base 10 is an angular member and supports the massage members 11 and the drive mechanism 12. The casing 13 is disposed on a front surface of the base 10, and the massage members 11 and the drive mechanism 12 are disposed on the front surface of the base 10 and are located behind the casing 13.

[0038]

FIG. 3 is a perspective view of an internal mechanism of the massage unit 1, and illustrates the front of the internal mechanism seen from the lower left.

[0039]

As illustrated in FIG. 3, the massage members 11 of the present embodiment are a left massage member 11L disposed on the left of the massage unit 1 and a right massage member 11R disposed on the right of the massage unit 1. The massage members 11 each include an arm portion 14 having a proximal end (a rear end) supported by the drive mechanism 12 (specifically, a kneading operation conversion portion 39 described later), and a treatment element 15 disposed on a distal end of the arm portion 14.

[0040]

In the massage unit 1 of the present disclosure, the treatment element 15 includes a first treatment element 16 disposed on an upper side of the distal end of the arm portion 14, and a second treatment element 17 disposed on a lower side of the distal end of the arm portion 14. The first treatment element 16 has a first contact surface 18 that is contactable with the treatment target. The second treatment element 17 has a second contact surface 19 that is contactable with the treatment target. The first contact surface 18 is larger in area than the second contact surface 19, and is capable of giving a soft feeling of massage by applying a pressing force dispersed in the large area to the treatment target. Since the second contact surface 19 is

smaller in area than the first contact surface 18, the second treatment element 17 is capable of applying a larger pressing force to the treatment target and giving on, the treatment target, a feeling of massage stronger than the feeling of massage which the first treatment element 16 gives. The massage unit 1 of the present disclosure is characterized by the plurality of treatment elements 15 with different contact areas.

[0041]

In the following, a description will be given of the treatment elements 15 (the first treatment element 16 and the second treatment element 17) first, prior to a description of the drive mechanism 12 that causes the treatment elements 15 (the massage members 11) to perform massage operation and a description of the massage operation. The treatment elements 15 are a left treatment element 15L disposed on the left massage member 11L and a right treatment element 15R disposed on the right massage member 11R. The left treatment element 15L and the right treatment element 15R have the same configuration except that the left treatment element 15L and the right treatment element 15R are in a laterally symmetrical arrangement. In the following, therefore, the treatment elements 15 are described using as an example the left treatment element 15L disposed on the left massage member 11L.

[0042]

FIG. 5A is a right side view of the left first treatment element 16L and left second treatment element 17L disposed on the left massage member 11L as seen from the right. FIG. 5B is a front view of the left first treatment element 16L and left second treatment element 17L disposed on the left massage member 11L as seen from the front.

[0043]

As illustrated in FIG. 5A, the left arm portion 14L includes a front-rear midway portion where the extending direction of the left arm portion 14L changes as seen from the right. A part of the left arm portion 14L ranging from a central axis O_1 of the rotary shaft 20 to the front-rear

midway portion is inclined slightly upward from the front to the rear. A part of the left arm portion 14L ranging from the front-rear midway portion to a front end of the left arm portion 14L is inclined slightly downward from the rear to the front.

[0044]

The extending direction of the left arm portion 14L from the front-rear midway portion to the front end is defined as a longitudinal direction L_1 of the left arm portion 14L. In this case, the first treatment element 16 is disposed on a distal end of the left arm portion 14L so as to protrude in the direction crossing the longitudinal direction L_1 of the left arm portion 14L.

[0045]

The left arm portion 14L includes a left first support shaft 21 extending forward and upward from an upper surface of the front end of the left arm portion 14L. The left first support shaft 21L has a columnar shape centered around a first axis a_1 . The first axis a_1 extends in the up-down direction (forward and upward in the present embodiment) through the center of the left first treatment element 16L. At an intersection point P_1 on the front end of the left arm portion 14L, the first axis a_1 and the longitudinal direction L_1 of the left arm portion 14L cross each other at a crossing angle θ_1 . In the present embodiment, the left first support shaft 21L extends forward and upward from the intersection point P_1 as seen from the right (or the left) and extends vertically and upward from the intersection point P_1 as seen from the front, and the crossing angle θ_1 is approximately 70° to 90° .

[0046]

The left first treatment element 16L has on its outer periphery a curved surface so as to have a circular section when being cut along a plane orthogonal to the first axis a_1 . The curved surface of the left first treatment element 16L has an outside diameter centered around the first axis a_1 , and this outside diameter gradually decreases from the center of the left first treatment element 16L to an upper side of the left first treatment element 16L. In other words, the left

first treatment element 16L has an upright egg-shaped profile. The left first treatment element 16L has a left first insertion hole 22L into which the left first support shaft 21L is insertable. The left first treatment element 16L is mounted to the front end of the left arm portion 14L so as to protrude upward with an upper portion of the left first support shaft 21L inserted in the left first insertion hole 22L. The left first support shaft 21L includes a left first retaining portion 23L located on an outer peripheral surface of an upper end of the left first support shaft 21L, and the left first retaining portion 23L has a diameter larger than an outside diameter of a lower end of the left first support shaft 21L. The left first retaining portion 23L is fitted into the left first insertion hole 22L with the left first support shaft 21L inserted in the left first insertion hole 22L, so that the left first treatment element 16L is fixed to the left first support shaft 21L so as not to come out of the left first support shaft 21L. The left first support shaft 21L includes a mount portion 24 having a recess shape, and a heater is mounted to the mount portion 24. The heater includes, for example, an LED and is configured to heat the left first treatment element 16L in order to apply heat to the user.

[0047]

As illustrated in FIGs. 4, 5A, and 5B, the left first treatment element 16L has a left first contact surface 18L that is curved around the first axis a_1 and is contactable with the treatment target. The left first treatment element 16L of the present embodiment is mounted to the left first support shaft 21L so as to be rotatable about the first axis a_1 , and any portion of the outer peripheral surface, which is curved around the first axis a_1 , of the left first treatment element 16L is contactable with the treatment target. In other words, the left first contact surface 18L corresponds to the entire outer peripheral surface, which is curved around the first axis a_1 , of the left first treatment element 16L.

[0048]

The left first contact surface 18L is a smooth surface that is continuous along and

around the first axis a_1 . The term “smooth surface” as used herein does not refer to a flat surface, but refers to a surface that is smoothly continuous and has no irregularities.

[0049]

The left second treatment element 17L is disposed on the distal end of the left arm portion 14L so as to protrude in the direction crossing the longitudinal direction L_1 of the left arm portion 14L and in the direction away from the left first treatment element 16L (i.e., so as to protrude rearward and downward).

[0050]

The left arm portion 14L includes a left second support shaft 25L extending rearward and downward from a lower surface of the front end of the left arm portion 14L. The left second support shaft 25L has a columnar shape centered around a second axis a_2 . The second axis a_2 extends in the up-down direction (e.g., extends rearward and downward in the present embodiment) through the center of the left second treatment element 17L. At the intersection point P_1 on the front end of the left arm portion 14L, the first axis a_1 and the second axis a_2 cross each other at an angle θ_2 .

[0051]

In the present embodiment, the left second support shaft 25L extends downward and rearward from the intersection point P_1 in an inclined state as seen from the right (or the left) and extends leftward and downward from the intersection point P_1 in an inclined state as seen from the front. The angle θ_2 , at which the first axis a_1 and the second axis a_2 cross each other, is approximately 5° to 30° .

[0052]

The left second treatment element 17L has on its outer periphery a curved surface so as to have a circular section when being cut along a plane orthogonal to the second axis a_2 . The curved surface of the left second treatment element 17L has an outside diameter centered around

the second axis a_2 , and this outside diameter gradually decreases from the center of the left second treatment element 17L toward a lower side of the left second treatment element 17L. In other words, the left second treatment element 17L has a downward hemispherical shape. The left second treatment element 17L is shorter in up-down length than the left first treatment element 16L. In the present embodiment, the up-down length of the left second treatment element 17L is approximately one-third of the up-down length of the left first treatment element 16L. The left second treatment element 17L has a left second insertion hole 26L into which the left second support shaft 25L is insertable. The left second treatment element 17L is mounted to the front end of the left arm portion 14L so as to protrude downward with a lower portion of the left second support shaft 25L inserted in the left second insertion hole 26L. The left second support shaft 25L includes a left second retaining portion 27L located on an outer peripheral surface of a lower end of the left second support shaft 25L, and the left second retaining portion 27L has a diameter larger than an outside diameter of an upper end of the left second support shaft 25L. The left second retaining portion 27L is fitted into the left second insertion hole 26L with the left second support shaft 25L inserted in the left second insertion hole 26L, so that the left second treatment element 17L is fixed to the left second support shaft 25L so as not to come out of the left second support shaft 25L.

[0053]

The left second treatment element 17L has a left second contact surface 19L that is curved around the second axis a_2 and is contactable with the treatment target. The left second contact surface 19L is on the outer periphery of the left second treatment element 17L. Since the left second treatment element 17L includes one or more protrusions 28 unlike the left first treatment element 16L, the left second contact surface 19L includes outer surfaces of the protrusions 28. The protrusions 28 on the left second contact surface 19L protrude outward from the center of the left second treatment element 17L. Therefore, when the left second

treatment element 17L is pressed against the treatment target, tips of the protrusions 28 come into contact with the treatment target first. However, the left second treatment element 17L and the entire outer surface of the left second treatment element 17L do not come into contact with the treatment target.

[0054]

For example, when the left second treatment element 17L is pressed against the treatment target, the tips of the protrusions 28, which come into contact with the treatment target, are included in the left second contact surface 19L. However, a part of the outer surface of each protrusion 28, such as a portion of each protrusion 28 near the proximal end of the protrusion 28, does not come into contact with the treatment target even when the left second treatment element 17L is pressed against the treatment target. In the hemispherical outer surface of the left second treatment element 17L, a region where the protrusions 28 are not formed, such as a region near the protrusions 28, does not come into contact with the treatment target even when the left second treatment element 17L is pressed against the treatment target. Therefore, a portion of the left second contact surface 19L, which is substantially contactable with the treatment target, is a part of the outer surface, which includes the tips of the protrusions 28, of the left second treatment element 17L and is much smaller in area than a portion of the left first contact surface 18L, which is substantially contactable with the treatment target.

[0055]

As indicated by a chain double-dashed line in FIG. 5B, the massage unit 1 of the present embodiment includes a left grabbing treatment element 29L disposed inward with respect to the left second treatment element 17L in the left-right direction (the width direction) of the massage unit 1. It can be said that in the present embodiment, the left second treatment element 17L is oriented toward the left grabbing treatment element 29L since the second axis a_2 is inclined inward with respect to the first axis a_1 at the angle θ_2 in the left-right direction (the width

direction) as described above.

[0056]

In the massage unit 1 of the present embodiment illustrated in FIGs. 5A and 5B, as an example, the second axis a_2 is oriented toward the left grabbing treatment element 29L at the lowermost swing position. In the massage unit 1 of the present disclosure, alternatively, the second axis a_2 may be oriented toward the left grabbing treatment element 29L at the uppermost swing position or the second axis a_2 may be oriented toward the left grabbing treatment element 29L at a midway swing position in the up-down direction.

[0057]

FIG. 6A is a bottom view of the left second treatment element 17L seen from the extending direction of the second axis a_2 . FIG. 6B is a sectional view of the left second treatment element 17L taken along line X-X in FIG. 6A at a section including, within its plane, the second axis a_2 and passing an intersection point P_2 at the center of the tip of each protrusion 28.

[0058]

As illustrated in FIG. 6A, the left second treatment element 17L includes the one or more protrusions 28 arranged around the second axis a_2 (the intersection point P_1). In the present embodiment, the left second treatment element 17L is disposed on the left second support shaft 25L so as to be rotatable about the second axis a_2 ; therefore, the plurality of protrusions 28 are provided such that at least one of the plurality of protrusions 28 can be brought into contact with the treatment target even when the left second treatment element 17L rotates. However, the massage unit 1 of the present disclosure may include a left second treatment element 17L that does not rotate with respect to the left second support shaft 25L. In a case where the left second treatment element 17L does not rotate about the second axis a_2 , the protrusions 28 are disposed so as to protrude in the protruding direction of the left second

treatment element 17L (i.e., so as to protrude rearward and downward and so as to be directed rightward in the present embodiment). According to this configuration, even when the number of the protrusions 28 is one, the tip of the one protrusion 28 can be brought into contact with the treatment target. That is, the massage unit 1 of the present disclosure includes the one or more protrusions 28 since the left second treatment element 17L may rotate or does not necessarily rotate.

[0059]

In the case where the left second treatment element 17L is rotatable about the second axis a_2 as described in the present embodiment, the number of the protrusions 28 to be arranged around the second axis a_2 is at least two or more, preferably four or more in order to bring the tips of the protrusions 28 into contact with the treatment target.

[0060]

As illustrated in FIG. 6A, in the case of the left second treatment element 17L of the present embodiment, the number of the protrusions 28 arranged around the second axis a_2 is six. The six protrusions 28 each protrude from the intersection point P_1 along a line a_3 passing the intersection point P_2 at the center of the tip of the protrusion 28. In other words, each line a_3 indicates the protruding direction of the corresponding protrusion 28. The lines a_3 of the respective protrusions 28 extend radially from the intersection point P_1 at intervals of an angle θ_3 as seen from the extending direction of the second axis a_2 (i.e., as seen from below in FIG. 6A). In the present embodiment, every angle θ_3 between adjacent two of the lines a_3 each connecting opposite two of the protrusions 28 is 60° .

[0061]

As illustrated in FIG. 6B, the second axis a_2 crosses, at the intersection point P_1 , an upper surface of the left second treatment element 17L (to be precise, the longitudinal direction L_1 of the left arm portion 14L). Each protrusion 28 has the line a_3 between the intersection

point P_1 and the intersection point P_2 . Each line a_3 and the upper surface of the left second treatment element 17L form an angle θ_4 . The angle θ_4 formed between each line a_3 and the upper surface of the left second treatment element 17L is larger than 0 degrees and smaller than 90 degrees (e.g., 30°, 45°, 60°, etc.). In the present embodiment, the angle θ_4 is set at 30°.

[0062]

Next, the left massage member 11L that includes the left treatment element 15L, a left grabbing massage member 30L that includes the left grabbing treatment element 29L, and the drive mechanism 12 that causes the left massage member 11L to perform massage operation are described.

[0063]

As illustrated in FIGs. 4 and 5A, the left arm portion 14L includes a left first rotation restriction portion 31L disposed on a proximal end of the left arm portion 14L, and the left first rotation restriction portion 31L restricts the rotation of the left arm portion 14L together with the rotary shaft 20. The left first rotation restriction portion 31L couples the left arm portion 14L to the base 10 so as to restrict displacement of the left arm portion 14L in the up-down direction (the rotating direction of the rotary shaft 20) while permitting displacement of the left arm portion 14L in the left-right direction. In the present embodiment, the left first rotation restriction portion 31L corresponds to a first restriction pin 32 disposed on the proximal end of the left arm portion 14L, and the first restriction pin 32 (the left first rotation restriction portion 31L) is inserted into a restriction groove 33 in the base 10, thereby restricting the rotation of the left arm portion 14L while allowing the left arm portion 14L to swing in the left-right direction. The first restriction pin 32, which serves as the left first rotation restriction portion 31L, extends rearward and upward from the proximal end of the left arm portion 14L. The restriction groove 33 is formed in a restriction member 34 disposed on the base 10 located rearward of and above the rotary shaft 20 as seen from the left of the rotary shaft 20. The restriction groove 33 has a

groove width slightly wider than an outside diameter of the first restriction pin 32, and a left-right groove length longer than the groove width. The first restriction pin 32, which serves as the left first rotation restriction portion 31L, is inserted into the restriction groove 33 in the restriction member 34, thereby restricting the displacement of the left arm portion 14L in the up-down direction and permitting the displacement of the left arm portion 14L in the left-right direction.

[0064]

The left first rotation restriction portion 31L of the present disclosure may be a ball joint or may be a combination of an oblong hole and a pin insertable into the oblong hole.

[0065]

The massage unit 1 of the present embodiment includes grabbing massage members 30 configured to cooperate with the massage members 11, thereby applying a grabbing massage to the treatment target so as to grab the treatment target in the up-down direction. The grabbing massage members 30 are a left grabbing massage member 30L configured to apply a grabbing massage in cooperation with the left massage member 11L (the left second treatment element 17L), and a right grabbing massage member 30R configured to apply a grabbing massage in cooperation with the right massage member 11R (the right second treatment element 17R).

[0066]

The grabbing massage members 30 are described using the left grabbing massage member 30L as in the case of the left massage member 11L.

[0067]

The left grabbing massage member 30L includes a left grabbing arm portion 35L having a proximal end supported by the drive mechanism 12 (specifically, a left grabbing operation conversion portion 40L described below), and the left grabbing treatment element 29L disposed on a distal end of the left grabbing arm portion 35L.

[0068]

As illustrated in FIG. 3, the left grabbing arm portion 35L is an arm-shaped long member and has a first end extending forward and downward from the base 10, a midway portion supported by the base 10 via the drive mechanism 12, and a second end extending rearward and upward from the base 10. The midway portion of the left grabbing arm portion 35L of the present embodiment is supported by the base 10 via the drive mechanism 12 (specifically, a left second annular fitting portion 56L described below). The left grabbing treatment element 29L is mounted to the first end (the front end or the lower end) of the left grabbing arm portion 35L. To the second end (the rear end or the upper end) of the left grabbing arm portion 35L, a left second rotation restriction portion is mounted, which restricts rotation of the left grabbing arm portion 35L together with the rotary shaft 20.

[0069]

The left second rotation restriction portion couples the left grabbing arm portion 35L to the base 10 so as to permit displacement of the left grabbing arm portion 35L in the up-down direction while restricting displacement of the left grabbing arm portion 35L in the front-rear direction. In the present embodiment, the left second rotation restriction portion corresponds to an oblong hole formed in the second end (the rear end or the lower end) of the left grabbing arm portion 35L, and a second restriction pin 37 disposed on the base 10 is inserted through this oblong hole (the left second rotation restriction portion 36L). The oblong hole as the left second rotation restriction portion has a shape (a substantially “C” shape) that extends long in the up-down direction as seen from the left and is curved so as to protrude forward at a middle from an upper hole end to a lower hole end. The left second rotation restriction portion having the foregoing curved shape (the substantially “C” shape) and the second restriction pin 37 disposed on the base 10 and inserted through the left second rotation restriction portion restrict the displacement of the left grabbing arm portion 35L in the front-rear direction (i.e., permit only the

displacement by a portion of the oblong hole protruding in the front-rear direction) and permit the displacement of the left grabbing arm portion 35L in the up-down direction.

[0070]

The left second rotation restriction portion of the present disclosure may be a ball joint or may be a combination of an oblong hole and a pin insertable into the oblong hole.

[0071]

The left grabbing treatment element 29L is mounted to the distal end (the front end or the lower end) of the left grabbing arm portion 35L and is configured to apply a grabbing massage to the treatment target with the treatment target sandwiched between the left grabbing treatment element 29L and the left treatment element 15L from above and below. The left grabbing treatment element 29L has a flat shape, and a width of the left grabbing treatment element 29L in the left-right direction is wider than that in the up-down direction. The distal end (the front end) of the left grabbing arm portion 35L is coupled to a rear end of the left grabbing treatment element 29L.

[0072]

As illustrated in FIG. 3, the drive mechanism 12 of the present embodiment includes: the rotary shaft 20 to be rotationally driven about the axis extending horizontally; a driver 38 configured to rotationally drive the rotary shaft 20; kneading operation conversion portions 39 configured to convert rotating motion of the rotary shaft 20 into swinging motion in the left-right direction and to allow the massage members 11 to swing in the left-right direction; and grabbing operation conversion portions 40 configured to convert the rotating motion of the rotary shaft 20 into swinging motion in the up-down direction and to allow the grabbing massage members 30 to swing in the up-down direction.

[0073]

The rotary shaft 20 is located on the lower side of the base 10 (the massage mechanism)

and extends in the left-right direction. The rotary shaft 20 is supported by the base 10 so as to be rotatable about its central axis extending in the left-right direction. An input gear 41 is provided on a left-right midway portion of the rotary shaft 20 (i.e., at a position slightly leftward with respect to the center of the rotary shaft 20) so as to be rotatable together with the rotary shaft 20. The driver 38, which rotationally drives the rotary shaft 20, is disposed above the rotary shaft 20 in the base 10.

[0074]

The driver 38 includes a drive motor 42 configured to generate a rotational driving force. In the massage unit 1 of the present embodiment, the drive motor 42 is located on the upper side of the base 10 and includes a drive shaft 42a extending downward. The drive shaft 42a has a central axis extending in the up-down direction, and receives the rotational driving force from the drive motor 42. A plurality of transmission gears 43 are arranged between the drive shaft 42a and the input gear 41 (the rotary shaft 20). The plurality of transmission gears 43 reduce the rotational driving force transmitted to the drive shaft 42a, and transmit the reduced rotational driving force to the input gear 41. In the present embodiment, the plurality of transmission gears 43 include a gear disposed on the drive shaft 42a and two gears disposed on an intermediate shaft between the drive shaft 42a and the rotary shaft 20. By the plurality of transmission gears 43, the rotational driving force generated by the drive motor 42 is reduced and transmitted to the input gear 41 (the rotary shaft 20).

[0075]

The kneading operation conversion portions 39 are a left kneading operation conversion portion 39L disposed on the left of the rotary shaft 20, and a right kneading operation conversion portion 39R disposed on the right of the rotary shaft 20. The grabbing operation conversion portions 40 are the left grabbing operation conversion portion 40L disposed on the right of the left kneading operation conversion portion 39L on the left of the rotary shaft 20, and a right

grabbing operation conversion portion 40R disposed on the left of the right kneading operation conversion portion 39R on the right of the rotary shaft 20.

[0076]

FIG. 4 is an exploded view of the left kneading operation conversion portion 39L exploded along the central axis of the rotary shaft 20 (i.e., in the left-right direction).

[0077]

As illustrated in FIG. 4, the left kneading operation conversion portion 39L includes a left first boss portion 44L and a left second boss portion 45L disposed rightward of the left first boss portion 44L. The left second boss portion 45L has a left first cam surface 49L facing the left first boss portion 44L.

[0078]

The left first boss portion 44L has a cylindrical shape centered around the central axis of the rotary shaft 20 extending in the left-right direction (i.e., a cylindrical shape laid sidelong with its central axis extending in the left-right direction). The left first boss portion 44L has a left side surface that is flat along a direction perpendicular to the central axis of the rotary shaft 20, and a right side surface that is flat along a direction obliquely crossing the central axis of the rotary shaft 20. The left first boss portion 44L has at its center a first shaft hole 47 through which the rotary shaft 20 is inserted.

[0079]

The left second boss portion 45L has a multistage cylindrical shape centered around the central axis of the rotary shaft 20 extending in the left-right direction (i.e., a multistage cylindrical shape composed of a large cylinder laid sidelong and small cylinders respectively superimposed on the left and right of the large cylinder). The left second boss portion 45L has a left side surface that is flat along a direction obliquely crossing the central axis of the rotary shaft 20, and a right side surface that is flat along a direction perpendicular to the central axis of

the rotary shaft 20. The left side surface of the left second boss portion 45L is parallel to the right side surface of the left first boss portion 44L.

[0080]

The left second boss portion 45L has on its left side surface a left first cam portion 48L of a cylindrical shape protruding leftward. The left first cam portion 48L has a cylindrical shape centered around its central axis extending obliquely with respect to the central axis of the rotary shaft 20. The left first cam portion 48L has a cylindrical shape the outside diameter of which is smaller than an outside diameter of the left second boss portion 45L at the center of the left second boss portion 45L. The left first cam portion 48L has on its outer peripheral surface the left first cam surface 49L. In other words, the left first cam surface 49L is located between the left side surface of the left second boss portion 45L and the right side surface of the left first boss portion 44L.

[0081]

A left first annular fitting portion 50L is slidably fitted to the left first cam surface 49L. The left first annular fitting portion 50L is disposed on a proximal end of the left massage member 11L (the left arm portion 14L).

[0082]

The left second boss portion 45L has at its center a second shaft hole 51 through which the rotary shaft 20 is inserted. The second shaft hole 51 obliquely extends through the center of the cylindrical shape of the left second cam portion 55L, and communicates with the second shaft hole 51 in the left first cam portion 48L.

[0083]

The left first annular fitting portion 50L serves as a cylindrical hole portion extending through the proximal end of the left arm portion 14L in the left-right direction. The left first annular fitting portion 50L is open in a circular shape as seen from the left-right direction, and

has an opening diameter slightly larger than the outside diameter of the left first cam portion 48L. The left first cam portion 48L of the left second boss portion 45L is inserted through the left first annular fitting portion 50L, and the proximal end of the left arm portion 14L is rotatable relative to the left first cam portion 48L. In other words, since the cylindrical shape of the left first cam portion 48L is centered around the axis of the left first cam portion 48L extending obliquely to the central axis of the rotary shaft 20, the left arm portion 14L is rotatable about the axis extending obliquely to the central axis of the rotary shaft 20.

[0084]

As illustrated in FIG. 4, the left grabbing operation conversion portion 40L includes the left second boss portion 45L and a left third boss portion 53L disposed rightward of the left second boss portion 45L. The left second boss portion 45L has a left second cam surface 54L facing the left third boss portion 53L.

[0085]

In the present embodiment, the left second boss portion 45L has a function as a member constituting a part of the left kneading operation conversion portion 39L and a function as a member constituting a part of the left grabbing operation conversion portion 40L. In the massage unit 1 of the present disclosure, a boss member functioning as the left kneading operation conversion portion 39L and a boss member functioning as the left grabbing operation conversion portion 40L may be provided independently of each other.

[0086]

Specifically, as illustrated in, for example, FIG. 4, the left second boss portion 45L of the present embodiment has on its right side surface a left second cam portion 55L of a cylindrical shape protruding rightward. The left second cam portion 55L has a cylindrical shape the outside diameter of which is smaller than the outside diameter of the left second boss portion 45L at the center of the left second boss portion 45L. The cylindrical shape of the left

second cam portion 55L is centered around an axis extending along the central axis of the rotary shaft 20 (i.e., in the left-right direction). The left second cam portion 55L has on its outer peripheral surface the left second cam surface 54L to which the left second annular fitting portion 56L is slidably fitted. The left second cam surface 54L has a cylindrical orbit around an axis eccentric to the central axis of the rotary shaft 20. The left second boss portion 45L has the second shaft hole 51 through which the rotary shaft 20 is inserted. The second shaft hole 51 extends through the left second boss portion 45L in the left-right direction at a position eccentric to the center of the cylindrical shape of the left second cam portion 55L.

[0087]

The left second annular fitting portion 56L serves as a cylindrical hole portion extending through the midway portion of the left grabbing arm portion 35L in the left-right direction. The left second annular fitting portion 56L is open in a circular shape as seen from the left-right direction, and has an opening diameter slightly larger than the outside diameter of the left second cam portion 55L. The left second annular fitting portion 56L is externally and slidably fitted to the left second cam surface 54L (the left second cam portion 55L) of the left second boss portion 45L. In other words, since the cylindrical shape of the left second cam surface 54L is centered around the axis eccentric to the central axis of the rotary shaft 20, the midway portion of the left grabbing arm portion 35L is rotatable about the axis eccentric to the central axis of the rotary shaft 20.

[0088]

The left third boss portion 53L has a cylindrical shape centered around the central axis of the rotary shaft 20 extending in the left-right direction. The left third boss portion 53L has at its center a third shaft hole 57 through which the rotary shaft 20 is inserted. The third shaft hole 57 extends in the left-right direction. The left third boss portion 53L has a left side surface that is flat along a direction orthogonal to the central axis of the rotary shaft 20, and a right side

surface that is flat along a direction obliquely crossing the central axis of the rotary shaft 20.

The left side surface of the left third boss portion 53L is parallel to the right side surface of the left second boss portion 45L. The third shaft hole 57 communicates with the first shaft hole 47 and the second shaft hole 51.

[0089]

The right massage member 11R includes a right arm portion 14R, a right first rotation restriction portion, and a right treatment element 15R (a right first treatment element 16R and a right second treatment element 17R) that are in a laterally line symmetric arrangement with the left arm portion 14L, the left first rotation restriction portion 31L, and the left treatment element 15L (the left first treatment element 16L and the left second treatment element 17L) of the left massage member 11L, respectively. In addition, the right grabbing massage member 30R includes a right grabbing arm portion 35R, a right second rotation restriction portion 36R, and a right grabbing treatment element 29R that are in a laterally line symmetric arrangement with the left grabbing arm portion 35L, the left second rotation restriction portion, and the left grabbing treatment element 29L of the left grabbing massage member 30L, respectively. These members have the same structures except that these members are in a laterally line symmetric arrangement. Therefore, the right massage member 11R and the right grabbing massage member 30R are not described.

[0090]

As described above, the left first cam surface 49L of the left second boss portion 45L of the left massage member 11L has a cylindrical shape centered around the axis extending obliquely with respect to the central axis of the rotary shaft 20. The right second boss portion 45R of the right massage member 11R, which is in a laterally line symmetric arrangement with the left massage member 11L, also has a right first cam surface 49R. The left first cam surface 49L and the right first cam surface 49R are in a laterally symmetric arrangement; therefore, the

respective cam surfaces are inclined in laterally opposite directions (i.e., inclined oppositely in the left-right direction). Specifically, when the left massage member 11L externally fitted to the left first cam surface 49L swings leftward, the right massage member 11R externally fitted to the right first cam surface 49R swings rightward. On the other hand, when the left massage member 11L externally fitted to the left first cam surface 49L swings rightward, the right massage member 11R externally fitted to the right first cam surface 49R swings leftward. The left massage member 11L and the right massage member 11R are thus brought close to and separated from each other repeatedly in the left-right direction, so that the massage unit 1 is capable of applying a kneading massage to the treatment target located between the left massage member 11L and the right massage member 11R.

[0091]

The left second boss portion 45L of the left grabbing operation conversion portion 40L and the right second boss portion 45R of the right grabbing operation conversion portion 40R each have the second shaft hole 51 at the position eccentric to the center of its cylindrical shape, and rotate about the axis eccentric to the central axis of the rotary shaft 20 (the second shaft hole 51). In the left grabbing massage member 30L externally fitted to the left second cam surface 54L of the left second boss portion 45L and the right grabbing massage member 30R externally fitted to the right second cam surface 54R of the right second boss portion 45R, inserting the restriction pins through the left second rotation restriction portion and right second rotation restriction portion 36R restricts displacement of the left grabbing arm portion 35L and right grabbing arm portion 35R in the front-rear direction and permits the displacement of the left grabbing arm portion 35L and right grabbing arm portion 35R in the up-down direction. In other words, the left grabbing massage member 30L and the right grabbing massage member 30R repeatedly swing in the up-down direction to apply grabbing massages to the treatment target located between the left grabbing treatment element 29L and the left treatment element

15L (the left second treatment element 17L) and the treatment target located between the right grabbing treatment element 29R and the right treatment element 15R (the right second treatment element 17R), respectively.

[0092]

Next, the massage operation to be performed by the massage unit 1 of the present embodiment is described with reference to FIG. 7.

[0093]

FIG. 7 illustrates positions of the massage unit 1 relative to the treatment targets of the user and massage operation to be performed by the treatment elements 15 at each position.

[0094]

First, a description is given of a case where the massage unit 1 is at a position corresponding to the back (the treatment target) of the user (e.g., the shoulder blades and their vicinities of the user). In the following, this position is referred to as a first position.

[0095]

In the case where the massage unit 1 is at the first position, since the treatment target protrudes rearward, the first treatment elements 16 of the treatment elements 15 come into contact with the treatment target, but the second treatment elements 17 of the treatment elements 15 do not come into contact with the treatment target. The first treatment elements 16 come into contact with the treatment target at the first contact surfaces 18. Each of the first contact surfaces 18 is smooth and is continuous along and around the first axis a_1 . In addition, the first contact surfaces 18 are larger in area than the second contact surfaces 19. Therefore, a pressing force applied to each treatment element 15 is dispersed at the first contact surface 18 with the large area, so that a feeling of massage given on the treatment target is not strong.

[0096]

Specifically, the drive motor 42 of the drive mechanism 12 is driven to generate a

rotational driving force and the rotational driving force of the drive shaft 42a is transmitted to the rotary shaft 20 so that the rotary shaft 20 rotates. As a result, the left kneading operation conversion portion 39L and the right kneading operation conversion portion 39R convert the rotational driving force, so that the massage members 11 swing in the left-right direction. Since the left first cam surface 49L of the left kneading operation conversion portion 39L and the right first cam surface 49R of the right kneading operation conversion portion 39R are inclined in laterally opposite directions (i.e., inclined oppositely in the left-right direction), the left massage member 11L and the right massage member 11R swing in laterally opposite directions. The massage unit 1 at the first position thus applies a kneading massage to the treatment target with the left massage member 11L and the right massage member 11R brought close to and separated from each other in the left-right direction repeatedly.

[0097]

According to the massage unit 1 at the first position, as described above, the pressing force applied to each treatment element 15 is dispersed at the first contact surface 18 with the large area, so that a feeling of massage given on the treatment target is not strong. The massage unit 1 at the first position is therefore capable of applying a soft kneading massage to the back as the treatment target. In a case where a back is a treatment target, since shoulder blades and the like protrude rearward, many users prefer a soft feeling of massage rather than a strong feeling of massage. For this reason, the massage unit 1 of the present embodiment is capable of applying a kneading massage to the back (the treatment target) of the user such that the user has an optimal soft feeling of massage.

[0098]

In the foregoing description, the first position corresponds to the back (the treatment target) of the user. However, the treatment target is not limited to the back. For example, the massage unit 1 of the present disclosure is capable of producing the same advantageous effects

even when a position corresponding to, for example, the neck of the user, where the user prefers a soft (mild) feeling of massage, is set at the first position.

[0099]

Next, a description is given of a case where the massage unit 1 is at a position corresponding to the waist (the treatment target) of the user. In the following, this position is referred to as a second position.

[0100]

In the case where the massage unit 1 is at the second position (which covers a region from the waist to the buttocks and their vicinities), since the treatment target is recessed forward, the first treatment elements 16 of the treatment elements 15 do not come into contact with the treatment target, but the second treatment elements 17 of the treatment elements 15 come into contact with the treatment target. Particularly in the case where the waist is the treatment target, the contour of the waist is inclined rearward from top to bottom. Therefore, the second treatment elements 17 disposed on the lower side of the arm portions 14 come into contact with the waist with ease.

[0101]

Although each of the second treatment elements 17 comes into contact with the treatment target at the second contact surface 19, a portion of the second contact surface 19, which is substantially contactable with the treatment target, is a part of the outer surface of the second treatment element 17 including the tips of the protrusions 28 and is much smaller in area than a portion of the first contact surface 18, which is substantially contactable with the treatment target. Therefore, a pressing force applied to each treatment element 15 is concentrated on the second contact surface 19 with the small area, so that a feeling of massage given on the treatment target is strong.

[0102]

The massage unit 1 at the second position, as with the massage unit 1 at the first position, applies a kneading massage to the treatment target with the left massage member 11L and the right massage member 11R brought close to and separated from each other in the left-right direction repeatedly. According to the massage unit 1 at the second position, as described above, the pressing force applied to each treatment element 15 is not dispersed so much at the second contact surface 19 with the small area, so that a feeling of massage given on the treatment target is strong. The massage unit 1 at the second position is therefore capable of applying a kneading massage to the waist as the treatment target while giving the strong feeling of massage to the user.

[0103]

In a case where a waist is a treatment target, since the treatment target is located away from the surface of a body, many users prefer a strong feeling of massage rather than a soft feeling of massage. For this reason, the massage unit 1 of the present embodiment is capable of applying a kneading massage to the waist (the treatment target) of the user such that the user has an optimal strong feeling of massage.

[0104]

In the foregoing description, the second position corresponds to the waist (the treatment target) of the user. However, the treatment target is not limited to the waist. For example, the massage unit 1 of the present disclosure is capable of producing the same advantageous effects even when a position corresponding to, for example, the buttocks of the user, where the user prefers a strong feeling of massage, is set at the second position.

[0105]

The massage unit 1 of the present embodiment is configured to give a soft feeling of massage to the user in the case where the treatment target is, for example, the back protruding rearward and give a strong feeling of massage to the user in the case where the treatment target

is, for example, the waist recessed forward. Alternatively, the massage unit 1 of the present disclosure may give different feelings of massage to the user on any treatment target by changing the inclination angle of the base 10. For example, the inclination angle of the base 10 can be changed by changing the inclination angle of a part of the guide rail 6 of the guide mechanism 5. Alternatively, the inclination angle of the base 10 can be changed by providing, for example, a link mechanism on the base 10 so as to change an orientation of the base 10 to a rising orientation or a tilted orientation. This configuration allows the massage unit 1 of the present disclosure to selectively give different feelings of massage on any treatment target.

[0106]

The massage unit 1 of the present disclosure includes the pair of left and right massage members 11 (the left massage member 11L and the right massage member 11R) disposed on the base 10 and the drive mechanism 12 configured to perform kneading operation on a treatment target by bringing or separating the pair of left and right massage members 11 (the left massage member 11L and the right massage member 11R) close to or from each other. The drive mechanism 12 includes the rotary shaft 20 to be rotationally driven about the axis extending horizontally, the driver 38 configured to rotationally drive the rotary shaft 20, and the kneading operation conversion portion 39 configured to convert rotating motion of the rotary shaft 20 into swinging motion in the left-right direction. The pair of left and right massage members 11 (the left massage member 11L and the right massage member 11R) each include the arm portion 14 having the proximal end supported by the kneading operation conversion portion 39, and the treatment element 15 disposed on the distal end of the arm portion 14. The treatment element 15 includes the first treatment element 16 disposed on the upper side of the distal end of the arm portion 14, and the second treatment element 17 disposed on the lower side of the distal end of the arm portion 14. The first treatment element 16 on the distal end of the arm portion 14 has the first contact surface 18 that is curved around the first axis a_1 crossing the longitudinal

direction L_1 of the arm portion 14 and is contactable with the treatment target. The second treatment element 17 on the distal end of the arm portion 14 has the second contact surface 19 that is curved around the second axis a_2 crossing the longitudinal direction of the arm portion 14 and is contactable with the treatment target. The first contact surface 18 is larger in area than the second contact surface 19.

[0107]

According to this configuration, since the first contact surface 18 is larger in area than the second contact surface 19, the pressing force transmitted to the first treatment element 16 via the arm portion 14 is dispersed at the first contact surface 18 with the large area. As a result, the pressing force applied to the treatment target is decreased. Therefore, the user has a soft feeling of massage on the treatment target. On the other hand, since the second contact surface 19 is smaller in area than the first contact surface 18, the pressing force transmitted to the second treatment element 17 via the arm portion 14 is not dispersed so much at the second contact surface 19 with the small area. As a result, the pressing force applied to the treatment target is stronger than that applied by the first treatment element 16. Therefore, the user has a strong feeling of massage on the treatment target. Hence, the massage unit 1 of the present disclosure is capable of changing the strength of a feeling of massage on a treatment target in accordance with whether treatment is performed by the first treatment element 16 or the second treatment element 17. The massage unit 1 of the present disclosure is thus capable of giving different feelings of massage in accordance with treatment targets so as to meet the needs of the user.

[0108]

Preferably, the first contact surface 18 is smooth, the first treatment element 16 applies a massage to the treatment target with the first contact surface 18 pressed against the treatment target, the second treatment element 17 includes the one or more protrusions 28 disposed on the second contact surface 19, and the second treatment element 17 applies a massage to the

treatment target with the one or more protrusions 28 pressed against the treatment target.

[0109]

According to this configuration, since the first contact surface 18 of the first treatment element 16 is smooth and curved and has an egg shape (a teardrop shape), the first treatment element 16 does not strongly stimulate the treatment target even when any portion of the first contact surface 18 comes into contact with the treatment target. Therefore, the first treatment element 16 is capable of massaging the treatment target softly (mildly). On the other hand, since the second contact surface 19 of the second treatment element 17, where the protrusions 28 are disposed, is considerably smaller in area than the first contact surface 18. Therefore, when the second treatment element 17 is pressed against the treatment target, the pressing force is concentrated on the second contact surface 19 with the small area, so that the user has a strong feeling of massage on the treatment target.

[0110]

Preferably, the first axis a_1 is inclined forward and upward, and the second axis a_2 is inclined rearward and downward.

[0111]

Since the first axis a_1 is inclined forward and upward, the first treatment element 16 can be disposed on the front end of the arm portion 14 so as to protrude upward. In addition, since the second axis a_2 is inclined rearward and downward, the second treatment element 17 can be disposed on the front end of the arm portion 14 so as to protrude downward. When the first treatment element 16 is disposed so as to protrude upward and the second treatment element 17 is disposed so as to protrude downward, the massage unit 1 of the present disclosure is capable of applying a massage to the treatment target such as the back or the shoulders, using the first treatment element 16 such that the user has a soft feeling of massage, and is capable of applying a massage to the treatment target such as the waist, using the second treatment element 17 such

that the user has a strong feeling of massage. It is thus possible to change the strength of a massage in accordance with a treatment target.

[0112]

Preferably, the second axis a_2 is inclined inward by the angle θ_2 in the left-right direction (the width direction) of the massage unit 1.

[0113]

Since the second axis a_2 is inclined inward by the angle θ_2 in the left-right direction (the width direction), the second axis can be directed to the grabbing treatment element 29. As indicated by the chain double-dashed line in FIG. 5B, the grabbing treatment element 29 is disposed inward with respect to the second treatment element 17 in the left-right direction (width direction) of the massage unit 1. Since the second axis a_2 is directed to the grabbing treatment element 29, the protrusions 28 can be directed to the grabbing treatment element 29 during grabbing massage operation by the grabbing treatment element 29. It is thus possible to apply a grabbing massage to the treatment target such that the user has a strong feeling of massage.

[0114]

Preferably, the first axis a_1 and the second axis a_2 cross each other so as to be directed differently in the left-right direction.

[0115]

The configuration that the first axis a_1 and the second axis a_2 cross each other so as to be directed differently in the left-right direction is particularly preferable in a case where the massage unit 1 includes the grabbing massage members 30 configured to apply a grabbing massage in addition to the massage members 11 configured to apply a kneading massage. Since each second treatment element 17 (or each first treatment element 16) protrudes toward the corresponding grabbing massage member 30, a feeling of massage given by the grabbing massage can be increased.

[0116]

Preferably, the number of the protrusions 28 is at least two or more, and the at least two or more protrusions 28 are arranged around the second axis a_2 .

[0117]

In other words, the lines a_3 passing the tips of the respective protrusions 28 extend radially from the intersection point P_2 at intervals of the angle θ_3 as seen from the extending direction of the second axis a_2 .

[0118]

Since the at least two or more protrusions 28 are arranged around the second axis a_2 , at least one of the protrusions 28 comes into contact with the treatment target irrespective of the protruding direction of the second treatment element 17. It is thus possible to give a strong feeling of massage on the treatment target, using the tips of the protrusions 28 of the second treatment element 17.

[0119]

Preferably, the line a_3 representing the protruding direction of each protrusion 28 extending from the intersection point (the intersection point P_1) where the line passing the center of the second treatment element 17 and extending in the up-down direction and the upper surface of the second treatment element 17 cross each other, toward the tip of the protrusion 28 and the upper surface of the second treatment element 17 form the angle that is larger than 0 degrees and smaller than 90 degrees.

[0120]

Since the angle θ_4 formed by the line a_3 and the upper surface of the second treatment element 17 is larger than 0 degrees and smaller than 90 degrees, the tips of the protrusions 28 come into contact with the treatment target even when the second treatment element 17 is inclined. It is thus possible to give a strong feeling of massage on the treatment target, using

the tips of the protrusions 28.

[0121]

The massage unit 1 of the present disclosure further includes the pair of left and right grabbing massage members 30 respectively disposed below the pair of left and right massage members 11 (the left massage member 11L and the right massage member 11R) and configured to apply a grabbing massage to the treatment target in cooperation with the second treatment elements 17. The drive mechanism 12 includes the grabbing operation conversion portion 40 configured to convert rotating motion of the rotary shaft 20 into swinging motion in the up-down direction. The pair of left and right grabbing massage members 30 each include the grabbing arm portion 35 having the proximal end supported by the grabbing operation conversion portion 40, and the grabbing treatment element 29 disposed on the distal end of the grabbing arm portion 35. The second axis a_2 is directed to the grabbing treatment element 29.

[0122]

Since the second axis a_2 is directed to the grabbing treatment element 29, the treatment target is sandwiched between the protrusions 28 of the second treatment element 17 and the grabbing treatment element 29 by the upward swinging motion of the grabbing massage member 30. It is thus possible to apply a grabbing massage to the treatment target such that the user has a strong feeling of massage.

[0123]

The chair-type massage machine 2 of the present disclosure includes the seat portion 4, the backrest portion 3, the massage unit 1 of the present disclosure disposed in the backrest portion 3, and the guide mechanism 5 configured to guide the massage unit 1 to a part of the user U ranging from the shoulders to the waist.

[0124]

The chair-type massage machine 2 of the present disclosure is capable of changing the

strength of a feeling of massage on a treatment target in accordance with whether treatment is performed by the first treatment element 16 or the second treatment element 17. The chair-type massage machine 2 of the present disclosure is thus capable of giving different feelings of massage in accordance with treatment targets so as to meet the needs of the user.

[0125]

It should be understood that embodiments disclosed herein are illustrative and are not restrictive in all respects. Especially, as matters that are not explicitly disclosed in the embodiments, such as massage conditions and massage modes, parameters, such as strength and speed, of various massage operations, and dimensions, weights, volumes, and the like of constituents, values are adopted that can be easily conceived by a person skilled in the art without departing from the scope of ordinary implementations by a person skilled in the art.

[0126]

The foregoing embodiment has exemplified the massage unit 1 applied to the back massage mechanism of the backrest portion 3. However, the massage unit 1 of the present disclosure is also applicable to a placement-type massage machine and a massage chair-type massage machine. In addition, the massage unit 1 of the present disclosure can be used as a seat portion massage mechanism of the seat portion 4 in addition to the back massage mechanism of the backrest portion 3.

[0127]

It can be considered that the massage unit 1 of the present disclosure has the following configurations. Specifically, the first treatment element 16 on the distal end of the arm portion 14 has the first contact surface 18 that is curved around the first axis crossing the longitudinal direction of the arm portion 14 and is contactable with the treatment target. The second treatment element 17 on the distal end of the arm portion 14 has the second contact surface 19 that is curved around the second axis crossing the longitudinal direction of the arm portion 14

and is contactable with the treatment target. The first contact surface 18 is smooth. The second treatment element 17 includes the one or more protrusions 28 disposed on the second contact surface 19. According to this configuration, the massage unit 1 of the present disclosure is capable of achieving a variety of massages, using the first contact surface 18 and the second contact surface 19 capable of giving different kneading feelings to the user.

[0128]

In addition, the first contact surface 18 is larger in area than the second contact surface 19. According to this configuration, since the first contact surface 18 has a low contact pressure, the massage unit 1 of the present disclosure is capable of giving a soft kneading feeling to the user. In addition, since the second contact surface 19 has a high contact pressure, the massage unit 1 of the present disclosure is capable of giving a strong kneading feeling to the user.

[0129]

The embodiments disclosed herein are in all aspects illustrative and not restrictive. The scope of the present invention is defined by the claims rather than the foregoing embodiments, and includes all modifications within the meaning and scope equivalent to the scope of the claims.

REFERENCE SIGNS LIST

[0130]

- 1 massage unit
- 2 chair-type massage machine
- 3 backrest portion
- 4 seat portion
- 5 guide mechanism

- 6 guide rail
- 7 rack portion
- 8 travelling gear
- 9 travelling motor
- 10 base
- 11 massage member
- 11L left massage member
- 11R right massage member
- 12 drive mechanism
- 13 casing
- 14 arm portion
- 14L left arm portion
- 14R right arm portion
- 15 treatment element
- 15L left treatment element
- 15R right treatment element
- 16 first treatment element
- 16L left first treatment element
- 16R right first treatment element
- 17 second treatment element
- 17L left second treatment element
- 17R right second treatment element
- 18 first contact surface
- 18L left first contact surface
- 19 second contact surface

- 19L left second contact surface
- 20 rotary shaft
- 21 first support shaft
- 21L left first support shaft
- 22L left first insertion hole
- 23L left first retaining portion
- 24 mount portion
- 25L left second support shaft
- 26L left second insertion hole
- 27L left second retaining portion
- 28 protrusion
- 29L left grabbing treatment element
- 29R right grabbing treatment element
- 30 grabbing massage member
- 30L left grabbing massage member
- 30R right grabbing massage member
- 31L left first rotation restriction portion
- 32 first restriction pin
- 33 restriction groove
- 34 restriction member
- 35L left grabbing arm portion
- 35R right grabbing arm portion
- 36R right second rotation restriction portion
- 37 second restriction pin
- 38 driver

- 39 kneading operation conversion portion
- 39L left kneading operation conversion portion
- 39R right kneading operation conversion portion
- 40 grabbing operation conversion portion
- 40L left grabbing operation conversion portion
- 40R right grabbing operation conversion portion
- 41 input gear
- 42 drive motor
- 42a drive shaft
- 43 transmission gear
- 44L left first boss portion
- 45L left second boss portion
- 45R right second boss portion
- 47 first shaft hole
- 48L left first cam portion
- 49L left first cam surface
- 49R right first cam surface
- 50L left first annular fitting portion
- 51 second shaft hole
- 53L left third boss portion
- 54L left second cam surface
- 54R right second cam surface
- 55L left second cam portion
- 56L left second annular fitting portion
- 57 third shaft hole

L_1 longitudinal direction

O_1 central axis

P_1 intersection point

P_2 intersection point

U user

a_1 first axis

a_2 second axis

a_3 line

θ_1 crossing angle

θ_2 angle

θ_3 angle

θ_4 angle

CLAIMS

1. A massage unit comprising:
 - a pair of left and right massage members disposed on a base; and
 - a drive mechanism configured to perform kneading operation on a treatment target by bringing or separating the pair of left and right massage members close to or from each other, wherein
 - the drive mechanism includes:
 - a rotary shaft to be rotationally driven about an axis extending horizontally;
 - a driver configured to rotationally drive the rotary shaft; and
 - a kneading operation conversion portion configured to convert rotating motion of the rotary shaft into swinging motion in a left-right direction,
 - the pair of left and right massage members each include:
 - an arm portion having a proximal end supported by the kneading operation conversion portion; and
 - a treatment element disposed on a distal end of the arm portion,
 - the treatment element includes:
 - a first treatment element disposed on an upper side of the distal end of the arm portion; and
 - a second treatment element disposed on a lower side of the distal end of the arm portion,
 - the first treatment element on the distal end of the arm portion has a first contact surface that is curved around a first axis crossing a longitudinal direction of the arm portion and is contactable with the treatment target,
 - the second treatment element on the distal end of the arm portion has a second contact surface that is curved around a second axis crossing the longitudinal direction of the arm portion

and is contactable with the treatment target, and

the first contact surface is larger in area than the second contact surface.

2. The massage unit according to claim 1, wherein

the first contact surface is smooth,

the first treatment element applies a massage to the treatment target with the first contact surface pressed against the treatment target,

the second treatment element includes one or more protrusions disposed on the second contact surface, and

the second treatment element applies a massage to the treatment target with the one or more protrusions pressed against the treatment target.

3. The massage unit according to claim 2, wherein

the first axis is inclined forward and upward, and

the second axis is inclined rearward and downward.

4. The massage unit according to claim 2, wherein

the first axis and the second axis cross each other so as to be directed differently in the left-right direction.

5. The massage unit according to claim 2, wherein

a number of the protrusions is at least two or more, and

the at least two or more protrusions are arranged around the second axis.

6. The massage unit according to claim 2, wherein

a line representing a protruding direction of each protrusion extending from an intersection point where a line passing a center of the second treatment element and extending in an up-down direction and an upper surface of the second treatment element cross each other, toward a tip of the protrusion and the upper surface of the second treatment element form an angle that is larger than 0 degrees and smaller than 90 degrees.

7. The massage unit according to claim 2, further comprising

a pair of left and right grabbing massage members respectively disposed below the pair of left and right massage members and configured to apply a grabbing massage to the treatment target in cooperation with the second treatment elements,

wherein

the drive mechanism includes a grabbing operation conversion portion configured to convert rotating motion of the rotary shaft into swinging motion in an up-down direction,

the pair of left and right grabbing massage members each include a grabbing arm portion having a proximal end supported by the grabbing operation conversion portion, and a grabbing treatment element disposed on a distal end of the grabbing arm portion, and

the second axis is directed to the grabbing treatment element.

8. A chair-type massage machine comprising:

a seat portion;

a backrest portion;

the massage unit according to any one of claims 1 to 7, the massage unit being disposed in the backrest portion; and

a guide mechanism configured to guide the massage unit to a part of a user ranging from a shoulder to a waist.

9. A massage unit comprising:
 - a pair of left and right massage members disposed on a base; and
 - a drive mechanism configured to perform kneading operation on a treatment target by bringing or separating the pair of left and right massage members close to or from each other, wherein
 - the drive mechanism includes:
 - a rotary shaft to be rotationally driven about an axis extending horizontally;
 - a driver configured to rotationally drive the rotary shaft; and
 - a kneading operation conversion portion configured to convert rotating motion of the rotary shaft into swinging motion in a left-right direction,
 - the pair of left and right massage members each include:
 - an arm portion having a proximal end supported by the kneading operation conversion portion; and
 - a treatment element disposed on a distal end of the arm portion,
 - the treatment element includes:
 - a first treatment element disposed on an upper side of the distal end of the arm portion; and
 - a second treatment element disposed on a lower side of the distal end of the arm portion,
 - the first treatment element on the distal end of the arm portion has a first contact surface that is curved around a first axis crossing a longitudinal direction of the arm portion and is contactable with the treatment target,
 - the second treatment element on the distal end of the arm portion has a second contact surface that is curved around a second axis crossing the longitudinal direction of the arm portion

and is contactable with the treatment target,

the first contact surface of the first treatment element is smooth, and

the second treatment element includes one or more protrusions disposed on the second contact surface.

10. The massage unit according to claim 9, wherein
the first contact surface is larger in area than the second contact surface.