

DESCRIPTION

Title of Invention: MESSAGE CHAIR APPARATUS

Technical Field

[0001] The present invention relates to a message chair apparatus, the seat portion of which is provided at its front with a leg massager that operates to give pressing massage to user's leg, in particular, a calf-to-thigh range of the leg, as well as to user's foot.

Background Art

[0002] An example among conventional massaging apparatuses in chair form is a message chair apparatus, the seat portion of which is provided at its front with a leg massager for massaging user's leg.

For example, Patent Literature 1 discloses technologies for a message chair apparatus capable of automatic massaging operation. The message chair apparatus basically comprises: a backrest portion mounted for tilting motion relative to a seat portion; and a footrest portion mounted for tilting motion relative to the seat portion, or mounted for advancing and withdrawing motion relative to the seat portion. The message chair apparatus also comprises: a detector that detects information on user's body shape via a detecting element disposed at the backrest portion or the footrest portion; and a control unit that

permits automatic tilting motion of the backrest portion or the footrest portion, or permits automatic advancing and withdrawing motion of the footrest portion in accordance with the result of detection by the detector.

Prior Art Reference

Citation List

[0003] Patent Literature 1: Japanese Unexamined Patent Publication JP-A 2006-87737

Summary of Invention

Technical Problem

[0004] The variety of user's demands for massaging equipment has increased in recent years. For example, there are user requests for a leg massager capable of giving message not only to user's foot but also to a calf-to-thigh range of user's leg, and also a message chair apparatus equipped with such a leg massager.

The present invention has been devised in view of the circumstances as discussed supra, and accordingly its object is to provide a message chair apparatus equipped with a leg massager including a position-adjustable massaging system that operates to give message to message target areas of user's leg, with which the user is able to have any area of the leg such as foot, calf, and thigh massaged while sitting in a chair, etc.

[0005] In order to achieve the described object, the

following technical means is adopted for the present invention to be carried into effect.

The present invention provides a massage chair apparatus comprising: a seat portion for user seating; a backrest portion mounted at a rear of the seat portion; and a footrest portion mounted at a front of the seat portion. In this construction, the footrest portion is built as a leg massager for massaging the leg of a user.

[0006] In the present invention, it is preferable that the leg massager comprises: a lower massaging system for massaging a massage target area of the leg of the user, which includes at least the foot of the user; an upper massaging system for massaging an upper massage target area located above the massage target area which is massaged by the lower massaging system; a drive mechanism for driving the upper massaging system and the lower massaging system; and a rockably supporting section for supporting the upper massaging system for rocking motion about a horizontal-pointing axis.

[0007] In the present invention, it is preferable that the upper massaging system includes a first massaging member or air bag, and the lower massaging system includes a second massaging member or air bag, that the rockably supporting section, located above the second massaging member or air bag, supports a base-end side of the first

massaging member or air bag for rocking motion to permit rising movement of a front-end side of the first massaging member or air bag via a horizontally-oriented rock shaft.

[0008] In the present invention, it is preferable that, at a position with the first massaging member leaning forward in adjoining relation to the second massaging member, the first massaging member faces forward, and, at a position with the first massaging member raised away from the second massaging member, the first massaging member faces upward.

In the present invention, it is preferable that the upper massaging system comprises: a horizontally-oriented first rotation shaft which rotates under a rotational driving force from the drive mechanism; right-hand and left-hand first massaging members used in a pair, each disposed at an intermediate part of the first rotation shaft, that hold the upper massage target area lying in between while moving close to and away from each other under a rotational driving force from the first rotation shaft; and a first conversion section for converting the rotational driving force from the first rotation shaft into mutually approaching and separating movement of the paired right-hand and left-hand first massaging members.

[0009] In the present invention, it is preferable that the rock shaft and the first rotation shaft are constructed

in one-piece of a single shaft body.

In the present invention, it is preferable that the massage chair apparatus is provided at its front with the leg massager which includes an upper massaging system for massaging, of the leg of the user, at least the calf of the user, that the upper massaging system is electrically driven for rotational movement about the first rotation shaft having a horizontal-pointing axis, and that the leg massager is mounted so as to be electrically driven for rotational movement in a front-rear direction.

[0010] In the present invention, it is preferable that the leg massager comprises: a lower massaging system for massaging a massage target area of the leg of the user, which includes at least the foot of the user; and the upper massaging system for massaging an upper massage target area located above the massage target area which is massaged by the lower massaging system, and that an upper part of the lower massaging system is provided with a safety switch for preventing a catching accident.

[0011] In the present invention, it is preferable that a sensor is provided to recognize a rotational position of the upper massaging system in an electrically driven state, the upper massaging system being supported for rocking motion about a horizontal-pointing axis.

In the present invention, it is preferable that a

sensor is provided to recognize a rocking position of the leg massager in the front-rear direction, the leg massager being mounted for rotational movement in the front-rear direction.

In the present invention, it is preferable that the leg massager is electrically driven by a vertical movement mechanism for moving action in a vertical direction.

[0012] In the present invention, it is preferable that a sensor is provided to recognize extended and contracted positions of the leg massager in extending and contracting movement.

In the present invention, it is preferable that a limit value of a rotation angle at which the upper massaging system is risingly rotated is determined in accordance with a vertical position of the leg massager and/or extended and contracted positions of the leg massager in a direction of extending and contracting movement.

[0013] In the present invention, it is preferable that the upper massaging system comprises: a horizontally-oriented first rotation shaft which rotates under a rotational driving force from the drive mechanism; right-hand and left-hand first massaging members used in a pair, each disposed at an intermediate part of the first rotation shaft, that hold the upper massage target area lying in

between while moving close to and away from each other under a rotational driving force from the first rotation shaft; and a first conversion section for converting the rotational driving force from the first rotation shaft into mutually approaching and separating movement of the paired right-hand and left-hand first massaging members, and that the upper massaging system rotationally moves around a horizontal-pointing axis, and the axis coincides with an axis of the first rotation shaft.

[0014] In the present invention, it is preferable that the upper massaging system and the lower massaging system are driven by one common drive motor.

In the present invention, it is preferable that a massage span set for the upper massaging system is adjustable according to a width of the leg of the user, and that the upper massaging system is rotationally moved following the completion of adjustment of the massage span.

[0015] In the present invention, it is preferable that, upon its 90- to 180-degree turn about a turning shaft, the leg massager becomes ready to serve as an ottoman for resting the leg of the user.

In the present invention, it is preferable that a sensor is provided to recognize a position of the leg massager in a state of serving as an ottoman, and, with the leg massager set in this position to serve as an ottoman,

the upper massaging system is at a standstill.

[0016] In the present invention, it is preferable that, after the paired second massaging members or air bags disposed in the lower massaging system are set close to each other to restrain the foot of the user, the paired first massaging members or air bags disposed in the upper massaging system are set close to each other to hold the leg of the user, and then rotationally moved upward.

In the present invention, it is preferable that the paired first massaging members or air bags disposed in the upper massaging system, after being set close to each other to hold the leg of the user, are rotationally moved downward for forward-leaning action, during which period a main body of the leg massager is moved downward, or the leg massager is electrically driven so as to move to its extended position.

[0017] In the present invention, it is preferable that, after achieving one of a condition where the paired first massaging members or air bags disposed in the upper massaging system are set close to each other to hold the leg of the user and a condition where the paired second massaging members or air bags disposed in the lower massaging system are set close to each other to restrain the foot of the user, the first massaging members or air bags are rotationally moved downward for forward-leaning

action, during which period the leg massager main body is moved downward, or the leg massager is electrically driven so as to move to its extended position.

[0018] In the present invention, it is preferable that, after the paired first massaging members or air bags disposed in the upper massaging system are set close to each other in a position facing the thigh of the user, an air bag mounted inside the seat portion is alternately inflated and deflated repeatedly, or a seat's built-in massaging mechanism mounted inside the seat portion is driven for at least one of kneading operation in a horizontal direction, tapping operation, back-and-forth movement in the vertical direction, and travel in the front-rear direction.

[0019] In the present invention, it is preferable that a no-kneading zone is provided to stop kneading operation of the paired first massaging members or air bags disposed in the upper massaging system when set in a position facing the knee of the user.

In the present invention, it is preferable that the upper massaging system is installed with a heater for warming the leg of the user.

Advantageous Effects of Invention

[0020] The message chair apparatus of the present invention, in particular, the leg massager mounted at the

front of the seat portion of the massage chair apparatus, is characterized by having a position-adjustable massaging system that operates to give massage to massage target areas of user's leg. With this construction, the user is able to have any area of the leg such as foot, calf, and thigh massaged while sitting in a chair, for example.

Brief Description of Drawings

[0021]

[FIG. 1] is a front perspective view showing the configuration of the leg massager of the present invention set in a position with the massaging section of the upper massaging system substantially horizontally oriented (first position for calf massage).

[FIG. 2] is a rear perspective view showing the leg massager of the present invention that has changed its position to a position with the massaging section inclined slightly rearward relative to the vertical (first position for calf massage).

[FIG. 3] is a front view showing the leg massager of the present invention.

[FIG. 4] is a front perspective view showing the internal structure of the leg massager of the present invention.

[FIG. 5] is a front perspective view showing the configuration of the leg massager of the present invention that has changed its position to a position with the

massaging section of the upper massaging system substantially vertically oriented (second position for thigh massage).

[FIG. 6] is a front perspective view showing the internal structure of the substantially vertically-oriented massaging section of the upper massaging system (rockably supporting section).

[FIG. 7] is a side view showing the massaging section of the upper massaging system that has changed its position to a substantially horizontally-oriented position (first position for calf massage).

[FIG. 8] is a side view showing the massaging section of the upper massaging system that has changed its position to an obliquely upward and forward-facing position (second position for massage to the upper part of the calf, the knee, etc.).

[FIG. 9] is a side view showing the massaging section of the upper massaging system that has changed its position to a position inclined slightly rearward relative to the vertical (third position for thigh massage).

[FIG. 10] is a view showing the massage chair apparatus and the leg massager installed in the massage chair apparatus pursuant to the present invention.

[FIG. 11] is a side view showing a case where the footrest (leg massager) installed in the massage chair apparatus has

changed its position to the foot kneading position.

[FIG. 12] is a side view showing another case where the footrest (leg massager) installed in the massage chair apparatus has changed its position to the foot kneading position.

[FIG. 13] is a side view showing a case where the footrest (leg massager) installed in the massage chair apparatus has changed its position to the ottoman-providing position.

[FIG. 14] is a rear perspective view showing the configuration of the footrest (leg massager).

[FIG. 15] is a front perspective view showing the configuration of the footrest (leg massager).

Description of Embodiments

[0022] Referring first to FIG. 10, an embodiment of a massage chair apparatus 70 pursuant to the present invention will now be described.

The massage chair apparatus 70 discussed in this embodiment externally appears to be a chair in which a user sits down.

The massage chair apparatus 70 comprises: a seat portion 71 for user seating; and a backrest portion 72 against which the user sitting in the seat portion 71 rests their back. The massage chair apparatus 70 further comprises a footrest portion 73, disposed at the front of the seat portion 71, for massaging user's leg. This

footrest portion serves as a leg massager 1 as will hereafter be described.

[0023] The seat portion 71, the backrest portion 72, and the footrest portion 73 that constitute the massage chair apparatus 70 will now be briefly described. In the following description, the terms of orientation, such for example as "right-left, or horizontal direction", are based on the view of the user sitting in the massage chair apparatus 70.

The seat portion 71 is a horizontally-extended flat member (a member extending flatly both in a horizontal direction and in a front-rear direction). The seat portion 71 is provided at its upper side with a cushion material for comfortable user seating. Mounted below the seat portion 71 is a support frame 74 via which the seat portion 71 is supported on a floor, etc. The support frame 74 is formed as a grid frame (platform) from an assembly of rectangular bar (rod) members respectively pointing in the vertical direction, the horizontal direction, and the front-rear direction. Thus constructed, the support frame 74 supports the seat portion 71 spaced above the floor.

[0024] The backrest portion 72 is a constituent member mounted at the rear of the seat portion 71. Like the seat portion 71, the backrest portion 72 has its user-facing side made of a cushion material. Moreover, the backrest

portion 72 is internally provided with a massaging mechanism (not shown in the drawings) for massaging (performing massage treatment on) massage target areas, such as the shoulder, the back, the waist, and the buttocks of a person sitting in the massage chair apparatus, and also a vertically-oriented movement rail (not shown) for guiding the described massaging mechanism in vertical movement.

[0025] The seat portion 71 and the backrest portion 72 are unitarily moved about a horizontal-pointing axis into a reclined position in the front-rear direction. The footrest portion 73 is configured to give massage to user's leg. The footrest portion 73 is preferably supported in movable relation toward and away from the seat portion 71.

The following details the leg massager 1 used as the footrest portion 73.

[0026] An embodiment of the leg massager 1 will be described with reference to FIGs. 1 to 9. The following embodiment is given by way of example of carrying the present invention into effect, and therefore not intended to be limiting of the structural features of the present invention. Moreover, some constituent components are omitted from FIGs. 1 to 9 for clarity of illustration.

The leg massager 1 discussed in this embodiment is made position-adjustable for giving massage to various

areas (massage target areas) of user's leg L.

[0027] In this embodiment, the leg L refers to users' leg areas in the range from thigh T, through calf C, to foot F. Moreover, in the present specification, "thigh T" refers to that part of human leg L located above the knee, the "calf C" refers to that part of the leg L located below the knee and located above the ankle, and the "foot F" refers to that part of the leg L located below the ankle and extending from the heel to the toe.

[0028] Moreover, as seen from some drawings for reference, terms of orientation such as forward and rearward directions (front-rear direction), the horizontal direction, and the vertical direction are based on the view of the user sitting in a chair, etc. with the leg L placed in the leg massager 1. In the following description, the calf C may also be called "first massage target area", and the thigh T may also be called "second massage target area".

Moreover, for example, a changed position as shown in FIG. 7 with a first massaging member 13 substantially horizontally oriented corresponds to a massaging position defined as "first position" intended for massage to the calf C.

[0029] A changed position as shown in the FIG. 8 with the first massaging member 13 directed forward and

obliquely upward corresponds to a massaging position defined as "second position" intended for massage to the upper part of the calf C, the knee, etc.

A changed position as shown in the FIG. 9 with the first massaging member 13 inclined slightly rearward relative to the vertical corresponds to a massaging position defined as "third position" intended for massage to the thigh T.

[0030] The leg massager 1, which is placed on a floor R for example, is used to massage each of the right and left legs L (massage target areas) of the user sitting in a chair, etc. The leg massager 1 is configured to give kneading and squeezing massage to different areas of the leg L, namely the foot F and any one of the calf C and the thigh T, at the same time. The leg massager 1 is also configured to produce vibrating and pressing motion to give finger-pressure massage to user's sole S.

[0031] The leg massager 1 discussed in this embodiment comprises: an upper massaging system 11 that operates to give massage to any one of user's calf C (both of the right and left calves C), thigh T (both of the right and left thighs T), etc. via a massaging section; a lower massaging system 37 that operates to give massage to user's foot F (both of the right and left feet F); and a drive mechanism 23 for driving the upper massaging system 11 and the lower

massaging system 37.

[0032] The upper massaging system 11 is housed in an upper casing 2. The lower massaging system 37 is housed in a lower casing 8. The drive mechanism 23 is placed so as to run between the upper casing 2 and the lower casing 8.

The upper casing 2 is an elongated member shaped so that, at the "first position", it extends forward with a bend. The upper casing 2 forms a space therein to accommodate constituent components such as the upper massaging system 11 and a first gear box 28 constituting the drive mechanism 23 (hereafter described in detail).

[0033] The upper casing 2 is supported for rocking motion in the front-rear direction relative to the lower casing 8 by a rockably supporting section 30 (hereafter described in detail). That is, the upper casing 2 is rockable in sync with the rocking motion of the built-in upper massaging system 11 about a horizontal-pointing axis.

The upper casing 2 is an open-topped member comprising: a lower covering 3 fitted with the upper massaging system 11 and a base body 15 constituting the upper massaging system 11; and an upper covering 4 mounted so as to cover the lower covering 3 from above.

[0034] The lower covering 3 is an upwardly-opening hollow member for receiving the upper massaging system 11, etc. Moreover, the lower covering 3 has its opposite ends

and centrally-located part in the horizontal direction extended forward in the form of furcations. This furcate lower covering 3 is internally provided with a mounting portion 5 for the base body 15 constituting the upper massaging system 11.

[0035] Moreover, the lower covering 3 is provided at its lower side with a centrally-located cavity 6 that receives a cap 34 for covering the rockably supporting section 30 when the "first position" is attained as the massaging position.

The upper covering 4 is a downwardly-opening member that covers the lower covering 3 from above. Like the lower covering 3, the upper covering 4 has its opposite ends and centrally-located part in the horizontal direction extended forward in the form of furcations.

[0036] The centrally-located part of the upper covering 4 in the horizontal direction is built as a member having a front-end part inclined obliquely downward in the forward direction. This inclined part is provided with a switch 60 to permit selection between an actuation mode and a stationary mode for the operation of the leg massager 1. With the switch 60 positioned on the inclined surface, even at the "first position" with the massaging section of the upper massaging system 11 substantially horizontally oriented as shown in FIG. 7, the switch 60 is discernible

with user's eyes without fail. Likewise, even at the "second position" with the massaging section located toward the upper area of the calf, the knee, etc. as shown in FIG. 8, and also even at the "third position" with the massaging section located toward the thigh as shown in FIG. 9, the location and status of the switch 60 can be identified by the user without fail. The switch 60 is thus ideally placed in such a position or place as is discernible with user's eyes at all times.

[0037] The upper casing 2, basically in the form of a forwardly-extending member with a bend, is formed with a pair of horizontally-spaced-apart first massaging recesses 7 for receiving the right and left calves C, as well as the right and left thighs T, for example.

For example, at the "first position" shown in FIG. 7, the first massaging recess 7 has an open top, an open front, and an open bottom. Although not shown in the drawings, the right-hand and left-hand first massaging recesses 7 used in a pair are each fitted internally with a lining material which is elastic, flexible, and adequately breathable.

[0038] The upper covering 4 and the lower covering 3 are butt-joined in the vertical direction to form the upper casing 2. The constituent components such as the upper massaging system 11 are housed in the interior space of the

upper casing 2 thus constructed.

Moreover, with a grasp on the right and left sides of the upper casing 2, the upper massaging system 11 can be rocked in the front-rear direction, and stopped and locked in a desired position, thereby accomplishing the changing of massaging position. That is, at the "first position" shown in FIGs. 1 and 7 for example, the right-hand and left-hand first massaging recesses 7 receive the right and left calves C, respectively. At the "second position" shown in FIG. 8, the right-hand and left-hand first massaging recesses 7 receive the right and left calves C, as well as the right and left knees, respectively. At the "third position" shown in FIGs. 5 and 9 for example, the right-hand and left-hand first massaging recesses 7 receive the right and left thighs T, respectively.

[0039] The lower casing 8 has a domical (convex) form with an upwardly-curved upper surface. The lower casing 8 forms a space therein to accommodate constituent components such as the lower massaging system 37 and the drive mechanism 23, both of which will be described later. The lower casing 8 is internally provided with a holder portion 32 for the placement of the rockably supporting section 30.

The lower casing 8 is provided at its upper surface with a pair of horizontally-spaced-apart upwardly opening second massaging recesses 9 for receiving user's right and

left feet F. Although not shown in the drawings, the second massaging recesses 9 are each fitted internally with a lining material which is elastic, flexible, and adequately breathable.

[0040] Moreover, the lower casing 8 is provided at each side in the horizontal direction with a hand well 10 for easy carrying of the leg massager 1 by user's hands.

The following describes the upper massaging system 11 housed in the upper casing 2.

As shown in FIGs. 1 to 9, the upper massaging system 11 discussed in this embodiment comprises: a horizontally-oriented first rotation shaft 12 which rotates under a rotational driving force from an upper transmission shaft 27a constituting the drive mechanism 23 (hereafter described in detail); right-hand and left-hand first massaging members 13 used in a pair, each disposed at an intermediate part of the first rotation shaft 12, that hold an upper massage target area, such as the calf C or the thigh T, lying in between while moving close to and away from each other under a rotational driving force from the first rotation shaft 12; and a first conversion section 14 for converting the rotational driving force from the first rotation shaft 12 into mutually approaching and separating movement of the paired right-hand and left-hand first massaging members 13.

[0041] The upper massaging system 11 is disposed on the base body 15 mounted in suspended fashion above the lower casing 8. Thus, the upper massaging system 11 is attached via the base body 15 to the upper casing 2.

The base body 15 is provided at each end in the horizontal direction with a shaft supporting portion 16 having a horizontal-pointing axis. A shaft bearing (bearing) engages in the shaft supporting portion 16. The shaft supporting portion 16 rotatably supports each end of the first rotation shaft 12 via the bearing. Moreover, the base body 15 is rockably supported by the rockably supporting section 30 (hereafter described in detail).

[0042] The first massaging member 13 is a constituent member attached to the base body 15. There are provided two pairs of horizontally-spaced-apart first massaging members 13. The paired first massaging members 13 hold a massage target area such as the calf C or the thigh T placed between them, and give squeezing (pressing) massage to the calf C or the thigh T. Each first massaging member 13 is shaped in an elongated plate bent at a lengthwise intermediate point of it.

[0043] At the "first position" shown in FIGs. 1 and 7 for example, the first massaging member 13 stays with its front end bent downward, and operates so as to give massage to the calf C (first massage target area). Moreover, at

the "second position" shown in FIG. 8, the first massaging member 13 stays with its front end facing forward, and operates so as to give massage to the calf C, the side of the knee. etc. At the "third position" shown in FIGs. 5 and 9 for example, the first massaging member 13 stays with its front end bent forward, and operates so as to give massage to the thigh T (second massage target area).

[0044] The first rotation shaft 12, which is mounted with its axis horizontally oriented, is placed so as to pass through the base-end side of the first massaging member 13 (first conversion section 14) in the horizontal direction. The first rotation shaft 12 is supported by the first gear box 28 constituting the drive mechanism 23 and a pair of shaft supporting portions 16.

The first conversion section 14 comprises: a first inclined boss portion 17 that rotates unitarily with the first rotation shaft 12; a first annular fit portion 19 which is located toward the base end of the first massaging member 13, and fitted externally to the first inclined boss portion 17 for relative rotation; and a first restraint portion 20 for restraining the first massaging member 13 from rotating concurrently with the rotation of the first rotation shaft 12.

[0045] The first inclined boss portion 17 is provided at its outer periphery with a cam face 18 inclined with

respect to the first rotation shaft 12. Thus, the first inclined boss portion 17 rotates in inclined relation to the axis of the first rotation shaft 12. The first inclined boss portion 17 (cam face 18) corresponding to one of the paired right-hand and left-hand first massaging members 13 and the first inclined boss portion 17 (cam face 18) corresponding to the other are inclined in opposite directions. The inclined rotation of the first inclined boss portion 17 externally fitted with the first annular fit portion 19 causes the first massaging member 13 to rock.

[0046] The first restraint portion 20 is located toward the base end of the first annular fit portion 19, and comprises: a first restraint pin 21 attached to the first annular fit portion 19; and a first restraint slot 22, formed in the base body 15, for receiving the first restraint pin 21 for sliding motion. The first restraint pin 21 is placed so as to extend from the first annular fit portion 19 in the opposite direction to the first massaging member 13. The base body 15 is provided at its first restraint pin 21-facing side with the horizontally-elongated first restraint slot 22 in which the first restraint pin 21 is slidably received for side-to-side rocking motion in substantially the horizontal direction. This restrains the first annular fit portion 19 from

rotating concurrently with the rotation of the first inclined boss portion 17.

[0047] Thus, a pair of the first massaging members 13 is assigned to each of the right-hand and left-hand first massaging recesses 7 of the upper casing 2; that is, a total of two pairs of the first massaging members 13 are provided. The paired right-hand and left-hand first massaging members 13 are rockably moved close to and away from each other, thereby giving efficacious squeezing massage to the calf C or the thigh T held between them.

The drive mechanism 23, housed in the lower casing 8, drives the first rotation shaft 12 of the upper massaging system 11 and a second rotation shaft 38 of the lower massaging system 37 (hereafter described in detail) so as to rotate together for actuation of each massaging system to produce squeezing massage.

[0048] As shown in FIG. 4, the drive mechanism 23 comprises: a drive motor 24 for output of a rotational driving force; an upper transmission shaft 27a for input of the rotational driving force outputted from the drive motor 24 to the upper massaging system 11; a lower transmission shaft 27b for input of the rotational driving force outputted from the drive motor 24 to the lower massaging system 37; a first gear box 28 for transmission of the transmitted rotational driving force to the first rotation

shaft 12; and a second gear box 29 for transmission of the transmitted rotational driving force to the second rotation shaft 38.

[0049] The upper massaging system 11 is driven under the rotational driving force transmitted via the upper transmission shaft 27a, and simultaneously the lower massaging system 37 is driven under the rotational driving force transmitted via the lower transmission shaft 27b.

The drive motor 24 is disposed in an intermediate area of the interior of the lower casing 8 in the vertical direction so as to lie between a left-hand inner second massaging member 39 and a right-hand inner second massaging member 39 that constitute the lower massaging system 37. The drive motor 24 is also located between the upper transmission shaft 27a and the lower transmission shaft 27b.

[0050] The drive motor 24 has a forwardly-extending output shaft 25. It can thus be said that the drive motor 24 is located substantially centrally of the interior of the lower casing 8 both in the vertical direction and in the horizontal direction.

There is provided a reduction gear box 26, disposed forward of the drive motor 24, in which the output shaft 25 is inserted and received.

[0051] The upper transmission shaft 27a has an upward-

pointing axis, and is mounted with its upper end facing obliquely rearward. Moreover, the lower transmission shaft 27b has a downward-pointing axis, and is mounted with its upper end facing obliquely forward.

Given that the upper transmission shaft 27a and the lower transmission shaft 27b are integral to form a single shaft body, then the shaft body is disposed so as to span the lower casing 8 and the upper casing 2 in the vertical direction, while being supported by the first gear box 28 and the second gear box 29.

[0052] Mounted between the upper transmission shaft 27a and the lower transmission shaft 27b is the reduction gear box 26 in which the upper transmission shaft 27a and the lower transmission shaft 27b are inserted and received.

That is, the drive motor 24 produces output of a rotational driving force, and, after the reduction gear box 26 effects deceleration to a predetermined rpm, the rotational driving force is inputted via the upper transmission shaft 27a to the first gear box 28 above, and then transmitted to the first rotation shaft 12, and is also inputted via the lower transmission shaft 27b to the second gear box 29 below, and then transmitted to the second rotation shaft 38. This allows concurrent actuation of the upper massaging system 11 and the lower massaging system 37.

[0053] The first gear box 28 is disposed between the inner first massaging members 13b constituting the upper massaging system 11. The first gear box 28 is supported by the rockably supporting section 30, and receives the inserted upper end of the upper transmission shaft 27a. The first gear box 28 receives the first rotation shaft 12 therethrough. The first rotation shaft 12 is horizontally oriented within the upper casing 2. Upon input of the rotational driving force to the first gear box 28 via the upper transmission shaft 27a, the piercingly mounted first rotation shaft 12 is rotated.

[0054] The second gear box 29 is disposed between the inner second massaging members 39a constituting the lower massaging system 37 (hereafter described in detail). The second gear box 29 receives the inserted lower end of the lower transmission shaft 27b. The second gear box 29 receives the second rotation shaft 38 therethrough. The second rotation shaft 38 constituting the lower massaging system 37 is horizontally oriented within the lower casing 8. Upon input of the rotational driving force to the second gear box 29 via the lower transmission shaft 27b, the piercingly mounted second rotation shaft 38 is rotated. Each of the gear boxes 26, 28, and 29 stores therein predetermined worm gear and worm wheel.

[0055] Thus, in the leg massager 1 of the present

invention, the rotational driving force outputted from the drive motor 24 of the drive mechanism 23 is distributed between the upper transmission shaft 27a and the lower transmission shaft 27b for the input of the rotational driving force to both of the upper massaging system 11 and the lower massaging system 37. That is, in the leg massager 1 of the present invention, the upper massaging system 11 and the lower massaging system 37 are driven by one common drive motor 24. As an alternative, a plurality of drive motors 24 may be provided. In this case, the upper massaging system 11 is driven by one of the drive motors, and the lower massaging system 37 is driven by the other.

[0056] As shown in FIGs. 1 to 9 for example, the leg massager 1 of the present invention is designed such that the upper massaging system 11 is supported for rocking motion about a horizontal-pointing axis by the rockably supporting section 30. The rockably supporting section 30 will now be described in detail.

As shown in FIGs. 4 and 6 for example, the rockably supporting section 30, located toward the top of the lower casing 8, supports the base-end side of the upper casing 2 (central area of the upper massaging system 11) for rocking motion to permit rising movement of the front-end side of the upper casing 2 via a horizontally-oriented rock shaft

31. In this embodiment, the rock shaft 31 is an integral part of the shaft body constituting the first rotation shaft 12. That is, a lengthwise midportion of the first rotation shaft 12 constitutes the rock shaft 31.

[0057] The rockably supporting section 30 is a support member disposed in upstanding condition on the holder portion 32 located centrally of the upper part of the interior of the lower casing 8. That is, one rockably supporting section 30 is located centrally of the lower casing 8. The rockably supporting section 30 is formed so as to extend upward from the holder portion 32 within the lower casing 8, and supports the first gear box 28 constituting the drive mechanism 23 from below.

The holder portion 32 is a mounting member located centrally of the upper part of the inner rear surface of the lower casing 8. The holder portion 32 supports the rockably supporting section 30 disposed on it from below. An opening 33 is formed in that part of the upper surface of the lower casing 8 located toward the top of the holder portion 32. The rockably supporting section 30 attached to the holder portion 32 is mounted so as to extend upward through the opening 33. In the opening 33, there is provided the cap 34 for covering the rockably supporting section 30, the first gear box 28, etc.

[0058] That is, with the holder portion 32, the

rockably supporting section 30 extends through the opening 33 formed in the upper part of the lower casing 8. The rockably supporting section 30 supports the first gear box 28 from below, and supports the lengthwise midportion of the first rotation shaft 12 (rock shaft 31) for rotation about a horizontal-pointing axis via a bearing attached to the first gear box 28. Thus constructed, the rockably supporting section 30 supports the upper massaging system 11 for rocking motion.

[0059] The upper massaging system 11, while being supported at one point by the rockably supporting section 30 located centrally of the upper part of the lower casing 8, is mounted in suspended fashion above the lower casing 8.

In this embodiment, at a position with the upper casing 2 supported by the rockably supporting section 30 leaning forward in adjoining relation to the lower casing 8, the first massaging member 13 housed in the upper casing 2 faces forward. Moreover, at a position with the upper casing 2 raised away from the lower casing 8, the first massaging member 13 housed in the upper casing 2 faces upward.

[0060] Thus, in this embodiment, the first massaging member 13 is made as a position-adjustable member for selection of massaging position from among those ranging from the "first position" shown in FIG. 7 (obliquely

downward and forward-facing position) to the "third position" shown in FIG. 9 (upward-facing position). That is, the first massaging member 13 has a plurality of position settings ranging from the "first position" (the position with the first massaging member substantially horizontally oriented) to the "third position" (the position with the first massaging member inclined slightly rearward relative to the vertical) for massage to any massage target area such as the calf C (first massage target area) and the thigh T (second massage target area).

[0061] The rock shaft 31 may be provided as a second shaft independently of the first rotation shaft 12. In this case, as the second shaft serving as the rock shaft 31, for example, a horizontally-oriented shaft is mounted in the rockably supporting section 30, with the axis of the shaft pointing in the same direction in parallel relation as the axis of the first rotation shaft 12. The first gear box 28 and the first rotation shaft 12 are each mounted so as to be supported for rotation about the horizontal-pointing axis of the shaft. Also in this case, the upper massaging system 11 is supported for rocking motion.

[0062] The rockably supporting section 30 is not limited to that as exemplified in this embodiment, and may thus be given any suitable form capable of supporting the upper massaging system 11 for rocking motion about a

horizontal-pointing axis. For example, a pair of the rockably supporting sections 30 may be provided. In this case, the rockably supporting sections 30 are disposed in upwardly-extending condition one on each side of the upper part of the interior of the lower casing 8 in the horizontal direction. That is, each rockably supporting section 30 rotatably supports corresponding one of the right and left ends of the horizontally-oriented first rotation shaft 12 (rock shaft 31), and supports corresponding one of the right and left sides of the upper massaging system 11 for rocking motion via the first rotation shaft 12.

[0063] With consideration given to variations in the shape (dimensions) of the leg L (such as the calf C and the thigh T) among users, the upper massaging system 11 discussed in this embodiment includes a span adjustment mechanism 35 for adjustment of the width of space between the paired first massaging members 13. The span adjustment mechanism 35 is located toward the outer first massaging member 13a, and comprises: a threaded screw portion 36 having external teeth in helical form disposed on the first rotation shaft 12; and the outer first inclined boss portion 17a having internal teeth which threadedly engage the threaded screw portion 36. Moreover, for example, the upper casing 2 may be provided with a button or the like

(not shown) to give span adjustment instructions to the span adjustment mechanism 35.

[0064] At the push of the button or the like provided for example in the upper casing 2 by the user, the outer first inclined boss portion 17a moves over the threaded screw portion 36 in the horizontal direction, causing the outer first massaging member 13a to move in the horizontal direction. This enables the width of space between the paired first massaging members 13 to be adjusted in a desired manner.

With consideration given also to variations in the shape (dimensions) of the foot F among users, the lower massaging system 37, which will hereafter be described, may also be provided with the span adjustment mechanism 35.

[0065] Moreover, preferably, the leg massager is internally provided with a detection section such as a distance sensor or a load sensor. In this case, the detection section detects the shape (size) of user's leg L such as the calf C, the thigh T, and the foot F, and, on the basis of the measurement result, the span adjustment mechanism 35 cooperatively adjusts the width of space between the paired first massaging members.

Although another mechanism may be used for the span adjustment mechanism 35, the mechanism disclosed in Japanese Unexamined Patent Publication JP-A 2017-153734,

i.e. the mechanism just described would be the optimum choice.

[0066] The lower massaging system 37 discussed in this embodiment comprises: the horizontally-oriented second rotation shaft 38 which rotates under a rotational driving force from the lower transmission shaft 27b constituting the drive mechanism 23; right-hand and left-hand second massaging members 39 used in a pair, each disposed at an intermediate part of the second rotation shaft 38, that hold a massage target area including at least the foot F, i.e. toe-to-heel region, lying in between while moving close to and away from each other under a rotational driving force from the second rotation shaft 38; and a second conversion section 40 for converting the rotational driving force from the second rotation shaft 38 into rocking motion of the paired right-hand and left-hand second massaging members 39.

[0067] The second massaging members 39 are located toward the bottom of the lower casing 8, and located above the second rotation shaft 38. Each second massaging member 39 is a platy member elongated in the front-rear direction so as to conform to the shape of the foot F, including the toe, the instep, the ankle, and the heel, and curved so as to encase the foot F. The second massaging members 39 are arranged in pairs, with the second massaging members 39 of

each pair spaced apart in the horizontal direction to hold a massage target area, i.e. the foot F placed between them. The paired second massaging members 39 give squeezing (pressing) massage to the foot F.

[0068] The second rotation shaft 38, which is mounted with its axis horizontally oriented, is supported via a shaft bearing (bearing) by two support members 47 and the second gear box 29 of the drive mechanism 23 located toward the bottom of the lower casing 8. The second rotation shaft 38 is mounted so as to pass through the base-end side of the second massaging member 39 (second conversion section 40) in the horizontal direction.

The second conversion section 40 comprises: a second inclined boss portion 41 that rotates unitarily with the second rotation shaft 38; a second annular fit portion 43 which is located toward the base end of the second massaging member 39, and fitted externally to the second inclined boss portion 41 for relative rotation; and a second restraint portion 44 for restraining the second massaging member 39 from rotating concurrently with the rotation of the second rotation shaft 38.

[0069] The second inclined boss portion 41 is provided at its outer periphery with a cam face 42 inclined with respect to the second rotation shaft 38. Thus, the second inclined boss portion 41 rotates in inclined relation to

the axis of the second rotation shaft 38. The second inclined boss portion 41 (cam face 42) corresponding to one of the paired right-hand and left-hand second massaging members 39 and the second inclined boss portion 41 (cam face 42) corresponding to the other are inclined in opposite directions. The inclined rotation of the second inclined boss portion 41 externally fitted with the second annular fit portion 43 causes the second massaging member 39 to rock.

[0070] The second restraint portion 44 is located toward the base end of the second annular fit portion 43, and comprises: a second restraint pin 45 attached to the second annular fit portion 43; and a second restraint slot 46, located above the bottom of the lower casing 8, in which the second restraint pin 45 is slidably engaged.

The second restraint pin 45 is placed so as to extend from the second annular fit portion 43 in the opposite direction to the second massaging member 39. The lower casing 8 is provided at its second restraint pin 45-facing side with the horizontally-elongated second restraint slot 46 in which the second restraint pin 45 is slidably received for side-to-side rocking motion in substantially the horizontal direction. This restrains the second annular fit portion 43 from rotating concurrently with the rotation of the second inclined boss portion 41.

[0071] The lower massaging system 37 further comprises a sole massaging roller 48 that operates to give pressing massage to the lengthwise central area of user's sole S (the arch (of the foot) A).

The sole massaging roller 48 is interposed between the paired right-hand and left-hand second massaging members 39. The sole massaging roller 48 is a rotatable cylindrical member having a horizontal-pointing axis, which is mounted so as to pass through the second rotation shaft 38 in impaled fashion.

[0072] The sole massaging roller 48 is provided at its outer periphery with a plurality of radially-outwardly extending massaging pieces 49 spaced apart in a direction circumferentially of the sole massaging roller 48, as well as in a direction axially of the second rotation shaft 38.

A set of the paired second massaging members 39 and the sole massaging roller 48 is assigned to each of the right-hand and left-hand second massaging recesses 9 of the lower casing 8, that is; a total of two such sets are provided.

[0073] The paired right-hand and left-hand second massaging members 39 are rockably moved close to and away from each other, thereby giving efficacious squeezing massage to the foot F, i.e. toe-to-heel region held between them. Moreover, under the rotational movement of the sole

massaging roller 48, the massaging pieces 49 act to give efficacious pressing massage to the arch (of the foot) A of the sole S.

The leg massager 1 discussed in this embodiment further comprises a vibratory massaging system 50. The vibratory massaging system 50 comprises: a motor 51 for producing a rotational driving force; a vibration producing section (not shown) for converting the rotational driving force into vibration; and a sole massaging member 52 which is vibrated by the vibration producing section.

[0074] The sole massaging member 52 is shaped in a rectangular frame, on which is disposed the second rotation shaft 38 fitted with the sole massaging roller 48. The sole massaging member 52 has a plurality of massaging pieces 53 in projection form respectively positioned in face-to-face relation to the front and rear areas of the sole S. That is, a plurality of the massaging pieces 53 are arranged forward of and behind the sole massaging roller 48 in the front-rear direction. The sole massaging member 52 is provided at its underside with a vibrating element 54 made of an elastic body such as rubber. The vibrating element 54 is located toward at least each of the four corners of the frame. The vibrating element 54 is attached to the inner bottom part of the lower casing 8.

[0075] The motor 51 has a downwardly-facing output

shaft provided at its front end with an eccentric cam (not shown). The eccentric cam is fitted in a recess (not shown) formed in the sole massaging member 52. That is, the vibration producing section comprises: the eccentric cam attached to the output shaft of the motor 51; and the recess of the sole massaging member 52.

Within the recess, the eccentric cam rotates in contact with the sole massaging member 52, and the resulting vibration causes the sole massaging member 52 to vibrate. At the same time, the vibrating element 54 also vibrates with consequent added vibration of the sole massaging member 52. This enables the massaging pieces 53 of the now vibrating sole massaging member 52 to give vibratory massage to the front and rear areas of the sole S.

[0076] Referring to FIGs. 7 to 9, the conditions of the first massaging member 13 corresponding to the "first position", the "second position", and the "third position" will be described. For example, in attaining the "first position" shown in FIG. 7, the first massaging member 13 is oriented substantially horizontally in a forwardly-extending condition. At the "first position", the first massaging recess 7 has an open top, an open front, and an open bottom. Moreover, the cap 34 for covering the rockably supporting section 30 is received in

the cavity 6 formed in the lower covering 3.

[0077] The user puts the calf C and the foot F in the first massaging recess 7 and the second massaging recess 9, respectively, of the leg massager 1.

At the "first position", the first massaging members 13 apply lateral squeezing forces for pressing massage to the calf C (first massage target area) received in the first massaging recess 7. At this time, the upper massaging system 11 is securely held in place under the calf C-holding action.

[0078] More specifically, as shown in FIG. 7, each first massaging member 13 is in a position for its lengthwise midportion to cover the front area of the calf C sideways, and for its base-end part to cover the rear area of the calf C sideways. At this position, the first massaging members 13 apply lateral and medial squeezing forces for pressing massage to the entire calf C. The size of user's calf C is determinative of the pressing position of the first massaging members 13 in the lengthwise direction.

[0079] Moreover, at the "first position", the second massaging members 39 apply lateral squeezing forces for pressing massage to the foot F (second massage target area) received in the second massaging recess 9.

More specifically, as shown in FIG. 7, each second

massaging member 39 is set with its front-end part positioned for covering the toe sideways, and with its base-end part positioned for covering the heel sideways. Thus, the second massaging members 39 apply lateral and medial squeezing forces for pressing massage to the foot, i.e. toe-to-heel region.

[0080] For a change from this position to the "second position", the user grasps the upper casing 2 by the front side edge and raises it upward with a predetermined force to rock the upper massaging system 11 about the axis of the first rotation shaft 12 (rock shaft 31).

In attaining the "second position" shown in FIG. 8, the first massaging member 13 is slightly raised into an obliquely upward and forward-facing position.

[0081] At the "second position", for example, the first massaging members 13 apply lateral squeezing forces for pressing massage to the upper and knee-side areas of the side of the calf C received in the first massaging recess 7. At this time, the upper massaging system 11 is securely held in place under the action of holding the upper and knee-side areas of the calf C.

More specifically, as shown in FIG. 8, each first massaging member 13 is in a position for its lengthwise midportion to cover the upper and knee-side areas of the calf C sideways. At this position, the first massaging

members 13 apply lateral and medial squeezing forces for pressing massage to the upper area and nearby areas of the calf C. The "second position" shown in FIG. 8 may be considered to be a position of transition from the "first position" to the "third position".

[0082] For a change from this position to the "third position", the user grasps the upper casing 2 by the front side edge and raises it further upward with a predetermined force to rock the upper massaging system 11 about the axis of the first rotation shaft 12 (rock shaft 31).

In attaining the "third position" shown in FIG. 9, the first massaging member 13 is forced back into an obliquely upward and rearward-facing position. At the "third position", the first massaging recess 7 has an open top, an open front, and an open rear.

[0083] At the "third position", the first massaging members 13 apply lateral squeezing forces for pressing massage to the thigh T (first massage target area) received in the first massaging recess 7. At this time, the upper massaging system 11 is securely held in place under the thigh T-holding action.

More specifically, as shown in FIG. 9, each first massaging member 13 is in a position for its upper-end part to cover the upper part of thigh T sideways, and for its lengthwise midportion to cover the side of the thigh T. At

this position, the first massaging members 13 apply lateral and medial squeezing forces for pressing massage to the entire thigh T.

[0084] The massaging position can be changed (returned) from the "third position" to the "first position" or the "second position" by reversing the described procedure. The massaging positions such as the "first to third positions" as employed in this embodiment are one example and therefore not intended to be limiting of the angularity of the upper massaging system 11 as exemplified herein.

As seen from the foregoing description of the present invention, the upper massaging system 11 is supported for rocking motion about a horizontal-pointing axis by the rockably supporting section 30, and can be set in any of predetermined massaging positions ("first to third positions") in the front-rear direction, that is; the first massaging member is made position-adjustable. Thus, the upper massaging system 11 is capable of giving pressing massage to any of massage target areas of the leg L, such as the calf C and the thigh T, of the user sitting in a chair, etc. At the same time, the lower massaging system 37 is capable of giving pressing massage to the foot F.

[0085] It should be understood that the embodiments as disclosed herein are each considered in all respects as

illustrative only and not restrictive.

In particular, for such matters as not explicitly specified in the disclosure of the embodiment, e.g. working and operating conditions, the dimensions and weights of structural components, etc., use has been made of such requirements as fall within the practical range defined in light of matters of common knowledge among those skilled in the art.

[0086] For example, the leg massager 1 of the present invention may include an air blower pump and a heater for warming air from the air blower pump. In this case, air warmed by the heater is delivered into the leg massager 1 so as to warm the neighborhood of the first massaging members 13 and the second massaging members 39. This enables the leg massager 1 to give thermomassage to massage target areas such as the foot F, the calf C, and the thigh T.

[0087] Moreover, the leg massager 1 of the present invention may include an air-bag member for giving pressing massage to massage target areas of user's body. In this case, a pair of air-bag members may be disposed in the location of the first massaging member 13 pair, and, a pair of air-bag members may also be disposed in the location of the second massaging member 39 pair.

Moreover, the leg massager 1 of the present invention

may include a positioning mechanism capable of stopping the rocking motion of the upper massaging system 11. In this case, the positioning mechanism is preferably configured to lock the upper massaging system 11 in a predetermined position in order for the upper massaging system 11 to stop its rocking motion in a predetermined position in the front-rear direction (massaging position).

[0088] When using the positioning mechanism, for example, a single positioning mechanism may be disposed in the vicinity of the rockably supporting section 30, or located centrally of the upper massaging system 11. For example, the positioning mechanism may be constructed of a ratchet mechanism capable of step-by-step positional adjustment.

A cylindrical member 55 is attached to that part of the first rotation shaft 12 located between the right-hand and left-hand first massaging members 13 of each pair. The cylindrical member 55 may be provided at its outer periphery with a projection which is pressed against massage target areas (such as the calf C and the back side of the thigh T). In this case, the cylindrical member 55 serves as a rotative massaging member.

[0089] Moreover, the material of construction of the described upper and lower casings 2 and 8 is not limited to specific materials. The upper casing 2 and the lower

casing 8 may be made of either a hard material such as plastic or a soft material such as cloth.

Moreover, for example, the leg massager may be designed for changing and adjustment of the intensity or rhythm of massage given to the leg L. In addition, one or both of the upper massaging system 11 and the lower massaging system 37 may include an arrangement configured to detect the size of user's leg, and then operate the span adjustment mechanism 35 cooperatively in a manner to adjust the width of space between the massaging members used in a pair (the first massaging members 13, the second massaging members 39) in accordance with the result of detection. As the span adjustment mechanism 35, the mechanism disclosed in Japanese Unexamined Patent Publication JP-A 2017-153734 would be the optimum choice. A mechanism for adjustment of the rocking angle of the paired massaging members (the first massaging members 13, the second massaging members 39) may also be provided.

[0090] Considering the use of the described leg massager 1 as shown in FIG. 1, etc. as a footrest portion 73, it is advisable to provide an arrangement capable of detecting the amount of extending movement of the footrest portion 73 (sliding amount), the angles of upward and downward movement of the footrest portion 73, and the angle at which the first massaging member 13 leaps upward, or the

leap-up angle of the first massaging member 13. This permits determination of suitable values of the amount of extending movement of the footrest portion 73 and the leap-up angle of the first massaging member 13 on the basis of the detected sliding amount and individual angles.

[0091] That is, the massage chair apparatus 70 and the leg massager 1 (footrest portion 73) pursuant to the present invention preferably have the following structural features. The structural design of the present invention (types and forms of constituent members in use, detecting means, etc.) as will be described below is one example and therefore not intended to be limiting of the present invention.

For the upwardly-extending and downwardly-contracting movement of the footrest portion 73, although the movement direction does not exactly coincide with a vertical upwards (downwards) direction when the footrest portion 73 rocks with inclination, a direction toward the top of the footrest portion 73 placed on a floor will be defined as "upward direction", and a direction toward the bottom of the placed footrest portion 73 will be defined as "downward direction".

[0092] As shown in FIGs. 10 to 15 for example, the leg massager 1 (footrest portion 73) for massaging the foot F, etc. is mounted at the front of the massage chair apparatus

70 comprising: the seat portion 71 that accommodates a mechanism for massaging the buttocks, etc. of a user sitting in the massage chair apparatus; and the backrest portion 72 that accommodates a mechanism for massaging user's back, etc.

The leg massager 1 includes the upper massaging system 11 for giving kneading massage to the calf C, etc. The upper massaging system 11 is electrically driven by a rock drive mechanism 75 for vertical rotational movement around the first rotation shaft 12 having a horizontal-pointing axis relative to the lower massaging system 37.

[0093] As shown in FIG. 15 for example, the rock drive mechanism 75, located toward the lower part of the drive mechanism 23, is attached to the base body 15. The rock drive mechanism 75 comprises: a drive motor 76 for output of a rotational driving force; a rotation shaft 77 which rotates under the rotational driving force; a gear 78 attached to the rotation shaft 77 for rotation together with the rotation shaft 77; and a gear 79 attached to the base body 15 for meshing engagement with the gear 78.

[0094] The drive motor 76 is mounted with its output shaft facing upward. The rotation shaft 77 having a horizontal-pointing axis is perpendicular to the output shaft. The gear 78 is adjacent to the output shaft. The gear 79, located above the gear 78, is attached to the

first rotation shaft 12 for rotation together with the first rotation shaft 12.

Upon output of a rotational driving force from the drive motor 76, the rotation shaft 77 rotates under the rotational driving force, and the gear 78 rotates concurrently with the rotation of the rotation shaft 77. In response to the rotation of the gear 78, the gear 79 rotates, causing the base body 15 to rotate about the first rotation shaft 12. This allows the first massaging member 13 to rock about the first rotation shaft 12 in the front-rear direction.

[0095] The upper massaging system 11 includes the first massaging member 13 (kneading plate) which is driven by the drive mechanism 23 so as to give kneading massage to the calf C-to-thigh T range of user's leg. An air bag that undergoes repeated cycles of inflation and deflation may be adopted for the upper massaging system 11.

Moreover, the leg massager 1 is preferably supported and electrically driven by a rotational movement mechanism 80 for rotational movement (rocking motion) in the front-rear direction.

[0096] As shown in FIGs. 11 to 14 for example, the rotational movement mechanism 80 comprises: a rockable arm member 81 attached to the front of the seat portion 71 (support frame 74); a link arm member 82 coupled to the arm

member 81 for rotational movement; and a drive section 83 for moving the link arm member 82 in the front-rear direction.

The arm member 81 is attached to the front of the support frame 74 for vertical rotational movement around an axis 81a. The arm member 81 is coupled to a side support member 84 for supporting the leg massager 1. There are provided right-hand and left-hand side support members 84 used in a pair, with the footrest portion 73 disposed in between so as to be supported at its sides. The drive section 83 is constructed of an actuator (linear-motion mechanism) in this embodiment.

[0097] Upon output of a driving force from the actuator 83, the link arm member 82 coupled to the actuator 83 is forced to move forward or move backward. Then, the arm member 81 coupled to the link arm member 82 rotationally moves around the axis 81a. The rotational movement of the arm member 81 causes the side support members 84 to rotationally move (rock) in the vertical direction, thereby permitting up-and-down rotational movement of the leg massager 1 (footrest portion 73) around the axis 81a in front of the seat portion 71 (support frame 74). That is, the leg massager 1 (footrest portion 73) is vertical position (height)-adjustable.

[0098] The leg massager 1 comprises the upper

massaging system 11 and the lower massaging system 37.

Mounted at the upper part of the lower massaging system 37 is a safety switch (e.g. limit switch or pressure sensor).

Although not shown in the drawings, the safety switch is attached to the upper end of the second massaging member 39. The safety switch is configured to, when it is determined that a foreign object (e.g. a hand of a person other than the user (such as child's hand), being caught in the space between the vertically-rotating upper massaging system 11 (first massaging member 13) and the second massaging member, interferes with the vertical rotational movement of the upper massaging system 11 (brought into contact with the upper massaging system 11), transmit a signal for indicating the accident to a control section. In response to the signal, the control section issues a command to a stop section. The stop section immediately stops the vertical rotational movement of the upper massaging system 11. The safety switch is included in a safety adjustment mechanism which will hereafter be described.

[0099] The leg massager 1 includes a sensor (not shown) to recognize the rotational position of the upper massaging system 11. That is, the sensor senses the position where the first massaging member 13 is electrically driven by the rock drive mechanism 75 for

vertical rocking motion about the first rotation shaft 12. Examples of the sensor for detecting given positions include a limit switch and a rotation sensor (e.g. rotary encoder).

[0100] Moreover, for example, a rotation sensor for detecting the rotation of the leg massager 1 may be provided. In this case, when no match is observed between a detected value from the rotation sensor and a previously-given rotation command, it is determined that a foreign object gets caught in the space between the upper massaging system 11 and the lower massaging system.

Moreover, the leg massager 1 includes a sensor (not shown) to recognize the rotationally-moving position of the main body of the leg massager 1. That is, the sensor senses the position where the main body of the leg massager 1 is electrically driven by the rotational movement mechanism 80 for vertical rocking motion about the axis 81a of the arm member 81.

[0101] Examples of the sensor for detecting given positions include a limit switch (means for detecting the position of a slider 87 which moves between first and second ends of the actuator 83 (drive section)) and a rotation sensor (e.g. means for detecting the rotation of a screw member (a rod 83a along which the slider 87 slidingly moves) of the actuator 83 (such as a rotary encoder)).

The leg massager 1 is electrically driven for extending and contracting movement in front of the seat portion 71. That is, the leg massager 1 is moved between an extended position and a contracted position in the vertical direction by a vertical movement mechanism 86 (which will hereafter be described in detail). Moreover, the leg massager 1 may be designed such that the upper massaging system 11 and the lower massaging system 37 can move away from each other, in other words, the main body of the leg massager 1 may be made to telescopically extend and contract in the vertical direction.

[0102] Moreover, the leg massager 1 includes a sensor (not shown) to recognize the extended and contracted positions of the main body of the leg massager 1. That is, the sensor senses a position to which the leg massager 1 was moved under electrically driving operation by the vertical movement mechanism 86.

Examples of the sensor for detecting given positions include a limit switch (means for detecting the position of a slider 91 which moves between first and second ends of an actuator 89 (up-and-down drive section) and a rotation sensor (e.g. means for detecting the rotation of a screw member (a rod 89a along which the slider 91 slidingly moves) of the actuator 89 (such as a rotary encoder)).

[0103] The maximum rotation angle of the upper

massaging system 11 is controlled in accordance with the vertical position of the main body of the leg massager 1 in up-and-down rotational movement or at least one of the extended and contracted positions of the main body of the leg massager 1 in extending and contracting movement in the direction of elongation of the leg massager 1 main body (vertical direction).

That is, the maximum rotation angle (permissible limit of rocking motion) of the first massaging member 13, which is controlled when the first massaging member 13 is risingly rotated under electrically driving operation by the rock drive mechanism 75, is preferably determined on the basis of which position (vertical position, extended position, etc.) the leg massager 1 main body assumes.

[0104] The upper massaging system 11 (first massaging member 13), which rotationally moves around a horizontal-pointing axis, is in axial alignment with the first rotation shaft 12 (shaft for kneading massage).

The upper massaging system 11 and the lower massaging system 37 are driven by one common drive motor 24.

Moreover, a kneading-massage span set for the upper massaging system 11, or the width of space between the paired first massaging members 13 can be changed by the span adjustment mechanism 35. For example, when it is desired to rotationally move (rock) the upper massaging

system 11 in the vertical direction from the calf C to the thigh T, preferably, the kneading-massage span (spacing between the paired first massaging members 13) is increased before starting the rotational movement. That is, it is advisable to provide an arrangement capable of changing and adjusting the kneading-massage span (spacing between the paired first massaging members 13) in conformity to the thickness of user's leg.

[0105] The leg massager 1 is preferably designed such that its main body rotationally moves around a horizontal-pointing axis (first rotation shaft 12). Upon its 90- to 180-degree turn about a turning shaft 88, the leg massager 1 becomes ready to serve as an ottoman. That is, by turning the leg massager 1 upside down (turning the leg massager 1 such that its bottom side comes to a position where it becomes the upper side, and massaging recess 9-bearing side comes to a position where it becomes the lower side), the bottom side or rear wall surface, now being the upper side, serves as ottoman's foot F-resting surface.

[0106] The angle of rotation of the leg massager 1 main body (the angle at which the massager main body is rotated into a position to serve as an ottoman, or ottoman-providing position) is preferably set at 90 degrees with respect to the turning shaft 88.

Moreover, the leg massager 1 includes a sensor 85 to

recognize the ottoman-providing position of the main body. The apparatus control is preferably exercised so that, with the leg massager 1 set in the ottoman-providing position, a signal for indicating the detected position is transmitted to the control section to inhibit the rotational movement of the upper massaging system 11.

[0107] In this embodiment, the side support member 84 (the left-hand side support member 84 in this embodiment) is provided with two limit switches, namely a limit switch 85a for recognition of the ottoman-providing position and a limit switch 85b for recognition of a position for foot kneading massage, or foot kneading position (refer to FIGs. 11 to 15, for example).

Moreover, the leg massager 1 is preferably configured to operate to give stretching massage to user's leg in a manner as will be described below.

[0108] That is, after setting the paired second massaging members 39 disposed in the lower massaging system 37 close to each other to restrain user's foot F, the paired first massaging members 13 disposed in the upper massaging system 11 are set close to each other to hold user's leg L, and then rotationally moved upward.

Moreover, the paired first massaging members 13 disposed in the upper massaging system 11, after being set close to each other (to hold user's leg area such as the

thigh T or the calf C), are rotationally moved downward (forward-leaning movement), during which period the leg massager 1 main body is moved downward, or the leg massager 1 is electrically driven by the vertical movement mechanism 86 so as to move to the extended position.

[0109] Moreover, after achieving one of a condition where the paired first massaging members 13 disposed in the upper massaging system 11 are set close to each other (to hold user's leg area such as the thigh T or the calf C) and a condition where the paired second massaging members 39 disposed in the lower massaging system 37 are set close to each other to restrain user's foot F, the first massaging members 13 are rotationally moved downward (forward-leaning movement), during which period the leg massager 1 main body is moved downward, or the leg massager 1 is electrically driven by the vertical movement mechanism 86 so as to move to the extended position.

[0110] In addition, after setting the paired first massaging members 13 disposed in the upper massaging system 11 close to each other in the thigh T-facing position, although not shown in the drawings, for example, an air bag mounted inside the seat portion 71 is alternately inflated and deflated repeatedly, or a seat's built-in massaging mechanism mounted inside the seat portion 71 is driven for at least one of travel in the front-rear direction,

kneading operation, tapping operation, and back-and-forth movement in the vertical direction.

[0111] As shown in FIG. 11 for example, in consideration of the presence of user's knee in the direction of extending and contracting movement of the leg massager 1 (upward direction), the apparatus control is exercised so that the paired first massaging members 13 perform no kneading operation in the knee-facing position. That is, a no-kneading zone is provided in the range ambient to the knee.

Moreover, the upper massaging system 11 is preferably installed with a heater for warming user's leg. In this case, on arrival of the upper massaging system 11 at the knee-facing position (no-kneading zone), the built-in heater is turned on to warm the leg. The apparatus control may also be exercised so that, on arrival of the upper massaging system 11 at other area than the no-kneading zone (such as the calf C-facing position or the thigh T-facing position), the heater is turned on to warm the entire leg (massage target areas as a whole). Likewise, the lower massaging system 37 may be installed with a heater for warming the foot F.

[0112] Moreover, a mode of massaging the entire thigh T may be provided. In this mode, after raising the first massaging members 13 of the upper massaging system 11 and

then setting the paired first massaging members 13 close to each other to hold the thigh T, the upper massaging system 11 is rotationally or reciprocally moved in one direction to give massage to the entire thigh T.

Likewise, a mode of massaging the entire calf C may be provided. In this mode, after moving the first massaging members 13 of the upper massaging system 11 so as to lean forward and then setting the paired first massaging members 13 close to each other to hold the calf C, the upper massaging system 11 is rotationally or reciprocally moved in one direction to give massage to the entire calf C.

[0113] The following, though it contains some overlapping explanation, describes more specifically the detection of the angles of upward and downward movement of the footrest portion 73, the detection of the amount of extending movement of the footrest portion 73 (sliding amount), and the leap-up angle of the first massaging member 13.

That is, in front of the seat portion 71, the footrest portion 73 (leg massager 1) is electrically driven by the rotational movement mechanism 80 for vertical rotational movement, and is also electrically driven by the vertical movement mechanism 86 for vertical sliding movement. Moreover, the first massaging member 13 is

electrically driven by the rock drive mechanism 75 for vertical rocking motion.

[0114] The leg massager 1 is electrically driven for upward and downward rotational movement in the vertical direction with respect to the axis 81a of the arm member 81 (base point) via the rockable arm member 81 attached to the front of the support frame 74.

The leg massager 1 is supported at its sides by the paired right-hand and left-hand side support members 84. Each side support member 84 in the form of a plate member is coupled to the L-shaped arm member 81. The arm member 81 is attached to the front of the support frame 74 for vertical rocking motion about the axis 81a. The leg massager 1 is supported for rotational movement relative to the seat portion 71 via the side support member 84 and the arm member 81.

[0115] Mounted below the seat portion 71 (inside the support frame 74) are the link arm member 82 coupled to the arm member 81 for rotational movement, and the drive section 83 for moving the link arm member 82 in the front-rear direction. That is, the leg massager 1 is supported for up-and-down rotational movement by the rotational movement mechanism 80 comprising the arm member 81, the link arm member 82, and the drive section 83.

In this embodiment, the drive section 83 is

constructed of a linear-motion mechanism (actuator), and thus moves linearly in the direction of from the front to the rear (and vice versa) of the seat portion 71. Note that the form of the drive section 83 is not limited to the actuator.

[0116] The link arm member 82 is driven by the drive section 83 so as to jut from and retracted into the support frame 74. The arm member 81 and the side support member 84 may be formed integral with each other.

The leg massager 1 includes a safety adjustment mechanism for safely adjusting the angles of upward and downward movement (rocking angle) of the leg massager 1 main body. The safety adjustment mechanism comprises: a detection section that detects the position of the slider 87 disposed in the drive section 83 (actuator) in the front-rear direction; and a stop section that stops the up-and-down rotational movement of the leg massager 1 in accordance with the result of detection by the detection section.

[0117] That is, on the basis of the position of the slider 87 disposed in the drive section 83 (actuator), the safety adjustment mechanism detects the up position, as well as the down position, of the leg massager 1, and effects adjustment to attain a predetermined position with safety at a command issued from the control section.

For example, when a user-selected position or an up-and-down rotational movement limit position is reached, then the detection section transmits a stop signal to the control section. In response to the stop signal from the control section, the stop section deactivates the drive section 83.

[0118] In implementing the detection section, for example, a sensor for stroke position detection is attached to the actuator 83, or a limit switch or the like is attached to a location corresponding to each stroke end. Moreover, the detection section may be configured to detect the angle of rotation of the arm member 81 about the axis 81a. That is, the detection section may be placed in any location where it is able to detect the position of the leg massager 1 in up-and-down rotational movement (given positions) without limitation to the exemplified locations.

[0119] During the vertical rotational movement of the leg massager 1, on arrival of the slider 87 at a predetermined position, the detection section detects the position of the slider 87, and, in accordance with the result of detection, the stop section deactivates the actuator 83. Thus, the up position and the down position of the leg massager 1 (the angle of rotational movement) can be adjusted with safety.

The side support member 84 is provided with the

turning shaft 88 having a horizontal-pointing axis. That is, the leg massager 1, when rotated about the axis of the turning shaft 88 so that the bottom side of the leg massager comes to a position where it becomes the upper side thereof, changes its position to a position to serve as an ottoman for resting user's leg. The apparatus control is preferably exercised so that, in the leg massager in ottoman form, while the ottoman-providing position is retained, the upper massaging system 11 is restrained against up-and-down rotational movement.

[0120] Moreover, as shown in FIGs. 11 to 13 for example, when the leg massager 1 has changed its position to the ottoman-providing position, the sensor 85 (limit switch 85a) attached to the side support member 84 (the left-hand side support member 84 in this embodiment) recognizes the position, and transmits a signal based on the recognition. Then, the upper massaging system 11 is brought to a stop at a command issued from the control section.

When the leg massager 1 has changed its position to the foot kneading position, the sensor 85 (limit switch 85b) attached to the side support member 77 recognizes the position, and transmits a signal based on the recognition. Then, the upper massaging system 11, the lower massaging system 37, etc. move to the ready state at a command issued

from the control section.

[0121] The leg massager 1 is moved between the extended position and the contracted position in the vertical direction (in the direction of the height of the sitting user) by the vertical movement mechanism 86.

The vertical movement mechanism 86 comprises: an up-and-down drive section 89 for producing a driving force to allow the leg massager 1 to move in the vertical direction; and a slide member 90 that allows the leg massager 1 to move in the vertical direction.

[0122] The up-and-down drive section 89 is mounted on the back side of the leg massager 1. In this embodiment, the up-and-down drive section 89 is constructed of a linear-motion mechanism (actuator), and thus moves linearly along the rear wall surface of the leg massager 1 in the vertical direction. Note that the form of the up-and-down drive section 89 is not limited to the actuator.

The slide member 90, mounted on the back wall surface of the leg massager 1, is fitted with the slider 91 of the up-and-down drive section 89. The linear movement of the up-and-down drive section 89 causes the slide member 90 to slide in the vertical direction.

[0123] Moreover, the safety adjustment mechanism includes an arrangement capable of safely adjusting the amount of extending movement of the leg massager 1 (sliding

amount). This safety adjustment arrangement comprises: a vertical position-detection section that detects the position of the slider 91 disposed in the up-and-down drive section 89 (actuator) in the vertical direction; and a vertical-movement stop section that deactivates the vertical movement mechanism 86 (leg massager 1) in accordance with the result of detection by the vertical position-detection section.

[0124] That is, on the basis of the position of the slider 91 disposed in the up-and-down drive section 89 (actuator), the safety adjustment mechanism detects the position of the leg massager 1 in the vertical direction, and effects adjustment to attain a predetermined position with safety at a command issued from the control section.

For example, when a user-selected position is reached, or when a load exceeding a predetermined level is applied, such as the occurrence of contact of the bottom of the leg massager 1 with user's sole placed in the second massaging recess 9, or also when a vertical-movement limit position is reached, then the vertical position-detection section transmits a stop signal to the control section. In response to the stop signal from the control section, the stop section deactivates the up-and-down drive section 89.

[0125] In implementing the vertical position-detection section, for example, a sensor for stroke position

detection is attached to the actuator 89, or a limit switch or the like is attached to a location corresponding to each stroke end. That is, the vertical position-detection section may be placed in any location where it is able to detect the extended position of the leg massager 1 in the vertical direction (given positions) without limitation to the exemplified locations.

During the operation to allow the leg massager 1 to move in the vertical direction, on arrival of the slider 91 at a predetermined position, the vertical position-detection section detects the position of the slider 91, and, in accordance with the result of detection, the stop section deactivates the actuator 89. Thus, the amount of extending movement of the leg massager 1 (sliding amount) can be adjusted to a predetermined level with safety.

[0126] The vertical position-detection section may be configured to detect circumstances that interfere with the moving action of the leg massager 1 in the vertical direction (including an accident of catching foreign matter and arrival to vertical-movement limit position). Moreover, the vertical position-detection section may include an arrangement capable of detecting the distance between the rear edge of the leg massager 1 and the front edge of the seat portion 71.

Moreover, the safety adjustment mechanism includes an

arrangement capable of safely adjusting the leap-up angle of the first massaging member 13 to a predetermined angle. The safety adjustment arrangement comprises: a shaft-angle detection section that detects the angle of rotation of the first rotation shaft 12; and a stop section that stops the rocking motion of the first massaging member 13 (the operation of the drive mechanism 23) in accordance with the result of detection by the shaft-angle detection section.

[0127] The safety adjustment mechanism may include a position detection section that detects the rocking limit position of the first massaging member 13. That is, the safety adjustment mechanism detects the leap-up angle of the first massaging member 13, and effects adjustment to attain a predetermined position with safety at a command from the control section.

The shaft-angle detection section is preferably attached to the first rotation shaft 12. For example, a rotary encoder may be used for the shaft-angle detection section.

[0128] Preferably, on the basis of the position of the leg massager 1, the position detection section detects an upper end (limit) position reachable by the first massaging member 13 in rising movement. The position detection section may include an arrangement capable of detecting the distance between the edge of the first massaging member 13

in the raised position and the front edge of the seat portion 71. In such a detection process, the distance between the top of the leg massager 1 and the front edge of the seat portion 71 is determinative of the upper limit position reachable by the first massaging member 13 in rising movement.

[0129] During the operation to allow the first massaging member 13 to rock in the front-rear direction, when the angle of rotation of the first rotation shaft 12 reaches a predetermined angle, the shaft-angle detection section detects the angle of rotation of the first rotation shaft 12, and, the stop section stops the rotation of the first rotation shaft 12 at a command issued from the control section in accordance with the result of detection. This causes the first massaging member 13 to stop its rocking motion in a predetermined position.

That is, as shown in FIG. 11, for example, when the leg massager 1 is in a rearwardly-inclined position and the slide member 84 is in an intermediate position in the vertical direction, that is; located in a point intermediate the ends of the leg massager 1 in the vertical direction, then the safety adjustment mechanism allows the first massaging member 13 to leap upward and slightly forward at the top of the leg massager 1 to keep the first massaging member 13 clear of the front of the seat portion

71 at a command from the control section.

[0130] On the other hand, as shown in FIG. 12, for example, when the leg massager 1 is in a rearwardly-inclined position and the slide member 84 is in an upper end position (upper limit point), that is; located in a point corresponding to the lowermost position of the leg massager 1, then the safety adjustment mechanism allows the first massaging member 13 to leap upward and rearward at the top of the leg massager 1 to keep the first massaging member 13 clear of the front of the seat portion 71 at a command from the control section.

[0131] That is, when the distance between the top of the leg massager 1 and the front edge of the seat portion 71 is relatively short as shown in FIG. 11, the first massaging member 13 is moved so as to leap upward and slightly forward at the top of the leg massager 1, whereas, when the distance is relatively long as shown in FIG. 12, the first massaging member 13 is moved so as to leap upward and slightly rearward at the top of the leg massager 1.

As seen from FIGs. 11 and 12 for example, the leap-up angle of the first massaging member 13 is adjusted to an adequate angle by the safety adjustment mechanism. This avoids that the first massaging member 13 is rearwardly inclined into contact with the seat portion 71.

[0132] The position of the leg massager 1, the leap-up

angle of the first massaging member 13, etc. based on the results of detection may be stored in data form in the control section, for example.

Moreover, the safety adjustment mechanism may be so designed that, when the detection section determines that a foreign object (e.g. a hand of a person other than the user (such as child's hand) interferes with massager movement, then the stop section immediately deactivates the vertical movement mechanism 86 to cause the leg massager 1 to stop its moving action, and also that the leg massager 1 stops its rocking motion in the front-rear direction immediately upon the occurrence of interference with the rocking motion.

[0133] The present invention thus far described provides a construction that operates to give proper massage to massage target areas with safety even under various conditions, including variations in leg length (height) among users. Moreover, the construction pursuant to the present invention avoids that the upper massaging system 11 is brought into contact with other constituent members such as the seat portion 71.

In the present invention, there is no specific limitation to the basic structural design of the upper massaging system 11 and the lower massaging system 37. That is, various suitable mechanisms may be adopted for use

as the upper massaging system 11 and the lower massaging system 37.

Reference Signs List

[0134]

- | | |
|-----|-----------------------------------|
| 1 | Leg massager |
| 2 | Upper casing |
| 3 | Lower covering |
| 4 | Upper covering |
| 5 | Mounting portion |
| 6 | Cavity |
| 7 | First massaging recess |
| 8 | Lower casing |
| 9 | Second massaging recess |
| 10 | Hand well |
| 11 | Upper massaging system |
| 12 | First rotation shaft |
| 13 | First massaging member |
| 13a | Outer first massaging member |
| 13b | Inner first massaging member |
| 14 | First conversion section |
| 15 | Base body |
| 16 | Shaft supporting portion |
| 17 | First inclined boss portion |
| 17a | Outer first inclined boss portion |
| 18 | Cam face |

- 19 First annular fit portion
- 20 First restraint portion
- 21 First restraint pin
- 22 First restraint slot
- 23 Drive mechanism
- 24 Drive motor
- 25 Output shaft
- 26 Reduction gear box
- 27a Upper transmission shaft
- 27b Lower transmission shaft
- 28 First gear box
- 29 Second gear box
- 30 Rockably supporting section
- 31 Rock shaft
- 32 Holder portion
- 33 Opening
- 34 Cap
- 35 Span adjustment mechanism
- 36 Threaded screw portion
- 37 Lower massaging system
- 38 Second rotation shaft
- 39 Second massaging member
- 39a Inner second massaging member
- 40 Second conversion section
- 41 Second inclined boss portion

42	Cam face
43	Second annular fit portion
44	Second restraint portion
45	Second restraint pin
46	Second restraint slot
47	Support member
48	Sole massaging roller
49	Massaging piece
50	Vibratory massaging system
51	Motor
52	Sole massaging member
53	Massaging piece
54	Vibrating element
55	Cylindrical member
60	Switch
70	Massage chair apparatus
71	Seat portion
72	Backrest portion
73	Footrest portion
74	Support frame
75	Rock drive mechanism
76	Drive motor
77	Rotation shaft
78	Gear
79	Gear

80	Rotational movement mechanism
81	Arm member
81a	Axis
82	Link arm member
83	Drive section (Actuator)
83a	Rod
84	Side support member
85	Sensor
85a	Limit switch
85b	Limit switch
86	Vertical movement mechanism
87	Slider
88	Turning shaft
89	Up-and-down drive section (Actuator)
89a	Rod
90	Slide member
91	Slider
L	Leg
F	Foot
C	Calf
T	Thigh
S	Sole
A	Arch (of the foot)
R	Floor

CLAIMS

1. A message chair apparatus, comprising:
 - a seat portion for user seating;
 - a backrest portion mounted at a rear of the seat portion; and
 - a footrest portion mounted at a front of the seat portion,
 - the footrest portion being built as a leg massager for massaging the leg of a user,
 - wherein the leg massager comprises:
 - a lower massaging system for massaging a message target area of the leg of the user, which includes at least the foot of the user;
 - an upper massaging system for massaging an upper message target area located above the message target area which is massaged by the lower massaging system;
 - a drive mechanism for driving the upper massaging system and the lower massaging system; and
 - a rockably supporting section for supporting the upper massaging system for rocking motion about a horizontal-pointing axis,
 - wherein the upper massaging system includes a first massaging member, and the lower massaging system includes a second massaging member,
 - wherein the rockably supporting section, located above the second massaging member, supports a base-end side of the first massaging member for rocking motion to permit rising movement of a front-end side of the first massaging member via a horizontally-oriented rock shaft,
 - wherein, at a position with the first massaging member leaning forward in adjoining relation to the second massaging

member, the first massaging member faces forward, and, at a position with the first massaging member raised away from the second massaging member, the first massaging member faces upward,

and wherein the upper massaging system comprises:

a horizontally-oriented first rotation shaft which rotates under a rotational driving force from the drive mechanism;

right-hand and left-hand first massaging members used in a pair, each disposed at an intermediate part of the first rotation shaft, that hold the upper message target area lying in between while moving close to and away from each other under a rotational driving force from the first rotation shaft; and

a first conversion section for converting the rotational driving force from the first rotation shaft into mutually approaching and separating movement of the paired right-hand and left-hand first massaging members.

2. The message chair apparatus according to claim 1, wherein the rock shaft and the first rotation shaft are constructed in one-piece of a single shaft body.

3. The message chair apparatus according to claim 1, wherein the leg massager is mounted so as to be electrically driven for rotational movement in a front-rear direction.

4. The message chair apparatus according to claim 1, wherein the leg massager comprises: the lower massaging system for massaging a message target area of the leg of the user, which includes at least the foot of the user; and the upper massaging system for massaging an upper message target area located above the message target area which is massaged

by the lower massaging system, and wherein an upper part of the lower massaging system is provided with a safety switch for preventing a catching accident.

5. The message chair apparatus according to claim 3, wherein a sensor is provided to recognize a rotational position of the upper massaging system in an electrically driven state, the upper massaging system being supported for rocking motion about a horizontal-pointing axis.

6. The message chair apparatus according to claim 3, wherein a sensor is provided to recognize a rocking position of the leg massager in the front-rear direction, the leg massager being mounted for rotational movement in the front-rear direction.

7. The message chair apparatus according to claim 3, wherein the leg massager is electrically driven by a vertical movement mechanism for moving action in a vertical direction.

8. The message chair apparatus according to claim 7, wherein a sensor is provided to recognize extended and contracted positions of the leg massager in extending and contracting movement.

9. The message chair apparatus according to claim 6, wherein a limit value of a rotation angle at which the upper massaging system is risingly rotated is determined in accordance with a vertical position of the leg massager and/or extended and contracted positions of the leg massager in a direction of extending and contracting movement.

10. The message chair apparatus according to claim 3,

wherein the upper massaging system rotationally moves around a horizontal-pointing axis, and the axis coincides with an axis of the first rotation shaft.

11. The message chair apparatus according to claim 10, wherein the upper massaging system and the lower massaging system are driven by one common drive motor.

12. The message chair apparatus according to claim 10, wherein a message span set for the upper massaging system is adjustable according to a width of the leg of the user, and wherein the upper massaging system is rotationally moved following completion of adjustment of the message span.

13. The message chair apparatus according to claim 3, wherein, upon its 90- to 180-degree turn about a turning shaft, the leg massager becomes ready to serve as an ottoman for resting the leg of the user.

14. The message chair apparatus according to claim 13, wherein a sensor is provided to recognize a position of the leg massager in a state of serving as an ottoman, and, with the leg massager set in this position to serve as an ottoman, the upper massaging system is at a standstill.

15. The message chair apparatus according to claim 1, wherein, after the paired second massaging members or air bags disposed in the lower massaging system are set close to each other to restrain the foot of the user, the paired first massaging members or air bags disposed in the upper massaging system are set close to each other to hold the leg of the user, and then rotationally moved upward.

16. The message chair apparatus according to claim 3, wherein the paired first massaging members or air bags disposed in the upper massaging system, after being set close to each other to hold the leg of the user, are rotationally moved downward for forward-leaning action, during which period a main body of the leg massager is moved downward, or the leg massager is electrically driven so as to move to its extended position.

17. The message chair apparatus according to claim 16, wherein, after achieving one of a condition where the paired first massaging members or air bags disposed in the upper massaging system are set close to each other to hold the leg of the user and a condition where the paired second massaging members or air bags disposed in the lower massaging system are set close to each other to restrain the foot of the user, the first massaging members or air bags are rotationally moved downward for forward-leaning action, during which period the leg massager main body is moved downward, or the leg massager is electrically driven so as to move to its extended position.

18. The message chair apparatus according to claim 16, wherein, after the paired first massaging members or air bags disposed in the upper massaging system are set close to each other in a position facing the thigh of the user, an air bag mounted inside the seat portion is alternately inflated and deflated repeatedly, or a seat's built-in massaging mechanism mounted inside the seat portion is driven for at least one of kneading operation in a horizontal direction, tapping operation, back-and-forth movement in the vertical direction, and travel in the front-rear direction.

19. The message chair apparatus according to claim 3, wherein a no-kneading zone is provided to stop kneading operation of the paired first massaging members or air bags disposed in the upper massaging system in a position facing the knee of the user.

20. The message chair apparatus according to claim 3, wherein the upper massaging system is installed with a heater for warming the leg of the user.