

[Title of Document] SPECIFICATION

[Title of the Invention] CHAIR

[Technical field]

[0001] The present invention relates to a massage mechanism incorporated in a chair.

[Background Art]

[0002] With the purpose of massaging user's back, waist, and nearby body regions, a chair-type massage apparatus with a backrest having a built-in massage mechanism has been used down to date.

[0003] An example of chair-type massage apparatuses is shown in Japanese Unexamined Patent Publication JP-A 2009-77755.

[0004] However, when a user sitting in an ordinary chair such as an office chair or a legless chair wants to have his/her back or waist massaged, the user will have to move to a different place where a chair-type massage apparatus such as shown in JP-A 2009-77755 is placed to receive a massage, which results in an inconvenience to the user.

[0005] In order to solve the above problem, for example, in Japanese Unexamined Patent Publication JP-A 2006-296960, there is disclosed a chair with a backrest having a built-in massage mechanism.

[Summary of the Invention]

[Problems to be solved by the Invention]

[0006] Referring to Figs. 2 and 3 of JP-A 2006-296960, the chair described in JP-A 2006-296960 is designed as a chair with massaging capability that has, in its backrest, switching means for allowing selection between a mode of providing no massage effect (non-massaging mode) and a mode of providing massage effect (massaging mode).

[0007] However, in the use of this chair, a user switches back and forth between the non-massaging mode and the massaging mode by manually operating the switching

means; that is, the operation of the chair is troublesome.

[0008] The present invention has been devised in view of the problem as mentioned supra, and accordingly its object is to provide a chair having a system in which, only when a massage is performed on user's back, a massage mechanism housed inside a backrest is readily brought into contact with the back.

[Means for solving the problem]

[0009] In order to accomplish the above object, the following technical means is adopted for the implementation of the present invention.

[0010] A chair pursuant to present invention comprises: a seat; a backrest mounted at the rear of the seat for supporting a user's back; and a massage mechanism incorporated in the backrest for performing a massage on the back of the user sitting on the seat. In this chair, a support frame is provided inside the backrest, and, the massage mechanism is disposed on the support frame via a moving mechanism. The moving mechanism is designed to move the massage mechanism from a position where it is housed inside the backrest to a position ahead of the backrest to permit a massage to the user's back.

[0011] In the present invention, it is preferable that the moving mechanism is designed to move the massage mechanism from a storage position where the massage mechanism is housed inside the backrest to a surface-side position where the massage mechanism is aligned parallel to the surface side of the backrest.

[0012] In the present invention, it is preferable that the moving mechanism is composed of a link mechanism for moving the massage mechanism, and a driving section disposed on the support frame, for rocking the link mechanism, and that the link mechanism comprises: a first link member in which one end is rotatably coupled to the massage mechanism, and a midportion is coupled to a rotary shaft of the driving section; a second link member disposed in a position different from the first link member in a vertical direction, in which a midportion is rotatably pivoted on the support frame, and

one end is rotatably coupled to the massage mechanism; and a rocking link member in which one end is rotatably pivoted on the other end of the first link member, and the other end is rotatably pivoted on the other end of the second link member.

[0013] In the present invention, it is preferable that the first link member is a member having an L-shaped form as seen in side view, and, one end of the L-shaped form is longer than the other end thereof, and the one end is rotatably coupled to a lower side of the massage mechanism, and that a bend at a midportion of the L-shaped form is fixedly pivoted on the rotary shaft provided in the driving section.

[0014] In the present invention, it is preferable that the second link member is a member having an L-shaped form as seen in side view, and, one end of the L-shaped form is longer than the other end thereof, and the one end is rotatably coupled to an upper side of the massage mechanism, and that a bend at a midportion of the L-shaped form is rotatably pivoted on the support frame.

[0015] In the present invention, it is preferable that the first and second link members can be rocked from a position where one end thereof is directed obliquely upwardly toward the rear of the support frame to a position where the one end is directed toward the front of the support frame.

[0016] In the present invention, it is preferable that, in the first link member, a pivotal point at which the rotary shaft is securely set in a hole for axial rotation is situated between a pivotal point for pivotally supporting the lower side of the massage mechanism and a pivotal point for pivotally supporting the rocking link member, and that, in the second link member, a pivotal point for pivotally supporting the support frame is situated between a pivotal point for pivotally supporting the upper side of the massage mechanism and a pivotal point for pivotally supporting the rocking link member.

[0017] In the present invention, it is preferable that the rocking link member is a long

platy member whose longitudinal length is substantially equal to the vertical height of the massage mechanism, and that the rocking link member is disposed in parallel with the vertical direction of the massage mechanism.

[0018] In the present invention, it is preferable that, in the link mechanism, the rocking link member is designed so that one end thereof is located more inward than is the other end thereof in a horizontal direction, and the second link member is designed so that one end thereof is located more inward than is the other end thereof in the horizontal direction.

[Effects of the Invention]

[0019] According to the chair pursuant to the present invention, only when a massage is performed on user's back, the massage mechanism housed inside the backrest is readily brought into contact with the back.

[Brief Description of Drawings]

[0020][Fig. 1] Figure 1 is a perspective view of a chair pursuant to the present invention.

[Fig. 2] Figure 2 is a front perspective view showing the internal structure of a backrest.

[Fig. 3] Figure 3 is a rear perspective view showing the internal structure of the backrest.

[Fig. 4] Figure 4 is a plan view showing the internal structure of the backrest.

[Fig. 5] Figure 5 is a side view showing the operation of a moving mechanism when a massage mechanism is set in a storage position.

[Fig. 6] Figure 6 is a side view showing the operation of the moving mechanism when the massage mechanism is set in a surface-side position.

[Fig. 7] Figure 7 is a side view showing the operation of the moving mechanism when the massage mechanism is set in a first massage position.

[Fig. 8] Figure 8 is a side view showing the operation of the moving mechanism when the massage mechanism is set in a second massage position.

Fig. 9] Figure 9 is a side view showing the operation of the moving mechanism when the massage mechanism is set in a third massage position.

[Modes for Carrying out the Invention]

[0021] Hereinafter, a chair pursuant to the present invention will be described with reference to the drawings.

[0022] It is noted that an embodiment as set forth hereunder is merely given by way of practicable example of the present invention, and is not intended to limit the construction of the present invention to the practicable example. Accordingly, the technical scope of the present invention is not limited to the disclosure of the embodiment.

[0023] For example, by way of the present embodiment, a moving mechanism 28 and a massage mechanism 17 housed inside a backrest 3 of an office chair 1 will be illustrated.

[0024] However, the office chair 1 is merely given as an example, and the invention of the present application is therefore applicable to a whole category of chairs, including a legless chair. That is, the invention of the present application is applicable to any of ordinary chairs without particular limitation.

[0025] Figures 1 to 9 show the up-and-down movement and advancing movement of the moving mechanism 28 and the massage mechanism 17 housed inside the backrest 3.

[0026] Moreover, in the following description, a right-left direction viewing Fig. 5 will be referred to as a front-rear direction of the backrest 3 (office chair 1), and a top-bottom direction viewing Fig. 5 will be referred to as a vertical direction of the backrest 3. A direction of drilling through the paper sheet with Fig. 5 printed on it will be referred to as a horizontal direction or widthwise direction of the backrest 3. These directions

conform to the definitions of directions based on the sight of a user sitting in the office chair 1 shown in Fig. 1.

[0027] To begin with, the basic structure of the chair 1 pursuant to the present invention will be explained.

[0028] As shown in Fig. 1, the chair 1 pursuant to the present invention (hereafter also referred to as “office chair”) comprises: a seat 2 on which a user is able to sit; a backrest 3 mounted at the rear of the seat 2 for supporting user’s back; and a massage mechanism 17 incorporated in the backrest 3 for performing a massage on the back of a user sitting on the seat 2. A support frame 11 is installed inside the backrest 3.

[0029] The massage mechanism 17 is disposed on the support frame 11 via a moving mechanism 28. The moving mechanism 28 allows the massage mechanism 17 to move from a position for its storage inside the backrest 3 to a position ahead of the backrest 3.

[0030] In addition, the office chair 1 of the present embodiment includes a headrest 4 mounted in an upstanding condition at the upper part of the backrest 3, and armrests 5 mounted on both sides of the seat 2 in the horizontal direction for receiving the elbows of a user sitting on the seat 2.

[0031] As shown in Figs. 1 and 5, in the office chair 1, when a massage to user’s back is not effected, the massage mechanism stays inside the backrest 3. That is, outwardly, the office chair 1 of the present embodiment looks much the same as an ordinary office chair.

[0032] Hereinafter, the office chair 1 pursuant to the present invention will be particularized.

[0033] The seat 2, which is a rectangular member having an area wide enough to support the hip of a seated user from below, is formed of a cushion material.

[0034] As shown in Fig. 1, there is provided a pair of armrests 5 on which user’s elbows can be rested, and more specifically the armrest 5 is mounted at each end of the

seat 2 in the horizontal direction. Moreover, a leg frame 6 is mounted under the seat 2 for supporting the seat 2 so that the seat 2 is located above a floor.

[0035] The leg frame 6 is composed of a column 7 for supporting the seat 2 from below, and a plurality of radially arranged legs 8 extending substantially horizontally or slightly downwardly from the column 7. Each of the legs 8 has a rollable wheel (caster) 9 disposed at the front end thereof.

[0036] The backrest 3 mounted at the rear of the seat 2 supported by the leg frame 6 has a sufficiently large area enough to support user's back, waist, and so forth, is designed as a thick vertically-elongated platy member as seen in front view, and is made of a cushion material for comfortable leaning of user's back. Moreover, the backrest 3 has the upstanding headrest 4 mounted at its upper part so as to protrude upward.

[0037] It is preferable that the backrest 3 includes a reclining mechanism for allowing a user to lean his/her upper body (back) backward in a relaxed state.

[0038] The backrest 3 is internally provided with the support frame 11 capable of supporting user's back adequately (which will hereafter be described in detail) and the massage mechanism 17 for performing a massage, such as a kneading massage, tapping massage, or vibration massage, on the body of a user sitting on the seat 2 between the back and waist regions.

[0039] Moreover, a cut-out part 10 having a substantially rectangular shape as seen in front view is formed beneath a surface side 62 (a surface contacted by user's back and waist) of the backrest 3. The area of the cut-out part 10 is wide enough for the massage mechanism 17 in storage to move forward beyond the surface side 62. That is, the area of the cut-out part 10 is adjusted to be larger than the size of the massage mechanism 17 as seen in front view.

[0040] As shown in Figs. 2 to 9, the support frame 11 disposed inside the backrest 3 is so installed that its lower end is pivoted on the rear of the seat 2 or the rear of the leg

frame 6, and extends obliquely rearwardly.

[0041] The support frame 11, which is a vertically-elongated rectangular frame body as seen in front view, is constructed by combining a plurality of rodlike members such as metal-made pipe members or angle bars in spanning relation to each other.

[0042] Specifically, the support frame 11 comprises: a pair of vertically-elongated right and left first support frame members 12; and a second support frame member 13 attached to each of the upper end and the lower end of the first support frame member 12 so as to span in the horizontal direction. The second support frame member 13 is shorter than the first support frame member 12. In the present embodiment, two second support frame members 13 are attached to each of the upper end and the lower end of the first support frame member 12.

[0043] Moreover, an engagement member 14 intended for the engagement of the moving mechanism 28 (which will hereafter be described in detail) is disposed in a position midway between the first support frame member 12 ends in the vertical direction so as to extend inward in the horizontal direction. The engagement member 14 is given a predetermined length in the horizontal direction, and, an engagement piece 15 for rotatably supporting the moving mechanism 28 is attached to the front end (inwardly-pointing tip) of the engagement member 14.

[0044] The engagement piece 15, which is a substantially square platy member, is disposed so that the flat surface of the platy member points in the front-rear direction. A forward part of the flat surface is formed with a hole 16 for pivotally supporting the moving mechanism 28.

[0045] The massage mechanism 17 is disposed on the support frame 11 so as to be located between a midpoint in the vertical direction and the bottom of the support frame 11 via the moving mechanism 28.

[0046] The massage mechanism 17 is a kneading device comprising: massage

members 18 arranged on the right side and the left side, respectively, as a pair; and a massage section 19 for operating the massage member 18 pair. The massage member 18 arranged on the left side will be referred to as the left massage member 20, whereas the massage member 18 arranged on the right side will be referred to as the right massage member 24. A single left massage member 20 and a single right massage member 24 are arranged at a predetermined spacing in the horizontal direction.

[0047] In the present embodiment, the massage section 19 of the massage mechanism 17 serves as one of link members constituting a link mechanism 29 (parallel link mechanism) which will hereafter be described.

[0048] As shown in Figs. 2 and 3, the above-described left massage member 20 includes a left arm member 21 protruding from the massage section 19 side toward a user (forward). The left arm member 21 has branched tips (front ends) protruding in two directions, namely upward and downward directions, respectively, and, these branched upper and lower tips are each provided with a massager component (upper-left massager 22 and lower-left massager 23).

[0049] Moreover, like the left massage member 20, the right massage member 24 also includes a right arm member 25 protruding from the massage section 19 side toward a user (forward). The right arm member 25 has branched tips (front ends) protruding in two directions, namely upward and downward directions, respectively, and, these branched upper and lower tips are each provided with a massager component (upper-right massager 26 and lower-right massager 27).

[0050] In the above-described massage mechanism 17, as the left arm member 21 and the right arm member 25 are driven to move close to and away from each other, the upper-left massager 22 and the upper-right massager 26 are moved close to and away from each other in the horizontal direction, and also the lower-left massager 23 and the lower-right massager 27 are moved close to and away from each other in the horizontal

direction. With such an approaching/separating movement, user's back and waist (to-be-massaged body parts) are held between the upper-left massager 22 and the upper-right massager 26, as well as between the lower-left massager 23 and the lower-right massager 27, in sandwich style, thereby giving a kneading massage to the to-be-massaged parts.

[0051] Although, in the present embodiment, a kneading device exemplifies the massage mechanism 17, the massage mechanism 17 is not so limited so long as it can be built as a device capable of performing an adequate massage on user's back and waist (for example, a device which effects a massage by utilizing rotation of a massager component, or a device which effects a massage by utilizing inflation and deflation of an air bag).

[0052] Next, the moving mechanism 28 which constitutes a distinctive feature of the present invention will be described in detail with reference to the drawings.

[0053] The moving mechanism 28 is designed to move the massage mechanism 17 from a position for its storage inside the backrest 3 (support frame 11) to a position ahead of the backrest 3 to permit a massage to user's back.

[0054] The moving mechanism 28 is also designed to move the massage mechanism 17 from a storage position where it is housed inside the backrest 3 (which will hereafter be described in detail) to a surface-side position where it is aligned parallel to the surface side 62 of the backrest 3 (surface contacted by user's back and waist) (which will hereafter be described in detail).

[0055] It is noted that, in each of the drawings, part of the placement positions and configurations of the constituent members may be omitted or depicted in an easy-to-see manner to facilitate explanation of the structure of the moving mechanism 28.

[0056] For example, in Figs. 2 to 9, the backrest 3 is illustrated in respect of its internal structure, namely the configurations of the moving mechanism 28, the support frame 11,

and the massage mechanism 17, and, on the other hand, the constituent members of the backrest 3 disposed outside of the support frame 11 (for example, the surface side 62) are schematically shown. Moreover, in Figs. 5 to 9, in order to facilitate the understanding of part of the configuration of the moving mechanism 28, the members constituting the moving mechanism 28 are each depicted in an easy-to-see manner.

[0057] That is, the internal structure of the backrest 3 in the office chair 1 pursuant to the present invention shown in the drawings may differ from the actual internal structure.

[0058] The moving mechanism 28 is composed of a link mechanism 29 for moving the massage mechanism 17, and a driving section 54 disposed at the lower part of the support frame 11, for rocking the link mechanism 29.

[0059] The link mechanism 29 is a parallel link mechanism comprising: a first link member 30 in which one end 31 is rotatably coupled to the lower side of the massage mechanism 17, and a midportion 33 is coupled to a rotary shaft 55 of the driving section 54; a second link member 39 disposed in a position different from the first link member 30 in the vertical direction, in which a midportion 42 is rotatably pivoted on the support frame 11, and one end 40 is rotatably coupled to the upper side of the massage mechanism 17; and a rocking link member 49 in which one end 50 is rotatably pivoted on the other end 32 of the first link member 30, and the other end 51 is rotatably pivoted on the other end 41 of the second link member 39.

[0060] There is provided a pair of first link members 30. The first link member 30 is disposed inwardly of the lower part of the support frame 11, and more specifically disposed inwardly of each of the paired right and left first support frame members 12 in the horizontal direction.

[0061] In the first link member 30 which is an L-shaped platy member as seen in side view, one end 31 is longer than the other end, and the one end 31 is coupled to the lower

side of the massage mechanism 17 for free rotation about an axis pointing in the horizontal direction, viz. a horizontal axis. Moreover, the other end 32 is coupled to one end 50 of the rocking link member 49, which will hereafter be described, for free rotation about the horizontal axis.

[0062] The one end 31 of the first link member 30 is formed with a hole 34 for pivotally supporting the lower side of the massage mechanism 17. The hole 34, in conjunction with a hole 60 formed in the lower side of the massage mechanism 17 (massage section 19) in alignment with the hole 34, receives a pivot stud 37. The hole 34 in which is fitted the pivot stud 37 serves as a pivotal point A at one end of the first link member 30.

[0063] On the other hand, the other end 32 of the first link member 30 is formed with a hole 35 for pivotally supporting one end 50 of the rocking link member 49. The hole 35, in conjunction with a hole 52 formed in one end 50 of the rocking link member 49 in alignment with the hole 35, receives a pivot stud 38. The hole 35 in which is fitted the pivot stud 38 serves as a pivotal point B at the other end of the first link member 30.

[0064] Moreover, the bend 33 at the midportion of the L-shaped first link member 30 is formed with a hole 36 through which the rotary shaft 55 provided in the driving section 54 passes. The rotary shaft 55 is securely set in the hole 36 of the bend 33 for pivotally supporting the bend 33, so that the first link member 30 can be rotated about the axis of the rotary shaft 55 in response to the rotation of the rotary shaft 55. The hole 36 through which the rotary shaft 55 passes serves as a pivotal point C at the bend 33 of the first link member 30.

[0065] That is, in the first link member 30, the pivotal point C at which the rotary shaft 55 is securely set in the hole for axial rotation is situated between the pivotal point A for pivotally supporting the lower side of the massage mechanism 17 and the pivotal point B for pivotally supporting one end of the rocking link member 49.

[0066] Thus, the first link member 30 can be rocked about the axis of the rotary shaft 55 (pivotal point B) from a position where the one end 31 is directed obliquely upwardly toward the rear of the support frame 11 to a position where the one end 31 is directed toward the front of the support frame 11.

[0067] There is provided a pair of right and left second link members 39. The second link member 39 is disposed above the first link member 30.

[0068] The second link member 39 is disposed inwardly of the vertical midpoint of the support frame 11, and more specifically disposed inwardly of each of the paired right and left first support frame members 12 in the horizontal direction.

[0069] In the second link member 39 which is, like the first link member 30, an L-shaped platy member as seen in side view, one end 40 is longer than the other end 41, and the one end 40 is coupled to the upper side of the massage mechanism 17 for free rotation about the horizontal axis. Moreover, the other end 41 is coupled to the other end 51 of the rocking link member 49, which will hereafter be described, for free rotation about the horizontal axis.

[0070] That is, the second link member 39 is substantially equal in form to the first link member 30.

[0071] The second link member 39 differs in form from the first link member 30 in that the one end 40 is located more inward than is the other end 41 in the horizontal direction.

[0072] The one end 40 of the second link member 39 is formed with a hole 43 for pivotally supporting the upper side of the massage mechanism 17. The hole 43, in conjunction with a hole formed in the upper side of the massage mechanism 17 in alignment with the hole 43, receives a pivot stud 46. The hole 43 in which is fitted the pivot stud 46 serves as a pivotal point D at one end of the second link member 39.

[0073] On the other hand, the other end 41 of the second link member 39 is formed

with a hole 44 for pivotally supporting the other end 51 of the rocking link member 49. The hole 44, in conjunction with a hole 53 formed in the other end 51 of the rocking link member 49 in alignment with the hole 44, receives a pivot stud 47. The hole 44 in which is fitted the pivot stud 47 serves as a pivotal point E at the other end of the second link member 39.

[0074] Moreover, the bend 42 at the midportion of the L-shaped second link member 39 is formed with a hole 45 for pivoting it on the engagement piece 15 of the engagement member 14 (support frame 11). The hole 45, in conjunction with a hole 16 formed in the engagement piece 15 in alignment with the hole 45, receives a pivot stud 48.

[0075] With the hole 45 of the bend 42 and the hole 16 of the engagement piece 15 kept in alignment with each other, the pivot stud 48 is inserted in the holes for rotatably supporting the bend 42, so that the second link member 39 can be rotated about the axis of the pivot stud 48. The hole in which is fitted the pivot stud 48 serves as a pivotal point F at the bend 42 of the second link member 39.

[0076] That is, in the second link member 39, the pivotal point F for pivoting the second link member on the engagement piece 15 is situated between the pivotal point D for pivotally supporting the upper side of the massage mechanism 17 and the pivotal point E for pivotally supporting the other end of the rocking link member 49.

[0077] Moreover, the pivotal point F at the bend 42 of the second link member 39 is located substantially immediately above the pivotal point C at the bend 33 of the first link member 30, so that the second link member 39 is rotated substantially identically with the first link member 30.

[0078] That is, the second link member 39 can be rocked about the axis of the pivot stud 48 fitted into the bend 42 (engagement piece 15) from a position where the one end 40 is directed obliquely upwardly toward the rear of the support frame 11 to a position

where the one end 40 is directed toward the front of the support frame 11.

[0079] There is provided a pair of right and left rocking link members 49. The rocking link member 49 is situated between the second link member 39 and the first link member 30.

[0080] The paired rocking link members 49 are each disposed so as to span the space between the other end 32 of the first link member 30 and the other end 41 of the second link member 39.

[0081] The rocking link member 49 is a long platy member whose longitudinal length is substantially equal to the vertical height of the massage mechanism 17, or equivalently the distance between the pivotal point A and the pivotal point D. The rocking link member 49 is disposed in parallel with the vertical direction of the massage mechanism 17.

[0082] One end 50 (lower end) of the rocking link member 49 is formed with a hole 52 for pivoting it on the other end 32 of the first link member 30. As has already been described, the pivot stud 38 is inserted into the hole 52, whereby the one end is pivotally supported on the other end 32 of the first link member 30 (pivotal point B).

[0083] On the other hand, the other end 51 (upper end) of the rocking link member 49 is formed with a hole 53 for pivoting it on the other end 41 of the second link member 39. As has already been described, the pivot stud 47 is inserted into the hole 53, whereby the other end is pivotally supported on the other end 41 of the second link member 39 (pivotal point E).

[0084] Moreover, as shown in Fig. 4, in the rocking link member 49, the one end 50 is located more inward than is the other end 51 in the horizontal direction to make up for the gap between the other end 32 of the first link member 30 and the other end 41 of the second link member 39 (widthwise gap between the pivotal point B and the pivotal point E) as seen in plan view.

[0085] That is, the rocking link member 49 can be moved downward (toward a position where it overlaps the first support frame member 12 as seen in side view) from the vertical midpoint of the support frame 11 along the vertical (longitudinal) direction of the support frame 11.

[0086] Thus, in the link mechanism 29, in response to the rotation of the rotary shaft 55 of the driving section 54, the first link member 30 pivotally supported on the lower side of the massage mechanism 17 is rocked about the axis of the rotary shaft 55. At the same time, the second link member 39 pivotally supported on the upper side of the massage mechanism 17 is rocked about the axis of the pivot stud 48 fitted into the engagement piece 15.

[0087] On the other hand, the rocking link member 49 pivotally supported on the first link member 30 and the second link member 39 is rocked downwardly from the vertical midpoint of the support frame 11 toward the rear.

[0088] In response to the rocking motion of the first link member 30, the second link member 39, and the rocking link member 49, the massage mechanism 17 is moved from below upward in a frontward direction, in other words, moved forward beyond the surface side 62 from the interior of the backrest 3, while staying horizontal.

[0089] At this time, the pivotal point A and the pivotal point D move from the rear to the front of the support frame 11 about the axis of the rotary shaft 55. On the other hand, the pivotal point B and the pivotal point E move from the front to the rear of the support frame 11 about the axis of the rotary shaft 55.

[0090] Moreover, in the link mechanism 29, since the rocking link member 49 is designed so that the one end 50 is located more inward than is the other end 51 in the horizontal direction, and the second link member 39 is also designed so that the one end 40 is located more inward than is the other end 41 in the horizontal direction, it follows that the first link member 30, the second link member 39, the rocking link member 49,

and the massage mechanism 17 (serving as a link member) can be rotated without mutual interference.

[0091] Disposed below the link mechanism 29 is the driving section 54 for rocking the link mechanism 29.

[0092] The driving section 54 is composed of the rotary shaft 55 for rocking the link mechanism 29, an electric motor 56 for producing a rotational drive force, and a gear box 57 for rotatably driving the rotary shaft 55 by transmitting the produced rotational drive force to the rotary shaft 55.

[0093] The electric motor 56 situated at the lower-end part of the support frame 11 is placed so as to point in the horizontal direction, and has a single rotational drive shaft protruding leftward (not represented graphically). A drive gear (not represented graphically) is attached to the rotational drive shaft. Meanwhile, the rotary shaft 55 is situated behind the rotational drive shaft of the electric motor 56 in parallel with the rotational drive shaft. A driven gear (not represented graphically) is attached to the left-end side of the rotary shaft 55. The drive gear engages with the driven gear. The driven gear and the drive gear are incorporated in the gear box 57, and, through these components, the rotational drive force exerted by the electric motor 56 is transmitted to the rotary shaft 55.

[0094] The driving section 54 is supported at the lower part of the support frame 11 via a pair of support members 58 and 59 arranged at the lower part of the support frame 11.

[0095] The support member 58, 59 is obtained through the working of a plate piece into a predetermined shape by means of press working or otherwise. The paired support members 58 and 59 are placed so as to protrude forward from the lower part of the support frame 11.

[0096] The support member 58 on the left side supports the gear box 57 and the electric motor 56. The left side of the rotary shaft 55 is supported by the gear box 57,

and, in its supported point, a bearing for rotatably supporting the rotary shaft 55 is fitted (not represented graphically). On the other hand, the support member 59 on the right side supports the rotary shaft 55 and the electric motor 56, and, also, a bearing for rotatably supporting the rotary shaft 55 (not represented graphically) is fitted in the supported point of the rotary shaft 55.

[0097] Next, with reference to Figs. 5 to 9, five positions to be accomplished by the above-described moving mechanism 28, viz. the link mechanism 29 (namely, a position for storage; a position corresponding to the surface side; a position defined as a first massage position; a position defined as a second massage position; and a position defined as a third massage position), in other words, the operation of the chair 1 pursuant to the present invention will be explained.

[0098] As shown in Fig. 5, a position where the link mechanism 29 in a yet-to-be-rocked state and the massage mechanism 17 are housed inside the support frame 11 as seen in sectional side view will be designated as a storage position.

[0099] As shown in Fig. 6, a position where the lower-left massager 23 and the lower-right massager 27 of the massage mechanism 17 are brought into contact with the surface side 62 by the link mechanism 29 which has just started rocking motion as seen in sectional side view will be designated as a surface-side position.

[0100] As shown in Fig. 7, a position where the upper-left massager 22, the lower-left massager 23, the upper-right massager 26, and the lower-right massager 27 of the massage mechanism 17 are caused to jut from the surface side 62 by the link mechanism 29 in a rocking state as seen in sectional side view will be designated as a first massage position (upper position).

[0101] As shown in Fig. 8, a position where the massage mechanism 17 is caused to jut from the surface side 62 (the upper-left massager 22, the lower-left massager 23, the upper-right massager 26, and the lower-right massager 27 of the massage mechanism 17

are caused to jut even further from the surface side 62) by the link mechanism 29 in a rocking state as seen in sectional side view will be designated as a second massage position (middle position).

[0102] As shown in Fig. 9, a position where the massage mechanism 17 is caused to jut from the surface side 62 while being moved to the lower part of the surface side 62 (backrest 3) by the link mechanism 29 in a rocking state as seen in sectional side view will be designated as a third massage position (lower position).

[0103] Thus, the moving mechanism 28 permits smooth movement of the massage mechanism 17 among the five positions thus far described.

[0104] At first, as shown in Fig. 5, in the storage position, the first link member 30 and the second link member 39 are set so that their one ends 31 and 40 are directed obliquely rearwardly and upwardly, and their other ends 32 and 41 are directed obliquely frontwardly and downwardly. On the other hand, the rocking link member 49 is set at substantially the same level as the massage mechanism 17 so as to extend vertically while being spaced forwardly from the support frame 11 by a predetermined distance.

[0105] Thus, when the L-shaped first and second link members 30 and 39 are set in downwardly-convex form, the pivotal point A and the pivotal point B are both located on a substantially horizontal line pointing in the front-rear direction. Also, the pivotal point D and the pivotal point E are located on a substantially horizontal line pointing in the front-rear direction.

[0106] On the other hand, when the rocking link member 49 is so set as to extend substantially vertically, the other end (pivotal point E) is located a little more forward than is the one end (pivotal point B).

[0107] In the storage position, the massage mechanism 17 is positioned in overlapping relation to the support frame 11 as seen in side view by the link mechanism 29 folded

compact. That is, the massage mechanism 17 in the storage position is fully retracted inside the backrest 3.

[0108] In the moving mechanism 28 in the above-described storage position, upon driving the electric motor 56 to run in the normal direction of rotation, the first link member 30 is rotated about the axis of the rotary shaft 55, thereby shifting the link mechanism 29 from the storage position to the surface-side position.

[0109] Next, as shown in Fig. 6, in the surface-side position, the first link member 30 and the second link member 39 are set so that their one ends 31 and 40 are directed obliquely rearwardly and more upwardly than in the storage position, and their other ends 32 and 41 are directed obliquely frontwardly and more downwardly than in the storage position. On the other hand, the rocking link member 49 is set at a level slightly lower than the level of the massage mechanism 17 so as to extend vertically while being spaced forwardly from the support frame 11 by a predetermined distance.

[0110] Thus, when the L-shaped first and second link members 30 and 39 are rotated forward in downwardly-convex form, the pivotal point A and the pivotal point D are spaced upwardly from the pivotal point B and the pivotal point E, respectively, by a predetermined distance.

[0111] On the other hand, when the rocking link member 49 is moved downward in response to the displacement of the first and second link members 30 and 39, the other end (pivotal point E) is located a little more forward than is the one end (pivotal point B).

[0112] In the surface-side position, the massage mechanism 17 is positioned so as to protrude slightly forward and upward from the support frame 11 as seen in side view by the link mechanism 29 which has started rocking motion, and, the lower-left massager 23 and the lower-right massager 27 jut from the surface side 62.

[0113] Consequently, the lower-left massager 23 and the lower-right massager 27

jutting from the surface side 62 abut on the waist of a user leaning at his/her back on the backrest 3 for the support of the waist. Therefore, the surface-side position can be deemed also as a “waist support position” to accomplish a position where the upper body of the user can be supported from the back side.

[0114] In the moving mechanism 28 in the above-described surface-side position, as the electric motor 56 is further driven to run in the normal direction of rotation, the one end 31 of the first link member 30 is rocked about the axis of the rotary shaft 55 so as to be directed obliquely upwardly frontward of the support frame 11, thereby shifting the link mechanism 29 from the surface-side position to the first massage position.

[0115] As shown in Fig. 7, in the first massage position, the first link member 30 and the second link member 39 are set so that their one ends 31 and 40 are positioned in substantially overlapping relation to the vertical direction of the support frame 11 (positioned substantially in parallel with the vertical direction of the support frame 11), and their other ends 32 and 41 are positioned perpendicularly to the vertical direction of the support frame 11 (positioned so as to protrude forward while staying horizontal).

[0116] On the other hand, the rocking link member 49 is moved downward while being located farther away from the support frame 11 in the forward direction than in the surface-side position, with its other end positioned in substantially overlapping relation to a vertical midpoint of the massage mechanism 17.

[0117] Thus, when the one ends 31 and 40 of the L-shaped first and second link members 30 and 39 stay substantially vertical (when the other ends thereof stay substantially horizontal), then the pivotal point A and the pivotal point C are located on substantially the same straight line in the vertical direction, and the pivotal point D and the pivotal point F are located on substantially the same straight line in the vertical direction. That is, the pivotal point A, the pivotal point D, the pivotal point C, and the pivotal point F are located on substantially the same straight line in the vertical

direction.

[0118] Moreover, the pivotal point B and the pivotal point C are located on substantially the same straight line in the front-rear direction while being arranged horizontal, and the pivotal point E and the pivotal point F are located on substantially the same straight line in the front-rear direction while being arranged horizontal.

[0119] On the other hand, after the rocking link member 49 was moved downward, the other end 51 (pivotal point E) is located a little more forward than is the one end 50 (pivotal point B).

[0120] In the first massage position, the massage mechanism 17 is positioned so as to protrude slightly forward and upward from the support frame 11 as seen in side view by the link mechanism 29 in a rocking state, and, the upper-left massager 22, the lower-left massager 23, the upper-right massager 26, and the lower-right massager 27 jut from the surface side 62.

[0121] Consequently, the upper-left massager 22, the lower-left massager 23, the upper-right massager 26, and the lower-right massager 27 jutting from the surface side 62 abut on the waist and back of a user leaning at his/her back on the backrest 3, whereby a massage can be performed on the waist and the back.

[0122] In the moving mechanism 28 in the above-described first massage position, as the electric motor 56 is further driven to run in the normal direction of rotation, the one end 31 of the first link member 30 is rocked about the axis of the rotary shaft 55 so as to be located in front of a lower part of the support frame 11, thereby shifting the link mechanism 29 from the first massage position to the second massage position.

[0123] As shown in Fig. 8, in the second massage position, the first link member 30 and the second link member 39 are set so that their one ends 31 and 40 are positioned perpendicularly to the vertical direction of the support frame 11 (positioned so as to protrude forward while staying horizontal), and their other ends 32 and 41 are positioned

in substantially overlapping relation to the vertical direction of the support frame 11 (positioned substantially in parallel with the vertical direction of the support frame 11).

[0124] On the other hand, the rocking link member 49 is positioned in substantially overlapping relation to the vertical direction of the support frame 11 (positioned substantially in parallel with the vertical direction of the support frame 11), and, the rocking link member 49, the other end 32 of the first link member 30, and the other end 41 of the second link member 39 are located on substantially the same straight line.

[0125] Thus, when the one ends 31 and 40 of the L-shaped first and second link members 30 and 39 stay substantially horizontal (when the other ends thereof stay substantially vertical), then the pivotal point A and the pivotal point C are located on substantially the same straight line in the front-rear direction while being arranged horizontal, and the pivotal point D and the pivotal point F are located on substantially the same straight line in the front-rear direction while being arranged horizontal.

[0126] Moreover, the pivotal point B and the pivotal point C are located on substantially the same straight line in the vertical direction, and the pivotal point E and the pivotal point F are located on substantially the same straight line in the vertical direction. That is, the pivotal point B, the pivotal point C, the pivotal point E, and the pivotal point F are located on substantially the same straight line in the vertical direction.

[0127] In the second massage position, the massage mechanism 17 is positioned so as to protrude forward from the support frame 11 as seen in side view by the link mechanism 29 in a rocking state, and, the upper-left massager 22, the lower-left massager 23, the upper-right massager 26, and the lower-right massager 27 jut greatly from the surface side 62.

[0128] Consequently, the upper-left massager 22, the lower-left massager 23, the upper-right massager 26, and the lower-right massager 27 jutting greatly from the

surface side 62 abut on the waist and so forth of a user leaning at his/her back on the backrest 3, whereby a massage can be performed on the waist and so forth.

[0129] In the moving mechanism 28 in the above-described second massage position, as the electric motor 56 is further driven to run in the normal direction of rotation, the one end 31 of the first link member 30 is rocked about the axis of the rotary shaft 55 so as to be directed obliquely downwardly frontward of the support frame 11, thereby shifting the link mechanism 29 from the second massage position to the third massage position.

[0130] As shown in Fig. 9, in the third massage position, the first link member 30 and the second link member 39 are set so that their one ends 31 and 40 faces forward while being inclined somewhat obliquely downwardly relative to a horizontal line, and their other ends 32 and 41 are directed obliquely downwardly rearward of the support frame 11.

[0131] On the other hand, the rocking link member 49 is positioned in substantially overlapping relation to the vertical direction of the support frame 11 (positioned substantially in parallel with the vertical direction of the support frame 11), and, the rocking link member 49, the other end 32 of the first link member 30, and the other end 41 of the second link member 39 are located on substantially the same straight line. At this time, the rocking link member 49 is located a little more upward than in the second massage position.

[0132] Thus, when the one ends 31 and 40 of the L-shaped first and second link members 30 and 39 are positioned while being inclined somewhat obliquely downwardly relative to the forward direction, then the pivotal point A and the pivotal point B are located on substantially the same straight line in the front-rear direction while being arranged horizontal, and the pivotal point D and the pivotal point F are located on substantially the same straight line in the front-rear direction while being

arranged horizontal.

[0133] Moreover, the rocking link member 49 is designed to move only in the vertical direction in any of the five positions (the storage position, the surface-side position, the first massage position, the second massage position, and the third massage position), wherefore its position in the front-rear direction remains substantially unchanged. That is, the rocking link member 49 maintains the position of the massage mechanism 17 horizontal.

[0134] In the third massage position, the massage mechanism 17 is positioned so as to protrude forward from the lower side of the support frame 11 as seen in side view by the link mechanism 29 in a rocking state, and, the upper-left massager 22, the lower-left massager 23, the upper-right massager 26, and the lower-right massager 27 are positioned at the lower side of the backrest 3.

[0135] Consequently, the upper-left massager 22, the lower-left massager 23, the upper-right massager 26, and the lower-right massager 27 jutting out greatly at the lower side of the backrest 3 abut on the lower waist (part of the waist region near the hip) of a user leaning at his/her back on the backrest 3, whereby a massage can be performed on the lower waist.

[0136] When it is desired to store the massage mechanism 17 inside the backrest 3 (for example, to effect a return to the condition as shown in Fig. 5 from the condition shown in Fig. 9), the electric motor 56 is driven to run in the reverse direction of rotation to rock the first link member 30 backward. In response to the backward rocking motion of the first link member 30, the second link member 39 is rocked so that the massage mechanism 17 can be housed inside the backrest 3 (support frame 11). Then, the link mechanism 29 (moving mechanism 28) is shifted from the third massage position to the second massage position, and from there to the first massage position, and from there to the surface-side position, and from there to the storage position.

[0137] That is, in the chair 1 of the present embodiment, as the electric motor 56 is driven to run in the normal direction of rotation, the link mechanism 29 undergoes a shift over a range extending from the storage position to the third massage position, whereas, as the electric motor 56 is driven to run in the reverse direction of rotation, the constituent members are operated in the reverse manner, thereby shifting the link mechanism 29 from the third massage position to the storage position.

[0138] As described heretofore, in the chair 1 of the present embodiment, only when a massage is performed on user's back, the massage mechanism 17 housed inside the backrest 3 is readily brought into contact with the back. Moreover, in the chair 1 of the present embodiment, in spite of its simple structure, the moving mechanism 28 can be rocked into various positions, and also, with this chair, a user is able to receive a massage in a relaxed state of mind.

[0139] It should be understood that the embodiment as set forth hereinabove is considered in all respects as illustrative only and not restrictive.

[0140] For example, although the link mechanism 29 of the present embodiment is illustrated as being designed so that the first link member 30 is disposed at the lower part of the support frame 11 and the second link member 39 is disposed at the upper part of the support frame 11, the first link member 30 and the second link member 39 may be arranged in the place of each other in the vertical direction.

[0141] That is, by way of an example of modified form of the link mechanism 29, for example, under a condition where the driving section 54 for rocking the link mechanism 29 is disposed at the upper part of the support frame 11, the link mechanism 29 may comprise: a first link member 30 in which one end 31 is rotatably coupled to the upper side of the massage mechanism 17, and a midportion 33 is coupled to the rotary shaft 55 of the driving section 54; a second link member 39 disposed in a position different from the first link member 30 in the vertical direction, in which a midportion 42 is rotatably

pivoted on the support frame 11, and one end 40 is rotatably coupled to the lower side of the massage mechanism 17; and a rocking link member 49 in which one end 50 is rotatably pivoted on the other end 32 of the first link member 30, and the other end 51 is rotatably pivoted on the other end 41 of the second link member 39.

[0142] Moreover, although the link mechanism 29 of the present embodiment is illustrated as being designed so that the rotary shaft 55 of the driving section 54 is coupled to the midportion 33 of the first link member 30 to allow the link mechanism 29 to rotate in response to the rotation of the first link member 30, it may be designed so that the rotary shaft 55 of the driving section 54 is coupled to the midportion 42 of the second link member 39 to allow the link mechanism 29 to rotate in response to the rotation of the second link member 39.

[0143] That is, the link mechanism 29 and the example of its modified form as above described are merely one example of parallel link mechanisms of various types, and therefore, a link mechanism of any given type may be adopted so long as it has such configurations and workings as have already been described in the chapter entitled “Modes for Carrying out the Invention” (advancing/retracting movement of the massage mechanism 17).

[0144] It is noted that, as to particulars that are not specified in the embodiment as disclosed hereinabove, for example, working conditions, operating procedures, relevant parameters, and the dimensions, weights, and volumes of constituent components, values and so forth that do not depart from the scope of the invention to be fulfilled by those skilled in the art and are easily conceivable by persons having ordinary skill in the art are adopted.

[0145] Moreover, the design and technical ideas of the invention of the present application are not limited to the office chair 1, but may be applied also to an ordinary chair such as a legless chair or sofa.

[0146] Moreover, in the above description, although the office chair 1 additionally provided with the armrests 5 and the headrest 4 exemplifies the present embodiment, the office chair 1 may be simply composed of the seat 2, the backrest 3, and the leg frame 6.

CLAIMS

1. A chair comprising:
 - a seat;
 - a backrest mounted at a rear of said seat for supporting a user's back; and
 - a massage mechanism incorporated in said backrest for performing a massage on the back of the user sitting on the seat,
 - said backrest being internally provided with a support frame,
 - said massage mechanism being disposed on said support frame via a moving mechanism,
 - said moving mechanism being designed to move said massage mechanism from a position where the massage mechanism is housed inside said backrest to a position ahead of said backrest to permit a massage to the user's back.
2. The chair according to claim 1,
 - wherein said moving mechanism is designed to move said massage mechanism from a storage position where the massage mechanism is housed inside the backrest to a surface-side position where the massage mechanism is aligned parallel to a surface side of said backrest.
3. The chair according to claim 1 or 2,
 - wherein said moving mechanism is composed of a link mechanism for moving said massage mechanism, and a driving section disposed on said support frame, for rocking said link mechanism,
 - and wherein said link mechanism comprises:
 - a first link member in which one end is rotatably coupled to the massage

mechanism, and a midportion is coupled to a rotary shaft of said driving section;

a second link member disposed in a position different from the first link member in a vertical direction, in which a midportion is rotatably pivoted on said support frame, and one end is rotatably coupled to the massage mechanism; and

a rocking link member in which one end is rotatably pivoted on the other end of the first link member, and the other end is rotatably pivoted on the other end of the second link member.

4. The chair according to claim 3,

wherein said first link member is a member having an L-shaped form as seen in side view, and, one end of said L-shaped form is longer than the other end thereof, and the one end is rotatably coupled to a lower side of said massage mechanism,

and wherein a bend at a midportion of said L-shaped form is fixedly pivoted on the rotary shaft provided in said driving section.

5. The chair according to claim 3 or 4,

wherein said second link member is a member having an L-shaped form as seen in side view, and, one end of said L-shaped form is longer than the other end thereof, and the one end is rotatably coupled to an upper side of said massage mechanism,

and wherein a bend at a midportion of said L-shaped form is rotatably pivoted on the support frame.

6. The chair according to any one of claims 3 to 5,

wherein said first and second link members can be rocked from a position where one end thereof is directed obliquely upwardly toward a rear of said support frame to a position where the one end is directed toward a front of the support frame.

7. The chair according to any one of claims 3 to 6,

wherein, in said first link member, a pivotal point at which said rotary shaft is securely set in a hole for axial rotation is situated between a pivotal point for pivotally supporting a lower side of the massage mechanism and a pivotal point for pivotally supporting the rocking link member,

and wherein, in said second link member, a pivotal point for pivotally supporting said support frame is situated between a pivotal point for pivotally supporting an upper side of the massage mechanism and a pivotal point for pivotally supporting the rocking link member.

8. The chair according to claim 3,

wherein said rocking link member is a long platy member whose longitudinal length is substantially equal to a vertical height of said massage mechanism,

and wherein said rocking link member is disposed in parallel with a vertical direction of said massage mechanism.

9. The chair according to any one of claim 3 and claims 5 to 8,

wherein, in said link mechanism, said rocking link member is designed so that one end thereof is located more inward than is the other end thereof in a horizontal direction, and said second link member is designed so that one end thereof is located more inward than is the other end thereof in the horizontal direction.