

DESCRIPTION
CHAIR

Technical Field

[0001]

The present invention relates to a chair

Background Art

5 [0002]

In a chair provided with a backrest provided rotatably to a front-and-rear direction of the chair by a support shaft fixed to a rear part of the chair and a headrest provided rotatably to the front-and-rear direction on an upper part of the backrest, such a chair that the more the backrest reclines rearward, the more the headrest gradually rises in relation to the backrest is
10 known (See Patent Literature 1).

Citation List

Patent Literature

[0003]

Patent Literature 1: JP-B2-3618443

15 Summary of Invention

Technical Problem

[0004]

In the above-described prior-art chair, if a seated person slightly reclines the backrest of a chair rearward from its upright position so as to relax and watch TV or the like, as
20 the backrest of the chair reclines, the headrest of the chair gradually rises in relation to the backrest, and the seated person can visually recognize the front or watch TV easily, for example, even if the backrest of the chair slightly reclines.

[0005]

However, if the headrest of the chair further rises more than prescribed in relation
25 to the backrest when the seated person further reclines the backrest of the chair to a sleeping posture or the like, a burden on the neck of the seated person increases. If the seated person takes a sleeping posture, it is preferable that the headrest of the chair does not rise in relation to

the backrest. Therefore, there is a problem that in a chair whose headrest is manually brought down in relation to the backrest, the manual operation is cumbersome.

[0006]

Thus, the present invention has an object to provide a chair in which, in the case
 5 of wanting to orient the line of sight forward when slightly reclining the backrest from an upright position, the headrest of the chair rises in relation to the backrest in conjunction with the reclining operation of the backrest so that the line of sight of the seated person forward can be held, and if the backrest significantly reclines so as to take a sleeping posture, the headrest of the chair reclines in relation to the backrest in conjunction with the reclining operation of the
 10 backrest.

Solution to Problem

[0007]

In order to solve the above-described problems, a chair according to the present invention has a reclinable/straightenable back frame and a reclinable/straightenable head frame
 15 in relation to the back frame,

as the back frame reclines rearward from the upright position, the head frame rises in relation to the back frame, and after an angle of the head frame in relation to a vertical axis of the back frame reaches a prescribed angle, the head frame reclines in relation to the back frame as the back frame reclines further rearward, and

20 as the back frame rises from the reclined position, the head frame rises in relation to the back frame, and after an angle of the head frame in relation to the vertical axis of the back frame reaches a prescribed angle, the head frame reclines in relation to the back frame as the back frame rises further.

[0008]

25 In the chair according to the present invention, it may be so configured that a guide groove and a guide member provided movably in the guide groove are further provided; a position of the guide member in the guide groove changes in accordance with an inclination angle of the back frame in relation to a horizontal plane; and

the angle of the head frame in relation to the vertical axis of the back frame
 30 changes in accordance with a change of the position of the guide member in the guide groove.

[0009]

In the chair according to the present invention, it may be so configured that a slide frame whose position in relation to the vertical axis direction of the back frame changes in

accordance with the inclination angle of the back frame in relation to the horizontal plane is further provided; and

the angle of the head frame in relation to the vertical axis of the back frame is changed in accordance with a change of relative positions of the back frame and the slide frame in the vertical axis direction.

[0010]

In the present invention, it may be so configured that as the back frame reclines rearward, the slide frame moves in a direction of a seat in relation to the back frame, and as the back frame is raised, it moves in a direction opposite to the seat in relation to the back frame.

10 [0011]

In the present invention, the guide groove may be provided in the head frame.

Advantageous Effects of Invention

[0012]

In the present invention, during a period until the back frame reaches a state where an angle of a front surface of the head frame in relation to the vertical axis of the back frame becomes a prescribed angle from the upright position, as the back frame reclines, the head frame rises in relation to the back frame, while as the back frame rises, the head frame reclines in relation to the back frame, and thus, if the seated person slightly reclines the back frame (backrest) from the upright position so as to watch TV forward or the like, the head frame (headrest) rises more than in the upright position of the back frame in relation to the back frame, and the line of sight of the seated person forward can be held more easily.

[0013]

Moreover, during a period until the back frame reaches a state where the angle of the front surface of the head frame in relation to the vertical axis of the back frame becomes a prescribed angle from the reclined position, as the back frame reclines, the head frame reclines in relation to the back frame, while as the back frame rises, the head frame rises in relation to the back frame, and thus, if the back frame (backrest) significantly reclines so as to take a sleeping posture and the like, the neck of the seated person does not become tired but can be relaxed.

[0014]

Moreover, in the chair according to the present invention, there is no need to manually recline the head frame as in the prior-art technology, but since the head frame reclines/rises in relation to the back frame in conjunction with the reclining/raising operation of the back frame as described above, the chair can be easily operated without the need to pay

attention to the angle of the headrest.

Brief Description of Drawings

[0015]

[Fig. 1] Fig. 1 is a perspective view illustrating a state where a backrest of a chair in

5 Embodiment 1 according to the present invention is upright and a frame portion is illustrated, while a cushion material and a skin material are omitted for convenience of explanation.

[Fig. 2] Fig. 2 is a right side view of Fig. 1.

[Fig. 3] Fig. 3 is a front view of Fig. 1.

[Fig. 4] Fig. 4 is a top view of Fig. 1.

10 [Fig. 5] Fig. 5 is a sectional side view taken along E-E line in Fig. 4.

[Fig. 6] Fig. 6 is a side sectional view of a state where a back frame reclines from the state in Fig. 5.

[Fig. 7] Fig. 7 is a side sectional view of a state where the back frame further reclines from the state in Fig. 6.

15 [Fig. 8] Fig. 8 is a sectional view taken along F-F line in Fig. 5.

[Fig. 9] Fig. 9 is a side schematic diagram of a state in Fig. 5 illustrating a relationship between the backrest and a seat of the chair in Embodiment 1 of the present invention.

[Fig. 10] Fig. 10 is a side schematic diagram of the state in Fig. 6 in which the backrest reclines from the state in Fig. 9.

20 [Fig. 11] Fig. 11 is a side schematic diagram of the state in Fig. 7 in which the backrest further reclines from the state in Fig. 10.

[Fig. 12] Fig. 12 is a side view illustrating a state where a backrest of a chair in Embodiment 2 according to the present invention is upright and a frame portion is illustrated, while a cushion material and a skin material are omitted for convenience of explanation.

25 [Fig. 13] Fig. 13 is a side view of a state where the backrest reclines from the state in Fig. 12.

[Fig. 14] Fig. 14 is a side view of a state where the backrest further reclines from the state in Fig. 13.

[Fig. 15] Fig. 15 is a side view illustrating a state where a backrest of a chair in Embodiment 3 according to the present invention is upright and a frame portion is illustrated, while a cushion
30 material and a skin material are omitted for convenience of explanation.

[Fig. 16] Fig. 16 is a side view of a state where the backrest reclines from the state in Fig. 15.

[Fig. 17] Fig. 17 is a side view of a state where the backrest further reclines from the state in Fig. 16.

[Fig. 18] Fig. 18 is a side view illustrating a state where a backrest of a chair in Embodiment 4 according to the present invention is upright and a frame portion is illustrated, while a cushion material and a skin material are omitted for convenience of explanation.

[Fig. 19] Fig. 19 is a side view of a state where the backrest reclines from the state in Fig. 18.

5 [Fig. 20] Fig. 20 is a side view of a state where the backrest further reclines from the state in Fig. 19.

[Fig. 21] Fig. 21 is a side view illustrating a state where a backrest of a chair in Embodiment 5 according to the present invention is upright and a frame portion is illustrated, while a cushion material and a skin material are omitted for convenience of explanation.

10 [Fig. 22] Fig. 22 is a side view of a state where the backrest reclines from the state in Fig. 21.

[Fig. 23] Fig. 23 is a side view of a state where the backrest further reclines from the state in Fig. 22.

[Fig. 24] Fig. 24 is a side view illustrating a state where a backrest of a chair in Embodiment 6 according to the present invention is upright and a frame portion is illustrated, while a cushion
15 material and a skin material are omitted for convenience of explanation.

[Fig. 25] Fig. 25 is a side view of a state where the backrest reclines from the state in Fig. 24.

[Fig. 26] Fig. 26 is a side view of a state where the backrest further reclines from the state in Fig. 25.

[Fig. 27] Fig. 27 is a side view illustrating a state where a backrest of a chair in Embodiment 9
20 according to the present invention is upright and a frame portion is illustrated, while a cushion material and a skin material are omitted for convenience of explanation.

[Fig. 28] Fig. 28 is a side view of a state where the backrest reclines from the state in Fig. 27.

[Fig. 29] Fig. 29 is a side view of a state where the backrest further reclines from the state in Fig. 28.

25 Description of Embodiments

[0016]

Modes for carrying out the present invention will be described on the basis of illustrated Embodiments.

Embodiment 1

30 [0017]

Figs. 1 to 11 illustrate Embodiment 1.

[0018]

A chair 1 in Embodiment 1 according to the present invention has a base 2 as

illustrated in Figs. 1 to 4. On the base 2, a rotating base 3 is provided rotatably in relation to the base 2 by using its vertical direction (perpendicular direction) as a rotation axis. On the rotating base 3, a chair frame 4 is fixed. In the following explanation, a seating side of the chair 1, that is, a side opposite to a back frame 8 (backrest 28) in Fig. 5 is referred to a front A, the back frame 8 side as a rear B, the left side in Fig. 3 as a left C, and the right side as a right D.

[0019]

The chair frame 4 has, as illustrated in Figs. 1 to 4, both side frames 4a and 4b and a lower frame 4c extended between lower ends of the both side frames 4a and 4b. The both side frames 4a and 4b and the lower frame 4c are integrally formed. At the center in the lower part of the lower frame 4c, the rotating base 3 is fixed, and the rotating base 3 is, as illustrated in Fig. 2, formed so as to incline downward as the base goes from the front A toward the rear B. On a rear part of the rotating base 3, a cylindrical base portion 3a provided upright in the vertical direction (perpendicular direction) is provided. The base portion 3a is rotatably connected to the base 2.

[0020]

On the upper end portions of the both side frames 4a and 4b, members constituting elbow portions or plate-shaped elbow frames 5 and 5 in this Embodiment are fixed in a front-and-rear (A-B) direction of the chair 1.

[0021]

On the rear in the upper parts of the both side frames 4a and 4b, as illustrated in Figs. 5 to 7, support shafts 7 and 7 protruding horizontally (in a C-D direction) in an inward direction from the inner faces thereof are fixed. On the support shaft 7, a back frame 8 is provided rotatably to the front and rear around this support shaft 7 as a center axis.

[0022]

This back frame 8 has, as illustrated in Figs. 1 and 3, a pair of right and left side frames (hereinafter referred to as back side frames) 8a and 8b, and in this Embodiment 1, the back side frames 8a and 8b are constituted of hollow cylindrical metal pipes, respectively. The both back side frames 8a and 8b are provided so that the axial direction thereof is orthogonal to a left-and-right (C-D) direction of the chair 1. Moreover, in the axial intermediate portion of each of the back side frames 8a and 8b, the support shafts 7 and 7 are inserted, respectively, and the back side frames 8a and 8b are provided rotatably to the front and rear around the support shafts 7 and 7. Between the upper parts of the both back side frames 8a and 8b, a connecting bar 8c is extended.

[0023]

To the lower end portions of the both back side frames 8a and 8b, as illustrated in Fig. 1, a seat frame 10 is connected rotatably to the front-and-rear (A-B) direction. The seat frame 10 has a pair of right and left side frames (hereinafter referred to as seat side frames) 10a and 10b, and in this Embodiment 1, the seat side frames 10a and 10b are constituted of hollow cylindrical metal pipes, respectively. These seat side frames 10a and 10b are provided so that the axial directions thereof are located in the front-and-rear (A-B) direction of the chair 1.

Between the front end portions of the both seat side frames 10a and 10b, a seat front frame 10c is extended, and between the rear end portions of the both seat side frames 10a and 10b, a seat rear frame 10d is extended. On the both side portions of the seat rear frame 10d, as illustrated in Fig. 1, connecting pieces 10e and 10e protruding in the rear B direction from the seat rear frame 10d are provided, and the lower end portions of the both back side frames 8a and 8b are connected to each of the connecting pieces 10e and 10e rotatably to the front and rear around a connection shaft 10f provided horizontally in the right-and-left (C-D) direction.

[0024]

On inner faces of the both side frames 4a and 4b of the chair frame 4, as illustrated in Figs. 1 and 5 to 7, seat guide members 11 and 11 are provided, and the seat guide members 11 are formed, as illustrated in Figs. 5 to 7, each having a curved shape gently lowering as it goes from the front A to the rear B. On the seat guide members 11 and 11, guide receiving members 12 and 12 movable along the seat guide members 11 and 11 are provided. Inside the guide receiving members 12 and 12, axial intermediate portions of the both seat side frames 10a and 10b are connected by a seat shaft 12a provided horizontally in the right-and-left (C-D) direction, and the seat side frames 10a and 10b are provided rotatably to the front and rear around the seat shaft 12a. As a result, the seat frame 10 can rotate around the seat shaft 12a and also can move to the front and rear along the guide members 11.

[0025]

On the upper end portions of the both back side frames 8a and 8b, head guide members 14 and 14 are provided, respectively. Each of the head guide members 14 and 14 has plate-shaped members 14a and 14a, respectively, and one end portions (lower end portions) in the longitudinal direction of the plate-shaped members 14a and 14a are fixed to the both back side frames 8a and 8b, respectively, while on the other end portions (upper end portions) in the longitudinal direction of the plate-shaped members 14a and 14a, pins 14b and 14b are provided. The pin 14b is provided, as illustrated in Figs. 3 and 4, so as to protrude outward in the right-and-left (C-D) direction from an outer face of the plate-shaped member 14a.

[0026]

On the both back side frames 8a and 8b, a slide frame 15 is provided slidably in the axial directions of the back side frames 8a and 8b. The slide frame 15 is, as illustrated in Figs. 1 and 5 to 7, arranged closer to the front A side than the back frame 8. The slide frame 15 has, as illustrated in Figs. 1 and 3, a pair of right and left slide side frames 15a and 15b and a
 5 connecting member 20. The slide side frames 15a and 15b are, in this Embodiment 1, constituted of hollow cylindrical metal pipes. These slide side frames 15a and 15b are provided with the axial directions thereof substantially in parallel with the back side frames 8a and 8b.
 [0027]

A connecting bar 17 is extended between upper rear sides of the both slide side
 10 frames 15a and 15b, and a connecting bar 18 is extended between lower rear sides of the both slide side frames 15a and 15b. Moreover, on the upper and lower parts on the rear B side (back frame 8 side) of the right slide side frame 15a, as illustrated in Figs. 5 to 7, connecting members 20 and 20 are fixed by a fixing member 20a. Moreover, on the upper and lower parts on the rear B side (back frame 8 side) of the left slide side frame 15b, too, as illustrated in Figs. 5 to 7,
 15 the connecting members 20 and 20 are fixed by the fixing member 20a. The right-side connecting members 20 and 20 are loosely fitted slidably in the axial direction thereof, that is, in the vertical axis direction of the back frame 8 in relation to the right back side frame 8a. Moreover, the left-side connecting members 20 and 20 are also loosely fitted slidably in the axial direction thereof in relation to the left back side frame 8b, and the slide frame 15 is provided
 20 slidably in the axial directions of the both back side frames 8a and 8b. That is, the slide frame 15 is movable in the axial directions of the back side frames 8a and 8b.
 [0028]

As the connecting member 20, arbitrary materials can be used as long as the material is in a solid state and can be molded, such as plastic, metal or wood, and in this
 25 Embodiment, polyacetal (POM) is used.
 [0029]

On the rear B side of the connecting member 20, as illustrated in Figs. 5 to 8, a back back panel 21 is fixed, and the slide frame 15 and the back back panel 21 are integrally movable in the axial directions of the back side frames 8a and 8b.
 30 [0030]

The back back panel 21 is composed of a back plate 21a and both side plates 21b and 21b provided on the both sides of the back plate 21a. The right side plate 21b is provided between the right slide side frame 15a and the right side frame 4a of the chair frame 4, while the left side plate 21b is provided between the left slide side frame 15b and the left side frame 4b of

the chair frame 4. In the both side plates 21b and 21b, a slotted hole 21c penetrating from the front to the back thereof is formed so as to have its longitudinal direction in the axial directions of the back side frames 8a and 8b, and in the slotted hole 21c, the support shaft 7 is penetrated.
[0031]

5 On the upper end portions of the both slide side frames 15a and 15b, as illustrated in Figs. 5 to 7, a head frame 22 is provided. The head frame 22 has a pair of head cams 22a and 22a on the right and left, and head shafts 22b and 22b provided on their lower parts horizontally in the right-and-left (C-D) direction are rotatably connected to the upper end portions of the slide side frames 15a and 15b, and the head frame 22 is provided rotatably to the front and rear. The
10 head cam 22a is formed having a plate shape, and inside thereof, a guide groove 23 opened at least in the inner face thereof is formed. The guide groove 23 may be formed as a through hole penetrating to an outer side face of the head cam 22a or may be formed as a bottomed groove not opened in the outer side face of the head cam 22a. On the rear part of the head cam 22a, a head back panel 25 is provided.

15 [0032]

The guide groove 23 is formed, in this Embodiment 1, as illustrated in Figs. 5 to 7, having a dogleg shape in which a first guide groove 23a inclined to the rear B side as it goes upward from the lower part of the head cam 22a, an arc groove 23b formed having an arc shape on the upper part of the first guide groove 23a, and a second guide groove 23c inclined to the
20 front A side as it goes upward from the lower part of the head cam 22a on the upper part of the arc groove 23b continue from each other.

[0033]

In the guide groove 23, the pin 14b of the back frame 8 is loosely fitted movably along the guide groove 23.

25 [0034]

As illustrated in Figs. 1 and 5 to 7, one end portion (lower end portion) of a link 27 is connected to the lower end portions of the both slide side frames 15a and 15b rotatably to the front and rear around a rotation shaft 27a provided horizontally in the right-and-left (C-D) direction. The other end portion (upper end portion) of the link 27 is connected to inner faces
30 of the upper rear B sides of the both side frames 4a and 4b of the chair frame 4 rotatably to the front and rear around a rotation shaft 27b provided horizontally in the right-and-left (C-D) direction. The link 27 is provided so that the other-end side rotation shaft 27b is located closer to the upper part of the front A than the one-end side rotation shaft 27a in a state where the back frame 8 is upright as illustrated in Figs. 5 and 9.

[0035]

The link 27 is formed having a plate shape, its side face shape being formed to be an arc, and is provided so that the center side of the arc is located on the front side A. The side face shape of the link 27 may be an arbitrary shape such as a linear shape other than the above-described arc shape.

[0036]

Between the both slide side frames 15a and 15b and between the both head cams 22a and 22a, a first cloth spring (not shown) is provided, and the both sides thereof are attached to the slide side frames 15a and 15b and the head cams 22a and 22a through biasing means (not shown). The upper end of the first cloth spring is fixed to a connecting bar (not shown) provided between the upper end portions of the head cams 22a and 22a, and the lower end of the first cloth spring is fixed to a lower connecting bar 18 of the slide frame 15. The both sides of the first cloth spring are biased by the biasing means in a direction of the slide side frame 15a (15b). As the biasing means, a spring is used in this Embodiment.

[0037]

On the front surface of the first cloth spring provided between the slide side frames 15a and 15b, a back urethane material is fixed by an adhesive or the like, and on the front surface of the first cloth spring between the head cams 22a and 22a, a head urethane material is fixed by an adhesive or the like.

[0038]

A first skin material (not shown) is provided so as to cover the entire outer peripheral portions of the slide frame 15, the back frame 8, the first cloth spring, the back urethane material, the head urethane material, the back back panel 21, and the head back panel 25. The first skin material may be fixed to any one of the slide frame 15, the back frame 8, the first cloth spring, the back urethane material, the head urethane material, the back back panel 21, and the head back panel 25, or does not have to be fixed to any of them.

[0039]

The first cloth spring provided between the slide side frames 15a and 15b and the back urethane material constitute the back cushion material, but as the back cushion material, an arbitrary cushion material other than the cloth spring and the urethane material can be used. Moreover, the slide frame 15, the back frame 8, the back cushion material, the back back panel 21, and the first skin material constitute the backrest 28.

[0040]

The first cloth spring provided between the head cams 22a and 22a and the head

urethane material constitute the head cushion material, but as the head cushion material, an arbitrary cushion material other than the cloth spring and the urethane material can be used. Moreover, the head frame 22, the head cushion material, the head back panel 25, and the first skin material constitute a headrest 30.

5 [0041]

Moreover, on the seat frame 10, a second cloth spring (not shown) is provided, and the both sides thereof are fixed to the seat side frames 10a and 10b, respectively, and the front end of the second cloth spring is fixed to the seat front frame 10c. Moreover, the rear end portion of the second cloth spring is fixed to the seat rear frame 10d through biasing means (not shown), and the rear end portion of the second cloth spring is biased by the biasing means in a rear side direction of the seat frame 10. As this biasing means, a spring is used in this Embodiment.

[0042]

On the upper part of the second cloth spring, a seat urethane material is fixed by an adhesive or the like. The second cloth spring and the seat urethane material constitute the seat cushion material, but as the seat cushion material, an arbitrary cushion material other than the cloth spring and the urethane can be used.

[0043]

A second skin material (not shown) is provided so as to cover the entire outer peripheral portions of the seat frame 10 and the seat cushion material. The second skin material may be fixed to any one of the seat frame 10, the second cloth spring, and the seat urethane, or does not have to be fixed to any of them. The seat frame 10, the seat cushion material, and the second skin material constitute a seat 29.

[0044]

25 Subsequently, movements of the chair 1 will be described.

[0045]

As illustrated in Figs. 5 and 9, if the back frame 8 is reclined gradually to the rear B around the support shaft 7 from a state where the back frame 8 (backrest 28) of the chair 1 is upright, as illustrated in Figs. 6 and 10, the link 27 rotationally moves forward on the slide frame 15 side around the rotation shaft 27b on the chair frame 4 side, and the slide frame 15 connected to the rotation shaft 27a moves in the lower side direction (seat 29 direction) along the back side frames 8a and 8b. As a result, the back cushion material and the first skin material provided on the slide frame 15 also move gradually in the seat 29 direction. That is, the position of the slide frame 15 in relation to the back frame 8 changes in accordance with an inclination angle β in the

vertical axis direction (axial directions of the back side frames 8a and 8b) of the back frame 8 in relation to the horizontal plane.

[0046]

Moreover, the seat frame 10 is pushed by the lower end portion of the back frame 8 toward the front A as the back frame 8 gradually reclines, and moves gradually to the upper front portion along the seat guide member 11.

[0047]

Moreover, since the head frame 22 is rotatably connected to the upper end of the slide frame 15, as illustrated in Figs. 6 and 10, the head frame 22 moves to the lower side (in the seat 29 direction) together with the slide frame 15. At this time, the head guide member 14 moves relatively upward (in the direction opposite to the seat 29) in relation to the head cam 22a (guide groove 23). That is, the pin 14b gradually moves upward in the first guide groove 23a inclined to the rear B as it goes from the lower part to the upper part. As a result, an angle α formed by the axes of the back side frames 8a and 8b (the vertical axis of the back frame 8) and the front surface of the head frame 22 (head cam 22a) gradually increases, and the headrest 30 (head frame 22) gradually rises in relation to the backrest 28 (back frame 8).

[0048]

When the pin 14 is located at the center of the arc groove 23b, the angle α of the front surface of the head frame 22 (head cam 22a) in relation to the vertical axis of the back frame 8 (axes of the back side frames 8a and 8b) becomes the maximum (prescribed value).

[0049]

As illustrated in Figs. 7 and 11, if the back frame 8 is further reclined gradually, the slide frame 15 further moves in the lower side (seat 29) direction by means of the rotational movement of the link 27 and the pin 14b gradually moves upward in the second guide groove 23c inclined to the front A as it goes from the lower part to the upper part in the head cam 22a. As a result, the angle α formed by the axes of the back side frames 8a and 8b and the front surface of the head cam 22a gradually decreases, and the head frame 22 (headrest 30) gradually reclines rearward in relation to the back frame 8 (backrest 28).

[0050]

Moreover, oppositely to the above-described action, as illustrated in Figs. 7 and 11, if the back frame 8 is gradually raised from the state where the backrest 28 (back frame 8) of the chair 1 is reclined, the slide frame 15 moves to the upper side direction (the direction opposite to the seat 29) along the back side frames 8a and 8b by means of the rotational movement of the link 27 in the direction opposite to the above. With that movement, the head

frame 22 gradually rises in relation to the back frame 8 as the back frame 8 rises, and after the angle α of the front surface of the head frame 22 in relation to the vertical axis of the back frame 8 reaches the prescribed value, if the back frame 8 is further raised, the head frame 22 gradually reclines rearward in relation to the back frame 8 as the back frame 8 rises and enters the state
5 illustrated in Figs. 5 and 9.

[0051]

That is, until the back frame 8 enters the state where the angle α of the front surface of the head frame 22 in relation to the vertical axis of the back frame 8 reaches the maximum value from the upright position illustrated in Fig. 5, as the back frame 8 is reclined,
10 the head frame 22 rises in relation to the back frame 8, and as the back frame 8 is raised, the head frame 22 reclines in relation to the back frame 8.

[0052]

Moreover, from the state where the angle α becomes the maximum value to the state where the back frame 8 is reclined as in Fig. 7, as the back frame 8 is reclined, the head
15 frame 22 reclines in relation to the back frame 8, and as the back frame 8 is raised, the head frame 22 rises in relation to the back frame 8.

[0053]

With the configuration as above, the chair 1 in Embodiment 1 of the present invention has the following actions and effects.

20 [0054]

The present invention is configured such that, as the back frame 8 (backrest 28) is reclined, the slide frame 15 and the back cushion material, the back back panel 21, and the first skin material provided on the slide frame move together in the seat 29 direction, and as the back frame 8 (backrest 28) is raised, the slide frame 15, the back cushion material, and the first skin
25 material move together in the direction opposite to the seat 29. As a result, in the reclining/raising operation of the backrest 28 between the upright position of the backrest 28 illustrated in Fig. 9 and the reclined position of the backrest 28 illustrated in Fig. 11, as illustrated in Figs. 9 to 11, a change amount in the distance between an upper rear portion 29a of the seat 29 and a front lower portion 28a of the backrest 28 is extremely small as compared with
30 a chair whose back cushion material does not move in relation to the back frame 8 in conjunction with reclining/raising of the backrest 28.

[0055]

As a result, even if a user seats on the chair 1 in a state where the backrest 28 is raised and the user reclines or raises the backrest 28 in a state leaning on the backrest 28, clothes

are prevented from being pulled upward by the backrest 28 and moved, and even if the backrest 28 is reclined/raised, it is not necessary to correct the clothes or to be seated again and the user can use the chair 1 comfortably.

[0056]

5 Moreover, when the backrest 28 is to be reclined/raised, rubbing between the user and the skin of the backrest 28 can be reduced, and damage on the skin of the backrest 28 can be decreased.

[0057]

10 Moreover, it is configured such that, when the back frame 8 is gradually reclined from the upright position until the angle α of the front surface of the head frame 22 in relation to the vertical axis of the back frame 8 becomes the prescribed value, as the back frame 8 (backrest 28) is gradually reclined, the head frame 22 (headrest 30) is gradually raised in relation to the back frame 8 (backrest 28), and thus, if the seated person slightly reclines the backrest 28 of the chair 1 so as to watch TV forward or the like, the headrest 30 rises in relation to the backrest 28
15 more than the state illustrated in Figs. 5 and 9, and the line of sight of the seated person can be held forward easily.

[0058]

20 Moreover, it is configured such that, after the angle α of the front surface of the head frame 22 in relation to the vertical axis of the back frame 8 reaches the prescribed value, as the back frame 8 (backrest 28) is reclined, the head frame 22 (headrest 30) is gradually reclined in relation to the back frame 8 (backrest 28), and thus, if the seated person significantly reclines the backrest 28 of the chair 1 and takes a sleeping posture or the like, the neck of the seated person is not tired but the seated person can take a relaxed posture.

[0059]

25 The link 27 is provided so that the other-end side rotation shaft 27b is located closer to the upper part of the front A than the one-end side rotation shaft 27a in the state where the back frame 8 is upright as illustrated in Figs. 5 and 9, but it is only necessary that as the back frame 8 is reclined rearward, the slide frame 15 moves in the lower side direction (seat 29 direction) and as the back frame 8 is raised forward, the slide frame 15 moves in the upper side
30 direction (direction opposite to the seat 29) by means of the link 27, and the shape of the link 27 and a positional relationship between the link 27 and the other members can be set arbitrarily.

Embodiment 2

[0060]

Figs. 12 to 14 illustrate Embodiment 2.

[0061]

This Embodiment 2 is an embodiment different from the above-described Embodiment 1 in a method of changing the angle α of the front surface of the head frame 22 in relation to the axes of the back side frames 8a and 8b in accordance with the inclination angle β of the back frame 8 in a chair in which the slide frame 15 is moved in the axial directions of the back side frames 8a and 8b in accordance with the inclination angle β of the vertical axis of the back frame 8 (axes of the back side frames 8a and 8b) in relation to the horizontal plane similarly to the above-described Embodiment 1.

[0062]

In this Embodiment 2, a head frame 35 is provided rotatably to the front and rear around a head shaft 35c provided horizontally in the right-and-left (C-D) direction on the upper end portions of the slide side frames 15a and 15b as illustrated in Figs. 12 to 14. The rear B side face of the head frame 35 is formed from the lower end portion thereof to the center part as a first tapered face 35a inclined to the rear B side as it goes upward, and is formed from the upper end of the first tapered face 35a to the upper end portion of the head frame 35 as a second tapered face 35b inclined to the front A side as it goes upward, as illustrated in Figs. 12 to 14.

[0063]

The back frame 8 has the pair of right and left back side frames 8a and 8a, and it is different from the back frame 8 in the above-described Embodiment 1 in that it has a structure in which, in a state where the back frame 8 is upright as illustrated in Fig. 12, the upper ends of the back side frames 8a and 8a are located on the lower rear part of the first tapered face 35a, but the other structures are the same as those in the back frame 8 in the above-described Embodiment 1.

[0064]

At the center part of the head frame 35, one end (upper end) of a connection link 37 is connected rotatably to the front and rear around a rotation shaft 37a provided horizontally in the right-and-left (C-D) direction, and the other end (lower end) of the connection link 37 is connected rotatably to the front and rear around a rotation shaft 37b provided horizontally in the right-and-left (C-D) direction on the upper ends of the back side frames 8a and 8a. The connection link 37 is provided such that the one-end side rotation shaft 37a is located closer to the front than the other-end side rotation shaft 37b and also in the upper part in the state where the back frame 8 is upright.

[0065]

Since the other structures and configurations are the same as those in the above-described Embodiment 1, the description will be omitted.

[0066]

Subsequently, movements of the chair 1 of this Embodiment 2 will be described.

5 [0067]

Similarly to the above-described Embodiment 1, if the back frame 8 is gradually reclined rearward around the support shaft 7 from the upright position as illustrated in Fig. 12, the slide frame 15 moves in the lower side (seat 29) direction along the back side frames 8a and 8a as illustrated in Figs. 13 and 14 by means of the link 27. Moreover, if the back frame 8 is
10 gradually raised from the reclined position as illustrated in Fig. 14, the slide frame 15 moves in the upper side (side opposite to the seat 29 direction) direction along the back side frames 8a and 8.

[0068]

Moreover, if the back frame 8 is gradually reclined from the upright position
15 illustrated in Fig. 12 and the slide frame 15 is gradually moved in the lower side (seat 29) direction in relation to the back frame 8 as illustrated in Fig. 13, the connection link 37 has the upper end side thereof rotationally move to the front A around the rotation shaft 37b. As a result, in the head frame 35 connected to the rotation shaft 37a of the connection link 37, the upper part thereof rotationally moves to the front A around the head shaft 35c. Since this
20 connection link 37 rotationally moves around the rotation shaft 37b, a distance L1 of a perpendicular line from the rotation shaft 37a of the head frame 35 to the axis of the back side frame 8a gradually increases.

[0069]

Therefore, if the back frame 8 gradually reclines rearward from the upright
25 position as illustrated in Fig. 12, the head frame 35 gradually rises in relation to the back frame 8. That is, the angle α of the front surface of the head frame 35 in relation to the vertical axis of the back frame 8 gradually increases.

[0070]

If the back frame 8 is reclined to the prescribed position, the distance L1 of the
30 perpendicular line from the rotation shaft 37a of the connection link 37 to the axis of the back side frame 8a becomes the maximum, and the angle α also becomes the maximum (prescribed value).

[0071]

After that, if the back frame 8 is further reclined rearward, the slide frame 15

further moves in the lower side (seat 29) direction in relation to the back frame 8, the connection link 37 rotationally moves further downward around the rotation shaft 37b, the distance L1 gradually decreases, and the angle α also gradually decreases. As a result, the head frame 35 gradually reclines rearward in relation to the back frame 8 to the state illustrated in Fig. 14.

5 [0072]

Moreover, oppositely to the above-described movement, if the back frame 8 is gradually raised from the reclined position as illustrated in Fig. 14, as the back frame 8 rises, the head frame 35 gradually rises in relation to the back frame 8, and if the back frame 8 is further raised after the angle α becomes the maximum (prescribed value), as the back frame 8 rises, the head frame 35 gradually reclines rearward in relation to the back frame 8 to the state illustrated in Fig. 12.

[0073]

As described above, also in this Embodiment 2, similarly to the above-described Embodiment 1, by means of a change in the relative positions in the vertical axis direction of the back frame 8 and the slide frame 15, the angle α of the front surface of the head frame 35 in relation to the vertical axis of the back frame 8 (axis of the back side frame 8a) changes.

[0074]

Also in this Embodiment 2, the same actions and effects as those in the above-described Embodiment 1 can be exerted.

20 Embodiment 3

[0075]

Figs. 15 to 17 illustrate Embodiment 3.

[0076]

This Embodiment 3 is an embodiment different from the above-described Embodiments 1 and 2 in a method of changing the angle α of the front surface of a head frame 45 in relation to the axes of the back side frames 8a and 8b in accordance with the inclination angle β of the back frame 8 in a chair in which the slide frame 15 is moved in the axial directions of the back side frames 8a and 8b in accordance with the inclination angle β of the vertical axis of the back frame 8 in relation to the horizontal plane similarly to the above-described

30 Embodiments 1 and 2.

[0077]

In this Embodiment 3, a fixed head member 42 fixed to the upper end of the slide side frame 15a is formed having a plate shape, and in the fixed head member 42, a bending guide

groove 43 penetrating from the front to the back thereof is formed. It is only necessary that the bending guide groove 43 is formed such that at least the outer side of the fixed head member 42 is opened, and the bending guide groove 43 may be formed as a through hole penetrating from the front to the back thereof, or may be formed as a bottomed groove not opened in the inner side of the fixed head member 42. This bending guide groove 43 is formed, as illustrated in Figs. 15 to 17, having a dogleg shape in which a first guide groove 43a inclined to the front A side as it goes upward from the lower part of the fixed head member 42 and a second guide groove 43b inclined to the rear B side as it goes from the lower side to the upper side of the fixed head member 42 on the upper part of the first guide groove 43a continue from each other.

[0078]

The head frame 45 has a pair of right and left head cams 45a and 45a, and each head cam 45a is provided rotatably to the front and rear around a head shaft 45d provided horizontally in the right and left (C-D) direction outside in the lower part of each fixed head member 42. In the inner side face of each head cam 45a, a slotted hole shaped guide groove 45b is provided having one end (lower end) in the longitudinal direction thereof on the lower part of the head cam 45a and the other end (upper end) closer to the central upper part of the head cam 45a and formed linearly to the rear B as it goes from the lower part to the upper part.

[0079]

Moreover, in the state where the back frame 8 is upright as illustrated in Fig. 15, the slotted hole shaped guide groove 45b is provided with inclination so that the longitudinal direction thereof is located to the front at the upper end of the slotted hole shaped guide groove 45b in relation to the axial directions of the back side frames 8a and 8b.

[0080]

As illustrated in Figs. 15 to 17, a guide member 46 is loosely fitted penetrating both the slotted hole shaped guide groove 45b and the bending guide groove 43, and the guide member 46 is provided movably in the slotted hole shaped guide groove 45b and the bending guide groove 43. An engaging portion of the guide member 46 with the guide grooves 45b and 43 is formed having a pin shape in this Embodiment.

[0081]

Since the shapes of the slotted hole shaped guide groove 45b and the bending guide groove 43 are different as described above, if the guide member 46 moves in the vertical direction in the bending guide groove 43 and the slotted hole shaped guide groove 45b and the position of the guide member 46 changes, the angle α of the front surface of the head frame 45 in relation to the back side frames 8a and 8b changes. Moreover, as the guide member 46

gradually moves downward in the second guide groove 43b and the slotted hole shaped guide groove 45b from the uppermost end position, the head frame 45 gradually rises in relation to the back frame 8, that is, the angle α of the front surface of the head frame 45 in relation to the vertical axis of the back frame 8 gradually increases. After this angle α reaches the maximum (prescribed value), it is so configured that, as the guide member 46 gradually moves downward in the first guide groove 43a and the slotted hole shaped guide groove 45b, the head frame 45 gradually reclines in relation to the back frame 8, that is, the angle α gradually decreases.

[0082]

On the upper part of each head cam 45a, a pin 45c protruding in the inside direction from the inner side face is provided. The pin 45c is, as illustrated in Figs. 15 to 17, located closer to the front surface side of the head cam 45 than the slotted hole shaped guide groove 45b and on the side opposite to the seat 29.

[0083]

A first moving member 48 having a strap shape and formed of metal wire, a plastic rope or the like which can be curved at an arbitrary spot and for moving the guide member 46 is provided between the support shaft 7 and the guide member 46, as illustrated in Figs. 15 to 17, having one end thereof fixed to the support shaft 7, an intermediate portion thereof slidably hooked by the outside of the rotation shaft 27a on the slide frame 15 side of the link 27 and folded, and the other end fixed to the guide member 46 so as not to sag. In this Embodiment, as the first moving member 48, a metal wire is used.

[0084]

A second moving member 49 having a strap shape and formed of metal wire, a plastic rope or the like which can be curved at an arbitrary spot and for moving the guide member 46 is provided between the support shaft 7 and the guide member 46, as illustrated in Figs. 15 to 17, having one end thereof fixed to the support shaft 7, an intermediate portion thereof slidably hooked by the outside of the pin 45c of the head cam 45a and folded, and the other end fixed to the guide member 46 so as not to sag. In this Embodiment, as the second moving member 49, a metal wire is used.

[0085]

Since the other structures and configurations are the same as those in the above-described Embodiment 1, the description will be omitted.

[0086]

Subsequently, movements of the chair 1 of this third Embodiment will be described.

[0087]

Similarly to the above-described Embodiments 1 and 2, if the back frame 8 is gradually reclined rearward from the upright position as illustrated in Fig. 15, the slide frame 15 moves in the seat 29 (lower side) direction along the back side frames 8a and 8b. Moreover, if
 5 the back frame 8 is gradually raised from the reclined position as illustrated in Fig. 17, the slide frame 15 gradually moves in the (upper side) direction opposite to the seat 29 along the back side frames 8a and 8b.

[0088]

As described above, as the back frame 8 is gradually reclined rearward from the
 10 upright position as illustrated in Fig. 15 and the slide frame 15 gradually moves in the lower side (seat 29) direction in relation to the back frame 8, as illustrated in Fig. 16, the distance between the rotation shaft 27a of the slide side frame 15a and the support shaft 7 gradually increases, the first moving member 48 is pulled in the lower side (seat 29) direction, and the guide member 46 gradually moves in the lower side direction in the second guide groove 43b and the slotted hole
 15 shaped guide groove 45b. At the same time, the head frame 45 also moves in the lower side direction together with the slide frame 15, and since the distance between the support shaft 7 and the pin 45c in the second moving member 49 decreases, the guide member 46 can move in the lower side direction in the guide grooves 43b and 45b.

[0089]

20 With the movement of the guide member 46, the head frame 45 gradually rises in relation to the back frame 8, that is, the angle α of the front surface of the head frame 45 in relation to the axes of the back side frames 8a and 8b gradually increases. Then, when the guide member 46 is located at the lower end of the second guide groove 43b, the angle α reaches the maximum (prescribed value).

25 [0090]

Then, if the back frame 8 is further reclined gradually, the guide member 46 gradually moves in the lower side direction in the first guide groove 43a and the slotted hole shaped guide groove 45b, whereby the head frame 45 is gradually reclined rearward in relation to the back frame 8, that is, the angle α gradually decreases, and the back frame 8 comes to the
 30 reclined position as illustrated in Fig. 17.

[0091]

Moreover, oppositely to the above-described action, if the back frame 8 is gradually raised from the reclined position as illustrated in Fig. 17, the guide member 46 gradually moves from the lower part to the upper part in the guide grooves 43b and 45b by

means of the moving member 49, and as the back frame 8 rises, the head frame 45 gradually rises in relation to the back frame 8, and after the angle α reaches the prescribed value, if the back frame 8 is further raised, as the back frame 8 rises, the head frame 45 gradually reclines in relation to the back frame 8.

5 [0092]

As described above, also in this Embodiment 3, similarly to the above-described Embodiments 1 and 2, by means of the change in the relative positions in the vertical axis direction of the back frame 8 and the slide frame 15, the angle α of the front surface of the head frame 45 in relation to the vertical axis of the back frame 8 (axes of the back side frames 8a and 10 8b) changes. Moreover, similarly to the above-described Embodiment 1, since the position of the guide member 46 in the guide grooves 43 and 45b changes, the angle α of the front surface of the head frame 45 in relation to the vertical axis of the back frame 8 changes.

[0093]

Also in this Embodiment 3, the same actions and effects as those in the above-
15 described Embodiments 1 and 2 can be exerted.

[0094]

In this Embodiment 3, it is configured such that the guide member 46 moves in the guide grooves 43 and 45b by the moving members 48 and 49 in accordance with reclining/raising of the back frame 8, but as the moving members 48 and 49, any member can be
20 used as long as it moves the guide member 46 in a prescribed position in the guide grooves 43 and 45b in accordance with the reclining/raising of the back frame, and one of the moving members 48 and 49 may be replaced by biasing means such as a coil spring, for example.

Embodiment 4

[0095]

25 Figs. 18 to 20 illustrate an example of Embodiment 4.

[0096]

In the above-described Embodiments 1 to 3, the back cushion material is attached to the slide frame 15, and the back cushion material is moved together with the slide frame 15, but in this Embodiment 4, the back cushion material is provided in the back frame 8, and it is
30 configured such that, though the back cushion material does not move in relation to the back frame 8 with reclining/raising of the back frame 8, the angle α of the front surface of the head frame in relation to the back side frame axis is changed in accordance with the inclination angle β of the back frame 8 as in the above-described Embodiments 1 to 3.

[0097]

In the above-described Embodiments 1 to 3, the head frames 22, 35, and 45 are provided rotatably to the front and rear on the upper end portion of the slide frame 15, but this Embodiment 4 is different in a point that the head frame is provided on the upper end portion of the back frame rotatably to the front and rear around a head shaft provided horizontally in the right-and-left (C-D) direction. However, also in this Embodiment 4, similarly to the above-described Embodiments 1 to 3, by means of the change in the relative position of the slide frame in relation to the back frame, the angle α of the front surface of the head frame in relation to the vertical axis of the back frame (back side frame axis) changes, and similarly to the above-described Embodiments 1 to 3, as the back frame is gradually reclined rearward from the upright position, the head frame gradually rises in relation to the back frame, and after the angle α reaches the prescribed angle, if the back frame is further reclined, as the back frame gradually reclines rearward, the head frame is gradually reclined rearward in relation to the back frame.

[0098]

Figs. 18 to 20 illustrate an example in which Embodiment 4 is applied to the above-described Embodiment 1, and this Embodiment 4 will be described on the basis of Figs. 18 to 20.

[0099]

As illustrated in Figs. 18 to 20, a head frame 51 is provided on the upper part of the back frame 8, rotatably to the front and rear around a head shaft 51b provided horizontally in the right-and-left (C-D) direction. The head frame 51 has a pair of right and left head cams 51a and 51a, and in the inner face of each head cam 51a, a guide groove 52 opened only in the inner side is provided. The guide groove 52 is formed having a dogleg shape in which a first guide groove 52a inclined to the rear B side as it goes from the lower part to the upper part of the head cam 51a, an arc groove 52b formed having an arc shape on the upper part of the first guide groove 52a, and a second guide groove 52c provided linearly from the lower part to the upper part of the head cam 51a on the upper part of the arc groove 52b continue from each other, as illustrated in Figs. 18 to 20. Moreover, as illustrated in Fig. 18, in the state that the back frame 8 is upright, the longitudinal direction of the second guide groove 52c is inclined so that the upper side thereof is located in the front in relation to the axial directions of the back side frames 8a and 8b.

[0100]

To the back frame 8, the back cushion material is fixed, and the skin material is provided similarly to the above-described Embodiment 1.

[0101]

On the rear part of the back frame 8, a slide frame 53 is provided. On the front A sides (back frame 8 side) of the upper part and the lower part of the right and left slide side frames in the slide frame 53, as illustrated in Figs. 18 to 20, the connecting members 20 and 20 similar to those in the above-described Embodiments 1 to 3 are fixed by a fixing member. Moreover, the connecting member 20 is loosely fitted slidably in the vertical axis direction of the back frame 8, and the slide frame 53 is provided slidably in the axial direction of the back frame 8 similarly to the above-described Embodiments 1 to 3.

[0102]

The slide frame 53 has a pair of right and left slide side frames 53a and 53a, and one end portion (lower end portion) of a link 54 is connected to the lower end portions of the both slide side frames 53a and 53a, as illustrated in Figs. 18 to 20 rotatably to the front and rear around a rotation shaft 54a provided horizontally in the right-and-left (C-D) direction. The other end portion (upper end portion) of the link 54 is connected to the inner faces of the upper parts in the rear B of the both side frames 4a and 4b of the chair frame 4 rotatably to the front and rear around a rotation shaft 54b provided horizontally in the right-and-left (C-D) direction. The rotation shaft 54b to the chair frame 4 is provided so as to be located closer to the upper front part than the rotation shaft 54a to the slide frame 53.

[0103]

A portion from the lower part to the intermediate part of each of the slide side frames 53a and 53a is formed substantially in parallel with the back side frames 8a and 8b, respectively, as illustrated in Figs. 18 to 20, and the upper parts of the slide side frames 53a and 53a are formed bent so as to be located closer to the front as it goes to the upper part and to be inclined to the back frame 8. Moreover, the upper end portions of the slide side frames 53a and 53a are located closer to the front than the axis extensions of the back side frames 8a and 8b.

[0104]

As a result, if the back frame 8 is reclined rearward around the support shaft 7, the slide frame 53 moves in the seat 29 (lower side) direction by the link 54, while if the back frame 8 is raised, the slide frame 53 moves in the (upper side) direction opposite to the seat 29.

[0105]

On the upper end portions of the both slide side frames 53a and 53a, a guide member 55 is fixed protruding to the outside in the right-and-left (C-D) direction from the outer faces of the slide side frames 53a and 53a, and the guide member 55 is loosely fitted slidably in the guide groove 52. The guide member 55 is located closer to the front A than the axis

extensions of the back side frames 8a and 8b as illustrated in Figs. 18 to 20. In this Embodiment, as the guide member 55, a pin is used.

[0106]

Since the other structures and configurations are the same as those in the above-described Embodiment 1, the description will be omitted.

[0107]

Subsequently, movements of the chair 1 of this fourth Embodiment will be described.

[0108]

Similarly to the above-described Embodiments 1 to 3, if the back frame 8 of the chair 1 is gradually reclined rearward from the upright position as illustrated in Fig. 18, the slide frame 53 moves in the seat 29 (lower side) direction along the back side frames 8a and 8b as illustrated in Figs. 19 and 20. Moreover, if the back frame 8 is gradually raised from the reclined position as illustrated in Fig. 20, the slide frame 53 moves in the (upper side) direction opposite to the seat 29 along the back side frames 8a and 8b.

[0109]

If the back frame 8 is gradually reclined from the upright position as illustrated in Fig. 18 and the slide frame 53 gradually moves in the lower side (seat 29) direction in relation to the back frame 8, the guide member 55 moves in parallel with the axes of the back side frames 8a and 8b as illustrated in Figs. 18 to 20. At this time, the guide member 55 is located closer to the front A than the back side frames 8a and 8b, and since the second guide groove 52c is inclined in relation to the axes of the back side frames 8a and 8b, if the guide member 55 gradually moves downward (seat 29 direction) in the second guide groove 52c, the angle α of the front surface of the head frame 51 in relation to the axes of the back side frames 8a and 8b gradually increases, and the head frame 51 gradually rises in relation to the back frame 8.

[0110]

Then, when the guide member 55 is located at the center of the arc groove 52b, the angle α of the front surface of the head frame 51 in relation to the vertical axis of the back frame 8 becomes the maximum (prescribed value).

[0111]

If the back frame 8 is gradually reclined further rearward, the guide member 55 gradually moves to the lower part in the first guide groove 52a inclined to the front A side the larger as it goes from the upper side to the lower side, whereby the angle α gradually decreases, and the head frame 51 gradually reclines in relation to the back frame 8, and the back frame 8

reaches the reclined position as illustrated in Fig. 20.

[0112]

Moreover, oppositely to the above-described action, if the back frame 8 is gradually raised from the reclined position as illustrated in Fig. 20, as the back frame 8 rises, the head frame 51 gradually rises in relation to the back frame 8, and after the angle α becomes the prescribed value, if the back frame 8 is further raised, as the back frame 8 rises, the head frame 51 gradually reclines in relation to the back frame 8.

[0113]

As described above, in this Embodiment 4, similarly to the above-described Embodiments 1 to 3, by means of the change in the relative positions in the vertical axis direction of the back frame 8 and the slide frame 53, the angle α of the front surface of the head frame 51 in relation to the vertical axis of the back frame 8 changes. Moreover, similarly to the above-described Embodiments 1 and 3, by means of the change in the position of the guide member 55 in the guide groove 52, the angle α of the front surface of the head frame 51 in relation to the vertical axis of the back frame 8 changes.

[0114]

Also in this Embodiment 4, regarding movements of the head frame 51, the same actions and effects as those in the above-described Embodiments 1 to 3 can be exerted.

Embodiment 5

[0115]

Figs. 21 to 23 illustrate an example of Embodiment 5.

[0116]

In the above-described Embodiments 1 to 4, the lower end portions of the slide side frames 15a (15b) and 53a and the both side frames 4a (4b) of the chair frame 4 are connected by one link 27, 54, but in this Embodiment 5, the axial intermediate portion of the slide side frames 15a (15b) and 53a and the both side frames 4a (4b) of the chair frame 4 are connected by a link 61 formed of a plurality of members so that as the back frame 8 is reclined rearward, the slide frame 15 moves in the seat 29 direction, and as the back frame 8 is raised, the slide frame 15 moves in the direction opposite to the seat 29.

[0117]

Figs. 21 to 23 illustrate an example in which Embodiment 5 is applied to the above-described Embodiment 1, and the example will be described on the basis of Figs. 21 to 23.

[0118]

The axial intermediate portions of the slide side frames 15a and 15b and the both side frames 4a and 4b of the chair frame 4 are connected by the link 61. The link 61 is composed of, as illustrated in Figs. 21 to 23, three links, that is, a first link 62, a second link 63, and a third link 64. One end (upper end) of the first link 62 is connected to the intermediate portions in the axial direction of the slide side frames 15a and 15b rotatably to the front and rear around a rotation shaft 62a provided horizontally in the right-and-left (C-D) direction, and the other end (lower end) of the first link 62 is connected to the one end (upper end) of the second link 63 rotatably to the front and rear around a rotation shaft 62b provided horizontally in the right-and-left (C-D) direction.

10 [0119]

A portion of the axial intermediate portion of the second link 63 which portion is closer to the other end side is connected to the back side frames 8a and 8b rotatably to the front and rear around a connection shaft 63a provided horizontally in the right-and-left (C-D) direction. The connection shaft 63a is provided so as to be located in the vicinity of the rear part of the support shaft 7. The other end (lower end) of the second link 63 is connected to one end (rear end) of the third link 64 rotatably to the front and rear around a rotation shaft 63b provided horizontally in the right-and-left (C-D) direction. The other end (front end) of the third link 64 is connected to the upper rear parts of the both side frames 4a and 4b of the chair frame 4 rotatably to the front-and-rear (A-B) direction around a rotation shaft 64a provided horizontally in the right-and-left (C-D) direction.

20 [0120]

Since the other structures and configurations are the same as those in the above-described Embodiment 1, the description will be omitted.

[0121]

25 Subsequently, movements of the chair 1 in this Embodiment 5 will be described.

[0122]

Similarly to the above-described Embodiments 1 to 4, if the back frame 8 is gradually reclined rearward around the support shaft 7 from the upright position illustrated in Fig. 21, a portion of the second link 63 on the third link 64 side rotationally moves to the upper rear part around the connection shaft 63a in the vicinity of the support shaft 7 as illustrated in Figs. 21 and 22. Moreover, by means of this rotational movement of the second link 63, the other end rotation shaft 62b of the first link 62 moves downward. As a result, as illustrated in Figs. 21 to 23, the slide side frames 15a and 15b connected to one-end side rotation shaft 62a of the first link 62 move in the lower side (seat 29) direction along the back side frames 8a and 8b.

30

[0123]

Moreover, oppositely to the above, if the back frame 8 is gradually raised from the reclined position illustrated in Fig. 23, through the action opposite to the above, the slide frame 15 moves in the (upper side) direction opposite to the seat 29 along the back side frames 8a and 8b.

[0124]

Moreover, with the movement of the slide frame 15, the head frame 22 also moves similarly to the above-described Embodiments 1 to 4.

[0125]

Also in this Embodiment 5, the same actions and effects as those in the above-described Embodiments 1 to 4 can be exerted.

Embodiment 6

[0126]

Figs. 24 to 26 illustrate an example of Embodiment 6.

[0127]

In the above-described Embodiments 1 to 5, the lower end portions of the slide side frames 15a (15b) and 53a and the both side frames 4a (4b) of the chair frame 4 are connected by the link 27, 54, 61, but in this Embodiment 6, the axial intermediate portions of the slide side frames 15a and 15b and the side frames 10a and 10b of the seat of the seat frame 10 are connected by a link 71 and it is configured such that, as the back frame 8 is reclined, the slide frame 15 moves in the seat 29 direction, and as the back frame 8 is raised, the slide frame 15 moves in the direction opposite to the seat 29.

[0128]

Figs. 24 to 26 illustrate an example in which Embodiment 6 is applied to the above-described Embodiment 1 and it will be described on the basis of Figs. 24 to 26.

[0129]

The link 71 is, as illustrated in Figs. 24 to 26, formed of a single link. Moreover, the link 71 is formed having a plate shape, and its side face is formed having an arc shape and is provided so that the center side of the arc is located on the front side A. One end (upper end) of the link 71 is connected to the axial direction intermediate portions of the slide side frames 15a and 15b rotatably to the front and rear around a rotation shaft 71a provided horizontally in the right-and-left direction (C-D) direction, and the other end (lower end) of the link 71 is connected to the intermediate portions of the seat side frames 10a and 10b rotatably to the front and rear

around a rotation shafts 71b provided horizontally in the right-and-left (C-D) direction.
[0130]

The link 71 may have an arbitrary shape such as a linear shape other than the above-described shape. Moreover, it is only necessary that the link 71 has its one end
5 connected rotatably to the slide side frames 15a and 15b, while the other end is connected rotatably to the seat side frames 10a and 10b, and the respective connection spots are set arbitrarily.

[0131]

Since the other structures and configurations are the same as those in the above-
10 described Embodiment 1, the description will be omitted.

[0132]

Subsequently, movements of the chair 1 of this Embodiment 6 will be described.

[0133]

Similarly to the above-described Embodiments 1 to 5, if the back frame 8 is
15 gradually reclined rearward around the support shaft 7 from the upright position as illustrated in Fig. 24, the seat frame 10 gradually moves to the upper front part along the seat guide member 11 as illustrated in Figs. 25 and 26. With this movement, the rotation shaft 71b connected to the seat frame 10 moves to the upper front part, and while the link 71 rotationally moves around the both side rotation shafts 71a and 71b, the rotation shaft 71a moves in the lower side (seat 29)
20 direction. With that movement, the slide frame 15 connected to the rotation shaft 71a of the link 71 moves in the seat 29 direction along the back side frames 8a and 8b.

[0134]

Moreover, oppositely to the above, if the back frame 8 is gradually raised from the reclined position as illustrated in Fig. 26, the slide frame 15 moves in the (upper side)
25 direction opposite to the seat 29 along the back side frames 8a and 8b.

[0135]

Moreover, with the movement of the slide frame 15, the head frame 22 also moves similarly to the above-described Embodiments 1 to 5.

[0136]

30 Also in this Embodiment 6, the same actions and effects as those in the above-described Embodiments 1 to 5 can be exerted.

Embodiment 7

[0137]

In the above-described Embodiments 1 to 6, the back frame 8 is rotationally moved around the support shaft 7, the slide frames 15 and 53 are moved by the links 27, 54, 61, and 71 in the axial direction of the back frame 8 in accordance with reclining/raising of the back frame 8, but it may be so configured that the support shaft 7 is provided on the slide frames 15 and 53, and the back frame 8 is moved by the link upward (in the direction opposite to the seat 29) as the slide frames 15 and 53 recline rearward and is moved downward (direction opposite to the seat 29) as the slide frames 15 and 53 rise.

[0138]

The support shaft 7 fixed to the chair frame 4 is connected to the intermediate portions of the slide frames 15 and 53 so that the slide frames 15 and 53 are provided rotatably to the front and rear around the support shaft 7. Moreover, the slide frames 15 and 53 and the back frame 8 are connected through the connecting member 20 similarly to the above-described Embodiments 1 to 7, and the back frame 8 is provided slidably in the axial directions of the slide side frames 15a and 53a.

[0139]

Then, as the slide frames 15 and 53 recline rearward around the support shaft 7, the back frame 8 moves upward (in the direction opposite to the seat 29) by means of the link in the axial directions of the slide side frames 15a and 53a, and with that movement, the seat frame 10 also moves rearward in relation to the lower ends of the slide frames 15 and 53, and the rear end of the seat frame 10 and the lower ends of the slide frames 15 and 53 gradually get close to each other relatively.

[0140]

Moreover, as the slide frames 15 and 53 rise forward around the shaft support 7, the back frame 8 moves downward (in the seat 29 direction) by means of the link in the axial directions of the slide side frames 15a and 53a, and with that movement, the seat frame 10 also moves forward in relation to the lower ends of the slide frames 15 and 53, and the rear end of the seat frame 10 and the lower ends of the slide frames 15 and 53 gradually move away from each other relatively.

[0141]

That is, as the back frame 8 reclines, the slide frames 15 and 53 move in the seat 29 direction in relation to the back frame 8. Moreover, as the back frame 8 rises, the slide frames 15 and 53 move in the direction opposite to the seat 29 in relation to the back frame 8.

[0142]

Since the other structures and configurations are the same as those in the above-

described Embodiments 1 to 6, the description will be omitted.

[0143]

Also in this Embodiment 7, the same actions and effects as those in the above-described Embodiments 1 to 6 can be exerted.

5 Embodiment 8

[0144]

The slide frames 15 and 53 and the back frame 8 in the above-described Embodiments 1 to 7 may be provided such that the positional relationship in the front and rear thereof becomes opposite to that in the above-described Embodiments 1 to 7.

10 [0145]

Since the other structures and configurations are the same as those in the above-described Embodiments 1 to 7, the description will be omitted.

[0146]

Also in this Embodiment 8, the same actions and effects as those in the above-described Embodiments 1 to 7 can be exerted.

Embodiment 9

[0147]

Figs. 27 to 29 illustrate Embodiment 9.

[0148]

20 In the above-described Embodiments 1 to 8, the slide frames 15 and 53 are provided, and by moving the slide frames 15 and 53 in the axial directions of the back side frames 8a and 8b, the angle α of the front surfaces of the head frames 22, 35, 45, and 51 in relation to the axes of the back side frames 8a and 8b is changed, but in this Embodiment 9, the slide frame is not provided but by reclining/raising the back frame 81, the angle α of the front
25 surface of the head frame 82 in relation to the axes of the back side frames 81a and 81a is changed in accordance with the inclination angle β of the back frame 81.

[0149]

The back frame 81 has the pair of right and left back side frames 81a and 81a, and a fixed head member 84 is fixed to the upper part of the back side frame 81a.

30 [0150]

The fixed head member 84 is formed having a plate shape, and an arc-shaped guide groove 84a is formed penetrating from the front to the back. The arc-shaped guide

groove 84a is formed having an arc shape as illustrated in Figs. 27 to 29 and formed so that the center of the arc is located in the rear B.

[0151]

The head frame 82 has a pair of head cams 82a and 82a, and each head cam 82a is provided rotatably to the front and rear around a head shaft 82d provided horizontally in the right-and-left (C-D) direction outside in the lower part of each fixed head member 84. In each head cam 82a, a slotted hole shaped guide groove 82b is provided linearly having one end in its longitudinal direction located in the lower part of the head cam 82 and the other end located closer to the upper center part of the head cam 82a.

[0152]

As illustrated in Figs. 27 to 29, a guide member 83 is provided by penetrating and by being loosely fitted in both the slotted hole shaped guide groove 82b and the arc-shaped guide groove 84a, and the guide member 83 is configured movably along both the slotted hole shaped guide groove 82b and the arc-shaped guide groove 84a. A lock portion with the guide grooves 82b and 84a in the guide member 83 is formed having a pin shape in this Embodiment.

[0153]

Since the shapes of the slotted hole shaped guide groove 82b and the arc-shaped guide groove 84a are formed as above, if the guide member 83a moves vertically in the both guide grooves 82b and 84a, with a change in the position of the guide member 83, the angle α of the front surface of the head frame 82 in relation to the axes of the back side frames 81a and 81a changes. That is, as the guide member 83 gradually moves upward from its lowermost end position in the guide grooves 82b and 84a, the head frame 82 gradually rises in relation to the back frame 81, that is, the angle α gradually increases, and after the angle α reaches the maximum (prescribed value), as the guide member 83 gradually moves upward, the head frame 82 gradually reclines in relation to the back frame 81, that is, the angle α gradually decreases.

[0154]

As illustrated in Figs. 27 to 29, one end (rear end) of a first connection link 87a is connected to the lower part of the back frame 81 rotatably to the front and rear around a rotation shaft 87c provided horizontally in the right-and-left (C-D) direction. Moreover, the other end (front end) of the first connection link 87a is connected to one end (upper end) of a second connection link 87b rotatably to the front and rear around a rotation shaft 87d provided horizontally in the right-and-left (C-D) direction. The other end (lower end) of the second connection link 87b is connected to the seat side frames 10a and 10b rotatably to the front and rear around the rotation shaft 87e provided horizontally in the right-and-left (C-D) direction.

[0155]

On the upper part of each of the head cams 82a, a pin 82c protruding inward in the right-and-left (C-D) direction from its inner side face is provided. Between the guide member 83 and the pin 82c, a biasing member 85 is extended, and the guide member 83 is biased
 5 by the biasing member 85 in the direction of the pin 82c (upper side) all the time. As the biasing member 85, any member can be used as long as it can bias the guide member 83 in the direction of the pin 82c, and a coil spring is used in this Embodiment.

[0156]

A moving member 86 having a strap shape and formed of metal wire, a plastic
 10 rope or the like which can be curved at an arbitrary spot and for moving the guide member 83 is provided between a connection rotation shaft 87d and the guide member 83, having one end thereof fixed to the connection rotation shaft 87d between the first connection link 87a and the second connection link 87b, an intermediate portion thereof slidably hooked by the outside of a back seat connection shaft 10f and folded, and the other end fixed to the guide member 83, so as
 15 not to sag. In this Embodiment, as the first moving member 86, a metal wire is used.

[0157]

Since the other structures and configurations are the same as those in the above-described Embodiments 1 to 8, the description will be omitted.

[0158]

20 Subsequently, movements of the chair 1 of this Embodiment 9 will be described.

[0159]

As the back frame 81 is gradually reclined rearward from the upright position as illustrated in Fig. 27, a distance L2 between the rotation shaft 87d and the back seat connection shaft 10f gradually decreases. As a result, as illustrated in Fig. 28, the guide member 83 moves
 25 in the upper direction in the guide grooves 82b and 84a by means of the biasing member 85, and the head frame 82 gradually rises in relation to the back frame 81, that is, the angle α of the front surface of the head frame 82 in relation to the axis of the back side frame 81a gradually increases. Then, the angle α reaches the maximum (prescribed value).

[0160]

30 Then, if the back frame 81 is gradually reclined further rearward, the guided member 83 gradually moves upward in the guide grooves 82b and 84a, the head frame 82 gradually reclines rearward in relation to the back frame 81, that is, the angle α gradually decreases, and the back frame 81 reaches the reclined position as illustrated in Fig. 29.

[0161]

Moreover, oppositely to the above-described action, as the back frame 81 is gradually raised from the reclined position as illustrated in Fig. 29, as the back frame 81 rises, the head frame 82 gradually rises in relation to the back frame 81, and after the angle α reaches the prescribed value, if the back frame 81 is further raised, as the back frame 81 rises, the head frame 82 gradually reclines in relation to the back frame 81.

[0162]

As described above, also in this Embodiment 9, similarly to the above-described Embodiments 1 and 3 to 6, by means of the change in the position of the guide member 83 in the guide grooves 82b and 84a, the angle α of the front surface of the head frame 82 in relation to the vertical axis of the back frame 81 is changed.

[0163]

Moreover, also in this Embodiment 9, the head frame 82 moves similarly to the above-described Embodiments 1 to 8, and regarding movements of the head frame 82, the same actions and effects as those in the above-described Embodiments 1 to 8 can be exerted.

Reference Signs List

[0164]

1	chair
7	support shaft
8, 81	back frame
14, 46, 55, 83	guide member
15, 53	slide frame
22, 35, 45, 51, 82	head frame
23, 43, 45b, 52, 82b, 84a	guide groove
α	angle of head frame in relation to vertical axis of back frame
β	inclination angle of back frame in relation to horizontal plane

CLAIMS

[Claim 1]

A chair comprising a reclinable/straightenable back frame and a reclinable/straightenable head frame in relation to the back frame, wherein

as the back frame reclines rearward from an upright position, the head frame rises in relation to the back frame, and after an angle of the head frame in relation to a vertical axis of the back frame reaches a prescribed angle, the head frame reclines in relation to the back frame as the back frame reclines further rearward; and

as the back frame rises from the reclined position, the head frame rises in relation to the back frame, and after an angle of the head frame in relation to the vertical axis of the back frame reaches a prescribed angle, the head frame reclines in relation to the back frame as the back frame further rises,

said chair further comprising a guide groove and a guide member provided movably in the guide groove, wherein

a position of the guide member in the guide groove changes in accordance with an inclination angle of the back frame in relation to a horizontal plane;

the angle of the head frame in relation to the vertical axis of the back frame changes in accordance with a change of the position of the guide member in the guide groove; and

the guide groove is provided in the head frame.

[Claim 2]

The chair according to claim 1, further comprising:

a slide frame whose position in relation to the vertical axis direction of the back frame changes in accordance with the inclination angle of the back frame in relation to the horizontal plane, wherein

the angle of the head frame in relation to the vertical axis of the back frame

changes in accordance with a change of relative positions of the back frame and the slide frame in the vertical axis direction.

[Claim 3]

The chair according to claim 2, wherein

as the back frame reclines rearward, the slide frame moves in a direction of a seat in relation to the back frame, and as the back frame is raised, it moves in a direction opposite to the seat in relation to the back frame.