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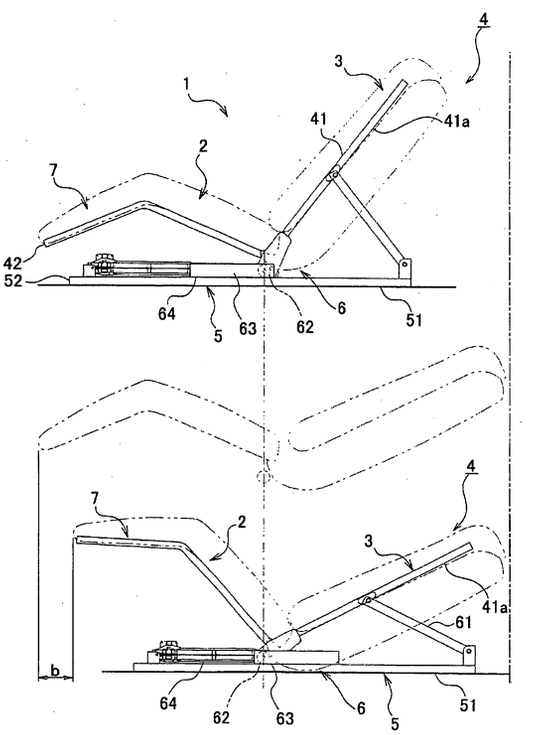
(54) Reclinable chair

(57) A chair (1), comprising a chair body (4) having a seat part (2) and a backrest part (3), and a supporting part (5) for supporting the chair body, is characterized in that a reclining mechanism (6) is provided between the supporting part (5) and the chair body (4) part, for shifting the seat part (2) and the backrest part (3) forward, simultaneously with backward reclining movement of the backrest part (3) in a state where the seat part (2) and the backrest part (3) are fixed at a certain angle.

Fig. 2



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Description

BACKGROUND OF THE INVENTION

Technical Field

[0001] The present invention relates to a chair suitable for a massage chair and the like, and particularly relates to a reclining mechanism.

Related Prior Art

[0002] In a chair having a conventional reclining mechanism, a backrest part greatly protrudes backward when reclined, as compared with when it is erected. Therefore, there has been a problem with this chair in that, when the chair is to be placed against a wall, assuming the state where the backrest part is reclined, a certain space needs to be kept between the chair and the wall.

[0003] A chair capable of preventing such backward protrusion of a backrest part has been proposed in Japanese Patent Laid-Open No. 2001-178575, in which a lower backrest part and a seat part are slid forward along a supporting frame when the backrest part is reclined.

[0004] However, the reclining mechanism described in Japanese Patent Laid-Open No. 2001-178575 is configured such that, with the angle of the seat fixed, only the backrest part is reclined, and the seat part thus greatly extends out forward to cause an increase in footprint of the whole chair, thereby raising a problem of necessitating a sufficient space for making the chair usable. Further, since the backrest part holds shoulders of a seated person at different positions in between its raised state and its reclined state, there is a problem in the case of using the chair as a massage chair: even when the positions of the shoulders to be massaged are adjusted, the shoulders may deviate from the positions upon change in reclining angle.

DISCLOSURE OF THE INVENTION

[0005] The present invention was made, focusing attention on the above conventional problems, and has an object to provide a chair having a reclining mechanism, which can make the footprint of the chair as small as possible while preventing a backrest part from protruding backward when it is reclined, and in which positions in contact with body parts such as shoulders remain unchanged.

[0006] In order to achieve the above object, in the present invention, a chair comprises a chair body having a seat part and a backrest part, and a supporting part for supporting the chair body from below, characterized in that a reclining mechanism is provided between the supporting part and the chair body part, for shifting the seat part and the backrest part forward, simultaneously with backward reclining movement of the backrest part in a state where an angle between the seat part and the backrest part is fixed.

[0007] Further, in the present invention, the reclining mechanism may be configured to comprise: a link member linking the supporting part and the backrest part; a shifting part provided in the vicinity of a bent part between the seat part and the backrest part of the chair body; a guiding part with the shifting part longitudinally shiftably attached thereto; and an actuator for changing the attitude of the chair body. Further, the shifting part may be configured to rotate and shift along said guiding part.

[0008] Further, the actuator may be configured to extend and shrink, with one end thereof linked to the shifting part of the chair body and the other end thereof linked to the supporting part.

[0009] Further, the actuator may be configured to extend and shrink, and to link the supporting part and the seat part.

[0010] Further, the actuator may be configured to extend and shrink and to link the supporting part and the backrest part.

[0011] Further, the shifting part may be provided with a wheel that rotates in contact with the supporting part, and the actuator may be a rotary actuator for rotationally driving a wheel, such as a rubber tire.

[0012] Further, in the present invention, a front supporting leg and a rear supporting leg may be formed with a longitudinal space therebetween in the supporting part, and the reclining mechanism may be configured to comprise: a front shifting part provided on said front supporting leg; a front guiding part provided along said seat part, with said front shifting part longitudinally shiftably attached thereto; a rear shifting part provided on said rear supporting leg; a rear guiding part provided along the backrest part, with said rear shifting part longitudinally shiftably attached thereto; and an extendable and shrinkable actuator linking the chair body and the supporting part, and also configured to change the attitude of the chair body by the extension or shrinkage of the actuator. Moreover, the front shifting part and the rear shifting part may be configured to rotate and shift along said guiding part.

[0013] Further, said actuator may be configured to link the front supporting leg of the supporting part and the seat part of the chair body. Moreover, it may be configured to link the rear supporting leg of the supporting part and the backrest part of the chair body.

[0014] Further, in the present invention, the supporting part may be provided with a supporting wall positioned on each side of the chair body, and the reclining mechanism may comprise: a front shifting part and a rear shifting part, which are disposed on one of the supporting wall and the chair body; guides which are disposed on the other of the supporting wall and the chair body, longitudinally shiftably support said front shifting part and said rear shifting part, and guide upward the front shifting part, relatively rather than the rear shifting

part, to recline the attitude of the backrest part backward, as the chair body is slid forward; and an actuator which is extendable and shrinkable, and links the chair body and the supporting part to change the attitude of the chair body.

[0015] Further, the guide may be a guiding groove disposed in the supporting wall, and the front shifting part and the rear shifting part may be guiding projections to be slidably fitted into the guiding grooves.

[0016] Further, the guide for guiding the rear shifting part is characterized in comprising: a slope declining toward the front while the guide for guiding the front shifting part has a slope ascending toward the front.

[0017] Further, the reclining mechanism may comprise: a four-node link system member linking the seat part of the chair body and the supporting part; and an extendable and shrinkable actuator provided diagonally to the four-node link system.

[0018] Further, the reclining mechanism may be provided with a pinion disposed in the vicinity of the boundary between the seat part and the backrest part, and a rack which is disposed on the supporting part and engaged with the pinion.

[0019] Further, the present invention may be used as a massage chair having a massaging tool on the backrest part. Moreover, the present invention may be used as a massage chair having a foot massaging tool on the footrest part.

[0020] According to the present invention, the reclining mechanism is provided between the supporting part and the chair body, for shifting the seat part and the backrest part forward, simultaneously with backward reclining movement of the backrest part in a state where an angle between the seat part and the backrest part is fixed, thereby to prevent backward protrusion of the backrest part. Further, since the seat part is lifted upward by a length corresponding to the reclined length of the backrest part, the forward protrusion of the seat part is shorter than in the case of reclining only the backrest part, which can make the footprint small. Moreover, the figuration of the chair body remains unchanged even when the backrest part is reclined, thereby preventing displacement of the position in contact with the body in the backrest part.

[0021] Further, the reclining mechanism is configured to comprise: a link member linking the supporting part and the backrest part; a shifting part provided in the vicinity of a bent part between the seat part and the backrest part of the chair body; a guiding part with the shifting part longitudinally shiftably attached thereto; and an actuator for changing the attitude of the chair body, so that the backrest part can be reclined while the position of the lower back of the seated person is kept constant.

[0022] Further, since the actuator is configured to extend and shrink, with one end thereof linked to the shifting part of the chair body and the other end thereof linked to the supporting part, the moving part is integrated into the supporting part and a cover can thus be placed over the moving part without a coercive look.

[0023] Further, since the actuator is configured to extend and shrink, and to link the supporting part and the seat part, the moving part can be integrated into a small part.

[0024] Further, since the actuator is configured to extend and shrink, and to link the supporting part and the backrest part, the backward protrusion of the backrest part when it is reclined can be completely prevented.

[0025] Further, since the shifting part is provided with a wheel that rotates in contact with the supporting part, and the actuator is a rotary actuator for rotationally driving a wheel, such as a rubber tire, a guiding part is not particularly necessary, thereby eliminating the possibility that some body part might be caught in the guiding part.

[0026] Further, the reclining mechanism is configured such that a front supporting leg and a rear supporting leg, which were formed with a longitudinal space therebetween in the supporting part, are attached longitudinally shiftably to the seat part and the backrest part, and also configured to change the attitude of the chair body by the extension or shrinkage of the actuator, thereby allowing the chair to have a simple outlook and a reduced weight.

[0027] Further, since the actuator is configured to link the front supporting leg of the supporting part and the seat part of the chair body, the moving part is integrated under the seat part not to be hardly visible.

[0028] Further, since the supporting part is provided with a supporting wall positioned on each side of the chair body, and the reclining mechanism is provided between the supporting wall and the chair body, the walls on the side faces can facilitate protection of the moving parts to achieve high safety.

[0029] Further, since guiding projections are configured to be slidably fitted into the guiding grooves, they can certainly be guided.

[0030] Further, if the rear shifting part is configured to have a slope declining toward the front while the guide for guiding the front shifting part is configured to have a slope ascending toward the front, the chair body can be greatly reclined.

[0031] Further, since the reclining mechanism comprises a four-node link system and an extendable and shrinkable actuator, reclining movement can be made with a simple constitution.

[0032] Further, since a rack and a pinion, engaged with each other, are provided between the chair body and the supporting part in the reclining mechanism, the movement can certainly be made without slipping.

[0033] Further, in the case where a massaging tool is provided on the backrest part, an adjusted position of the massaging tool remains unchanged even when the backrest part is reclined, and hence readjustment of the massaging position is not necessary.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034]

Fig. 1 shows an oblique perspective view showing a frame structure of a chair according to Embodiment 1 of the present invention.

Fig. 2A shows a side view showing a state where a backrest part of the chair of Fig. 1 is raised; Fig. 2B is a view showing a state where the backrest part is reclined.

Fig. 3 shows a view showing a chair according to Embodiment 2 of the present invention: Fig. 3A shows an oblique perspective view showing the frame structure; Fig. 3B shows a state where the backrest part is raised; Fig. 3C shows a state where the backrest part is reclined.

Fig. 4 shows a view showing a chair according to Embodiment 3 of the present invention: Fig. 4A shows an oblique perspective view showing the frame structure; Fig. 4B shows a state where the backrest part is raised; Fig. 4C shows a state where the backrest part is reclined.

Fig. 5 shows a view showing a chair according to Embodiment 4 of the present invention: Fig. 5A shows an oblique perspective view showing the frame structure; Fig. 5B shows a state where the backrest part is raised; Fig. 5C shows a state where the backrest part is reclined.

Fig. 6 shows a view showing a chair according to a transformed example of Embodiment 4 of the present invention: Fig. 6A shows an oblique perspective view showing the frame structure; Fig. 6B shows a state where the backrest part is raised; Fig. 6C shows a state where the backrest part is reclined.

Fig. 7 shows a view showing a chair according to Embodiment 5 of the present invention: Fig. 7A shows an oblique perspective view showing the frame structure; Fig. 7B shows a state where the backrest part is raised; Fig. 7C shows a state where the backrest part is reclined.

Fig. 8 shows a view showing a chair according to a transformed example of Embodiment 5 of the present invention: Fig. 8A shows an oblique perspective view showing the frame structure; Fig. 8B shows a state where the backrest part is raised; Fig. 8C shows a state where the backrest part is reclined.

Fig. 9 shows a view showing a chair according to Embodiment 6 of the present invention: Fig. 9A shows an oblique perspective view showing the frame structure; Fig. 9B shows a state where the backrest part is raised; Fig. 9C shows a state where the backrest part is reclined.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiment 1

[0035] Fig. 1 and Fig. 2 show a frame structure of a chair according to Embodiment 1 of the present invention. Reference numeral 1 indicates a whole chair, roughly comprising: a chair body 4 having a seat part 2 and a backrest part 3; and a pedestal supporting part 5 for supporting the chair body 4, and a reclining mechanism 6 is provided between the supporting part 5 and the chair body part 4, for shifting the seat part 2 and the backrest part 3 forward, simultaneously with backward reclining movement of the backrest part 3 in a state where an angle between the seat part 2 and the backrest part 3 is fixed.

[0036] A footrest part 7 is provided in front of the seat part 2 of the chair body 4, and in one frame structure, the seat part 2, the backrest part 3 and the 7 are integrally formed. Namely, a pair of longitudinal frames 41, 41 and a pair of horizontal frames 42, 42 form the frame structure, in which the longitudinal frames 41 are bent inward at a prescribed angle on the boundary between the backrest part 3 and the seat part 2, and also bent outward at a prescribed angle on the boundary between the seat part 2 and the footrest part 7.

[0037] The supporting part 5 also has a rectangular frame structure, and placed in a region vertically projecting the chair body 4 with the backrest part 3 in nearly a raised state. The reclining mechanism 6 is configured to comprise: link members 61, 61 for linking the supporting part 5 and the backrest part 3; a pair of rollers 62 as shifting parts provided in the vicinity of the sides of the bent part between the seat part 2 of the chair body 4 and the backrest part 3; a pair of U-shaped roller guides 63 as guide parts, with the rollers 62 rotatably and longitudinally shiftably attached thereto; and an actuator 64 for changing the attitude of the chair body 4.

[0038] The link members 61, 61 are provided respectively on both sides, and one end of each of the link members 61, 61 is pivotally linked to the center of the frame part 41a on each side of the backrest part 3, while the other end is pivotally linked to each rear end corner of the supporting part 5. In this example, each of the rollers 62 is rotatably attached to the outer surface of an attached board 62a fixed to the lower end part of each of the frame parts 41a of the backrest part 3. A linking shaft 62b links the right and left rollers 62, 62. The right and left rollers 62, 62 and the linking shaft 62b constitute the shifting part.

[0039] Further, the mutually parallel roller guides 63 with a prescribed length are fixed to right and left frames 51, 51 of the supporting part 5 such that U-shaped grooves to install rollers 62 are turned inward. The actuator 64 is configured to extend and shrink linearly longitudinally, and the rear end thereof is pivotally linked to the linking shaft 62b between the rollers 62 while the

front end thereof is pivotally linked to a front frame 52 of the supporting part 5.

[0040] The configuration of the actuator 64 is not particularly limited so long as it has an extendable and shrinkable drive, and in this example, the actuator 64 is configured to extend and shrink by a motor 64a and a feed screw system which is formed by combination of a feed screw shaft and a nut (not shown), between a cylindrical body 64b and a rod 64c to be inserted in the cylindrical body 64b.

[0041] Next, movement of the chair of Embodiment 1 is described. When the backrest part 3 is to be reclined, the actuator 64 is shrunk. With this shrinkage, as shown in Fig. 2, the rollers 62 rotates and shifts forward along the roller guides 63 and the lower end of the backrest part 3 is then shifted forward while the backrest part 3 is pulled by the link members 61 and reclined at a prescribed angle. Since the lower end of the backrest part 3 is shifted forward while the backrest part 3 is reclined, the backward protrusion of the backrest part 3 can be prevented.

[0042] Meanwhile, since the angle between the seat part 2 of the chair body 4 and the footrest part 7 and the angle between the seat part 2 and the backrest part 3 are fixed, the footrest part 7 and the seat part 2 are lifted upward by a length corresponding to the reclined length of the backrest part 3, and hence the forward protrusion is a length "b" shorter than in the case of reclining only the backrest part (cf. the chained lines in Fig. 2), which can make the footprint small.

[0043] Further, since the figuration of the chair body 4 remains unchanged even when the backrest part 3 is reclined, the position of the body in contact with the backrest part 3 remains unchanged, and in the case of a massage chair having a massaging tool on the backrest part 3, since an adjusted position of the massaging tool remains unchanged, readjustment of the massaging position is not necessary when the angle of the backrest part 3 is changed. Moreover, since the angle between the seat part 2 and the footrest part 7 remains unchanged, feet supported by the footrest part are raised simultaneously with reclining of the backrest part 3, which can help cure swelling of the feet.

[0044] Next, another embodiment of the present invention is described. In the following description, different features from those of the above embodiment are mainly described; the same component as that of Embodiment 1 is provided with the common numeral and the description thereof is not described.

Embodiment 2

[0045] Fig. 3 shows a chair according to Embodiment 2 of the present invention. In Embodiment 2, a front supporting leg 251 and a rear supporting leg 252 are formed with a longitudinal space therebetween in the supporting part 205. The front supporting leg 251 and the rear supporting leg 252 are integrally linked to each other by a longitudinally frame 253 which is made of a U-shaped member, and extends longitudinally. Further, the upper parts of the front supporting leg 251 are linked by a horizontally extending front frame 254.

[0046] A reclining mechanism 206 is configured to comprise: a front roller 262 as a front shifting part provided on the front supporting leg 251; a front roller guide 263 as a front guiding part provided along the seat part 2, with the front roller 262 longitudinally shiftably attached thereto; a rear roller 265 serving a rear shifting part provided on the rear supporting leg 252; a rear roller guide 266 as a rear guiding part provided along the backrest part 3, with the rear roller 265 longitudinally shiftably attached thereto; and an extendable and shrinkable actuator 64 member linking the front frame 254 of the supporting part 205 and a central frame 255 positioned on the boundary between the backrest part 3 and the seat part 2 of the chair body 4, and also configured to change the attitude of the chair body 4 by the extension or shrinkage of the actuator 64.

[0047] Although the actuator 64 is disposed on the side of the under surface of the seat part 2, it may be disposed on the side of the backrest part 3 so as to link the rear supporting leg 252 of the supporting part 205 and the backrest part 3 of the chair body 4. Further, the actuator 64 may be configured to link the longitudinal frame 253 and the backrest part 3 of the chair body 4.

[0048] Also in the case of Embodiment 2, when the backrest part 3 is to be reclined, the actuator 64 is shrunk as shown in Figs 3B and 3C. With this shrinkage, the front roller 262 and the back roller 265 rotate and shift backward along the front roller guide 263 and the rear roller guide 266 to shift the lower end of the backrest part 3 relatively forward, while the front end of the seat part 2 is lifted upward, thereby to recline the backrest part 3 at a prescribed angle. Therefore, with the backrest part 3 shifting forward while being reclined, the backward protrusion of the backrest part 3 can be prevented.

[0049] Meanwhile, since the seat part 2 and the footrest part 7 shift diagonally upward, changing the angle therebetween, the protruding length is shorter than in the case where those parts horizontally shift, which can make the footprint small. Further, since the figuration of the chair body 4 remains unchanged, the position of the body in contact with the backrest part 3 remains unchanged.

[0050] Further, according to the configuration of Embodiment 2, unlike Embodiment 1, the chair comprises no link member for supporting the backrest part 3, thereby to have a similar outside shape to that of a chair with its moving part made invisible. It is to be noted that, in the configuration of Embodiment 2, the seat part 2 constituting the chair body 4, the backrest part 3 and the footrest part 7 are not integrally formed by frames as in Embodiment 1, but a frame body constituting the seat part 2 and the footrest part 7 are integrally linked with the frame body constituting the backrest part 3, and meanwhile Embodiment 1 and Embodiment 2 are com-

mon in that the angles of those components are fixed.

Embodiment 3

[0051] Fig. 4 shows a chair according to Embodiment 3 of the present invention.

[0052] In Embodiment 3, unlike Embodiment 2, a pedestal supporting part 305 is provided with a pair of supporting walls 351, which are respectively positioned on both sides of the chair body 4, and support the chair body 4 at their front and back sides. In the example shown in the drawing, a pair of fixed walls 21 are provided on the seat part 2 in a protruding condition so as to be opposed to the supporting walls 351, and the fixed walls 21 are supported by the supporting walls 351.

[0053] The reclining mechanism 306 is characterized in comprising: a front sliding projection 362 and a rear sliding projection 365, which are disposed on each of the fixed walls 21 provided on the seat part 2 of the chair body 4; a front guide groove 363 and a rear guide groove 366, which are disposed on each side of the supporting walls 351, longitudinally movably support the front sliding projection 362 and the rear sliding projection 365, and serve as guides for guiding upward the front sliding projection 362, relatively rather than the rear sliding projection 365, to recline the attitude of the backrest part 3 backward, as the chair body 4 is slid forward; and the actuator 64 which is extendable and shrinkable, and links the chair body 4 and the supporting part 305 to change the attitude of the chair body 4.

[0054] The front sliding projection and the rear sliding projection are to be slidably fitted into the front guiding groove 363 and the rear guiding groove 366, respectively. The rear guiding groove 366 for guiding the rear sliding projection 365 has a slope declining toward the front while the front guiding groove 363 for guiding the front sliding projection 362 has a slope ascending toward the front.

[0055] One end of the actuator 64 is pivotally linked to a bracket 352 positioned at the rear lower ends of the supporting walls 351 on the supporting part 305 while the other end of the actuator 64 is pivotally linked to the center of the shaft 22 running between the two front sliding projections 362 positioned at the front upper ends of the fixed walls 21 on the chair body 4. The actuator 64 is positioned on almost the same sloping line as the front guiding grooves 363.

[0056] In the case of Embodiment 3, when the backrest part 3 is to be reclined, the actuator 64 is extended as shown in Figs 4B and 4C. With this extention, the front sliding projection 362 and the back sliding projection 365 shift forward along the front guiding groove 363 and the rear guiding groove 366 to shift the lower end of the backrest part 3 relatively forward, while the front end of the seat part 2 is lifted upward, thereby to recline the backrest part 3 at a prescribed angle. Therefore, with the backrest part 3 shifting forward while being reclined, the backward protrusion of the backrest part 3 can be prevented.

[0057] Meanwhile, since the seat part 2 and the footrest part 7 shift diagonally upward, changing the angle therebetween, the protruding length is shorter than in the case where those parts horizontally shift, which can make the footprint small. Further, since the figuration of the chair body 4 remains unchanged, the position of the body in contact with the backrest part 3 remains unchanged.

[0058] According to the configuration of Embodiment 3, the actuator 64 and the like are made invisible by the supporting walls 351 and the fixed walls 21, thereby making it easier to protect the moving part. In place of the fixed wall 21, the chair body 4 may be supported from below and frame members for supporting the front sliding projection 362 and the rear sliding projection 365 on the each side thereof may be used.

Embodiment 4

[0059] Fig. 5 shows a chair according to Embodiment 4 of the present invention. In Embodiment 4, the reclining mechanism 406 is configured to comprise: a link member 61 member linking a supporting part 405 in frame form and the backrest part 3; a wheel 462 as a shifting part provided in the vicinity of the boundary between the seat part 2 of the chair body 4 and the backrest part 3; and a motor 464 as an actuator for changing the attitude of the chair body 4. Namely, the wheel 462 that rotates in contact with the supporting part 405 is used as the shifting part, and the motor 464 for rotationally driving the wheel 462 is used as the actuator.

[0060] Although the supporting part 405 is formed of a rectangular frame body as in Embodiment 1, a width between right and left frames 451 is larger than the corresponding width in Embodiment 1, and the wheel 462 is rotatably in contact with the upper surface of each of the right and left frames 451. A rubber tire is used as the wheel 462, which is rotatably attached to an attached plate 462a fixed to the vicinity of the boundary between the seat part 2 of the chair body 4 and the backrest part 3, and shifts along the surface of the frame 451 by the force of friction with the frame 451.

[0061] In the motor 464, a motor shaft is disposed on the side of the supporting part 405, in parallel to the frame 451 so as not to extend out from the supporting part 405. Since the driving shaft of the motor 464 is orthogonal to the wheel shaft of the wheel 462, a direction of power transmission is changed by a power transmitting mechanism composed of a worm and a worm wheel (not shown).

[0062] Further, limit switches 467 and 468 are provided for detecting the positions of the backrest part 3 at the minimum reclining angle (raised position), so as to limit a prescribed range of the reclining angle of the backrest part 3, and at the maximum reclining angle (most reclined position). In the example shown in the figure, the limit switches 467 and 468 are disposed

sandwiching the linking parts of the link members 61 on the frame 41a of the backrest part 3, and turned on and off depending on the slope of the link members 61.

[0063] In the case of Embodiment 4, when the backrest part 3 is to be reclined, as shown in Figs 5B and 5C, the wheel 462 is rotationally driven by the motor 464 to rotate and shift forward along the each of the right and left frames 451 of the supporting part 405. With this shifting, the lower end of the backrest part 3 shifts forward while the front end of the seat part 2 is lifted upward. When the backrest part 3 is reclined at a prescribed angle, the link member 61 presses one limit switch 467 to stop the reclining. When the backrest part 3 is to be raised, the rotation of the motor 464 is reversed to shift the wheel 462 backward at the lower end of the backrest part 3. When the backrest part 3 is raised at a prescribed angle, the link member 61 presses the other limit switch 468 to stop the raising.

[0064] Therefore, with the backrest part 3 shifting forward while being reclined, the backward protrusion of the backrest part 3 can be prevented. Further, with the seat part 2 and the footrest part 7 shifting obliquely upward while changing the angle therebetween, the forward protrusion is shorter than in the case of horizontal shifting, which can make the footprint small. Moreover, since the figuration of the chair body 4 remains unchanged, the position of the body in contact with the backrest part 3 remains unchanged.

Transformed example of Embodiment 4

[0065] Fig. 6 shows a transformed example of Embodiment 4. In this transformed example, the reclining mechanism 406 is added with a pinion 469a disposed in the vicinity of the boundary between the seat part 2 and the backrest part 3, and a rack 469b which is disposed on the supporting part 405 and engaged with the pinion 469a.

[0066] The pinion 469a is pivotally disposed along with the wheel 462, and rotationally driven by the motor 464, integrally with the wheel 462. Only the wheel 462 may be driven while the pinion 469a may not, or only the pinion 469a may be driven while the wheel 462 may not. Further, the wheel 462 may not be disposed and the pinion 469a may support the chair body 4.

Embodiment 5

[0067] Fig. 7 shows a chair according to Embodiment 5. In Embodiment 5, the supporting part and the actuator are configured differently from those in Embodiment 4, and other components are configured in the same manner as in Embodiment 4. Namely, a supporting part 505 is not formed by a frame body, but by a block body comprising right and left guide walls 551 and a bottom wall 552 for liking the lower ends of the right and left guide walls 551, where the upper surfaces of the guide walls 551 are formed high. The reclining mechanism 506 comprises: the link member 61 member linking the supporting part 505 and the backrest part 3; and the wheel 462 as a shifting part provided in the vicinity of the boundary between the seat part 2 of the chair body 4 and the backrest part 3, where the wheel 462 at the lower end of the backrest part 3 rotates and shifts along the upper surface of each of the guide walls 551.

[0068] The actuator 64 is not configured to be rotary, but to extend and shrink as in Embodiment 1, and is disposed between the supporting part 505 and the backrest part 3. In the example shown in the figure, the upper end of the actuator 64 is linked to the intermediate frame 44 provided in the middle of the height of the backrest part 3. The intermediate frame 44 runs between the right and left frames 41, 41 of the backrest part 3. Further, the lower end of the actuator 64 is rotatably linked to the bottom wall 552 of the supporting part 505.

[0069] According to the chair of Embodiment 5, when the backrest part is to be reclined, the actuator 64 is shrunk as shown in Figs 7B and 7C. As the actuator 64 is shrunk, the wheel 462 rotates and shifts forward along each of the right and left guide walls 551, and the lower end of the backrest part 3 shifts forward while the backrest part 3 is pulled by the link member 61 and reclined at a prescribed angle. Therefore, since the backrest part 3 is shifted forward while reclined, the backward protrusion of the backrest part 3 can be prevented. Meanwhile, since the angle between the seat part 2 of the chair body 4 and the footrest part 7 and the angle between the seat part 2 and the backrest part 3 are fixed, the seat part 2 and the footrest part 7 are lifted upward by a length corresponding to the reclined length of the backrest part 3. Moreover, since the figuration of the chair body 4 remains unchanged even with the backrest part 3 reclined, the position of the body in contact with the backrest part 3 remains unchanged.

Transformed example of Embodiment 5

[0070] Fig. 8 shows a transformed example of Embodiment 5. In this transformed example, the actuator 64 is provided between the supporting part 505 and the seat part 2. In the example shown in the figure, the upper end of the actuator 64 is linked to the intermediate frame 45 provided at the front end of the seat part 2. Further, the lower end of the actuator 64 is rotatably linked to the bottom wall 552 of the supporting part 505.

[0071] When the backrest part 3 is to be reclined, the actuator 64 is extended as shown in Figs 8B and 8C. As the actuator 64 is extended, the front end of the seat part 2 is lifted and the lower end of the backrest part 3 shifts forward while the backrest part 3 is pulled by the link members 61 and reclined at a prescribed angle.

Embodiment 6

[0072] Fig. 9 shows a chair according to Embodiment 6. Embodiment 6 is the same as Embodiment 1 in terms

of the chair body, but essentially different in the configuration of the reclining mechanism. Namely, the reclining mechanism 606 is configured to comprise: a four-node link system 661 member linking the seat part 2 of the chair body 4 and the supporting part 605; and an extendable and shrinkable actuator 64 provided diagonally to the four-node link 661.

[0073] The four-node link 661 comprises a pair of (right and left) front link members 662 and a pair of (right and left) rear link members 663, where the front link member 662 is provided between the front end of the supporting part 605 and the position slightly forward from the center of the seat part 2 of the chair body 4, and the rear link member 663 is provided between the middle of the supporting part 605 and the vicinity of the boundary between the seat part 2 and the backrest part 3.

[0074] The upper ends of the front link member 662 and the rear link member 663 are rotatably linked to a fixed board 662a fixed to each of the right and left frames 41b and 41b, while the lower ends of the front link member 662 and the rear link member 663 are rotatably linked to the supporting part 605 via brackets.

[0075] The front link member 662 is longer than the rear link member 663, and as shown in Fig. 9B, when the backrest part 3 is in a raised position, both the front link member 662 and the rear link member 663 are inclined with the upper end thereof more backward than the lower end thereof, and the rear link member 663 has a smaller backward inclination angle than that of the front link member 662. When the front link member 662 and the rear link member 663 are rotated counterclockwise around the lower ends thereof as shafts, the rear link member 663 rotates with a larger angle; when the backrest part 3 is in a most reclined position, the upper end of the front link member 662 has not reached the highest position and is inclined backward while the upper end of the rear link member 663 has passed over the highest position and is inclined upward, which shifts the lower end of the backrest part 3 forward, simultaneously with backward reclining movement of the backrest part 3, and also lifts the front end of the seat part 2 upward.

[0076] The actuator 64 is the same extendable and shrinkable actuator as that in Embodiment 1, being positioned obliquely between the lower end of the front link member 662 and the upper end of the rear link member 663 in the side views of Figs. 9B and 9C, and the front end of the actuator 64 is rotatably linked to the bracket 651 fixed to the supporting part 605 while the rear end of the actuator 64 is rotatably liked to the center of the intermediate frame 43 disposed in the vicinity of the boundary between the seat part 2 of the chair body 4 and the backrest part 3.

[0077] Next, the function of Embodiment 6 is described. Fig. 9B shows the attitude of the chair with the backrest part in a raised position. Herein, the actuator 64 is in a most extended state, and is shrunk when the backrest part 3 is to be reclined. As the actuator 64 is shrunk, the front link member 662 and the rear link member 663 are both rotated counterclockwise, and since the upper end of the front link member 662 shifts upward in a greater degree than the upper end of the rear link member 663, and the rear link member 663 shifts forward in a greater degree than the front link member 662, the backrest part 3 is reclined while the lower end thereof is shifted forward, and the front end of the seat part 2 is lifted upward, which can prevent the backward protrusion of the backrest part 3 and also make the footprint small.

Industrial Applicability

[0078] While the chair of the present invention is suitable for a massage chair having a massaging tool on a backrest part, it is not limited to a massage chair, and is usable for a variety of reclining chairs. Further, while the chair of the present invention is described by taking the chairs having a footrest part as examples in the above embodiments, the reclining system of the present invention is applicable to a chair having no footrest.

Claims

1. A chair (1), comprising a chair body (4) having a seat part (2) and a backrest part (3), and a supporting part (5) for supporting said chair body (4) from below, **characterized in that**

   a reclining mechanism (6) is provided for shifting said seat part (2) and said backrest part (3) forward, simultaneously with backward reclining movement of said backrest part (3) in a state where an angle between said seat part (2) and said backrest part (3) is fixed.

2. The chair (1) according to claim 1, **characterized in that**

   said reclining mechanism (6) is configured to comprise: a link member (61) linking said supporting part (5) and said backrest part (3); a shifting part provided in the vicinity of a bent part between the seat part (2) and the backrest part (3) of the chair body (4); a guiding part with said shifting part longitudinally shiftably attached thereto; and an actuator (64) for changing the attitude of the chair body (4).

3. The chair (1) according to claim 2, wherein said actuator (64) is configured to extend and shrink, with one end thereof linked to said shifting part of the chair body (4) and the other end thereof linked to the supporting part (5).

4. The chair (1) according to claim 2, wherein said actuator (64) is configured to extend and shrink, and to link said supporting part (5) and said Seat part (2).

5. The chair (1) according to claim 2, wherein said actuator (64) is configured to extend and shrink, and to link said supporting part (5) and said backrest part (3).

6. The chair (1) according to claim 1, **characterized in that**

a front supporting leg (251) and a rear supporting leg (252) are formed with a longitudinal space therebetween, in said supporting part (5), and

the reclining mechanism (6) is configured to comprise: a front shifting part provided on said front supporting leg (251); a front guiding part provided along said seat part (2), with said front shifting part longitudinally shiftably attached thereto; a rear shifting part provided on said rear supporting leg (252); a rear guiding part provided along said backrest part (3), with said rear shifting part longitudinally shiftably attached thereto; and an extendable and shrinkable actuator (64) linking said chair body (4) and said supporting part (5), and also configured to change the attitude of the chair body (4) by the extension or shrinkage of the actuator (64).

7. The chair (1) according to claim 6, wherein said actuator (64) is configured to link said front supporting leg (251) of said supporting part (5) and the seat part (2) of the Chair body (4).

8. The chair (1) according to claim 1, **characterized in that**

said supporting part (5) is provided with a supporting wall (351) positioned on each side of the chair body (4), and

the reclining mechanism (6) comprises: a front shifting part and a rear shifting part, which are disposed on one of the supporting wall (351) and the chair body (4); guides which are disposed on the other of the supporting wall (351) and the chair body (4), longitudinally shiftably support said front shifting part and said rear shifting part, and guide upward the front shifting part, relatively rather than the rear shifting part, to recline the attitude of the backrest part (3) backward, as the chair body (4) is slid forward; and an actuator (64) which is extendable and shrinkable, and'links the chair body (4) and the supporting part (5) to change the attitude of the chair body (4).

9. The chair (1) according to claim 8, **characterized in that** said guide is a guiding groove disposed in the supporting wall (351), and said front shifting part and said rear shifting part are guiding projections to be slidably fitted into the guiding grooves.

10. The chair (1) according to claim 8 or 9, **characterized in that** the guide for guiding the rear shifting part has a slope declining toward the front while the guide for guiding the front shifting part has a slope ascending toward the front.

11. The chair (1) according to claim 1, **characterized in that**

said reclining mechanism (6) comprises: a four-node link system (661) member linking the seat part (2) of the chair body (4) and the supporting part (5); and an extendable and shrinkable actuator (64) provided diagonally to said four-node link system (661).

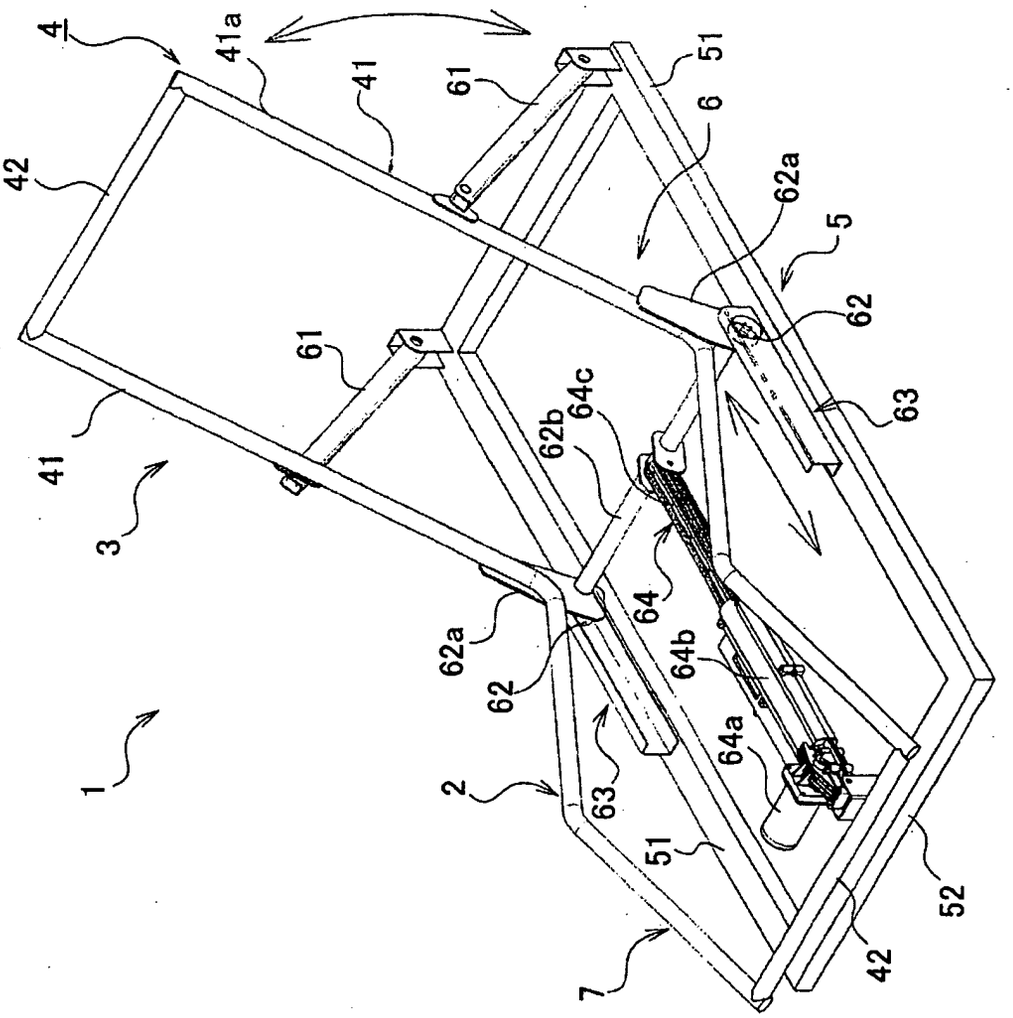
12. The chair (1) according to claim 1, **characterized in that**

said reclining mechanism (6) is configured to comprise: a link member (61) linking said supporting part (5) and said backrest part (3); a shifting part provided in the vicinity of a bent part between the seat part (2) and the backrest part (3) of the chair body (4); and an actuator (64) for changing the attitude of the chair body (4).

13. The chair (1) according to claim 12, wherein said shifting part is provided with a wheel (462) that rotates in contact with the supporting part (5), and said actuator (64) is a rotary actuator (64) for rotationally driving said wheel (462).

14. The chair (1) according to claim 12, **characterized in that** said reclining mechanism (6) is provided with a pinion (469a) disposed in the vicinity of the boundary between the seat part (2) and the backrest part (3), and a rack (469b) which is disposed on the supporting part (5) and engaged with said pinion (469a).

15. The chair (1) according to any one of claims 1 to 14, **characterized in that** said chair (1) is used as a massage chair (1) having a massaging tool on the backrest part (3) .


4
41a
41
61
51
6
42
62a
5
62
61
63
64c
62b
41
3
64
62a
64b
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64a
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2
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51
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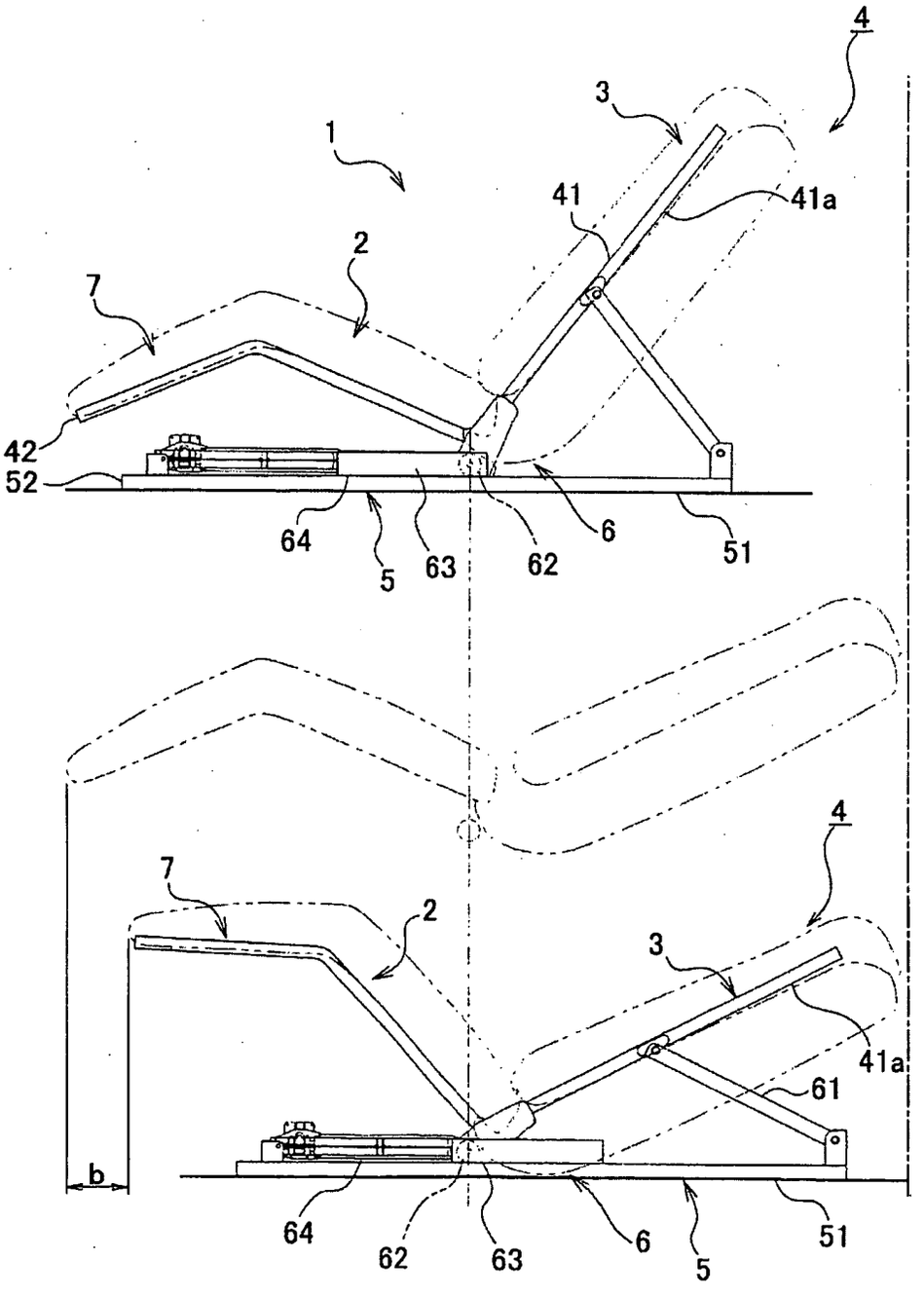
7
42

Fig. 1

Fig. 2



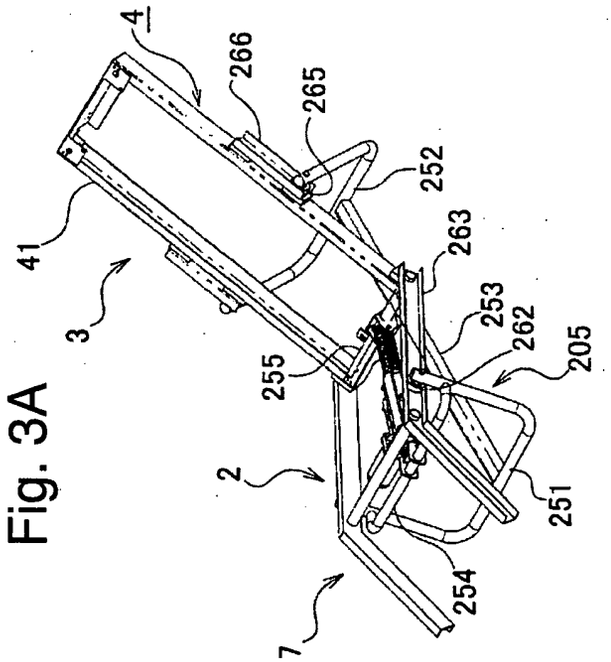


Fig. 3A

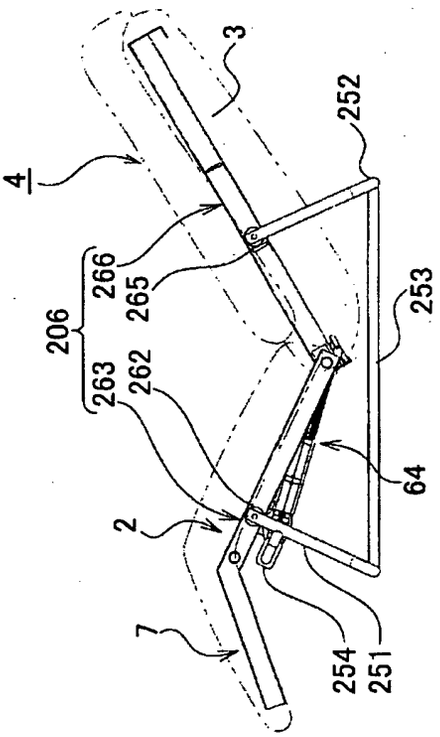


Fig. 3B

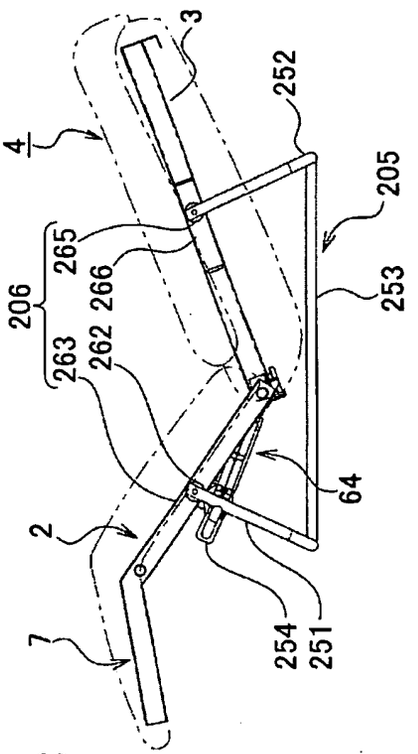


Fig. 3C

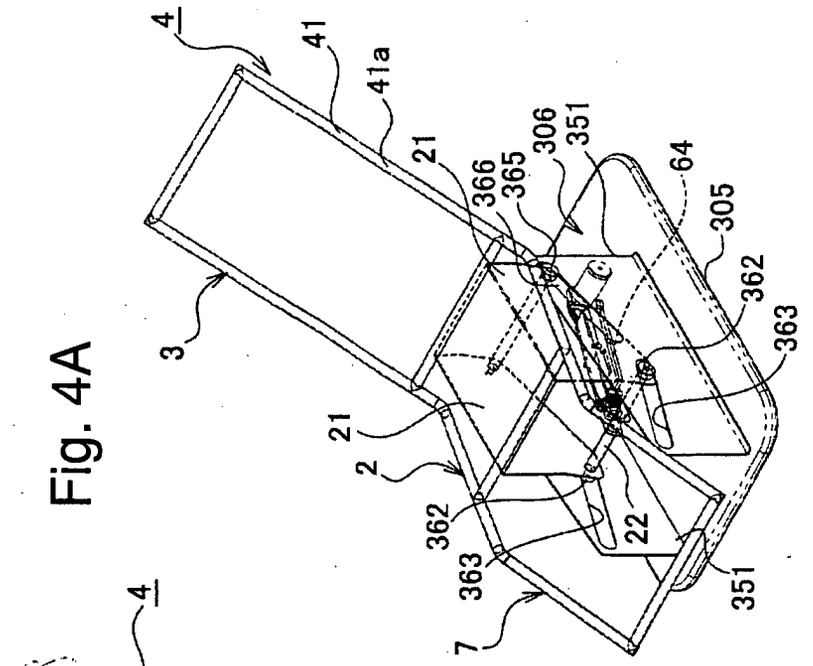


Fig. 4A

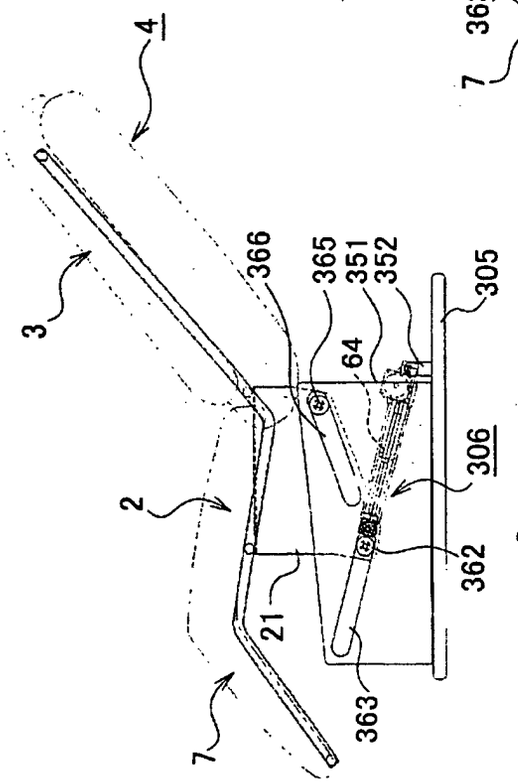


Fig. 4B

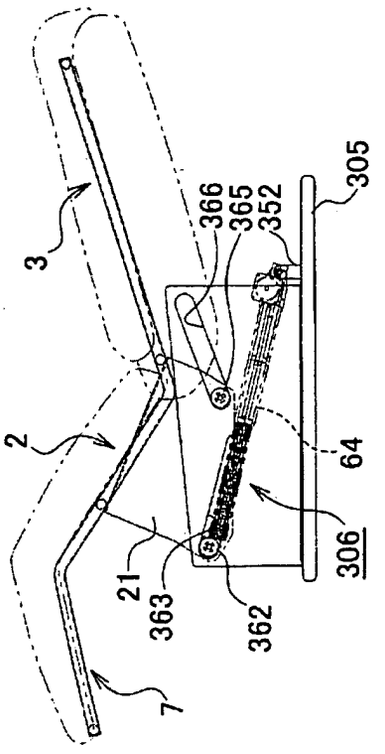


Fig. 4C

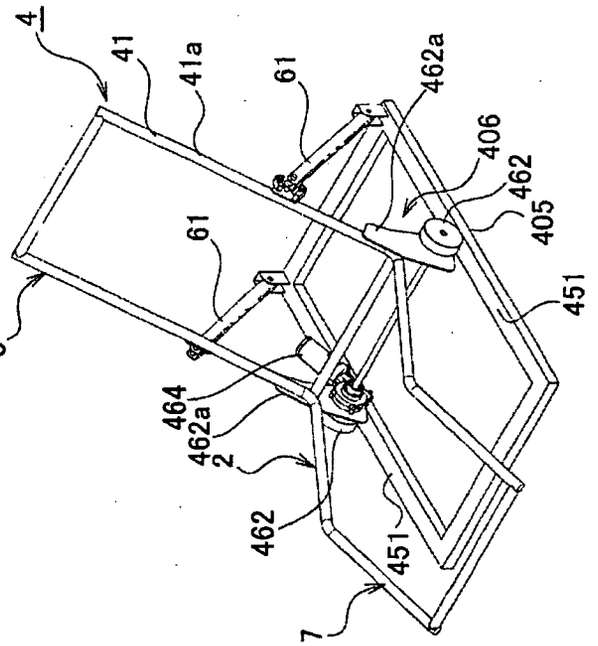


Fig. 5A

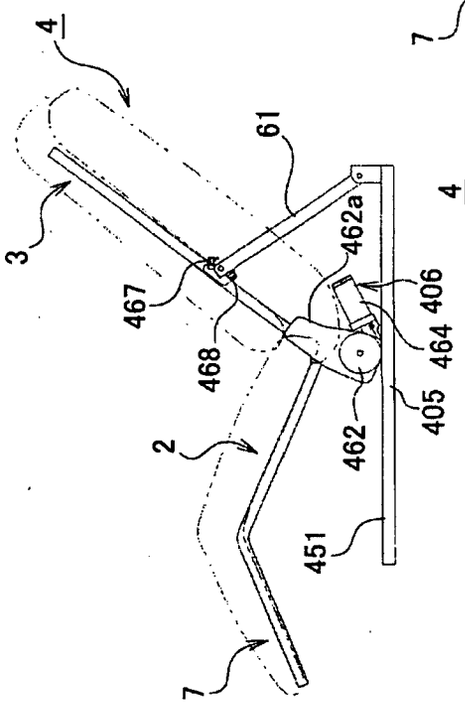


Fig. 5B

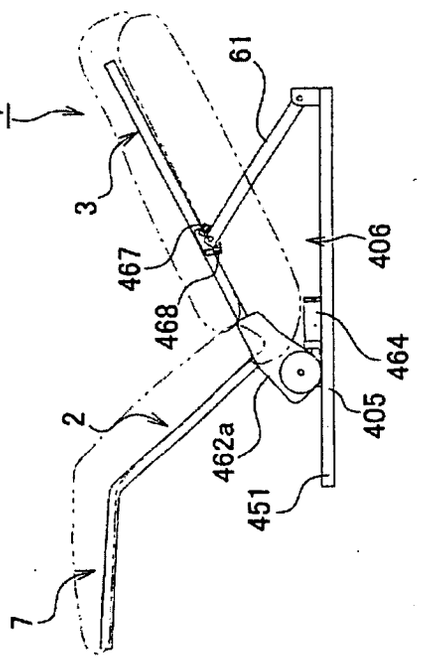


Fig. 5C

Fig. 6A

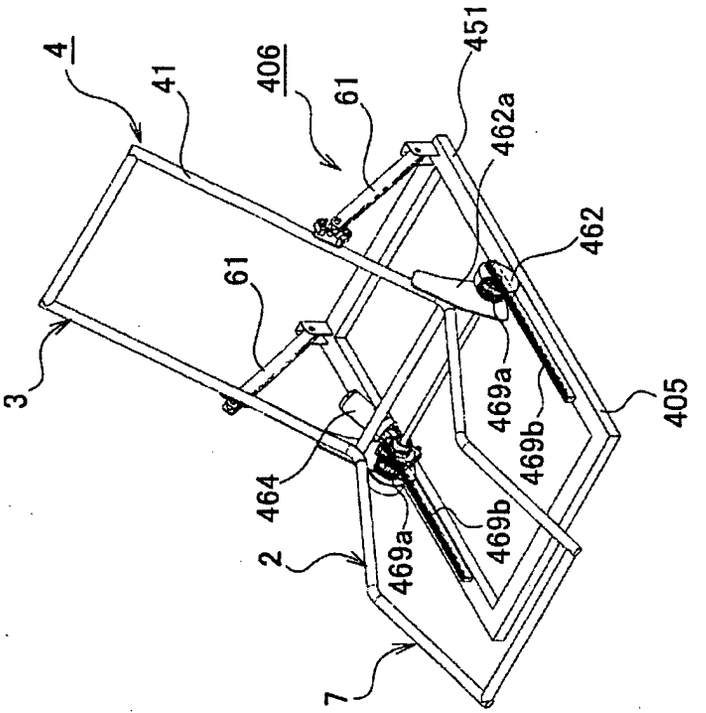


Fig. 6B

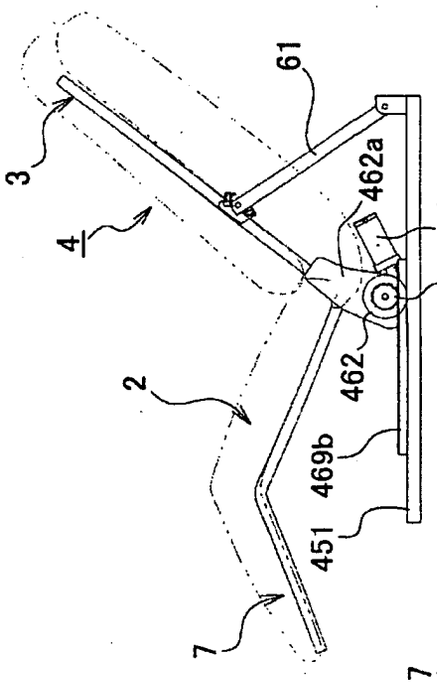


Fig. 6C

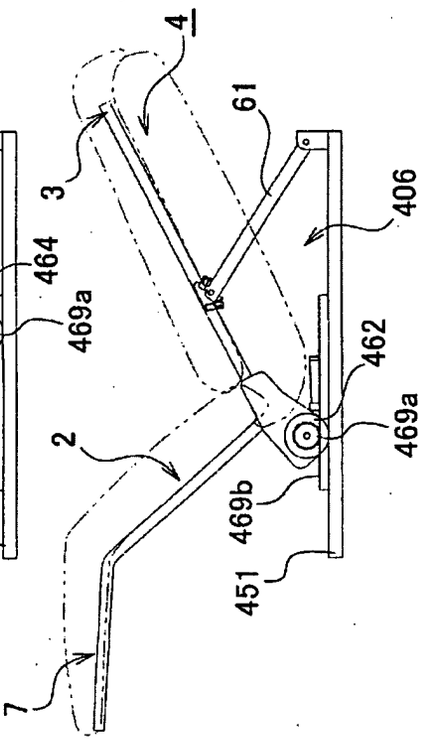


Fig. 7A

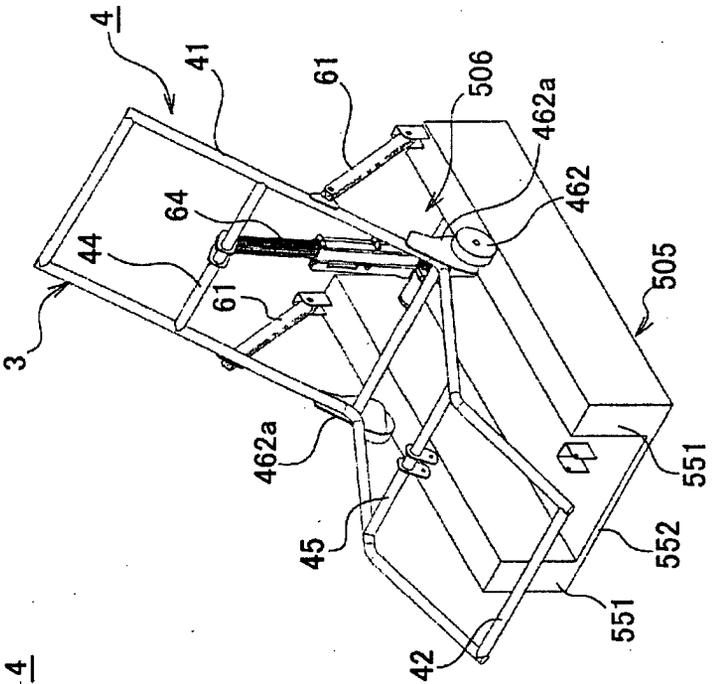


Fig. 7B

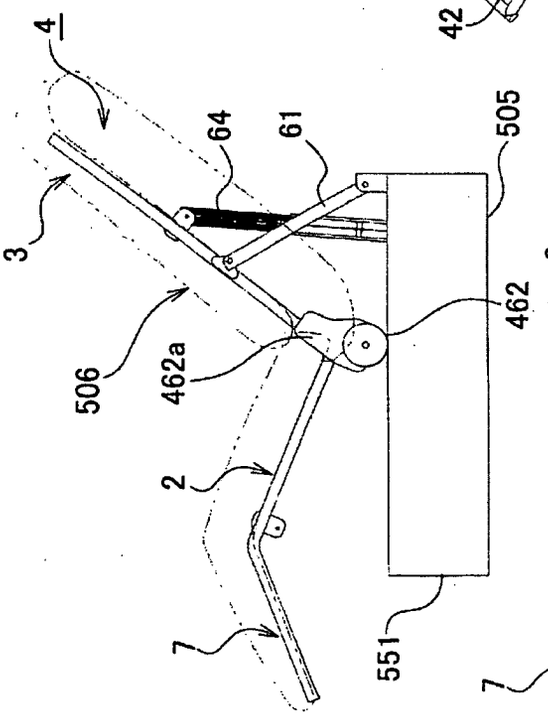
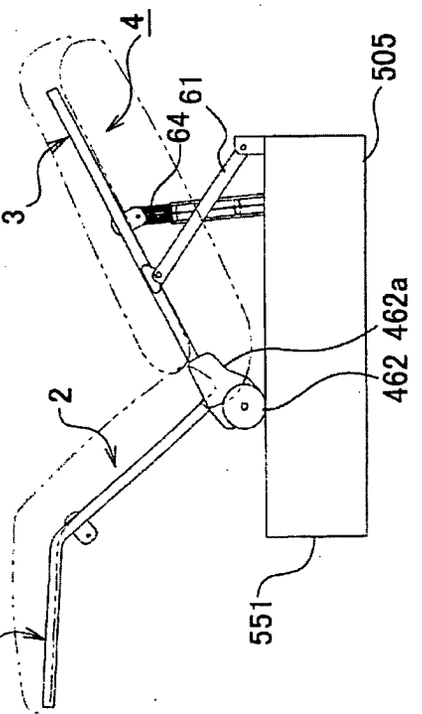


Fig. 7C



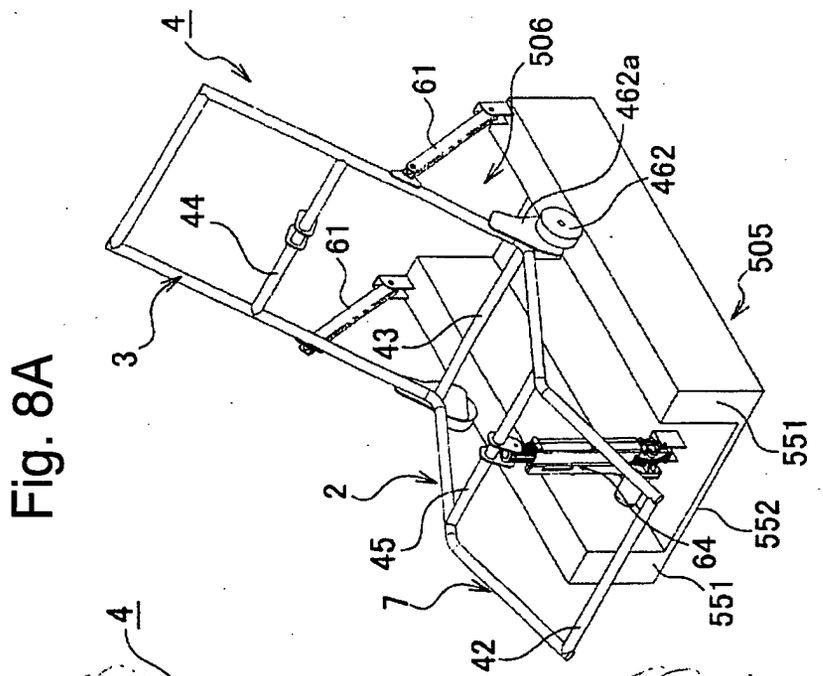


Fig. 8A

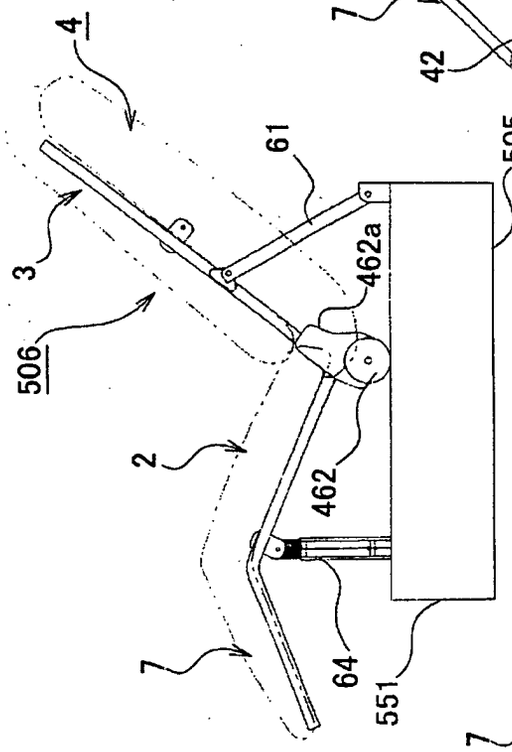


Fig. 8B

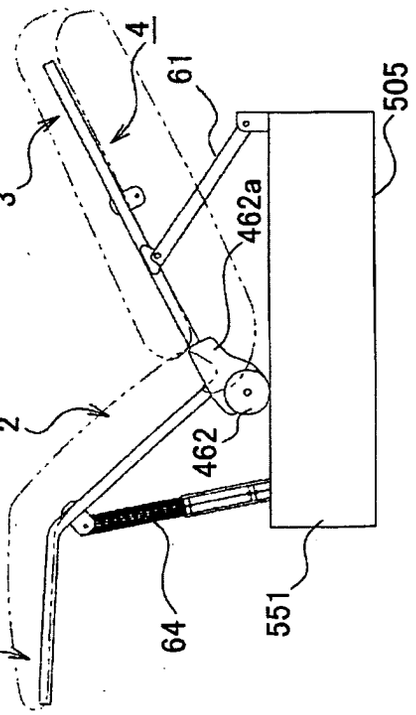


Fig. 8C

Fig. 9A

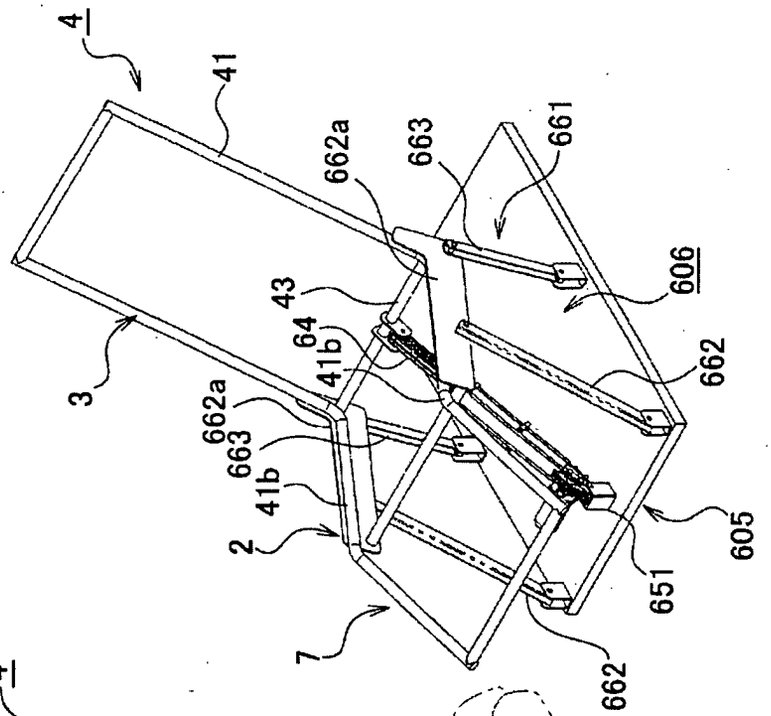


Fig. 9B

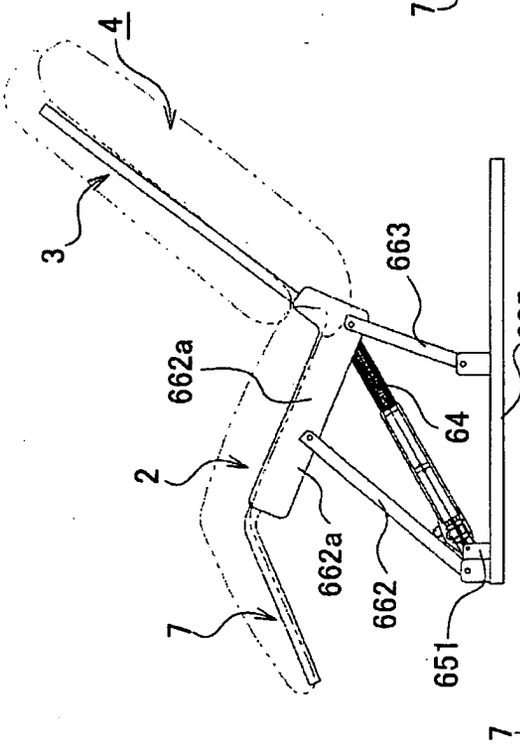


Fig. 9C