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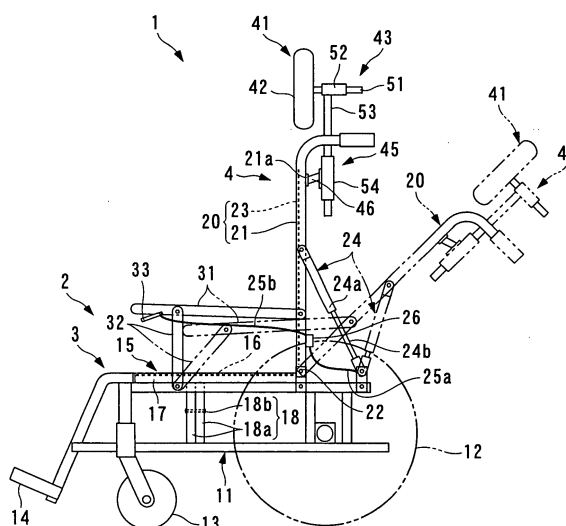
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(54) **Reclinable wheelchair**

(57) A reclinable wheelchair which allows a user seated therein to adjust the inclination angle of a seat back rest by himself, and is foldable in the width direction. The reclinable wheelchair comprises a frame foldable in the width direction, a seat assembly arranged in the frame, a seat back rest arranged on a back side of the seat assembly of the frame for pivotal movements between an upright position and an inclined position, actuators for driving the seat back rest and capable of holding the seat back rest at an arbitrary position between the upright position and the inclined position, a reclining lever arranged at a position which allows the user to manipulate, for manipulating the actuators, and a head rest attached to the frame. The head rest is comprised of a head rest body, and an attachment coupled to the left and right ends of the frame and folded up on the width direction as the frame is folded.

FIG. 1



EP 1 287 802 A2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a reclinable wheelchair which has a seat back rest, the inclination angle of which is variable.

Description of the Related Art

[0002] Generally, a wheelchair has a frame, assembled from metal pipes, which is foldable in the width direction. A pair of left and right wheels having a larger diameter (large wheels) and a pair of left and right wheels having a smaller diameter (casters) are attached to the frame. The frame is also provided with a seat for a user to sit on, and a seat back rest for the user to lean over. Further, a pair of left and right arm rests are provided on both left and right sides of the seat, making use of a portion of the frame.

[0003] In recent years, in addition to general wheelchairs as described above, a variety of reclinable wheelchairs have been proposed. For example, a reclinable wheelchair described in Laid-open Japanese Patent Application No. 2001-149413 is known. This reclinable wheelchair has a frame comprised of a body frame for supporting wheels, and a seat frame for supporting a seat and a seat back rest. The seat frame is made pivotable in the depth direction relative to the body frame. A locking device is provided between the two frames for locking the seat frame at a desired angle to the body frame, with a lever provided on the back side of the seat back rest for releasing the locking device. Specifically, with this reclinable wheelchair, a care worker standing behind the wheelchair may move the seat frame while releasing the locking device by manipulating the lever to adjust the seat back rest at an inclination angle desired by the user.

[0004] The reclinable wheelchair as described above, however, cannot be reclined unless the care worker manipulates the lever attached on the back side of the seat back rest. In other words, the reclinable wheelchair cannot be reclined without a care worker, so that the user of the wheelchair cannot adjust by himself the inclination angle of the seat back rest while he is seated on the wheelchair. Also, the body frame and seat frame of this reclinable wheelchair have a plurality of reinforcing members extending in the width direction in order to firmly support the user, when the wheelchair is reclined, without causing the frames to be distort or twist. In other words, this reclinable wheelchair is structurally unfoldable in the width direction. Furthermore, since the arm rests of the wheelchair are generally fixed, so that if the seat back rest is largely inclined backward when the wheelchair is reclined, gaps can be formed between the seat back rest and the arm rests, and the arm rests re-

main at high positions, thereby preventing the user from properly utilizing the arm rests.

OBJECT AND SUMMARY OF THE INVENTION

[0005] The present invention has been made to solve the problems as mentioned above, and it is an object of the invention to provide a reclinable wheelchair which allows a user seated therein to adjust the inclination angle of a seat back rest by himself, and is foldable in the width direction.

[0006] The reclinable wheelchair according to the present invention comprises a frame foldable in a width direction; a seat assembly arranged in the frame for a user to sit in; a seat back rest arranged on a back side of the seat assembly of the frame for pivotal movements about a horizontal axis in a width direction between an upright position at which the reclinable wheelchair is in an upright posture and an inclined position at which the reclinable wheelchair is inclined obliquely upward to the back; a seat back rest driving device for driving the seat back rest between the upright position and the inclined position, and capable of holding the seat back rest at an arbitrary position between the upright position and the inclined position; manipulating means arranged at a position which allows the user to manipulate the manipulating means, for manipulating the seat back rest driving device; and a head rest attached to the frame, including a head rest body, and a foldable mechanism coupled to a left and a right end of the frame and foldable in the width direction as the frame is folded.

[0007] According to the reclinable wheelchair of the present invention configured as described above, as the user manipulates the manipulating means, the seat back rest driving device is operated to pivotally drive the seat back rest about the axis to an arbitrary position (hereinafter called the "reclining position" in this disclosure) between the upright position and the inclined position. The seat back rest can be held at the reclining position. Since the manipulating means is arranged at a position which allows the user to manipulate while the user remains seated, the user can adjust by himself the inclination angle of the seat back rest, while the user is seated in the wheelchair. In addition, the head rest attached to the frame has the foldable mechanism for supporting the head rest body which is collapsed in the width direction as the frame is folded, so that the wheelchair itself can be folded in the width direction without the need for removing the head rest from the frame.

[0008] Preferably, in the foregoing configuration, the reclinable wheelchair preferably further comprises an arm rest arranged on at least one of left and right sides of the seat assembly, and extending to the depth direction, and an arm rest interlock mechanism for moving the arm rest in at least one of the depth direction and vertical direction associated with a pivotal movement of the seat back rest.

[0009] According to this preferred configuration of the

reclinable wheelchair, the arm rest arranged on both or one of the left and right sides of the seat assembly is moved by the arm rest interlock mechanism to the depth direction or vertical direction associated with a pivotal movement of the seat back rest. Therefore, for example, even in a reclined state, the arm rests can be properly utilized since the arm rest moves backward and/or downward associated with a pivotal movement of the seat back rest from the upright position to the reclined position. On the other hand, the arm rest can be readily returned to the position before reclining since the arm rest is moved in front and/or upward associated with a pivotal movement of the seat back rest from the reclined position to the upright position.

[0010] Also preferably, in the foregoing configuration, the seat back rest driving device includes a pair of left and right actuators coupled to a left and a right end of the seat back rest, respectively, for driving the seat back rest when the manipulating means is manipulated, and for holding the seat back rest when the manipulating means is not manipulated; a pair of control cables each having one end connected to one of the pair of actuators for controlling the pair of actuators; and a connector connected to the other ends of the pair of control cables and responsive to a manipulation by the manipulating means on the connector to actuate the pair of actuators at the same timing through the pair of control cables. The manipulating means includes a single manipulating member for manipulating the connector.

[0011] According to this preferred configuration of the reclinable wheelchair, by manipulating the single manipulating member of the manipulating means, the pair of left and right actuators can be actuated at the same timing through the connector and the pair of control cables. In other words, the user can readily actuate the pair of actuators in a well balanced manner only by manipulating the single manipulating member, consequently allowing the user to readily and smoothly recline the wheelchair.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is a side view illustrating a reclinable wheelchair according to one embodiment of the present invention; and

Figs. 2A and 2B are back views illustrating the reclinable wheelchair of Fig. 1, where Fig. 2A shows a usable state (before it is folded) and Fig. 2B shows a folded state.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] In the following, a preferred embodiment of the present invention will be described in detail with reference to the accompanying drawings. Figs. 1 and 2A, 2B

illustrate a reclinable wheelchair according to one embodiment of the present invention. As illustrated in these figures, the reclinable wheelchair 1 (hereinafter simply called the "wheelchair") is foldable in the width direction, and of a self-running type which allows the user to rotate wheels by himself to move about. The wheelchair 1 has a frame 2 composed of metal pipe materials such as aluminum, steel or the like which are assembled substantially in bilateral symmetry. The frame 2 is comprised of a base frame 3 and a back frame 4 arranged behind the base frame 3 (on the right side in Fig. 1).

[0014] The base frame 3 has a pair of left and right base frame bodies 11, which are spaced from each other in the width direction, and assembled into a predetermined shape that extends in the depth direction. The left and right base frame bodies 11 are provided with wheels 12 having a larger diameter; casters 13; and foot rests 14 (one each of which is illustrated in Fig. 1) arranged in bilateral symmetry, respectively. A seat assembly 15 is also provided above and between both base frames 11 for the user to sit thereon. The seat assembly 15 comprises a seat 16 made of cloth; and a pair of left and right seat supporting members 17 (only one of which is illustrated in Fig. 1) spaced from each other in the width direction by substantially the same spacing as that between the base frame bodies 11. Left and right edges of the seat 16 are fixed to the seat supporting members 17, respectively. The left and right seat supporting members 17 both extend in parallel with each other over a predetermined distance in the depth direction. Each seat supporting member 17 is carried on an adjoining base frame body 11 associated therewith through a catch, not shown.

[0015] Also, an X-shaped cross-link 18, when viewed from the front, is provided between the left and right base frame bodies 11 (see Fig. 2). The cross-link 18 has two link bars 18a which are coupled at their respective centers by a coupling pin 18b extending in the depth direction for pivotal movements to each other. Lower ends of the cross-link 18, i.e., lower leading ends of both link bars 18a are fixed to lower end portions of the left and right base frame bodies 11 different from each other. On the other hand, upper ends of the cross-link 18, i.e., upper leading ends of both link bars 18a are fixed to lower portions of the left and right seat supporting members 17, different from each other, of the seat assembly 15. Therefore, when the wheelchair 1 is folded up in the width direction, the cross-link 18 is also folded in the width direction, causing the seat 16 to bend and simultaneously, the seat assembly 15 to lift up.

[0016] The back frame 4, in turn, has a pair of left and right back frame bodies 21 spaced from each other in the width direction and extending in parallel with each other in the vertical direction. Each of the back frame bodies 21 has its lower end pivotably coupled to the adjoining base frame body 11 associated therewith through a horizontal coupling shaft 22 (axis) extending in the width direction. Also, each of the back frame bod-

ies 21 has the upper end extending rearward while curving. The extending portions serve as hand grips for a care worker. In addition, a back seat 23 made of cloth is provided between the left and right back frame bodies 21, with left and right edges fixed to the left and right back frame bodies 21, respectively. These left and right back frame bodies 21 and back seat 23 constitute a seat back rest 20 of the wheelchair 1. Therefore, this seat back rest 20 is configured for pivotal movements about the coupling shaft 22 between an upright position at which the wheelchair 1 is upright substantially in the vertical direction (position indicated by solid lines in Fig. 1) and an inclined position oriented obliquely upward to the back (position indicated by two-dot chain lines in Fig. 1).

[0017] A pair of left and right actuators 24 (seat back rest driving device) are provided on the back side of the seat back rest 20 for rotating the seat back rest 20 as well as for holding the same at an arbitrary position (reclining position) between the upright position and the inclined position. Each of the actuators 24 comprises a gas spring or an oil spring having a cylinder 24a and a piston rod 24b. While the piston rod 24b is normally locked to the cylinder 24a, a spring force is generated in a direction in which the piston rod 24b projects from the cylinder 24a when a reclining lever 33, later described, is manipulated to release the locked piston rod 24b.

[0018] The left and right actuators 24 are disposed on the left and right sides at the back of the seat back rest 20 to couple the base frame bodies 11 with the back frame body 21 coupled thereto. More specifically, each of the actuators 24 has the leading end of the piston rod 24b pivotably coupled to an upper rear end portion of the base frame body 11, and the leading end of the cylinder 24a pivotably coupled to substantially a central portion of the back frame body 21 in the vertical direction. Therefore, as the piston rods 24b move in a direction in which they project from the associated cylinders 24a, these actuators 24 drive the seat back rest 20 toward the upright position. On the other hand, as the user fully leans over the seat back rest 20, the piston rods 24b move in a direction in which they retract into the associated cylinders 24a against the spring forces of the actuators 24, causing the seat back rest 20 to pivotally move toward the inclined position.

[0019] The pair of actuators 24 are also connected to one ends of control cables 25a, the other ends of which are connected to a connector 26. As illustrated in Fig. 2, the connector 26 is attached at a position near the lower end of the left-hand back frame body 21 for actuating the pair of actuators 24 at the same timing through two control cables 25a. The connector 26 is also connected to the reclining lever 33, later described, through another control cable 25b.

[0020] A pair of left and right arm rests 31 are disposed above the left and right sides of the aforementioned seat assembly 15. Each of the arm rests 31 extends in the depth direction over a predetermined

length, and has its rear end pivotably coupled to the back frame body 21, and its portion near the front end pivotably coupled to the base frame body 11 through a coupling link 32 (arm rest interlock mechanism) extending in the vertical direction. Therefore, as the seat back rest 20 pivotally moves from the upright position to the inclined position, the left and right arm rests 31, associated with the seat back rest 20, largely move backward and slightly sink down. Conversely, as the seat back rest 20 pivotally moves toward the upright position, the left and right arm rests 31 largely move in front and slightly rise up to return to the original positions.

[0021] The left-hand arm rest 31 is provided with a single reclining lever 33 (manipulating member) at the leading end thereof for adjusting the inclination angle of the seat back rest 20. As described above, the reclining lever 33 is connected to the connector 26 through a control cable 25b. Therefore, as the user manipulates the reclining lever 33, this manipulation is transmitted to the left and right actuators 24 through the control cables 25a, 25b and connector 26 to simultaneously release the locked piston rods 24b of the actuators 24.

[0022] A head rest 41 is disposed above the seat back rest 20. The head rest 41 is comprised of a head rest body 42 for supporting the head of the user seated in the wheelchair 1 from the back, and an attachment 43 (folding mechanism) for attaching the head rest body 42 to the left and right back frame bodies 21. The attachment 43 is comprised of a supporter 45 for supporting the head rest body 42 in a manner adjustable in the depth direction and in the vertical direction, and a pair of left and right foldable links 46 for coupling between the supporter 45 and mounts 21a in upper end portions of the left and right back frame bodies 21.

[0023] The supporter 45 is comprised of a cylindrical lateral rod supporting member 52 for supporting a lateral rod 51 extending backward from the back of the head rest body 42 in a manner slidable in the depth direction; and supporting/coupling member 54 for vertically slidably supporting a vertical rod 53 extending downward from the lateral rod supporting member 52 over a predetermined length, and to which the left and right foldable links 46 are pivotably linked. Therefore, the head rest body 42 can be adjusted to a desired position by sliding the head rest body 42 in the depth direction and in the vertical direction with respect to the lateral rod supporting member 52 and supporting/coupling member 54.

[0024] Each of the left and right foldable links 46 has its one end pivotably coupled to the supporting/coupling member 54, and its other end pivotably coupled to the adjoining mount 21a, associated therewith, of the left or right back frame body 21. As illustrated in Fig. 2A, in a normal state (usable state) of the wheelchair 1, each of the foldable links 46 is arranged such that its end near the supporting/coupling member 54 is at a slightly higher position than its end near the mount 21a. In other words, the left and right foldable links 46 have their ends near the supporting/coupling member 54 higher than a dead

center at which the two foldable links 46 form a horizontal line in cooperation, and holds the left and right back frame bodies 21 in a stretched state to prevent them from approaching each other. In this way, the left and right back frame bodies 21 are firmly coupled to each other through the left and right foldable links 46 and supporting/coupling member 54.

[0025] Next, a brief description will be made in order on a reclining manipulation and a folding manipulation for the wheelchair 1 constructed as described above. Assume that the wheelchair 1 has the seat back rest 20 remaining at the upright position before the reclining manipulation.

[0026] First, the user seated in the wheelchair 1 manipulates the reclining lever 33 arranged on the left-hand arm rest 31 in a seated posture. As the user fully leans over the seat back rest 20 while manipulating the reclining lever 33, the respective piston rods 24b of the left and right actuators 24 move in directions in which they come into the cylinders 24a, causing the seat back rest 20 to pivotally move toward the inclined position, and also the left and right rest arms 31 to slightly sink down as they move backward. Then, the user lets go his hold of the reclining lever 33 when the seat back rest 20 provides at a desired inclination angle. Consequently, the left and right actuators 24 are locked, so that the seat back rest 20 is held at a reclining position with the desired inclination angle.

[0027] Conversely, for returning the seat back rest 20 at the reclining position to the upright position, the user raises the upper part of this body to some degree before he manipulates the reclining lever 33. This releases the left and right actuators 24 from the locked state to drive the respective piston rods 24b by spring forces in directions in which they go out of the cylinders 24a, causing the seat back rest 20 to automatically return to the upright position.

[0028] Next, for folding the wheelchair 1, the head rest 41 is first pushed down, and the supporting/coupling member 54 is moved down to exceed the dead center of the left and right foldable links 46. Then, in a manner similar to a general wheelchair, the cross-link 18 is collapsed in the width direction as the seat assembly 15 is lifted up in such a manner that the center of the seat 16 in the width direction is folded up. In this way, as illustrated in Fig. 2B, the frame 3 is folded in the width direction while the left and right base frame bodies 11 and the left and right back frame bodies 21 are brought closer to each other. Associated with this action, the left and right foldable links 46 are also folded in the width direction. In the manner as described, the wheelchair 1 can be folded in the width direction without removing the head rest 41 from the frame 3.

[0029] As described above in detail, according to the reclinable wheelchair 1 of the foregoing embodiment, the user can adjust the inclination angle of the seat back rest 20 by himself, while he is seated, by manipulating the reclining lever 33 arranged on the arm rest 31. More-

over, since the left and right actuators 24 can be actuated together at the same timing only by the user manipulating the single reclining lever 33, the actuators 24 can be simply actuated in a well balanced manner, consequently making it possible to simply and smoothly recline the wheelchair 1. Also, since the left and right back frame bodies 21 are firmly coupled to each other through the left and right foldable links 46 of the head rest 41 and the supporting/coupling member 54, the left and right back frame bodies 21 actuate in harmony with each other even if the left and right actuators 24 experience variations in spring forces and/or actuation timing, which are inevitable from a viewpoint of manufacturing. With this characteristic feature of the reclinable wheelchair 1 of the foregoing embodiment, the seat back rest 20 can be smoothly and stably reclined at all times. In addition, since the left and right arm rests 31 move in association in the depth direction and in the vertical direction as the seat back rest 20 is reclined, the arm rests 31 can be properly and sufficiently utilized at all times.

[0030] It should be understood that the present invention is not limited to the foregoing embodiment, but may be practiced in a variety of manners. For example, while the foregoing embodiment has been described for a self-running type wheelchair to which the present invention is applied, the present invention is not limited to this particular wheelchair, but may be applicable to an attendant-controlled wheelchair and the like. Also, while the reclining lever 33 is arranged on the left-hand arm rest 31, the reclining lever 33 may be arranged anywhere as long as it is accessible to the user. Further, instead of the lever, a button, a switch or the like may be employed. It should also be understood that detailed structure of the wheelchair 1 shown in the foregoing embodiment is illustrative in any sense, and can be modified as appropriate within the spirit and scope of the present invention.

[0031] As described above in detail, the reclinable wheelchair according to the present invention advantageously allows the user to adjust by himself the inclination angle for the seat back rest, while he remains seated. Also, the reclinable wheelchair can be collapsed down in the width direction.

Claims

1. A reclinable wheelchair comprising:

- a frame foldable in a width direction;
- a seat assembly arranged in said frame for a user to sit in;
- a seat back rest arranged on a back side of said seat assembly of said frame for pivotal movements about a horizontal axis in a width direction between an upright position at which said reclinable wheelchair is in an upright posture and an inclined position at which said reclinable

wheelchair is inclined obliquely upward to the back;

a seat back rest driving device for driving said seat back rest between said upright position and said inclined position, said driving device 5
capable of holding said seat back rest at an arbitrary position between said upright position and said inclined position;

manipulating means arranged at a position which allows the user to manipulate said manipulating means, for manipulating said seat 10
back rest driving device; and

a head rest attached to said frame, said head rest including a head rest body, and a foldable mechanism coupled to a left and a right end of 15
said frame and foldable in the width direction as said frame is folded.

2. A reclinable wheelchair according to claim 1, further comprising: 20

an arm rest arranged on at least one of left and right sides of said seat assembly, said arm rest extending to the depth direction; and
an arm rest interlock mechanism for moving 25
said arm rest in at least one of the depth direction and vertical direction associated with a pivotal movement of said seat back rest.

3. A reclinable wheelchair according to claim 1 or 2, 30
wherein said seat back rest driving device includes:

a pair of left and right actuators coupled to a left and a right end of said seat back rest, respectively, for driving said seat back rest when said 35
manipulating means is manipulated, and for holding said seat back rest when said manipulating means is not manipulated;

a pair of control cables each having one end connected to one of said pair of actuators for 40
controlling said pair of actuators; and

a connector connected to the other ends of said pair of control cables and responsive to a manipulation by said manipulating means on said 45
connector to actuate said pair of actuators at the same timing through said pair of control cables, and

said manipulating means includes a single manipulating member for manipulating said connector. 50

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FIG. 1

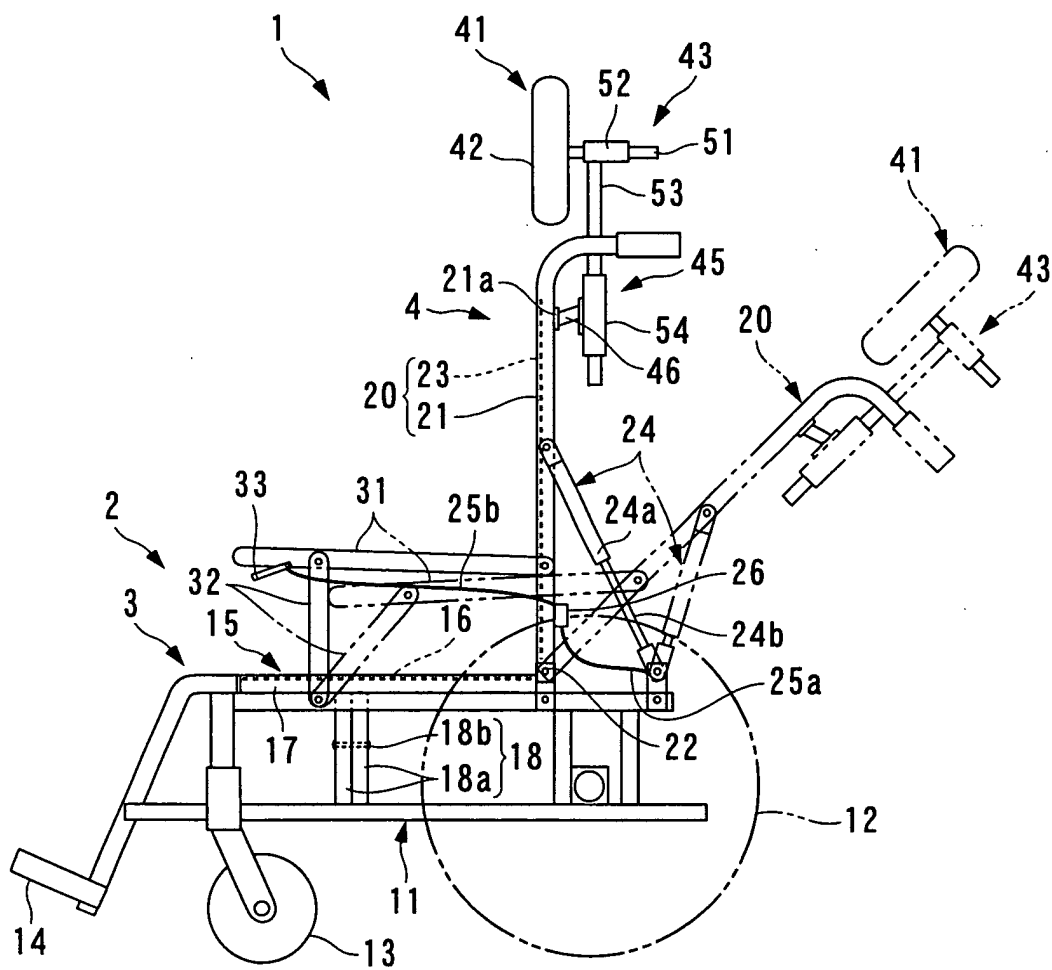


FIG. 2B

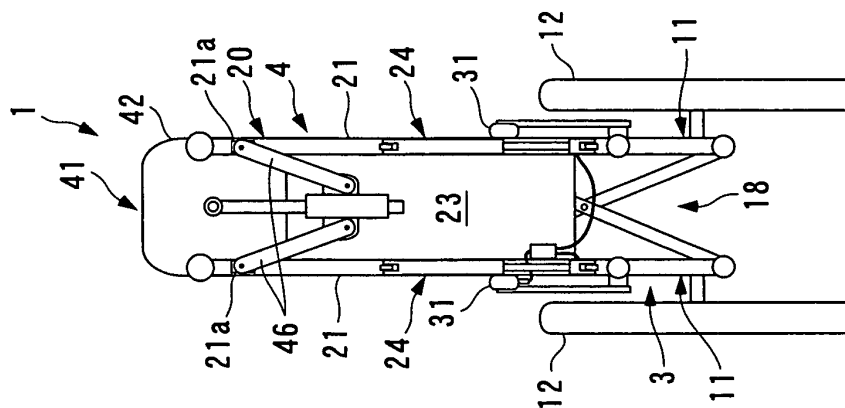


FIG. 2A

