



(11)

EP 3 360 526 A1

(12)

EUROPEAN PATENT APPLICATION

published in accordance with Art. 153(4) EPC

(43) Date of publication:
15.08.2018 Bulletin 2018/33

(51) Int Cl.: **A61G 5/14** ^(2006.01) **A61G 7/14** ^(2006.01)

(21) Application number: **16853306.5**

(86) International application number:
PCT/JP2016/069400

(22) Date of filing: 30.06.2016

(87) International publication number:
WO 2017/061151 (13.04.2017 Gazette 2017/15)

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
 GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
 PL PT RO RS SE SI SK SM TR**
 Designated Extension States:
BA ME
 Designated Validation States:
MA MD

(30) Priority: 06.10.2015 PCT/JP2015/078274
01.12.2015 PCT/JP2015/083821
14.01.2016 PCT/JP2016/051031
05.02.2016 PCT/JP2016/053499
15.02.2016 PCT/JP2016/054342
15.02.2016 PCT/JP2016/054343
17.05.2016 PCT/JP2016/064649
17.05.2016 PCT/JP2016/064650
17.05.2016 PCT/JP2016/064651

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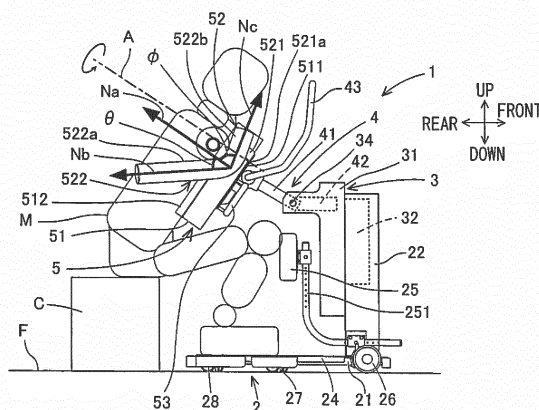
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(54) **ASSISTANCE DEVICE**

(57) An assisting apparatus is provided that a care receiver can easily board. When the trunk support member (51) is in the boarding position with respect to the care receiver (M) in the sitting posture, the underarm insertion portion (522a) of the underarm support member (52) is extended from the trunk support member (51) toward the rear of the care receiver (M) so as to be in the boarding orientation. When the trunk support member (51) is tilted forward to shift the care receiver (M) to the standing posture, the underarm insertion portion (522a) is extended upward and rearward from the trunk support member (51) toward the care receiver (M) so as to be in the standing-posture orientation.

Fig. 2



Description

Technical Field

[0001] The present invention relates to an assisting apparatus that assists a care receiver in standing up.

Background Art

[0002] PTL 1 describes an assisting apparatus that assists a care receiver in standing up. The assisting apparatus includes a trunk support member for supporting the trunk of the care receiver and underarm support members for supporting the underarms of the care receiver. The trunk support member and the underarm support members can be tilted in the front-rear direction in addition to being moved up and down. Consequently, the assisting apparatus can shift the care receiver from a sitting posture to a standing posture while supporting the trunk and underarms of the care receiver.

[0003] PTL 1: WO 2015/145915

BRIEF SUMMARY OF THE INVENTION

Technical Problem

[0004] In PTL 1, the underarm support members have a U shape opening upwardly and have portions that face the front and rear surfaces of the shoulder in addition to the underarms of the care receiver. Therefore, in order for the underarms of the care receiver to get into the state in which they are supported by the underarm support members when the care receiver boards the assisting apparatus, the care receiver needs to raise his/her shoulders and elbows high. However, it is not easy for a care receiver to raise his/her shoulders and elbows high. Further, for care receivers in need of intensive care, assistance by a caregiver may be required to get the underarms of the care receiver into a state in which they are supported by the underarm support member. Even in this case, the burden on the caregiver was large because the caregiver needs to raise the shoulders and elbows of the care receiver high while getting the care receiver into the assisting apparatus. For this reason, it is desirable to have an assisting apparatus that care receivers can board easily. It is an object of the present invention to provide an assisting apparatus that a care receiver can easily board.

Solution to Problem

[0005] The assisting apparatus according to the present invention is an assisting apparatus that supports the upper body of a care receiver and assists the care receiver in standing up. The assisting apparatus includes a base, an elevator provided on the base in a vertically movable manner, a trunk support member formed in a planar shape, being provided to the elevator in a forward-

rearward tiltable manner, which supports the trunk of the care receiver by coming into contact with a front surface of the trunk, and an underarm support member, being supported by the trunk support member, which supports an underarm of the care receiver.

[0006] The underarm support member includes an underarm insertion portion to be inserted into an underarm of the care receiver. The underarm insertion portion is extended from the trunk support member toward the rear of the care receiver so as to be in a boarding orientation when the trunk support member is positioned at a boarding position with respect to the care receiver in a sitting posture, and the underarm insertion portion is extended upward and rearward from the trunk support member toward the care receiver so as to be in a standing-posture orientation when the trunk support member is tilted forward to shift the care receiver to a standing posture.

Advantageous Effects of Invention

[0007] With the assisting apparatus, when the trunk support member is in a boarding position, the underarm insertion portion extends rearward to assume an orientation for boarding. Therefore, the care receiver in the sitting posture can easily insert the underarm insertion portions into his/her underarms when boarding the assisting apparatus. Consequently, the care receiver in the sitting posture can easily board the assisting apparatus.

[0008] Further, after the care receiver has boarded on the assisting apparatus, the care receiver is shifted from a sitting posture to a standing posture by tilting the trunk support member forward. With the forward tilt of the trunk support member, the underarm insertion portion goes into an orientation (i.e., a standing-posture orientation) that prevents the care receiver from falling rearward. Consequently, when shifting to the standing posture, the underarm insertion portion supports the care receiver in the standing position from below and behind and is, therefore, very safe.

Brief Description of Drawings

[0009]

[FIG. 1] FIG. 1 is a perspective view of an assisting apparatus as seen from the rear at an oblique angle in a state in which a care receiver in a sitting posture boards.

[FIG. 2] FIG. 2 is a side view of the assisting apparatus of FIG. 1 with the care receiver in a standing-assistance operation starting posture of the sitting posture added.

[FIG. 3] FIG. 3 is a side view showing the relationship between the support main body of a trunk support member and the underarm support member constituting the body support section of the assisting apparatus and omits the cushion of the trunk support member.

[FIG. 4] FIG. 4 is a view as seen from direction IV in FIG. 3 (a direction normal to the trunk support member).

[FIG. 5] FIG. 5 shows a side view of the assisting apparatus in a state in which the care receiver has shifted to a ready-to-stand posture with the care receiver in the ready-to-stand posture added.

[FIG. 6] FIG. 6 shows a side view of the assisting apparatus in a state in which the care receiver has shifted to a standing posture with the care receiver in the standing posture added.

[FIG. 7] FIG. 7 is a perspective view of the assisting apparatus as seen from the rear at an oblique angle in a state in which the care receiver gets into the sitting posture and the underarm insertion portions of the underarm support members have been laterally moved outward with respect to FIG. 1.

[FIG. 8] FIG. 8 shows a side view of the assisting apparatus of FIG. 7 with a large-physique care receiver in a sitting posture added.

DESCRIPTION OF EMBODIMENTS

(1. Configuration of an assisting apparatus 1)

[0010] The assisting apparatus 1 will be described with reference to FIGS. 1 and 2. FIGS. 1 and 2 show the assisting apparatus 1 in a state in which a care receiver M in a sitting posture is boarding on the assisting apparatus 1. The assisting apparatus 1 supports the upper body of the care receiver M and assists the care receiver M in standing up from the sitting posture to a standing posture. Furthermore, the assisting apparatus 1 supports the upper body of the care receiver M and assists the care receiver M in sitting down from the standing posture of the care receiver M to the sitting posture. As a result, the assisting apparatus 1 is capable of assisting the transfer and moving of the care receiver M.

[0011] A "standing posture" refers to a posture in which the lower body of the care receiver M is upright and the posture of the upper body is irrelevant. That is, standing assistance is an assistance for moving the buttocks position of the care receiver M upward. Further, sitting assistance is an assistance for moving the buttocks position of the care receiver M downward.

[0012] The assisting apparatus 1 includes a base 2, an elevator 3, a pivot section 4, a body support section 5, a control section 6, and the like. The base 2 includes a frame 21, a support column 22 (shown in FIG. 2), a fixed cover 23, a footrest 24, a lower leg contact 25, and six wheels 26, 27 and 28. The frame 21 is provided near a floor surface F in substantially horizontal. The support column 22 is erected upward from the center in the lateral direction at the front of the frame 21. An elevator driver 32, being described later, is arranged in the inner space of the support column 22 that has a substantially rectangular cross section. The fixed cover 23 covers and protects the periphery of the lower portion of the support

column 22 and an elevator 31 described later.

[0013] The footrest 24 is fixed at the rear of the top surface of the frame 21 and in substantially horizontal. A feet-shaped contact mark 241 drawn on the upper surface of the footrest 24 guides the position where the care receiver M puts his/her feet. The base 2 has sufficient mechanical strength even when the care receiver M gets on.

[0014] The lower leg contact 25 is provided above the contact mark 241 with a pair of left and right support arms 251, 251. The support arms 251, 251 have an L-shape, extend rearward from both the left and right sides of the support column 22, respectively, and bend in the middle to extend upward. The lower leg contact 25 is arranged across the upright portions of the left and right support arms 251 and extends in the lateral direction. The lower leg contact 25 is a part that comes into contact with the lower legs of the care receiver M and is made of a cushion material. The arranged height of the lower leg contact 25 is adjustable.

[0015] Wheels 26 to 28, three wheels on both left and right sides of the underside of the frame 21, are provided. Each of the wheels 26, 27 and 28 has a steering function for changing the movement direction and at least a front wheels 26 have a locking function for restricting movement. With the six wheels 26 to 28, the frame 21 and the footrest 24 are maintained slightly separated from the floor surface F in a horizontal manner. Due to the steering function of the six wheels 26 to 28, the assisting apparatus 1 is not only capable of moving in a front-rear direction and changing directions but is capable of moving laterally (i.e., moving directly to the side) and spin-turning (i.e., rotating on the spot).

[0016] The elevator section 3 includes the elevator 31, the elevator driver 32, an elevator cover 33, and the like. The elevator 31 is elongated in the vertical direction and is supported by the rear surface of the support column 22 in a vertically movable manner. In the present embodiment, the elevator 31 moves up and down by vertically moving with respect to the support column 22 but may also be made to move up and down by pivoting with respect to the support column 22.

[0017] An upper portion of the elevator 31 projects rearward and there is a pivot support 34 toward the rear end of the projection. A pivot driver 42, which will be described later, is arranged inside the upper portion of the elevator 31. The elevator driver 32 arranged inside the support column 22 drives the vertical movement of the elevator 31. The elevator cover 33 covers and protects the periphery and upper part of the elevator 31 and the support column 22. The elevator cover 33 is coupled to the elevator 31, and moves together vertically with the elevator 31. The lower portion of the vertically moving elevator cover 33 always overlaps the outer peripheral side of the fixed cover 23.

[0018] The pivot section 4 includes a pivot member 41, the pivot driver 42, and a first handle 43. The pivot member 41 has an arm shape. The pivot member 41 is pro-

vided so as to be capable of pivoting in the front-rear direction with respect to the elevator 31. More specifically, one end 411 of the pivot member 41 is supported by the pivot support 34 of the elevator 31 in a pivotable manner. The pivot driver 42 arranged inside the upper portion of the elevator 31 pivotally drives the one end of the pivot member 41 in the front-rear direction with the other end of the pivot member 41 as a pivoting center.

[0019] The first handle 43 is integrally provided on the one end of the pivot member 41. The first handle 43 is formed in a substantially square frame shape. The first handle 43 extends in the front upper direction from the one end of the pivot member 41. The sides of the first handle 43 are gripped by both hands of the care receiver M. Furthermore, the sides and front of the first handle 43 are gripped by a caregiver to move the assisting apparatus 1.

[0020] The body support section 5 includes a trunk support member 51, an underarm support members 52, 52, a second handle 53, and the like. The trunk support member 51 includes a support main body 511 and a cushion 512. The support main body 511 is made of metal and has a plate shape. The front underside of the support main body 511 is supported by the other end of the pivot member 41. Consequently, the support main body 511 can be tilted forward and backward with respect to the elevator 31 by the pivot driver 42.

[0021] Furthermore, the support main body 511 is supported in a free-tilting manner in the front-rear direction with respect to the pivot member 41 within a predetermined angular range. The support main body 511 is capable of free-tilting within a predetermined angle range in the clockwise direction of FIG. 2 with the state shown in FIG. 2 as the end of the predetermined angular range. It should be noted that the free-tilting does not refer to tilting driven by an actuator or the like but tilting that is done manually.

[0022] The cushion 512 is fixed to the rear top side of the support main body 511. The cushion 512 has a planar shape close to the trunk shape of the care receiver M and can be flexibly deformed. The support surface of the cushion 512 makes contact with and supports the front surface of the trunk of the care receiver M. In particular, the cushion 512 supports a portion ranging from the chest to the abdomen of the care receiver M from below.

[0023] The underarm support members 52, 52 are provided on the left and right sides of the trunk support member 51. The underarm support member 52 includes a support main body 521 and an underarm arm 522. The support main body 521 of the underarm support member 52 is made of metal and is pivotably supported by the support main body 511 of the trunk support member 51.

[0024] The underarm arm 522 supports the underarm of the care receiver M. The underarm arm 522 is a rod-shaped member formed into an -L-shape. The surface of the underarm arm 522 is covered with a material that can be flexibly deformed. The underarm arm 522 includes an underarm insertion portion 522a and a shoulder receiving portion 522b.

der receiving portion 522b.

[0025] The underarm insertion portion 522a is one extended portion of the L-shaped underarm arm 522 and has a substantially linear shape. The underarm insertion portion 522a extends rearward in FIG. 2. The underarm insertion portion 522a has a substantially linear shape and is inserted into the underarm of the care receiver M. More specifically, the underarm insertion portion 522a extends rearward from the center portion of the trunk support member 51 in the vertical direction.

[0026] The shoulder receiving portion 522b is the other extending portion of the L-shaped underarm support member 52 and has a substantially linear shape. The shoulder receiving portion 522b extends upward from the front end of the underarm insertion portion 522a in FIG. 2. The shoulder receiving portion 522b supports the front surface of the shoulder of the care receiver M. The underarm insertion portion 522a is longer than the shoulder receiving portion 522b. The support main body 521 of the underarm support member 52 is fixed to the front surface of the shoulder receiving portion 522b.

[0027] The second handle 53 is integrally provided on the front surface of the support main body 511 of the trunk support member 51. The second handle 53 has a U shape elongated in the horizontal direction. The second handle 53 includes a base shaft, being fixed to the lower end of the support main body 511 of the trunk support member 51, which is extending in the lateral direction, and a gripping portion, extending from both ends of the base shaft toward the first handle 43.

[0028] The control section 6 is provided on the top right side of the frame 21. The control section 6 controls the elevator driver 32 and the pivot driver 42 based on commands from the care receiver M or a caregiver. For the control section 6, a computer device operated with software can be used. The computer device may have a remote controller (not shown) for receiving instructions from the care receiver M or a caregiver. For the software, a standing-assistance program for assisting in standing up and a sitting-assistance program for assisting in sitting down are stored so as to be executable. A battery power supply (reference numeral omitted) which can be repeatedly charged and discharged is attached to the lower side of the control section 6. The battery power supply is also attached to the top left side of the frame 21. The battery power supply is also shared with the elevator driver 32 and the pivot driver 42.

(2. Rotating structure of the underarm support member 52)

[0029] Next, the rotating structure of the underarm support member 52 is described with reference to FIGS. 3 and 4. The support main body 521 of the underarm support member 52 is provided on the support main body 511 of the trunk support member 51 in a pivotable manner around a fulcrum 521a provided forward from the underarm insertion portion 522a. The fulcrum 521a is located

above the center in the vertical direction of the support main body 511 of the trunk support member 51 and is located at a position deviated outward from the center in the lateral direction of the support main body 511. The fulcrum 521a is located inside the underarm arms 522 in the lateral direction. That is, the fulcrum 521a is located at a position corresponding to the vicinity of the clavicle of the care receiver M. A pivot axis A of the fulcrum 521a is parallel to the normal direction of the support main body 521.

[0030] By rotating the support main body 521 of the underarm support member 52 about the fulcrum 521a with respect to the support main body 511 of the trunk support member 51, as shown by the two-dot chain line in FIG. 4, the underarm insertion portion 522a of the underarm arm 522 can laterally move away from the side of the cushion 512 of the trunk support member 51. That is, by rotating the underarm support member 52, the lateral direction and position of the underarm arm 522 changes.

(3. Position and orientation of the trunk support member 51 and the underarm support member 52)

[0031] Next, the relative position and orientation of the trunk support member 51 and the underarm support member 52 are described with reference to FIG. 2. FIG. 2 illustrates a state in which the assisting apparatus 1 is positioned at a boarding position with respect to the care receiver M in the sitting posture.

[0032] When the trunk support member 51 is at the boarding position, as shown in FIG. 2, the normal vector Na of the support surface of the cushion 512 of the trunk support member 51 in the side view (orientation shown in FIG. 2) of the assisting apparatus 1 is in the rearward and upward direction. The normal vector Na has a rearward angle of 45 to 60° with respect to the direction perpendicular to the floor surface F.

[0033] The pivot axis A of the fulcrum 521a of the side support member 52 is substantially parallel to the normal vector Na of the cushion 512 in a side view of the assisting apparatus 1. That is, when the trunk support member 51 is disposed at the boarding position, the pivot axis of the fulcrum 521a is also directed rearward and upward.

[0034] The underarm arm 522 is arranged on the side of the cushion 512 of the trunk support member 51. In the side view of the assisting apparatus 1, the underarm insertion portion 522a of the underarm arm 522 extends linearly rearward from the support surface of the cushion 512 of the trunk support member 51. The orientation of the underarm insertion portion 522a is a "boarding orientation". Consequently, there is an angle between the rearward-directed direction vector Nb of the underarm insertion portion 522a and the normal vector Na of the cushion 512. However, in the side view of the assisting apparatus 1, the normal vector Na is directed upward from the direction vector Nb.

[0035] Preferably, when the trunk support member 51

is in the boarding position, the underarm insertion portion 522a is in a boarding orientation that extends in a substantially horizontal direction. The substantially horizontal direction is meant to include a range of angles inclined 0 to 5° above and below the horizontal direction. Furthermore, the angle θ formed between the normal vector Na of the cushion 512 and the direction vector Nb of the underarm insertion portion 522a is an acute angle. The angle θ formed is preferably from 10 to 50° and more preferably from 35 to 45°.

[0036] The shoulder receiving portion 522b of the underarm arm 522 is arranged on the side of the cushion 512 of the trunk support member 51. In the side view of the assisting apparatus 1, the shoulder receiving portion 522b extends linearly upward. Preferably, the shoulder receiving portion 522b is in an orientation that extends upward and forward.

[0037] In the side view of the assisting apparatus 1, the angle ϕ formed between the direction vector Nc of the shoulder receiving portion 522b and the normal vector Na of the cushion 512 is an acute angle. The angle ϕ formed is preferably from 40 to 80° and more preferably from 45 to 60°. Further, the angle $(\theta + \phi)$ between the direction vector Nb of the underarm insertion portion 522a and the direction vector Nc of the shoulder receiving portion 522b is preferably from 90° to 120°. That is, the underarm arm 522 has an L shape having a formed angle that is a right angle or an obtuse angle.

(4. Assisting operation by the assisting apparatus 1)

[0038] Next, referring to FIGS. 2, 5, and 6, the standing-assistance operation of the assisting apparatus 1 is described. The assisting apparatus 1 assists the care receiver M sitting in a chair in the sitting posture as shown in FIG. 2, the starting posture of the standing-assistance operation, in standing to a standing posture in which the buttocks of the care receiver M is moved upward from the chair C, as shown in FIG. 6. In the standing operation, the assisting apparatus 1 assumes a starting posture of the standing-assistance operation as shown in FIG. 2, assumes the ready-to-stand state as shown in FIG. 5, and then to a standing-completion state as shown in FIG. 6.

[0039] First, the caregiver moves the assisting apparatus 1 close to the care receiver M in the sitting posture. At this time, as shown in FIG. 2, the caregiver operates the assisting apparatus 1 so that the care receiver M in a sitting posture can board the assisting apparatus 1. That is, the trunk support member 51 is positioned at the lower side of the movable range in the vertical direction and the normal vector Na of the trunk support member 51 in the side view is directed upward and rearward.

[0040] At this time, the caregiver adjusts the height of the elevator 31 according to the height of the care receiver M. Next, the care receiver M puts both legs under the body support section 5. Here, when the body support section 5 becomes obstructive, the care receiver M or

the caregiver raises the lower end of the body support section 5 by hand and allows the legs of the care receiver M to be easily inserted under the body support section 5.

[0041] Next, the care receiver M places both feet on the contact mark 241 and brings the lower legs in contact with the lower leg contact 25. Furthermore, the care receiver M places his/her trunk on the support surface of the cushion 512 of the trunk support member 51. That is, the upper body of the care receiver M is in a posture tilted slightly forward in a state of being supported by the trunk support member 5.

[0042] At the same time, the care receiver M inserts the underarm insertion portions 522a into his/her underarms. Here, the boarding orientation of the underarm insertion portion 522a extends linearly rearward of the cushion 512 of the trunk support member 51. In particular, the boarding orientation of the underarm insertion portion 522a extends in a substantially horizontal direction. Consequently, the care receiver M can easily insert the underarm insertion portions 522a into his/her underarms. Therefore, the care receiver M in the sitting posture can easily board the assisting apparatus 1.

[0043] The front end portions of the underarm insertion portions 522a are inserted into the underarms of the care receiver M and the front surfaces of the shoulders are brought in contact with the shoulder receiving portions 522b. At this time, the caregiver finely adjusts the height of the elevator 31 with consideration of the posture of the care receiver M. In this way, the assisting apparatus 1 is set to the starting state of the standing-assistance operation. Next, the caregiver has the care receiver M grip the first handle 43. The care receiver M at this time is in the starting posture of the standing-assistance operation.

[0044] Next, the caregiver starts driving the assisting apparatus 1 based on the standing-assistance program of the assisting apparatus 1. As a result, the elevation of the elevator 31 and the forward-tilt of the pivot member 41 are performed in a coordinated manner.

[0045] When the standing-assistance program is executed, the assisting apparatus 1 enters the ready-to-stand state shown in FIG. 5. The ready-to-stand state of the assisting apparatus 1 is a state immediately before lifting the care receiver M in the sitting posture from the chair C. That is, through the lowering of the elevator 31 and forward-tilting of the pivot member 41, the assisting apparatus 1 is taken from the starting posture of the standing-assistance operation shown in FIG. 2 to the ready-to-stand state shown in FIG. 5. Here, when the assisting apparatus 1 is in the ready-to-stand state, the buttocks of the care receiver M are in contact with the seat surface of the chair C and the trunk is tilted forward and extended. This posture of the care receiver M is referred to as a ready-to-stand posture.

[0046] While the assisting apparatus 1 shifts from the starting state of the standing-assistance operation to the ready-to-stand state, the body support member 51 and the underarm support members 52, 52 also tilt forward due to the forward tilt of the pivot member 41. At this time,

as shown in FIG. 5, the rear end (left end in FIG. 5) of the underarm insertion portion 522a rises upward with respect to the front end (right end in FIG. 5). Consequently, in a state in which the care receiver M is in the ready-to-stand posture, that is, before the buttocks of the care receiver M completely separate from the seat surface of the chair C, the underarm insertion portions 522a are provided to prevent the care receiver M from falling over rearward.

[0047] When the standing-assistance program is continued further, the elevator 31 is raised and the pivot member 41 further tilts forward as shown in FIG. 6, whereby the standing-assistance program ends. As a result, the care receiver M shifts from the ready-to-stand posture to the standing posture. That is, the upper body of the care receiver M in the standing posture tilts forward by a large amount and the position of the buttocks of the care receiver M is positioned higher than the seat surface of the chair C. The legs of the care receiver M are then almost completely extended.

[0048] In this way, after the care receiver M has boarded the assisting apparatus 1, by tilting the trunk support member 51 forward, the care receiver M is shifted from a standing-assistance operation starting posture of the sitting posture to a standing posture via the ready-to-stand posture. With the forward tilt of the trunk support member 51, the underarm insertion portion 522a goes into an orientation (i.e., a standing-posture orientation) that extends upward and rearward from the trunk support member 51. Consequently, as soon as the assisting apparatus 1 starts the standing-assistance operation and moves toward the standing posture via the ready-to-stand posture, the underarm insertion portion 522a supports the care receiver M from below and behind, which prevents the care receiver M from falling rearward. In this way, the assisting apparatus 1 is very safe when the care receiver M shifts to the standing posture. In particular, the assisting apparatus 1 is very safe when the care receiver M separates from the seat surface of the chair C, that is, when the care receiver M shifts from the ready-to-stand posture to the standing posture.

[0049] Further, the operation of the sitting assistance of the assisting apparatus 1 is performed by performing the standing-assistance operation in essentially the opposite manner. That is, while the trunk support member 51 tilts rearward, the elevator 31 descends, causing the care receiver M to shift from the standing posture to the sitting posture. The care receiver M in the sitting posture can then easily withdraw the underarm insertion portions 522a from his/her underarms.

(5. In the case of the large care receiver M)

[0050] Next, a case in which the care receiver M with a large physique boards the assisting apparatus 1 is described with reference to FIGS. 7 and 8. Here, it is assumed that the care receiver M with a large physique has a large chest width.

[0051] In this case, as shown in FIGS. 7 and 8, the caregiver or care receiver M pivots the underarm arm 522 around the fulcrum 521a and moves the underarm insertion portion 522a away from the side of the trunk support member 51. That is, the separation distance between the left and right underarm insertion portions 522a is increased and the trunk of the care receiver M having a large physical size can be brought into contact with the cushion 512 of the trunk support member 51.

[0052] As shown in FIG. 8, in the case in which the underarm arm 522 is pivoted and positioned at an angle different from the above-described case, the boarding orientation of the underarm insertion portions 522a is extended in a substantially horizontal direction in a similar manner as described above. Consequently, the care receiver M can easily insert the underarm insertion portions 522a into his/her underarms. Therefore, the care receiver M in the sitting posture can easily board the assisting apparatus 1 without assistance from a caregiver.

(6. Effect of the Embodiment)

[0053] The assisting apparatus 1 according to the present embodiment is an assisting apparatus that supports the upper body of the care receiver M and assists the care receiver M in standing up. The assisting apparatus 1 includes the base 2, the elevator 31 provided on the base 2 in a vertically movable manner, the trunk support member 51 formed in a planar shape, being provided to the elevator 31 in a forward-rearward tiltable manner, which supports the trunk of the care receiver M by coming into contact with the front surface of the trunk, and the underarm support members 52, 52 supported by the trunk support member 51, that support the underarms of the care receiver M.

[0054] The underarm support member 52 includes the underarm insertion portion 522a to be inserted into the underarm of the care receiver M. As shown in FIG. 2, when the trunk support member 51 is positioned at the boarding position with respect to the care receiver M in the sitting posture, the underarm insertion portion 522a is extended from the trunk support member 51 toward the rear of the care receiver M so as to be in the boarding orientation. On the other hand, as shown in FIG. 6, when the trunk support member 51 is tilted forward to shift the care receiver M to the standing posture, the underarm insertion portion 522a is extended upward and rearward from the trunk support member 51 toward the care receiver M so as to be in the standing-posture orientation.

[0055] According to the assisting apparatus 1, when the trunk support member 51 is positioned in a boarding position as shown in FIG. 2, the underarm insertion portion 522a is extended rearward so as to be in the boarding orientation. Consequently, the care receiver M in the sitting posture can easily insert the underarm insertion portions 522a into his/her underarms when boarding on the assisting apparatus 1. Consequently, the care receiver M in the sitting posture may comfortably board on the

assisting apparatus 1.

[0056] Further, after the care receiver M has boarded the assisting apparatus 1, the care receiver M is shifted from the sitting posture to the standing posture by tilting the trunk support member 51 forward. With the forward tilt of the trunk support member 51, the underarm insertion portion 522a goes into an orientation (i.e. a standing-posture orientation) that prevents the care receiver M from falling rearward. Consequently, when shifting to the standing posture, the underarm insertion portion 522a supports the care receiver M in the standing posture from below and behind and is, therefore, very safe.

[0057] In particular, as shown in FIG. 5, when the care receiver M is shifted from the standing-assistance operation starting posture of the sitting posture to the ready-to-stand posture by tilting the trunk support member 51 forward, the underarm insertion portion 522a becomes a standing-posture orientation that extends upward and to the rear of the care receiver M from the trunk support member 51. Thereafter, as shown in FIG. 6, when the care receiver M is shifted from the ready-to-stand posture to the standing posture by further tilting the trunk support member 51 forward, the underarm insertion portion 522a rises further.

[0058] Consequently, immediately before the buttocks of the care receiver M separate from the seat surface of the chair C, the underarm insertion portion 522a supports the care receiver M in the standing posture from below and behind. As a result, the assisting apparatus 1 is very safe when the care receiver M separates from the seat surface of the chair C, that is, when the care receiver M shifts from the ready-to-stand posture to the standing posture.

[0059] Further, the underarm support member 52 is provided at the front end of the underarm insertion portion 522a, is located on the side of the trunk support member 51, and further includes the shoulder receiving portion 522b for supporting the front of the shoulder of the care receiver M. With the underarm support member 52 having the underarm insertion portion 522a and the shoulder receiving portion 522b, the care receiver M is supported in a stable manner at a position of the underarm insertion portion 522a that is close to the shoulder receiving portion 522b. Consequently, the care receiver M is supported at the front of the trunk by the trunk support member 51, at the front of the shoulder by the shoulder receiving portions 522b of the underarm support member 52, and at the underarms from below by the underarm insertion portions 522a of the underarm support member 52. Hence, the care receiver M is in a state of being supported stably in the assisting apparatus 1.

[0060] Further, the underarm support member 52 has an L shape of which one extending portion is the underarm insertion portion 522a, and of which an other extending portion is the shoulder receiving portion 522b. As a result, the care receiver M can comfortably board the assisting apparatus 1 and the experience of being on the assisting apparatus 1 becomes favorable.

[0061] Further, the underarm insertion portion 522a is longer than the shoulder receiving portion 522b. As a result, in a state in which the care receiver M has boarded the assisting apparatus 1, since the underarm insertion portion 522a is located sufficiently behind the underarm of the care receiver M, falling rearward is unlikely and a sense of security is provided to the care receiver M. On the other hand, since the shoulder receiving portion 522b is relatively short, in a state in which the care receiver M has boarded the assisting apparatus 1, the care receiver M does not feel constricted by the shoulder receiving portion 522b.

[0062] Further, the underarm insertion portion 522a and the shoulder receiving portion 522b of the underarm support member 52 is formed by a rod-shaped member. In particular, the underarm insertion portion 522a is formed from the rod-shaped member into a linear shape, and the shoulder receiving portion 522b is also formed from the rod-shaped member into a linear shape. The underarm insertion portion 522a and the shoulder receiving portion 522b are provided such that there is an angle therebetween. That is, the underarm insertion portion 522a and the shoulder receiving portion 522b are formed together from the rod-shaped member into a bent shape.

[0063] Thus, since the underarm insertion portion 522a is a linear rod member, the care receiver M may have an impression such that the underarm insertion portions 522a are easy to insert into the underarms. From this, the care receiver M may have a sense such that the assisting apparatus 1 is comfortable to board. Furthermore, in a state in which the care receiver M boards on the assisting apparatus 1, since the underarm insertion portion 522a is a linear rod member, the care receiver M may obtain a sense that the underarm insertion portions 522a are interposed in his/her underarms. That is, the care receiver M can obtain a sense of security that he/she is being supported by the underarm insertion portions 522a.

[0064] Furthermore, in a state in which the care receiver in the sitting posture boards on the assisting apparatus, it is easy to move the arm back and forth since the underarm insertion portion 522a is a linear rod member. That is, from the viewpoint of the care receiver M, the experience of being on the assisting apparatus becomes favorable. Even if the care receiver M moves his/her arm back and forth, the care receiver M can easily maintain the state of interposing the underarm insertion portions 522a in his/her underarms. From this, the care receiver M can have a favorable experience of being on the assisting apparatus 1 and obtain a sense of security.

[0065] Further, the underarm insertion portions 522a are formed so as to extend toward the rear of the care receiver M from the center in a vertical direction of the trunk support member 51. That is, the trunk support member 51 supports the trunk of the care receiver M, from the chest portion above the underarms to the abdomen portion below the underarms. Thus, since the trunk of the care receiver M is supported by the trunk support

member 51 over a wide range, the sense of security of the care receiver M is favorable.

[0066] Further, when the trunk support member 51 is positioned in the boarding position with respect to the care receiver M in the sitting posture, the underarm insertion portions 522a are in a boarding orientation in which they are extended substantially in a horizontal direction. Thus, the care receiver M in the sitting posture can easily insert the underarm insertion portions 522a into his/her underarms. Consequently, the care receiver M in the sitting posture may comfortably board on the assisting apparatus 1.

[0067] Further, in the side view of the assisting apparatus 1, the angle θ between the rearward-directed direction vector Nb of the underarm insertion portion 522a and the normal vector Na of the support surface of the trunk support member 51 is an acute angle. When the trunk support member 51 is in the boarding position, the normal vector Na is directed more upward than the rearward-directed direction vector Nb of the underarm insertion portion 522a.

[0068] Consequently, it is possible to set the underarm insertion portion 522a in an orientation that extends in the horizontal direction while the support surface of the trunk support member 51 is tilted forward from the vertical direction. In a state in which the trunk of the care receiver M is supported by the trunk support member 51, the care receiver M can obtain a sense of stability due to the support surface of the trunk support member 51 being tilted forward. At the same time, the rear end of the underarm insertion portion 522a can be prevented from being disposed at a high position. Consequently, the care receiver M in the sitting posture can easily insert the underarm insertion portions 522a into his/her underarms. Thus, the assisting apparatus 1 can achieve compatibility between giving a sense of stability with the forward-tilted trunk support member 51 and facilitating boarding.

[0069] Further, the angle θ of the rearward-directed direction vector Nb of the underarm insertion portion 522a and the normal vector Na of the support surface of the trunk support member 51 is preferably 10° to 50° , and more preferably 35° to 45° . From this, the assisting apparatus 1 can reliably achieve compatibility between giving a sense of stability with the forward-tilted trunk support member 51 and facilitating boarding.

[0070] In particular, when the trunk support member 51 is in the boarding position, in the side view of the assisting apparatus 1, with the normal vector Na of the trunk support member 51 being 45° to 60° rearward with respect to the vertical direction of the floor surface, the angle θ between the direction vector Nb and the normal vector Na is preferably 10° to 50° . From this, the care receiver M can easily get on the forward-tilted trunk support member 51 and obtain a sense of security that he/she is being supported in a state in which the trunk is being supported by the trunk support member 51 and the underarm insertion portions 522a become easy to insert into the underarms.

[0071] Further, the underarm support member 52 is provided on the trunk support member 51 in a rotatable manner around the fulcrum 521a provided further toward the front of the care receiver M than the underarm insertion portion 522a. When the trunk support member 51 is positioned in the boarding position and the underarm support member 52 is rotated with respect to the trunk support member 51, the underarm insertion portion 522a has a boarding orientation that extends from the trunk support member 51 toward the rear of the care receiver M.

[0072] From this, when the care receiver M inserts the underarm insertion portion 522a into the underarm, the underarm insertion portion 522a rotates around the fulcrum 521a provided at the front so as to match the position of the underarm of the care receiver M. Consequently, the care receiver M can easily get into the assisting apparatus 1 since the position of the underarm insertion portions 522a can be matched with the physique of the care receiver M. Furthermore, even if the underarm insertion portion 522a is rotated about the fulcrum 521a, the underarm insertion portion 522a extends rearward from the trunk support member 51. Consequently, irrespective of the physique of the care receiver M, the care receiver M may easily board on the assisting apparatus 1.

[0073] Further, when the trunk support member 51 is in the boarding position and the underarm support member 52 is positioned at a different angle with respect to the trunk support member 51, the underarm insertion portion 522a has a boarding orientation that extends in a substantially horizontal direction. Thus, regardless of the physique of the care receiver M, the care receiver M in the sitting posture can easily insert the underarm insertion portions 522a into the underarms. Consequently, the care receiver M in the sitting posture may comfortably board on the assisting apparatus 1.

DESCRIPTION OF SYMBOLS

[0074] 1: an assisting apparatus, 2: a base, 3: an elevator section, 4: a pivot portion, 5: a trunk support member, 6: a control section, 31: an elevator, 32: an elevator driver, 41: pivot member, 42: pivot driver, 51: trunk support member, 52: underarm support member, 511: support main body, 512: cushion, 521: support main body, 521a: fulcrum, 522: underarm arm, 522a: underarm insertion portion, 522b: shoulder receiving portion, A: pivot axis, M: care receiver, Na: normal vector of the support surface of the cushion of the trunk support member as viewed from the side, Nb: direction vector toward the rear of the underarm insertion portion as viewed from the side, Nc: direction vector of the shoulder receiving portion as viewed from the side, θ : angle formed between the normal vector Na and the direction vector Nb, ϕ : angle formed between the normal vector Na and the direction vector Nc

Claims

1. An assisting apparatus that supports an upper body of a care receiver for assisting a care receiver in standing up, comprising:

a base,
an elevator provided on the base in a vertically movable manner,
a trunk support member formed in a planar shape, being provided to the elevator in a forward-rearward tiltable manner, which supports a trunk of the care receiver by coming into contact with a front surface of the trunk, and
an underarm support member, being supported by the trunk support member, which supports an underarm of the care receiver,
wherein the underarm support member includes an underarm insertion portion to be inserted into the underarm of the care receiver,
wherein the underarm insertion portion is extended from the trunk support member toward a rear of the care receiver so as to be in a boarding orientation when the trunk support member is positioned at a boarding position with respect to the care receiver in a sitting posture, and
wherein the underarm insertion portion is extended upward and rearward from the trunk support member toward the care receiver so as to be in a standing-posture orientation when the trunk support member is tilted forward to shift the care receiver to a standing posture.

2. The assisting apparatus according to claim 1, wherein the underarm support member is provided at a front end of the underarm insertion portion, and is located on a side of the trunk support member, and further includes a shoulder receiving portion for supporting a front of the shoulder of the care receiver.
3. The assisting apparatus according to claim 2, wherein the underarm support member has an L shape of which one extending portion is the underarm insertion portion, and of which an other extending portion is the shoulder receiving portion.
4. The assisting apparatus according to claim 3, wherein the underarm insertion portion is longer than the shoulder receiving portion.
5. The assisting apparatus according to any one of claims 1 to 4, wherein the underarm insertion portion extends toward a rear of the care receiver from a center in a vertical direction of the trunk support member.
6. The assisting apparatus according to any one of claims 1 to 5,

wherein the underarm insertion portion is in a boarding orientation that is extended substantially in a horizontal direction when the trunk support member is positioned in the boarding position with respect to the care receiver in the sitting posture.

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7. The assisting apparatus according to any one of claims 1 to 6,
wherein, in a side view of the assisting apparatus, an angle between a rearward-directed direction vector of the underarm insertion portion and a normal vector of a support surface of the trunk support member is an acute angle, and when the trunk support member is at the boarding position, the normal vector of the support surface is directed more upward than the rearward-directed direction vector of the underarm insertion portion.
8. The assisting apparatus according to claim 7, wherein the angle formed between the rearward-directed direction vector of the underarm insertion portion and the normal vector of the support surface is 10° to 50°.
9. The assisting apparatus according to any one of claims 1 to 8,
wherein the underarm support member is provided on the trunk support member in a pivotable manner around a fulcrum provided more forwardly from the care receiver than the underarm insertion portion, and
wherein the underarm insertion portion has a boarding orientation that extends from the trunk support member toward a rear of the care receiver when the trunk support member is positioned in the boarding position and the underarm support member is rotated with respect to the trunk support member.
10. The assisting apparatus according to claim 9, wherein the underarm insertion portion has the boarding orientation that extends in a substantially horizontal direction when the trunk support member is in the boarding position and the underarm support member is positioned at a different angle with respect to the trunk support member.

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Fig. 1

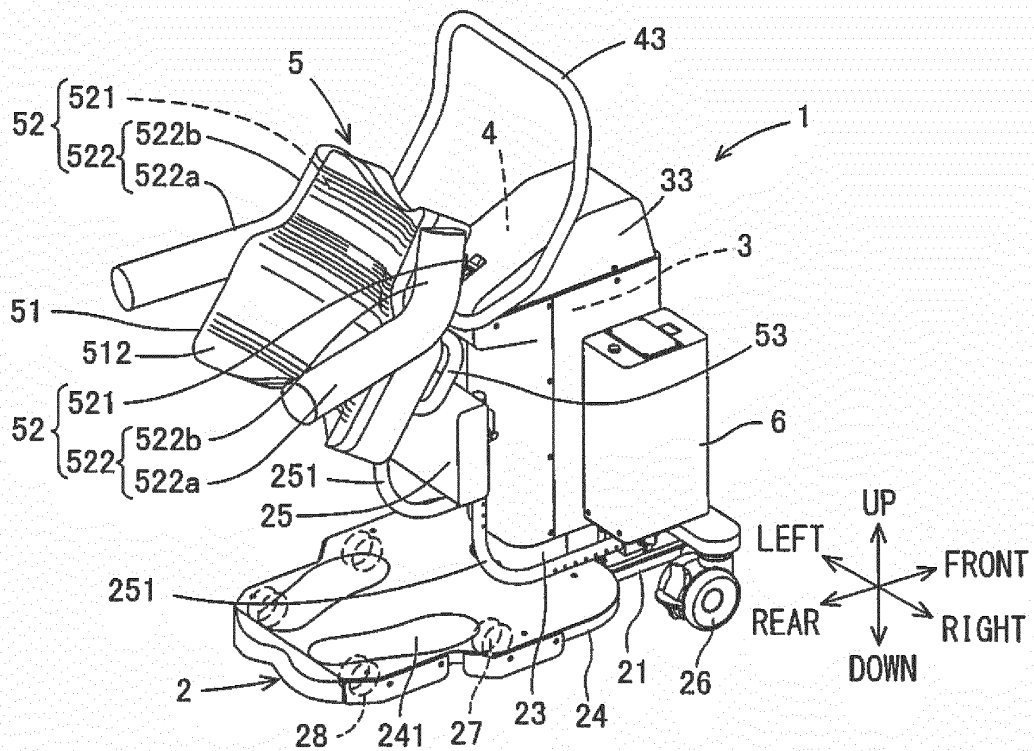


Fig. 2

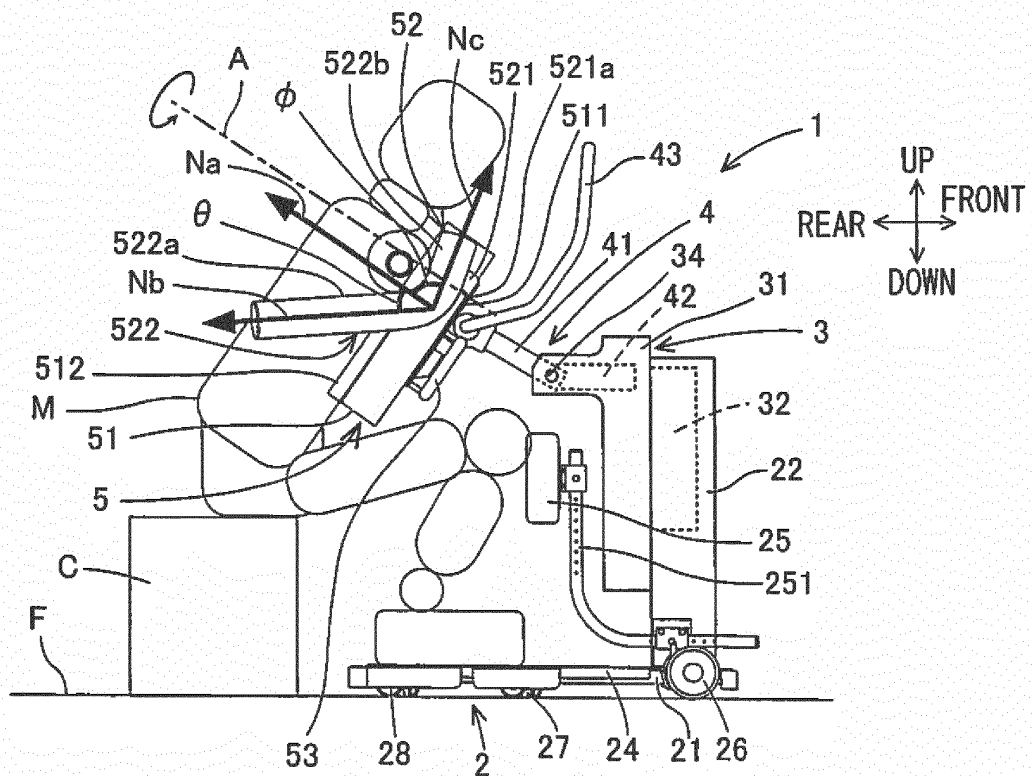


Fig. 3

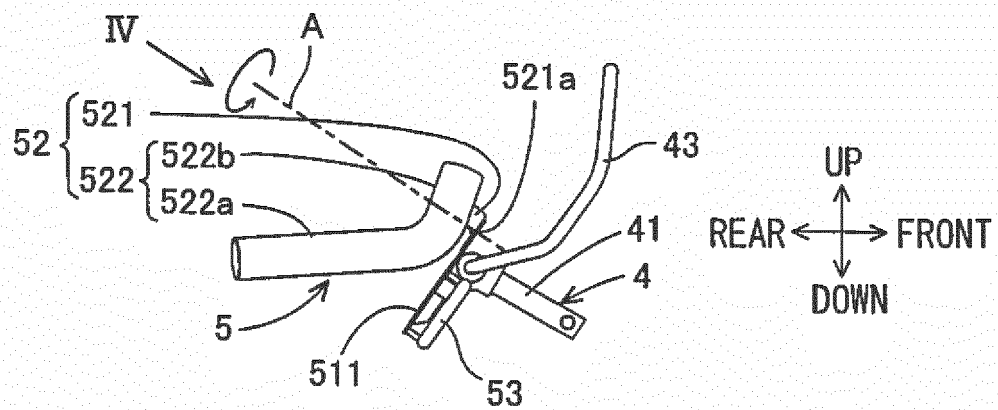


Fig. 4

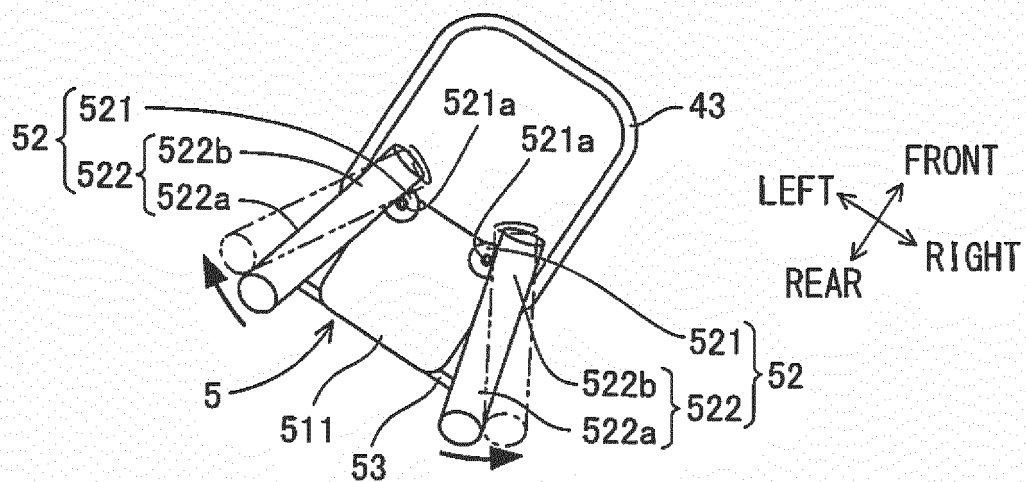


Fig. 5

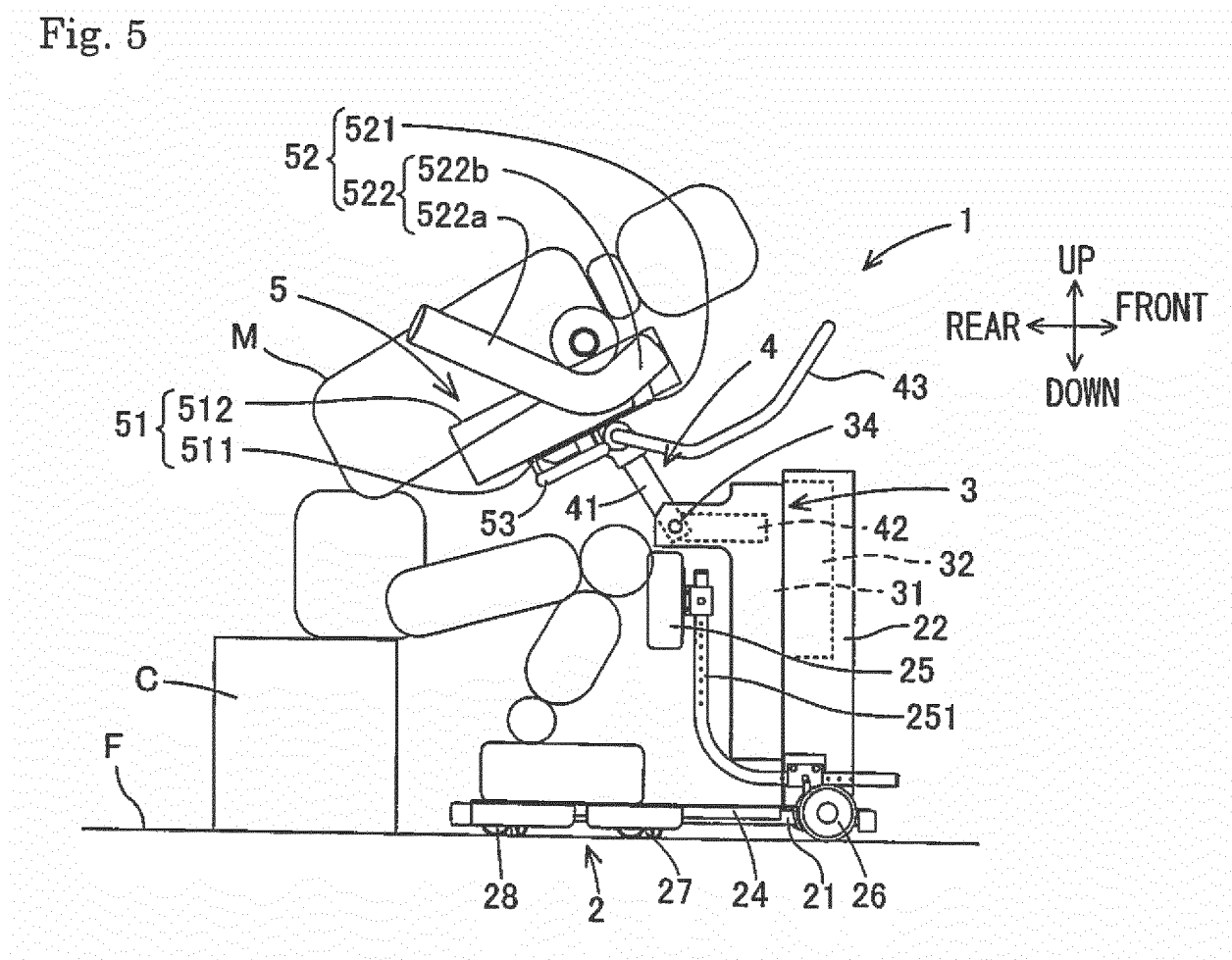


Fig. 6

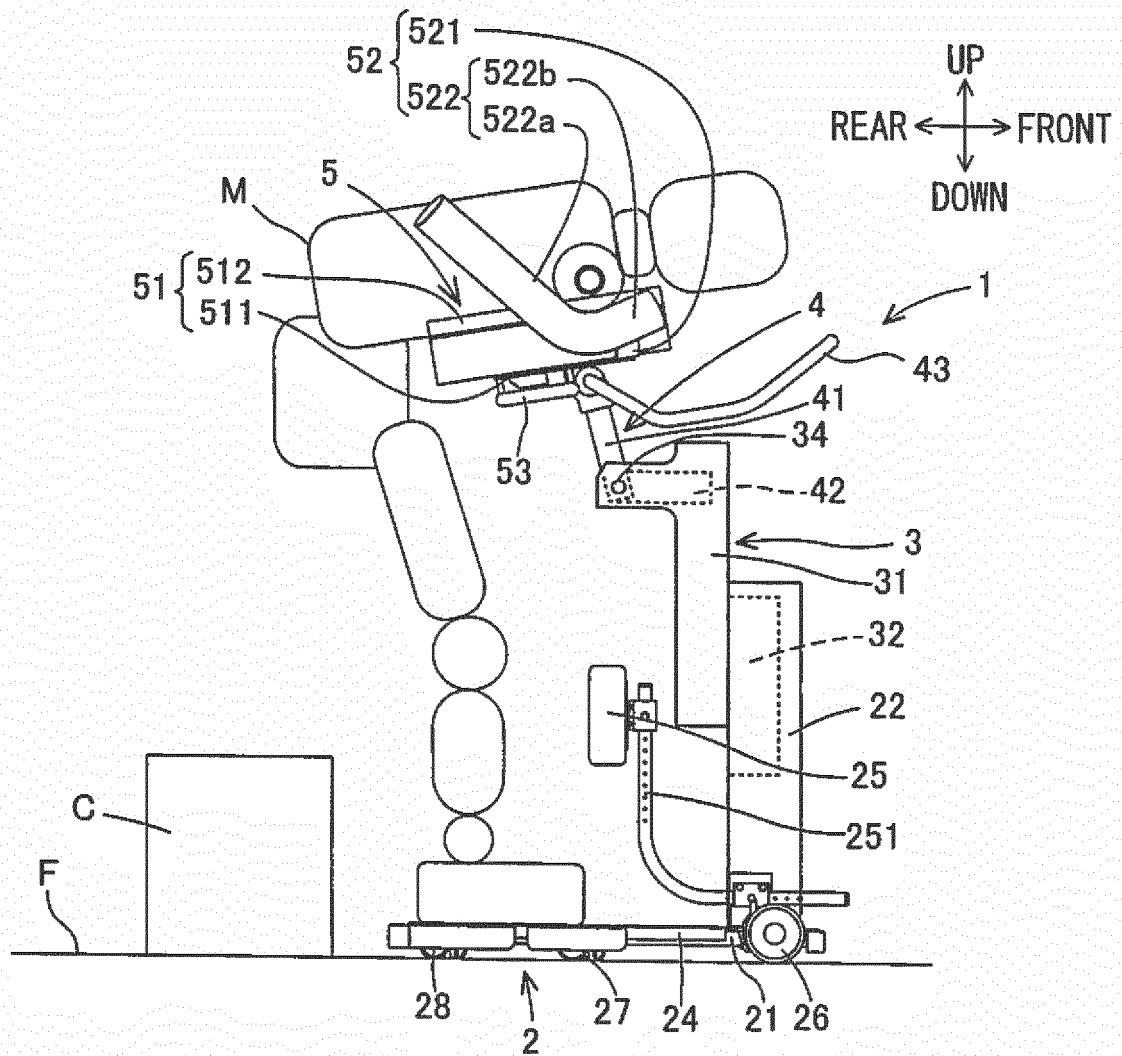


Fig. 7

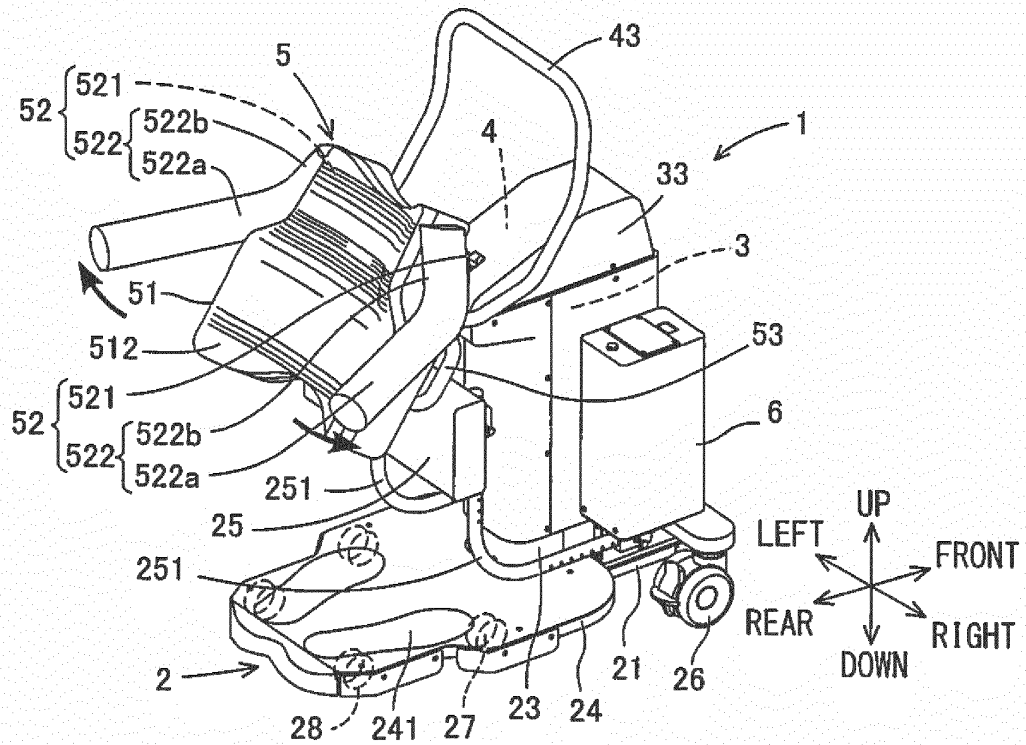
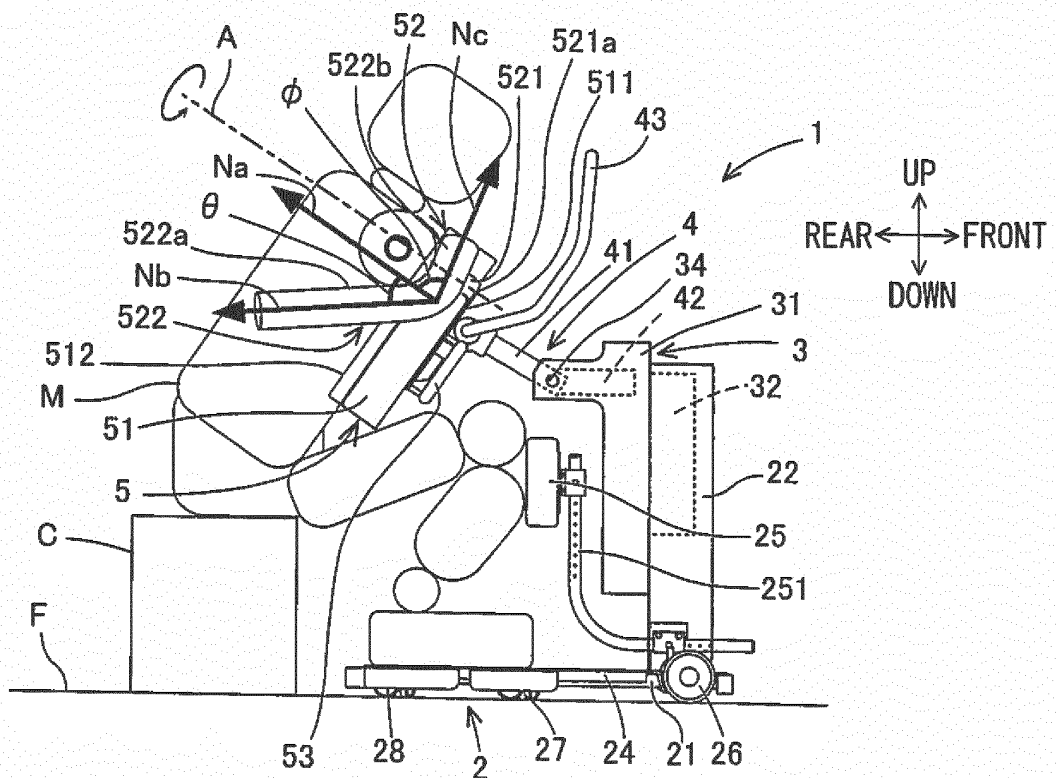


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2016/069400

5	A. CLASSIFICATION OF SUBJECT MATTER A61G5/14(2006.01)i, A61G7/14(2006.01)i		
	According to International Patent Classification (IPC) or to both national classification and IPC		
10	B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A61G5/14, A61G7/14		
15	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2016 Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016		
	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
20	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
25	X Y	JP 10-192344 A (The Japan Steel Works, Ltd.), 28 July 1998 (28.07.1998), paragraphs [0013] to [0027]; fig. 1 to 4 (Family: none)	1, 5-8 2-4, 9-10
30	Y A	JP 2005-168564 A (Sakai Medical Co., Ltd.), 30 June 2005 (30.06.2005), paragraphs [0004] to [0008], [0024] to [0036]; fig. 1 to 7 (Family: none)	2-10 1
35			
40	<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
45	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
50	Date of the actual completion of the international search 05 September 2016 (05.09.16)		Date of mailing of the international search report 20 September 2016 (20.09.16)
55	Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan		Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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