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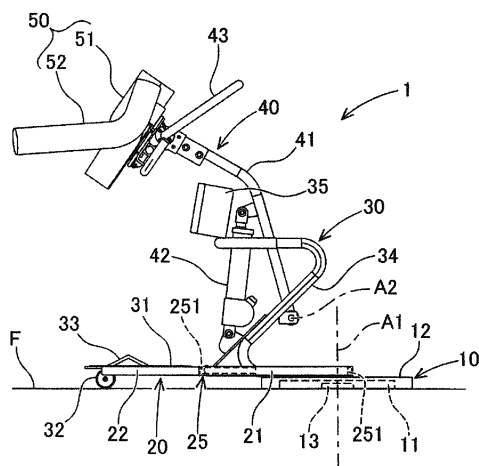
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(54) **ASSISTANCE DEVICE**

(57) An assistance device includes a rotary table provided on a floor surface of a room and being rotatable about an axis parallel to the vertical direction, a slide member provided on the rotary table and being slidable in the horizontal direction, and a support member provided on a slide member and supporting an upper body of

a care receiver. The slide member slides the support member between a position outside the room, where the care receiver gets on and off the support member, and a position inside the room, where the care receiver supported by the support member is in a state of being placed in the room.

Fig. 1



Description

Technical Field

[0001] The present invention relates to an assistance device.

Background Art

[0002] Patent Literature 1 discloses an assistance device configured to assist a transfer operation of a care receiver. In the assistance device, in assisting the transfer operation, the buttocks of the care receiver in the sitting posture are lifted from a seat surface, the direction is changed, and then the buttocks of the care receiver are lowered to be seated. In this way, the care receiver is transferred from a bed to a wheelchair, for example.

Patent Literature

[0003] Patent Literature 1: JP-A-2008-073501

Summary of the Invention

Technical Problem

[0004] Such an assistance device has been installed in rooms with limited space, such as toilet rooms. In such cases, it is desirable to improve usability of the assistance device such as in securing the range of mobility, within which the care receiver can move until the transfer target while preventing the care receiver from coming into contact with walls when rotating.

[0005] It is an object of the present specification to provide an assistance device capable of reducing the burden on the caregiver and the care receiver by improving the usability of the assistance device installed in a room having limited space.

Solution to Problem

[0006] The present specification discloses a first assistance device comprising: a rotary table mounted on a floor surface of a room and rotatable about an axis parallel to a vertical direction; a slide member mounted on the rotary table and slidable in a horizontal direction; and a support member, mounted on the slide member, configured to support an upper body of a care receiver; wherein the slide member slides the support member between a first position outside the room, where the care receiver gets on and off the support member, and a second position inside the room, where the care receiver supported by the support member is in a state of being placed inside the room.

[0007] The present specification discloses a second assistance device comprising: a rotary table installed on a floor surface of a room and rotatable about an axis parallel to a vertical direction; a slide member mounted

on the rotary table and slidable in a horizontal direction; a support member, mounted on the slide member, configured to support an upper body of a care receiver; and an angle setting device configured to set the angle of the rotary table, wherein a rotatable range of the rotary table includes a first angle at which a sliding direction of the slide member faces an entrance of the room and a second angle at which the sliding direction of the slide member faces a transfer target provided in the room; and the angle setting device sets the angle of the rotary table at the first angle and the second angle.

Advantageous Effect of the Invention

[0008] With the first assistance device, the care receiver supported by the support member can be moved from outside the room to inside the room with the slide member. As a result, the distance from the rotational center of the rotary table to the outermost portion can be shortened so that the direction can be changed within a small space. After the direction is changed, the care receiver is moved to the transfer target by the slide member properly slid. That is, in the above-described configuration, the slide member can be extended and contracted at an angle required for the transfer operation. As a result, the usability of the assistance device installed in a room with limited space can be improved, and the burden on the caregiver and the care receiver can be reduced.

[0009] With the second assistance device, it is possible to secure the rotatable range of the rotary table in the rotation direction by sliding of the slide member. As a result, the distance from the rotational center of the rotary table to the outermost portion can be shortened so that the direction can be changed within a small space. The angles of the rotary table are also set at the first angle and the second angle within a range rotatable by the angle setting device. As a result, it is easy for the caregiver or the like to set the angle to the first angle or the second angle when rotating the rotary table, thereby improving the operability of the assistance device.

[0010] After the direction is changed, the care receiver is moved to the transfer target by the slide member properly slid. That is, in the above-described configuration, the slide member can be extended and contracted at an angle required for the transfer operation. As a result, the usability of the assistance device installed in a room with limited space can be improved, and the burden on the caregiver and the care receiver can be reduced.

Brief Description of Drawings

[0011]

[Fig. 1] A side view of an assistance device of an embodiment viewed from the right side, illustrating an extended and retractable slide device.

[Fig. 2] A top view of the assistance device of Fig. 1.

[Fig. 3] A block diagram showing a control device of

the assistance device.

[Fig. 4] A side view illustrating the assistance device supporting a care receiver in a sitting posture.

[Fig. 5] A side view illustrating the assistance device supporting the care receiver in a standing posture.

[Fig. 6] A side view illustrating a state in which the slide device is contracted and the care receiver is moved forward.

[Fig. 7] A top view illustrating the states before and after an operation of the assistance device, with the care receiver omitted, in which the slide device is contracted so as to put the care receiver into the toilet room.

[Fig. 8] A top view illustrating the state before and after rotation of the assistance device, with the care receiver omitted, in which the rotation device is rotated so as to change the direction of the care receiver.

[Fig. 9] A top view illustrating the state before and after the operation of the assistance device, with the care receiver omitted, with the slide device extended so that the care receiver approaches the transfer target.

Description of Embodiment

(1. Embodiment)

(1-1. Summary of assistance device 1)

[0012] Assistance device 1 supports the upper body of care receiver M (see Fig. 4, etc.) to change the direction of care receiver M who is in a sitting posture and assist in a transfer operation in which care receiver M is re-seated in another position. In assisting the transfer operation of the present embodiment, assistance device 1 assists an operation of lifting buttocks Mt of care receiver M who is in the sitting posture from a seat surface (i.e., a buttocks lifting operation) and an operation of lowering and seating buttocks Mt after changing direction (i.e., a buttocks lowering operation).

[0013] Here, the buttocks lifting operation includes an erecting operation from the sitting posture to the standing posture and an operation from the sitting posture to a stooping posture. The buttocks lowering operation includes a seating operation from the standing posture to the sitting posture and a seating operation from the stooping posture to the sitting posture. Since assistance device 1 supports the upper body of care receiver M in the standing posture or the stooping posture, a single caregiver can operate assistance device 1 to transfer care receiver M. As a result, care receiver M is transferred between, for example, the riding position of assistance device 1 and the transfer target installed in the room of a assisting facility.

[0014] The standing posture refers to a posture in which the lower body of care receiver M is upright while the orientation of the upper body is not limited. The stoop-

ing posture refers to a state in which the lower body of care receiver M is in a posture between the sitting posture and the standing posture in which buttocks Mt of care receiver M is separated from the seat surface and the knees are bent.

(1-2. Configuration of assistance device 1)

[0015] The configuration of assistance device 1 will be described below mainly with reference to Figs. 1 to 3. As shown in Figs. 1 to 3, assistance device 1 includes rotation device 10, slide device 20, base 30, supporting device 40, and control device 60. Rotation device 10 is installed on floor surface F and rotatably supports slide device 20 and the like provided on the upper surface. Rotation device 10 includes fixed section 11, rotating table 12, rotation restricting section 13, first operation pedal 14, and angle setting device 15.

[0016] Fixed section 11 is fixed at a predetermined position on floor surface F. Fixed section 11 can be detachably fixed in a predetermined position on floor surface F by, for example, fitting with a fixing pin (not shown) provided on floor surface F. Rotating table 12 is supported by fixed section 11 so as to be freely rotatable about an axis A1 parallel to the vertical direction. Here, the term "freely rotatable" refers to a state in which the rotation can be performed, for example, by an external force such as an operational ability of a caregiver, without a driving force or a braking mechanism being applied by an actuator or the like to control the rotation angle.

[0017] Rotation restricting section 13 switches between a state in which the rotation of rotating table 12 is restricted and a state in which the rotation of rotating table 12 is permitted. In the present embodiment, rotation restricting section 13 switches between restricting and permitting the rotation of rotating table 12 whenever first operation pedal 14 is stepped on. Rotation restricting section 13 is configured to be capable of switching between restricting and permitting the rotation based on control by control device 60. Rotation restricting section 13 is provided in fixed section 11, for example, and restricts the rotation of rotary table 12, which can rotate while facing rotation restricting section 13, by engaging a pin with or pressing a friction plate against rotating table 12. When the restriction of rotation restricting section 13 is released, rotating table 12 is freely rotatable within a rotatable angular range.

[0018] Angle setting device 15 sets the angle of rotating table 12 at two or more predetermined angles, in this embodiment, first angle N1 and second angle N2 shown in Fig. 8. Here, angle setting includes restricting the rotation of rotating table 12 so as to define the end limits of the rotatable angular range of rotating table 12 as well as maintaining rotating table 12 at a specific angle within the rotatable angular range. In the present embodiment, as shown in Fig. 2, angle setting device 15 includes a pair of protrusions 151 on the fixed section 11 side and engaging portion 152 on the rotating table 12 side.

[0019] Angle setting device 15 restricts the rotation of rotating table 12 by engaging with engaging portion 152 provided on the inner peripheral surface of rotating table 12 with either one of the pair of protrusions 151 provided at two positions of the outer peripheral surface of fixed section 11, shifted by 90 degrees in the circumferential direction. As a result, angle setting device 15 sets rotatable angular range Ra of rotating table 12 (see Fig. 8) according to the positions of the pair of protrusions 151. Thus, angle setting device 15 sets the angles of rotating table 12 at first angle N1 and second angle N2 to prevent rotation of rotating table 12 beyond rotatable angular range Ra.

[0020] Slide device 20 is provided on the upper surface of rotation device 10 and slidably supports base 30 and the like with respect to rotation device 10. Slide device 20 includes a pair of rails 21, slide member 22, slide restricting section 23, second operation pedal 24, and positioning device 25. The pair of rails 21 extend horizontally in parallel with each other. One end of the pair of rails 21 is fixed to the upper surface of rotating table 12. The other end of the pair of rails 21 project radially outward from the outer edge of rotary table 12.

[0021] Slide member 22 is interposed between the pair of rails 21, and is provided on rotating table 12 via the pair of rails 21. Thus, slide member 22 is configured to be freely slidable in the sliding direction in which the pair of rails 21 extend. Here, the term "freely slidable" refers to a state in which neither a driving force or a braking mechanism is applied by an actuator or the like to control the slide position and the sliding is done, for example, by an external force such as a manual operation of a caregiver.

[0022] Slide restricting section 23 switches between restricting and permitting the sliding of slide member 22. In the present embodiment, slide restricting section 23 switches between restricting and permitting the sliding of slide member 22 whenever second operation pedal 24 is stepped on. Further, slide restricting section 23 is configured to be capable of switching between restricting and permitting the sliding based on control by control device 60. Slide restricting section 23 is provided on, for example, a pair of rails 21, and restricts the sliding of slide member 22 by engaging a pin with or pressing a friction plate against slidable slide member 22. When the restriction by slide restriction section 23 is released, slide member 22 is freely slidable within a movable range of slide member 22.

[0023] Positioning device 25 positions slide member 22 at two or more predetermined positions (in the present embodiment, first position P1 and second position P2 shown in Fig. 7). Here, positioning includes restricting the sliding of slide member 22 so as to define the end limits of the movable range of slide member 22 as well as maintaining slide member 22 at a specific position within the movable range. In the present embodiment, as shown in Fig. 1, positioning device 25 is configured by a pair of slide stoppers 251 on the rail 21 side.

[0024] Positioning device 25 restricts the sliding of slide member 22 by engaging the end of slide member 22 with one of a pair of slide stoppers 251 provided at two positions of the front end and the rear end on the inside of rails 21 and prevents the slide member 22 from falling off from the pair of rails 21. As a result, positioning device 25 sets movable range Rs of slide member 22 (see Fig. 7) in accordance with the positions of the pair of slide stoppers. Thus, positioning device 25 positions slide member 22 at first position P1 and second position P2 to prevent slide member 22 from sliding beyond movable range Rs.

[0025] Base 30 is provided on slide member 22 of slide device 20. Base 30 includes foot mount 31, a pair of wheels 32, operation section 33, frame 34, and lower leg contact 35. Foot mount 31 is fixed to slide member 22 and is provided substantially horizontally near floor surface F. As shown in Fig. 2, feet-shaped contact mark 311 for guiding the position on which care receiver M places his/her feet is drawn on the upper surface of foot mount 31.

[0026] A pair of wheels 32 are provided on the right and left on the lower side of foot mount 31. As a result, one end side of base 30 is supported by the pair of wheels 32. The other end of base 30 is supported by rotating table 12 via slide member 22. The pair of wheels 32 has a steering function to change the moving direction. As a result, base 30 is configured to be capable of changing direction in accordance with the rotation of rotating table 12 about axis A1 at any slide position.

[0027] As shown in Fig. 1, operating section 33 is fixed to the end portion in the left-right direction on the upper surface of foot mount 31. In the present embodiment, operation section 33 has an inverted V shape with a pair of inclined surfaces inclined forward and backward in the sliding direction of slide member 22. Operation section 33 enables the operation of rotating rotary table 12 or the operation of sliding slide member 22 by force of the caregiver's leg.

[0028] Frame 34 is fixed to an end portion of foot mount 31 on the side of rotating table 12. As shown in Fig. 1, frame 34 extends obliquely upward from the position where it is fixed to foot mount 31, curves rearward, and then extends in a substantially horizontal manner. Frame 34 supports lower leg contact 35 and supporting device 40. Lower leg contact 35 is provided above an area slightly to the front of contact mark 311 of foot mount 31. Lower leg contact 35 is made of a cushion material extending in the left-right direction. Lower leg contact 35 is a portion in contact with the lower legs of care receiver M. Lower leg contact 35 is configured to be adjustable in positioning height.

[0029] Supporting device 40 is provided on frame 34 of base 30. Supporting device 40 includes arm 41, driving device 42, handle 43, and support member 50. One end of arm 41 is supported so as to be swingable around horizontal axis A2 set at a predetermined position of frame 34 in the left-right direction. Arm 41 is driven by

driving device 42 which connects a lower portion of frame 34 with a middle portion of arm 41. In the present embodiment, driving device 42 expands and contracts a rod by supplying hydraulic fluid to a hydraulic cylinder. Arm 41 is configured such that the swing angle varies depending on the amount of expansion or contraction of driving device 42.

[0030] When assistance device 1 assists the buttocks lifting operation, driving device 42 extends and arm 41 pivots rearward. On the other hand, when assistance device 1 assists the buttocks lowering operation, driving device 42 contracts and arm 41 pivots rearward. Handle 43 is fixed to the other end of arm 41, that is, the end opposite the end connected to frame 34. Handle 43 extends forward and upward from the end of arm 41. Handle 43 is used as a part grasped by both hands of care receiver M. Further, the side and front of handle 43 are used as parts that are grasped by the caregiver to rotate or slide assistance device 1.

[0031] Support member 50 supports the upper body of care receiver M. Support member 50 is detachably fixed to arm 41. In this manner, support member 50 is provided on slide member 22 via arm 41 and frame 34. When arm 41 swings with respect to frame 34 by the driving of driving device 42, support member 50 tilts in the front-rear direction with respect to slide member 22.

[0032] Support member 50 includes trunk support section 51 and a pair of side support sections 52. Trunk support section 51 has a surface shape close to the trunk shape of care receiver M and can be flexibly deformed. The support surface of trunk support section 51 is in surface contact with the front surface of the trunk of the upper body of care receiver M and supports the trunk. Trunk support section 51 is attached to arm 41. The pair of side support sections 52 support both sides of care receiver M. More specifically, the pair of side support sections 52 are provided so as to be swingable to the left and right of trunk support section 51. Each side support section 52 is a rod-shaped member having an L-shape. The surface of side support section 52 is covered with a flexible deformable material.

[0033] Control device 60 is incorporated in a control unit (not shown) provided on base 30. In addition to control device 60, the control unit includes a hydraulic pump for driving driving device 42, a battery power source for control, and the like. As shown in Fig. 3, control device 60 includes drive control section 61 and controller 62. When assistance device 1 assists the buttocks lifting operation or the buttocks lowering operation of care receiver M, drive control section 61 controls the movement of support member 50 by driving driving device 42 based on instructions received by controller 62 from care receiver M or the caregiver.

[0034] When arm 41 of support device 40 swings, control device 60 regulates the rotation of rotary table 12. Specifically, rotation restricting section 13 of rotation device 10 switches to a state in which the rotation of rotating table 12 is restricted when driving device 42 is driven

based on a control signal from control device 60. As a result, rotary table 12 is locked with respect to fixed section 11 and cannot be rotated while support member 50 is pivoted forward or rearward.

[0035] Further, control device 60 regulates the sliding of slide member 22 when arm 41 of support device 40 swings. Specifically, slide restricting section 23 of slide device 20 switches to a state in which the slide of slide member 22 is restricted when driving device 42 is driven based on a control signal from control device 60. As a result, slide member 22 is locked with respect to the pair of rails 21 and cannot slide while support member 50 is pivoted forward or rearward.

(1-3. Assistance of transfer operation by assistance device 1)

[0036] The process of assisting the transfer operation by assistance device 1 will be described with reference to Figs. 4 to 9. Here, assistance device 1 is installed in a room in which a transfer target provided, for example, in an assisting facility. In the present embodiment, as shown in Fig. 7, the assisting facility includes toilet room 80 in which toilet 85, which is the transfer target, is installed. Toilet room 80 is defined by front wall 81 and rear wall 82 which are disposed opposite to each other in the front-rear direction of toilet 85, and a pair of side walls 83 which are disposed opposite to each other in the left-right direction of toilet 85. Entrance 84 of toilet room 80 is provided on side wall 83 located to the side of toilet 85.

[0037] The transfer operation in toilet room 80 includes an operation of transferring care receiver M from wheelchair W to toilet 85, and an operation of transferring the care receiver M from toilet 85 to wheelchair W. To give an outline of the transfer operation, the caregiver first boards care receiver M from wheelchair W to assistance device 1 outside toilet room 80. Next, the caregiver moves care receiver M supported by assistance device 1 into the toilet room and then changes the direction of the assistance device 1. Then, the caregiver moves care receiver M toward toilet 85 and seats care receiver M on toilet 85.

[0038] The transfer operation as described above is consists of the buttocks lifting operation, a direction changing operation, and the buttocks lowering operation. The present embodiment shows an erecting operation as an example of a buttocks lifting operation. As an initial state of the transfer operation, care receiver M is in a sitting posture in which buttocks Mt are in contact with the seat surface of wheelchair W, as shown in Fig. 4. Care receiver M is moved to the vicinity of entrance 84 of toilet room 80 by the operation of the caregiver.

[0039] In assistance device 1, in the initial state of the transfer operation, as shown in Fig. 7, rotary table 12 of rotation device 10 is set to first angle N1 so that the sliding direction of slide member 22 faces entrance 84 of toilet room 80. At this time, the support surface of truck support section 51 of support member 50 faces upward toward

the side of toilet room 80 (i.e., the left-right direction in Fig. 7). Further, as shown in Figs. 4 and 7, slide member 22 is pulled out to first position P1 outside toilet room 80 where care receiver M boards support member 50.

[0040] Care receiver M places both feet on foot mount 31 with contact mark 311 of base 30 as a guide and grips handle 43. Then, with care receiver M being seated in wheelchair W, the upper body of care receiver M is tilted forward so that his/her chest contacts truck support section 51 of support member 50 and is supported at both underarms by the pair of side supports 52. In this state, care receiver M or the caregiver directs the assistance of the erecting operation by operating controller 62. As a result, drive control section 61 of control device 60 drives driving device 42 of support device 40.

[0041] Arm 41 of support device 40 then rotates about axis A2, and support member 50 pivots forward. As a result, as shown in Fig. 5, care receiver M moves forward as the upper body rises and buttocks Mt assume a standing posture separated from the seat surface of wheelchair W. At this time, the knees of care receiver M may come in contact with lower leg contact 35. While driving device 42 is driven as described above, the rotation of rotary table 12 is restricted by rotation restricting section 13 and the sliding of slide member 22 is restricted by slide restricting section 23. Thus, assistance device 1 as a whole is stabilized, and as a result, the assisting of the standing operation of care receiver M is further stabilized.

[0042] Subsequently, when the front rotation of support member 50 stops, the rotation restriction by rotation restricting section 13 is released and the slide restriction by slide restricting section 23 is released. Then, when the caregiver applies an operational force in the sliding direction to operating section 33 of base 30 or handle 43 of support device 40, slide member 22 slides. As a result, slide device 20 contracts, and base 30 and support device 40 provided on slide device 20 move in parallel. As shown in Figs. 6 and 7, slide member 22 is pushed to second position P2 inside toilet room 80 at which care receiver M supported by support member 50 is in a state of being placed in toilet room 80.

[0043] Further, when the caregiver applies an operational force to operating section 33 of base 30, or handle 43 of support device 40, in the circumferential direction of rotary table 12, rotary table 12 rotates around axis A1. Specifically, as shown in Fig. 8, slide device 20, base 30, and support device 40 provided in rotation device 10 are rotated counterclockwise as a single unit. At this time, in assistance device 1, since slide device 20 is in a contracted state, the distance from axis A1 to the outermost side is shortened by the distance corresponding to the movable range of slide member 22 (i.e., the distance from first position P1 to second position P2). As a result, the direction of assistance device 1 can be changed within a small space.

[0044] The rotation with respect to fixed section 11 of rotary table 12 is restricted by angle setting device 15 after rotating 90 degrees from first angle N1 to a position

where the sliding direction of slide member 22 is directed toward toilet 85, which is the transfer target. As a result, rotary table 12 is angled to second angle N2 by angle setting device 15. In this manner, the direction of care receiver M supported by support device 40 can be changed with his/her back facing toilet 85.

[0045] When the caregiver applies an operational force in the sliding direction to operating section 33 of base 30 or handle 43 of support device 40, slide member 22 is slid toward toilet 85. As a result, slide device 20 extends and base 30 and support device 40 provided on slide device 20 move in parallel. As shown in Fig. 9, slide member 22 is moved, after rotation, from second position P2-2 to third position P3.

[0046] Second position P2-2, after rotation, is the position of slide member 22 when the angle of rotary table 12 is set to second angle N2 with angle setting device 15 and slide device 20 is in the contracted state. Third position P3 is a position of slide member 22 in which care receiver M, supported by support member 50 and whose direction has been changed by the rotation of rotary table 12, can be seated on toilet 85. That is, third position P3 is a position of slide member 22 when support member 50 is sufficiently close to toilet 85 to seat care receiver M.

[0047] In this state, care receiver M or the caregiver directs the assistance of the buttocks lowering operation by operating controller 62. As a result, drive control section 61 of control device 60 drives driving device 42 of support device 40. Arm 41 of support device 40 then rotates around axis A2 and support member 50 rotates rearward. Along with this, care receiver M is brought into a sitting posture in which buttocks Mt are in contact with the seat surface of toilet 85 by moving care receiver M rearward as the upper body descends.

[0048] While driving device 42 is driven as described above, the rotation of rotary table 12 is restricted by rotation restricting section 13, and the sliding of slide member 22 is restricted by slide restricting section 23 in the same manner as when the erecting operation is assisted. Thus, assistance device 1 as a whole is stabilized, and as a result, the assisting of the buttocks lowering operation of care receiver M is further stabilized.

[0049] Further, to assist the operation of transferring care receiver M from toilet 85 to wheelchair W, the above is performed in reverse order. Here, rotatable angular range Ra of rotary table 12 is an angular range from first angle N1 to second angle N2 in the present embodiment. Therefore, when rotary table 12 is rotated such that slide member 22 of assistance device 1 moves from second position P2-2 to original second position P2, rotary table 12 is restricted from rotating by angle setting device 15 at the end of rotatable angular range Ra and the angle is set to first angle N1. As a result, the direction of care receiver M supported by support device 40 can be redirected to original first angle N1 with his/her back facing wheelchair W.

[0050] Movable range Rs of slide member 22 is set to a range in which support member 50 is slid between first

position P1 outside toilet room 80 in which care receiver M gets on and off support member 50 and second position P2 inside toilet room 80 in which care receiver M supported by support member 50 is in a state of being placed in toilet room 80. Provided the distance between second position P2-2 and third position P3 after rotation in toilet room 80 is longer than the distance between first position P1 and second position P2, movable range Rs of slide member 22 may be made to accommodate these distances.

(2. Effect of the embodiment configuration)

[0051] As described above, assistance device 1 disclosed in this specification includes rotary table 12 which is provided on floor surface F of a room (toilet room 80) and is rotatable about axis A1 parallel to the vertical direction, slide member 22 which is provided on rotary table 12 and slidable in a horizontal direction, and support member 50 which is provided on slide member 22 and supports the upper body of care receiver M. Slide member 22 slides support member 50 between a position (first position P1) outside the room (toilet room 80), where care receiver M gets on and off support member 50, and a position (second position P2) inside the room (toilet room 80), where care receiver M supported by support member 50 is in a state of being placed in the room (toilet room 80).

[0052] With such a configuration, care receiver M supported by support member 50 can be moved from outside to inside the room (toilet room 80) by sliding slide member 22. As a result, the distance from the center of rotation (axis A1) of rotary table 12 to the outermost point can be reduced so that the direction can be changed within a small space. For example, in a configuration without slide member 22, it is necessary to operate support member 50 so that care receiver M approaches the rotational center. On the other hand, in the above-described configuration, if buttocks Mt of care receiver M can be elevated (i.e., separated from the seat surface) while in the position to get on or off (the first position), care receiver M can be moved into the room by sliding of slide member 22. That is, with buttocks Mt elevated to a higher position, it is possible to omit the operation of further lifting care receiver M.

[0053] Further, after the direction is changed within a small space, care receiver M is moved to the transfer target (toilet 85) by properly sliding slide member 22. For example, in the assistance device configured by a device for lifting care receiver M and a rotating device, it was necessary to increase the rotation radius to secure the movable region, whereas in the configuration exemplified in the present embodiment, it is possible to expand and contract by sliding slide member 22 at an angle necessary for the transfer operation. As a result, it is possible to improve the usability of assistance device 1 installed in a room with limited space (i.e., toilet room 80) and reduce the burden on the caregiver and care receiver M.

[0054] Assistance device 1 is provided on floor surface

F of the room (toilet room 80) and includes rotary table 12 rotatable about axis A1 parallel to the vertical direction, slide member 22 slidable in the horizontal direction, and support member 50 provided on slide member 22 and supporting the upper body of care receiver M. Rotatable angular range Ra of rotary table 12 includes first angle N1, in which the sliding direction of slide member 22 faces entrance 84 of the room (toilet room 80), and second angle N2, in which the sliding direction of slide member 22 faces the transfer target (toilet 85) provided in the room (toilet room 80). Assistance device 1 includes angle setting device 15 for setting an angle of rotary table 12 at at least one of first angle N1 and second angle N2.

[0055] With such a configuration, it is possible to secure the rotatable range of rotary table 12 in the rotational direction by sliding slide member 22. As a result, the distance from the center of rotation (axis A1) of rotary table 12 to the outermost point can be reduced so that the direction can be changed within a small space. Further, the rotatable range of rotary table 12 is limited to a part of the total circumference by angle setting device 15 so that rotations greatly exceeding first angle N1 and second angle N2 are prevented when the caregiver or the like rotates rotary table 12. The angle of rotary table 12 is set at first angle N1 and second angle N2 by angle setting device 15. This makes it easier for the caregiver or the like to set the angle to first angle N1 or second angle N2 when rotating rotary table 12, thereby improving the operability of assistance device 1.

[0056] Further, after the direction is changed within a small space, care receiver M is moved to the transfer target (toilet 85) by properly sliding slide member 22. For example, in the assistance device configured by a device for lifting care receiver M and a rotating device, it was necessary to increase the rotation radius to secure the movable region, whereas in the configuration exemplified in the present embodiment, it is possible to expand and contract by sliding slide member 22 at an angle necessary for the transfer operation. As a result, it is possible to improve the usability of assistance device 1 installed in a room with limited space (i.e., toilet room 80) and reduce the burden on the caregiver and care receiver M.

[0057] In assistance device 1 described above, movable range Rs of slide member 22 includes first position P1, second position P2, and third position P3, a position in which care receiver M, who is supported by support member 50 and whose direction was changed by rotation of rotary table 12, can be seated at the transfer target (i.e., toilet 85). Assistance device 1 comprises positioning device 25 for positioning slide member 22 in at least two of first position P1, second position P2, and third position P3. With this configuration, it is easier for a caregiver or the like, when sliding slide member 22, to position at first position P1 or second position P2, thereby improving the operability of assistance device 1.

[0058] Assistance device 1 includes driving device 42 that moves support member 50 with respect to slide member 22 so as to move buttocks Mt of care receiver

M in the sitting posture away from the seat surface. With such a configuration, the upper body of care receiver M can be lifted and lowered by operating support member 50 with driving device 42. In this manner, the assistance of driving device 42 can be utilized to assist an operation in which the caregiver has a large burden so as to reduce the load on the caregiver.

[0059] In assistance device 1 described above, rotary table 12 is configured to freely rotate about axis A1. Assistance device 1 includes rotation restricting section 13 for switching between restricting and permitting the rotation of rotary table 12. With this configuration, rotation restricting section 13 can stop rotary table 12 at any angle or allow rotating table 12 to freely rotate by releasing the restriction on the rotation. This makes it possible to stop the rotation of rotary table 12 as necessary, for example, while care receiver M is getting on and off or while slide member 22 is sliding, and stabilize the operation of assistance device 1.

[0060] Assistance device 1 includes driving device 42 that moves support member 50 with respect to slide member 22 so as to move buttocks Mt of care receiver M in the sitting posture away from the seat surface. When driving device 42 is driven, rotation restricting section 13 switches to a state in which the rotation of rotary table 12 is restricted.

[0061] With such a configuration, the rotation of rotary table 12 is restricted by rotation restricting section 13 while driving device 42 is being driven. Thereby, during the movement of support member 50 to move buttocks Mt of care receiver M to a position away from the seat surface, the direction change of care receiver M is suppressed, and care receiver M can feel assured in entrusting his/her body to the operation of assistance device 1.

[0062] In assistance device 1 described above, slide member 22 is configured to be freely slidable in the sliding direction. Assistance device 1 includes slide restricting section 23 for switching between restricting and permitting the sliding of slide member 22.

[0063] With such a configuration, slide member 22 can be stopped at any position by slide restricting section 23 or allow slide member 22 to freely slide by releasing the restriction on the sliding. This makes it possible to stop the sliding of slide member 22 as necessary, for example, while care receiver M is getting on and off or while rotary table 12 is rotating, and stabilize the operation of assistance device 1.

[0064] Assistance device 1 includes driving device 42 that moves support member 50 with respect to slide member 22 so as to move buttocks Mt of care receiver M in the sitting posture away from the seat surface. When driving device 42 is driven, slide restricting section 23 switches to a state in which the sliding of slide member 22 is restricted.

[0065] With such a configuration, the sliding of slide member 22 is restricted by slide restricting section 23 while driving device 42 is driven. As a result, during the movement of support member 50 to move buttocks Mt

of care receiver M to a position away from the seat surface, the forward and rearward movement of care receiver M by slide member 22 is suppressed, and care receiver M can feel assured in entrusting his/her body to the operation of assistance device 1.

[0066] Assistance device 1 described above includes operation section 33 that receives an operation of rotating rotary table 12 or sliding slide member 22 by a leg force of the caregiver assisting care receiver M. With such a configuration, the power needed to rotate or slide assistance device 1 corresponding to the mass of care receiver M can be obtained from operation section 33. Thus, for example, the caregiver can rotate rotary table 12 or slide slide member 22 with leg force while supporting support member 50 with both hands. In this way, the operability of assistance device 1 is improved and the burden on the caregiver and care receiver M can be further reduced.

[0067] In assistance device 1, the room is toilet room 80 in which toilet 85, as a transfer target, is installed. The space inside toilet room 80 may be particularly limited, and entrance 84 may also not be wide. In such a transfer in toilet room 80, it is desired that the entrance and exit of care receiver M and the transfer to toilet 85 as a transfer target are reliably assisted within a small space. On the other hand, with assistance device 1 having the above-described configuration, it is possible to perform the direction change within a small space while allowing care receiver M to get on and off outside toilet room 80 and reliably transfer care receiver M to toilet 85. Therefore, it is particularly useful to install assistance device 1 having the example configuration of the present embodiment in toilet room 80.

(3. Modifications of the embodiment)

(3-1. Rotation device 10 and sliding device 20)

[0068] In the embodiment, the room in which assistance device 1 is installed is toilet room 80 provided with toilet 85 as a transfer target. Alternatively, assistance device 1 may be installed in various types of rooms. In such cases, or in cases where entrance 84 is provided not on side wall 83 but on rear wall 82 or the like in toilet room 80, rotatable angular range Ra of rotary table 12 may be set to various angular ranges such as 180 degrees instead of 90 degrees.

[0069] Rotatable angular range Ra of rotary table 12 may be configured to be adjustable, for example, depending on the application of assistance device 1. More specifically, angle setting device 15 may be configured such that the pair of projections 151 are movable along the outer peripheral edge of fixed section 11 and fixed at any circumferential position by screw fastening or the like. As a result, it is possible to achieve the same effect as in the embodiment and it is possible to adapt assistance device 1 to the application, change of installation location, and the like.

[0070] Also, depending on the application of assist-

ance device 1, angle setting device 15 may be configured such that the angle of rotary table 12 is set to one or three or more predetermined angles. For example, in the case where the angle of rotary table 12 is set to three or more predetermined angles, angle setting device 15 may be configured such that, instead of the pair of projections 151 and engaging portion 152, when the rotary table 12 reaches a predetermined angle, a plunger provided in fixed section 11 engages with an engaging hole provided in rotary table 12 to set the angle.

[0071] Further, in a case where the transfer target provided in the room of the assisting facility is not fixed to floor surface F, or in a case where there are multiple transfer sources or transfer targets, rotary table 12 may be configured to be freely rotatable around the entire circumference of rotation device 10. Further, in the embodiment, axial line A1, which is the rotation center of rotary table 12, is set to a position which is an intersection point between a straight line passing through the center in the width direction of entrance 84 and a straight line passing through the center in the width direction of toilet 85, which is the transfer target. On the other hand, axis A1 can be properly set in accordance with the position of entrance 84, the transfer target, the positional relationship between rotary table 12 and slide device 20, and the like.

[0072] In the embodiment, movable range Rs of slide member 22 of slide device 20 is a range between first position P1 and second position P2 in which support member 50 slides between so that care receiver M enters and leaves toilet room 80. On the other hand, movable range Rs may be set to a range for the purpose of entrance/exit of care receiver M depending on the application of assistance device 1, or may be set to a range in which support member 50 is properly slid so as to enable boarding even if support member 50 is separated from axis A1 of rotary table 12 to some extent. Even in such a configuration, even if the position where wheelchair W or the like is close to assistance device 1 fixed to floor surface F is not accurate, an adjustment can be made by sliding slide member 22, thereby improving the usability of assistance device 1 in the transfer operation.

[0073] Movable range Rs of slide member 22 may be configured to be adjustable in accordance with, for example, the application of assistance device 1. More specifically, positioning device 25 may be configured so that the pair of slide stoppers 251 can move along rail 21 and be fixed at any slide-direction position by screw fastening or the like. As a result, it is possible to achieve the same effect as in the embodiment and it is possible to adapt assistance device 1 to the application, change of installation location, and the like.

[0074] Slide device 20 is provided on rotary table 12 so that axis A1 of rotary table 12 is positioned on a straight line passing through the center in the width direction of slide member 22. On the other hand, the sliding direction of slide member 22 may be shifted from the radial direction of rotary table 12 depending on the use of assistance device 1 and the layout of the room in which assistance

device 1 is installed. Further, support member 50 may be inclined in the horizontal direction with respect to the sliding direction of slide member 22. Further, the pair of rails 21 defining the sliding track of slide member 22 may have various shapes such as a curved shape in addition to a straight shape as exemplified in the embodiment.

[0075] Further, assistance device 1 may be configured to include a mechanism for defining the movement trajectory of support device 40 so that the rotation operation of rotary table 12 and the sliding operation of slide member 22 are synchronized with each other. With such a configuration, for example, rotary table 12 starts to rotate while slide device 20 is contracted when an operational force for rotating support member 50 is applied to assistance device 1 after care receiver M has boarded. Then, after some rotation, slide device 20 is again extended to allow care receiver M to move to the transfer target.

[0076] Further, in the embodiment, rotary table 12 is configured to be freely rotatable, and slide member 22 is configured to be freely slidable. On the other hand, at least one of rotary table 12 and slide member 22 may be provided with a driving force by, for example, an actuator to control the rotation angle and the slide position, respectively. In such a configuration, both rotary table 12 and slide member 22 may be configured to properly move support member 50 in coordination with each other's operations by the actuator and in coordination with the operation of driving device 42 of support device 40.

[0077] In the above-described configuration, angle setting device 15 and positioning device 25 may be configured by, for example, a control section of an actuator, and may set the angle of rotary table 12 to a predetermined angle stored in advance and the position of slide member 22 to a predetermined position stored in advance. At this time, the predetermined angle and rotatable angular range Ra of rotary table 12 and the predetermined position and movable range Rs of slide member 22 may be arbitrarily changed by changing the settings of the control section of the actuator.

[0078] More specifically, assistance device 1 receives a change in the set values for the predetermined angle and angular range Ra by the caregiver or the operator who installs assistance device 1, and stores the change in the control section of the actuator. Angle setting device 15 serving as a control section of the actuator controls the operation of the actuator based on the set predetermined angle and angle range Ra, and sets the angles of rotary table 12. Similarly, assistance device 1 receives a change in the set values of the specified position and movable range Rs, and stores the change in the control unit of the actuator. Positioning device 25 serving as a control section for the actuator controls the operation of the actuator based on the set predetermined position and movable range Rs and positions slide member 22. With such a configuration, it is possible to easily set the predetermined angle, predetermined angular range Ra, the defined position, and movable range Rs by changing the set value for the control section of the actuator, and adapt

assistance device 1 to the application, change of installation location, and the like.

[0079] In the embodiment, control device 60 regulates the rotation of rotary table 12 when driving device 42 of support device 40 is driven and regulates the sliding of slide member 22. On the other hand, even when driving device 42 is being driven, at least one of the rotation of rotary table 12 and the sliding of slide member 22 may be permitted. For example, when slide member 22 is permitted to slide while driving device 42 is being driven, it is possible to confirm that buttocks Mt of care receiver M is elevated from the seat surface during the buttocks lifting operation, thereby enabling sliding of slide member 22 to move care receiver M forward. Further, during the buttocks lowering operation, slide member 22 can be slid so as to adjust the position of buttocks Mt of care receiver M with respect to the seat surface of the transfer target.

(3-2. Other)

[0080] In the embodiment, driving device 42 of support device 40 is hydraulic. On the other hand, driving device 42 may adopt various modes as long as support member 50 is movable with respect to slide member 22 so as to move buttocks Mt of care receiver M in the sitting posture away from the seat surface. For example, driving device 42 may be an elastic device such as a gas spring or a lifting device that can be lifted while maintaining the angle of support member 50. Driving device 42 may include a swinging device for swinging support member 50 and a lifting device for lifting and lowering support member 50.

[0081] Further, controller 62 of control device 60 is configured to accept an instruction by manual operation of the caregiver or care receiver M. On the other hand, controller 62 may be provided at the foot of base 30 or the like so as to be able to accept an instruction by, for example, a foot operation of the caregiver. With such a configuration, it is possible for the caregiver to direct assistance device 1 to assist the buttocks lifting operation and the buttocks lowering operation while supporting the body of care receiver M or handle 43 of supporting device 40 with both hands.

Reference Signs List

[0082] 1: Assistance device, 10: Rotation device, 12: Rotary table, 13: Rotation restricting device, 15: Angle setting device, 20: Slide device, 22: Sliding member, 23: Slide restricting section, 25: Positioning device, 30: Base, 33: Operating section, 40: Support device, 42: Driving device, 50: Support member, 80: Toilet room (room), 84: entrance, 85: toilet (transfer target), A1: Axis, P1: First position, P2: Second position, N1: First angle, N2: Second angle, Ra: Angular range, Rs: Movable range, F: Floor surface, M: Care receiver, Mt: Buttocks, W: Wheel-chair.

Claims

1. An assistance device, comprising:

5 a rotary table, being mounted on a floor surface of a room, which is rotatable about an axis parallel to a vertical direction;
a slide member, being mounted on the rotary table, which is slidable in a horizontal direction, and
10 a support member, being mounted on the slide member, which is configured to support an upper body of a care receiver;
wherein the slide member slides the support member between a first position outside the room, where the care receiver gets on and off the support member, and a second position inside the room, where the care receiver supported by the support member is in a state of being placed inside the room.

2. The assistance device of claim 1, wherein a rotatable angular range of the rotary table includes a first angle at which the slide direction of the slide member faces an entrance of the room and a second angle at which the slide direction of the slide member faces a transfer target provided in the room, and the assistance device further comprises an angle setting device configured to set an angle of the rotary table at at least one of the first angle and the second angle.

3. The assistance device of claim 1 or 2, wherein the movable range of the slide member includes the first position, the second position, and a third position in which the care receiver supported by the support member and rotated by the rotary table is seated on a transfer target, and the assistance device includes a positioning device configured to position the slide member at at least two of the first position, the second position, and the third position.

4. An assistance device comprising:

45 a rotary table mounted on a floor surface of a room and rotatable about an axis parallel to a vertical direction;
a slide member mounted on the rotary table and slidable in a horizontal direction; a support member mounted on the slide member and supporting an upper body of a care receiver; and
an angle setting device configured to set an angle of the rotary table,
wherein a rotatable angular range of the rotary table includes a first angle at which a sliding direction of the slide member faces an entrance of the room, and a second angle at which the sliding direction of the slide member faces a

transfer target provided in the room, and
wherein the angle setting device sets the angle
of the rotary table at at least one of the first angle
and the second angle.

5

5. The assistance device of any one of claims 1 to 4,
wherein the assistance device comprises a driving
device for moving the support member relative to the
slide member so as to move the buttocks of the care
receiver in the sitting posture away from the seat
surface. 10
6. The assistance device of any one of claims 1 to 5,
wherein the rotating table is configured to be freely
rotatable about an axis, and the assistance device
includes a rotation restricting section for switching
between restricting and permitting rotation of the ro-
tary table. 15
7. The assistance device of claim 6, wherein the as-
sistance device comprises a driving device for mov-
ing the support member relative to the slide member
so as to move the buttocks of the care receiver in
the sitting posture away from the seat surface, and
the rotation restricting section switches to restricting 20
the rotation of the rotary table when the driving device
is driven. 25
8. The assistance device of any one of claims 1 to 7,
wherein the slide member is configured to be freely
slidable in a sliding direction, and the assistance de-
vice includes a slide restricting section configured to
switch between restricting and permitting sliding of
the slide member. 30
9. The assistance device of claim 8, wherein the as-
sistance device comprises a driving device for mov-
ing the support member relative to the slide member
so as to move the buttocks of the care receiver in
the sitting posture away from the seat surface and
the slide restricting section switches to restricting the
slide member when the driving device is being driv-
en. 35 40
10. The assistance device of any one of claims 1 to 9, 45
wherein the assistance device includes an operation
section configured to accept an operation of rotating
the rotary table or sliding the slide member by a leg
force of the caregiver assisting the care receiver. 50
11. The assistance device of any one of claims 1 to 10,
wherein the room is a toilet room in which a toilet as
a transfer target is installed. 55

Fig. 1

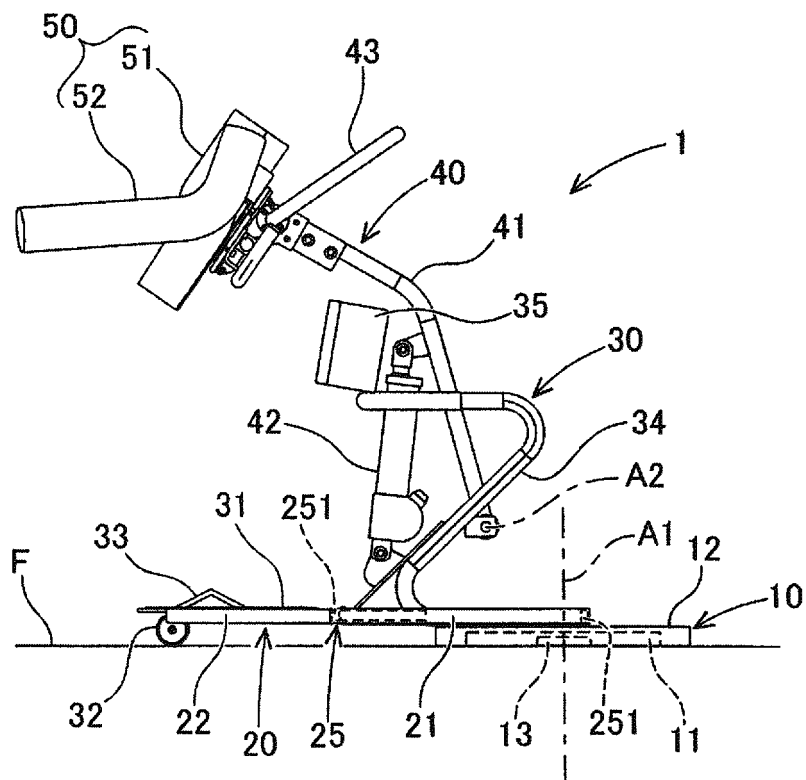


Fig. 2

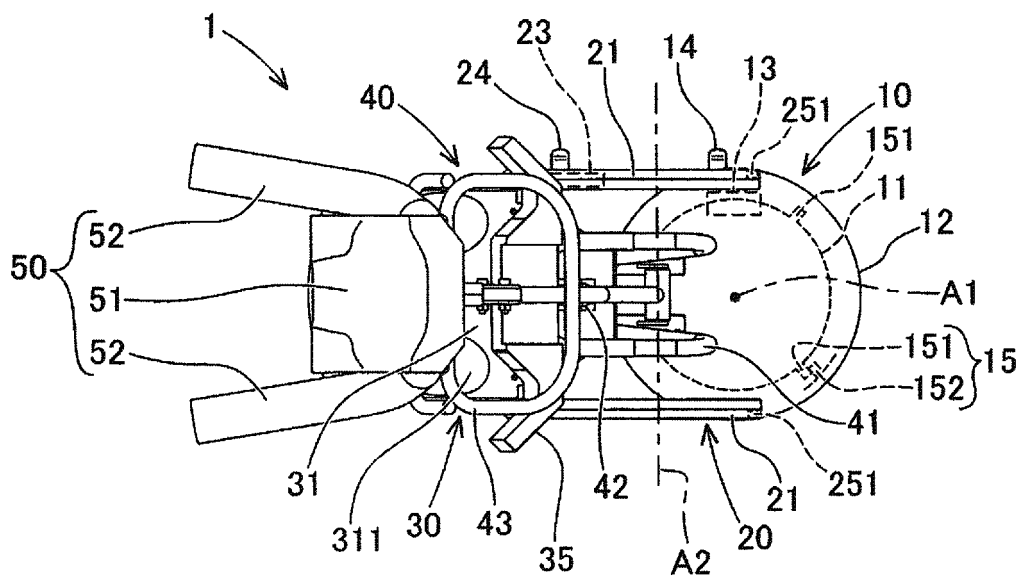


Fig. 3

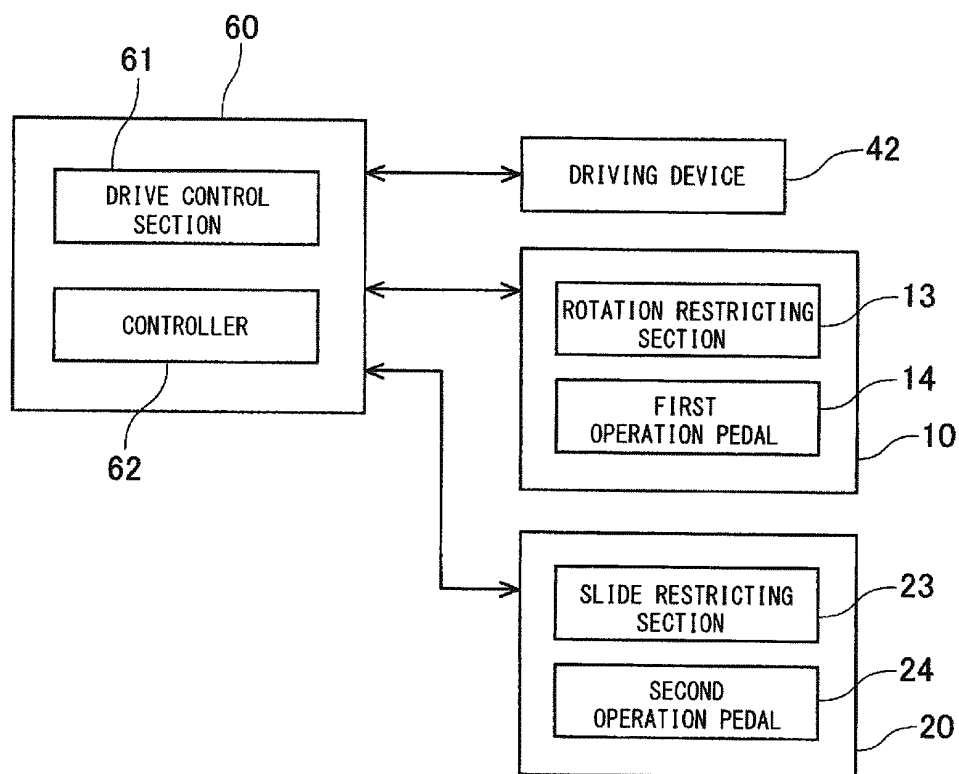


Fig. 4

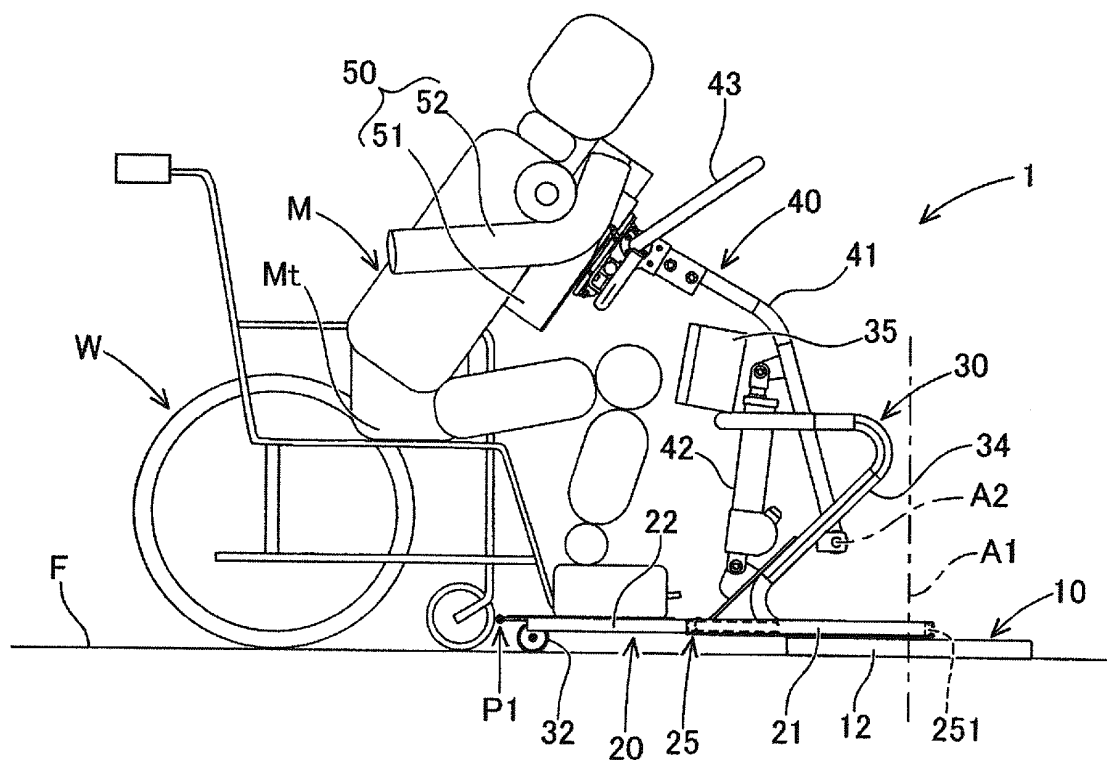


Fig. 5

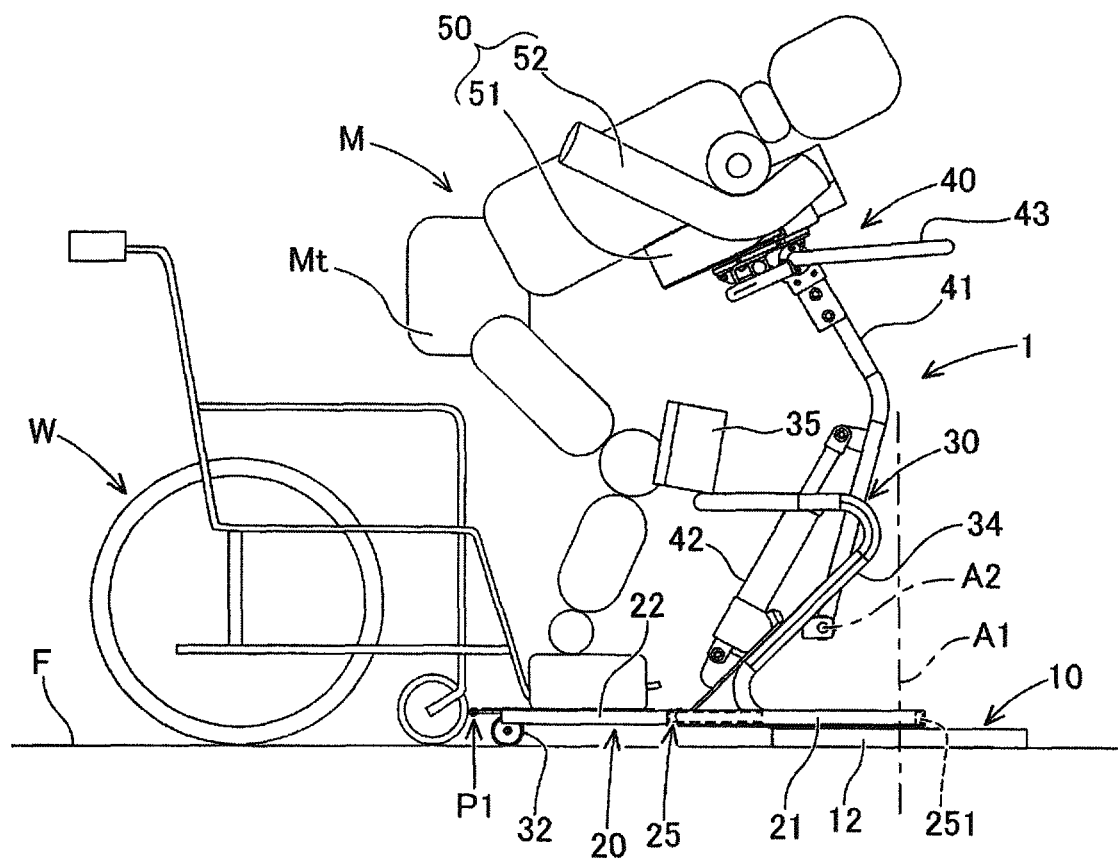


Fig. 6

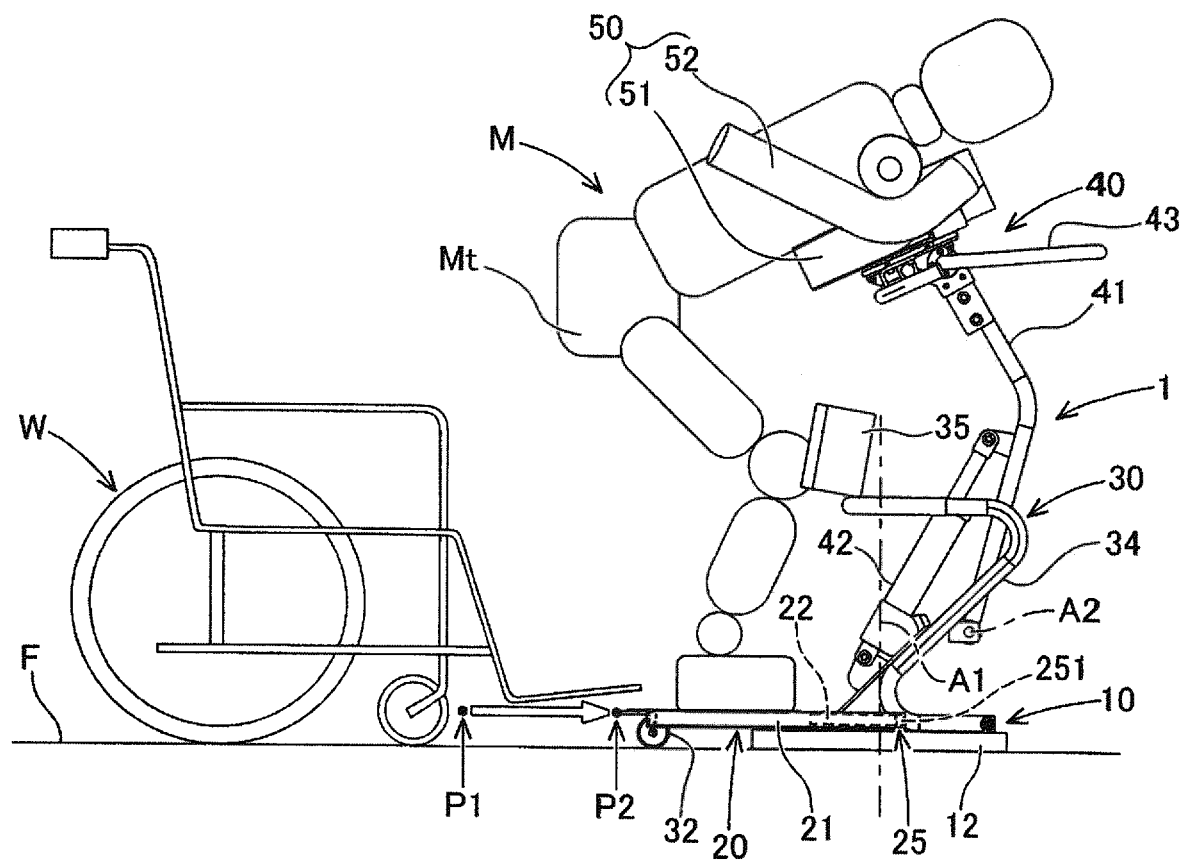


Fig. 7

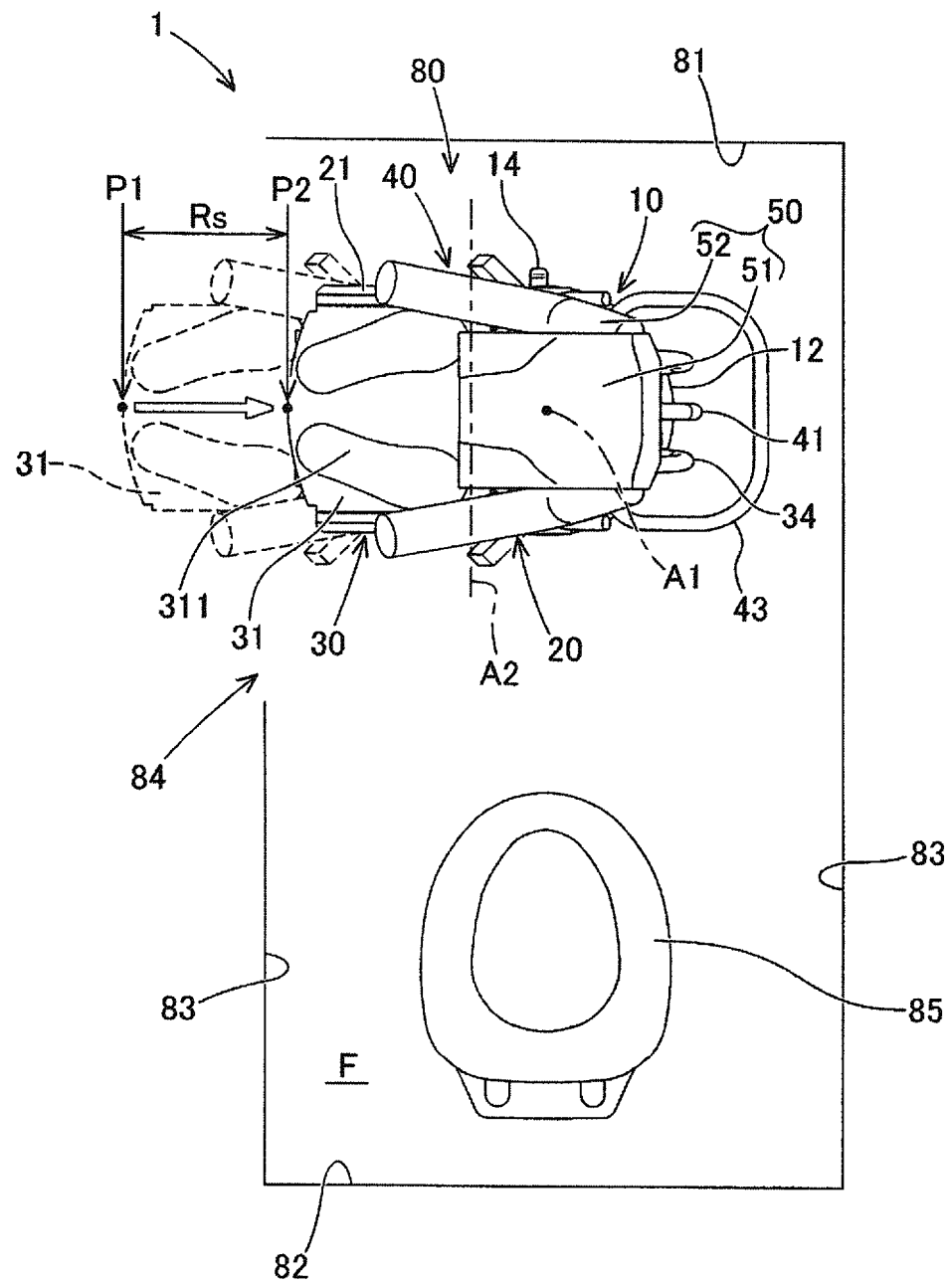


Fig. 8

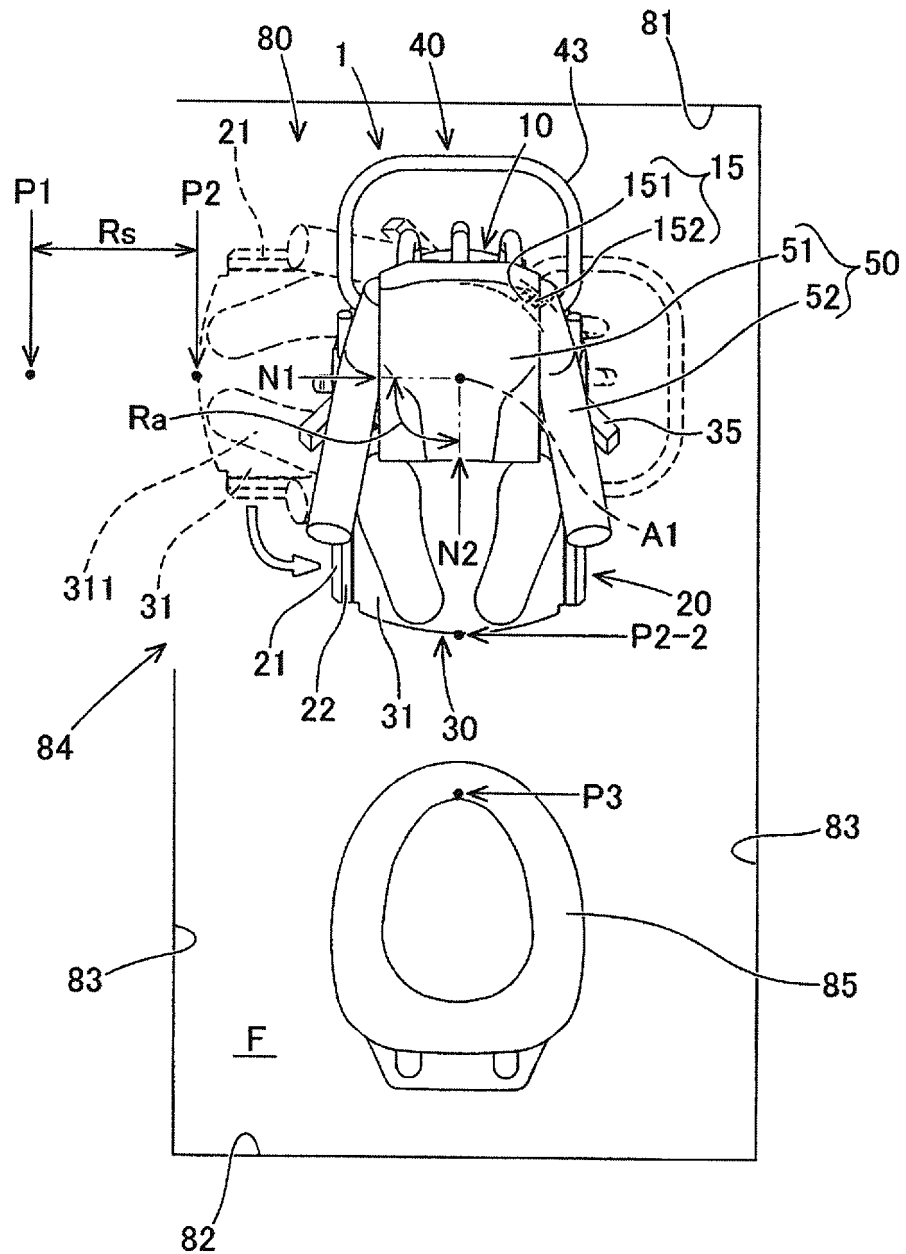
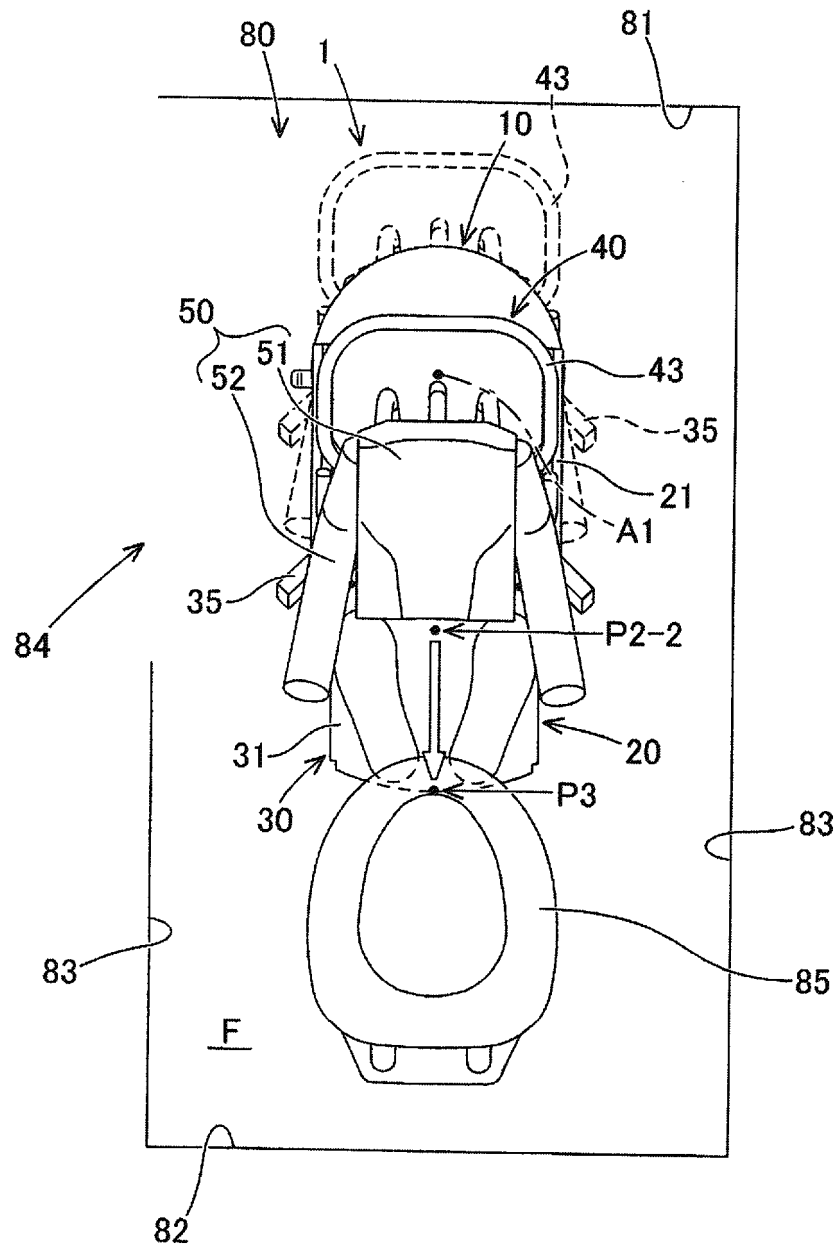


Fig. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/000921

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61G5/14, A61G7/14

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 1996-2017
 Kokai Jitsuyo Shinan Koho 1971-2017 Toroku Jitsuyo Shinan Koho 1994-2017

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2006-305092 A (Ricoh Co., Ltd.), 09 November 2006 (09.11.2006), paragraphs [0031] to [0053]; fig. 1 to 13 (Family: none)	1-11
A	JP 04-174664 A (Yoshinori HATAKE), 22 June 1992 (22.06.1992), page 2, lower left column, line 7 to page 3, right column, line 15; fig. 1 to 14 (Family: none)	1-11
A	JP 2005-118525 A (Tokutei Hi Eiri Katsudo Hojin Tendo Yobo o Kangaeru Kai), 12 May 2005 (12.05.2005), paragraphs [0006] to [0028]; fig. 4 to 11 (Family: none)	1-11

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

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Date of the actual completion of the international search
11 April 2017 (11.04.17)Date of mailing of the international search report
18 April 2017 (18.04.17)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/000921

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2002-153521 A (Kabushiki Kaisha Iwakura Corporation), 28 May 2002 (28.05.2002), paragraphs [0010] to [0011]; fig. 1 to 8 (Family: none)	6-9
A	JP 3181735 U (Toshiyuki MURAMATSU), 21 February 2013 (21.02.2013), paragraph [0018]; fig. 2 to 3 (Family: none)	6-9

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REFERENCES CITED IN THE DESCRIPTION

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