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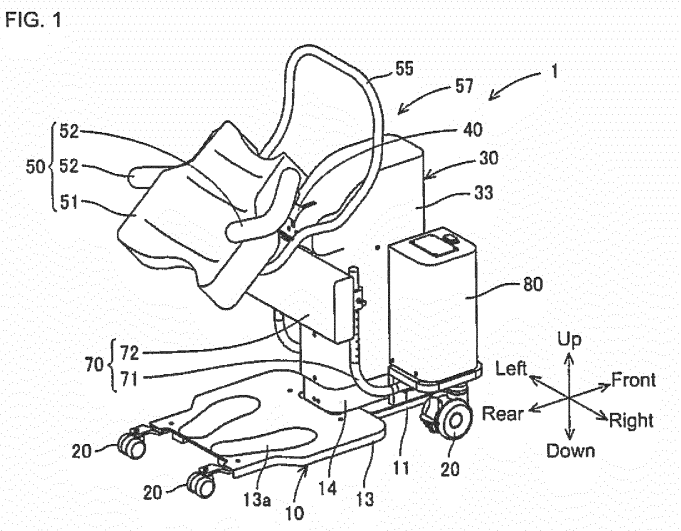
(54) CARE DEVICE

(57) Care device 1 includes: base 10; supporting device 50 configured to support care receiver M, supporting device 50 being provided on base 10; moving device 57 configured to perform a standing operation or a sitting operation by moving supporting device 50 with respect to base 10; load detecting device 60 configured to detect a load that supporting device 50 receives from care receiver M, load detecting device 60 being provided on supporting device 50; and control device 80 configured to control moving device 57. Control device 80 stops the standing operation or the sitting operation during the operation based on a load value detected by the load detecting device.

FIG. 1



EP 3 384 889 A1

Description

Technical Field

[0001] The present invention relates to a care device that assists a care receiver to stand up and sit down.

Background Art

[0002] As a care device, there has been proposed a device including a movable holding section that holds an upper body of a care receiver, a load detecting device provided on the holding section that detects a load the holding section receives from the care receiver, and a control section that controls operation of the holding section (for example, see patent literature 1). With this care device, in a case of the care receiver standing up, a center of gravity position is derived based on a detection result from the loading detecting device. Also, by performing control of the inclination and moving speed of the holding section such that the center of gravity position stays within a specified range, the care receiver is assisted to stand up without any discomfort.

Citation List

Patent Literature

[0003] Patent literature 1: International publication 2015/145756

Summary of Invention

Technical Problem

[0004] In the care device disclosed in patent literature 1 described above, practicability is improved by using the detection result from the load detecting device, but room for improvement remains regarding use of load detection results. The present invention takes account of such circumstances, and an object thereof is to provide a care device that has high practicability by using a detection result of a load.

Solution to Problem

[0005] The present invention uses the following means to solve the above problem.

[0006] A care device of the present invention is configured to assist standing or sitting of a care receiver, the care device including:

a base;
a supporting device configured to support the care receiver, the supporting device being provided on the base;
a moving device configured to perform a standing operation or a sitting operation by moving the supporting device with respect to the base;
a first load detecting device configured to detect a load that the supporting device receives from the care receiver, the first load detecting device being provided on the supporting device; and
a control device configured to control the moving device, and stop the standing operation or the sitting operation during the operation based on a load value detected by the first load detection device.

[0007] The care device assists a care receiver to stand up or sit down by moving a support device that supports the care receiver. Also, the care device uses a first load detecting device to detect a load that the supporting device receives from the care receiver, and stops the standing operation or the sitting operation during operation based on the detected load value. Therefore, the care device is capable of stopping the standing operation or the sitting operation during the operation based on a state of the load that the supporting device receives from the care receiver.

[0008] In a care device of the present invention, the control device may be configured to stop the standing operation or the sitting operation during the operation when determining that a load unbalance in a front-rear direction has occurred in a load that the supporting device is receiving from the care receiver, based on the load value detected by the first load detecting device. With this care device, it is possible to stop the standing operation or the sitting operation during the operation when a load unbalance in the front-rear direction occurs in a load that the supporting device receives from the care receiver, thus improving practicability.

[0009] In a care device of the present invention, the control device may be configured to stop the standing operation or the sitting operation during the operation when determining that a load unbalance in a left-right direction has occurred in a load which the supporting device is receiving from the care receiver, based on the load value detected by the first load detecting device. With this care device, it is possible to stop the standing operation or the sitting operation during the operation when a load unbalance in the left-right direction occurs in the load that the supporting device receives from the care receiver, thus improving practicability.

[0010] In a care device of the present invention, the first load detecting device may be capable of measuring load values at multiple positions of the supporting device, and the control device may determines that a load unbalance has occurred in a case in which a difference value between the load values at multiple positions exceeds a predetermined threshold.

[0011] A care device of the present invention may further include: an input device configured to receive a standing operation instruction or a sitting operation instruction from an operator, wherein the control device is configured to stop the standing operation or the sitting operation even in a case in which the standing operation

instruction or the sitting operation instruction has been input to the input device, when the control device has determined to stop the standing operation or the sitting operation during the operation based on the load value detected by the first load detecting device.

[0012] With a care device of the present invention: the control device may be configured to, in a case in which the standing operation or the sitting operation of the moving device has been stopped, restart the standing operation or the sitting operation on condition that the operator has input the standing operation instruction or the sitting operation instruction to the input device, when the control device has determined that the standing operation or the sitting operation may be restarted based on the load value detected by the first load detection device.

[0013] Further, the control device may be configured to ignore the standing operation instruction or the sitting operation instruction in a case in which the standing operation instruction or the sitting operation instruction has been continuously input to the input device before the standing operation or the sitting operation was stopped.

[0014] Alternatively, with a care device of the present invention, the base may be provided with a footrest on which a foot of the care receiver is loaded, the footrest being provided with a second load detection device, and wherein the control device may be configured to stop the standing operation or the sitting operation during the operation based on load values detected by the first load detecting device and the second load detecting device.

Brief Description of Drawings

[0015]

Fig. 1
Fig. 1 shows care device 1 of the present invention from the rear right.
Fig. 2
Fig. 2 shows a view of care device 1 from the right side with the care receiver sitting.
Fig. 3
Fig. 3 shows a view of care device 1 from the right side with the care receiver standing.
Fig. 4
Fig. 4 shows load detecting device 60 provided on base plate 53. Fig. 5
Fig. 5 is a block diagram showing the configuration of care device 11.
Fig. 6
Fig. 6 is a flowchart showing an example of a mounting processing routine.

Description of Embodiments

[0016] Hereinafter, an embodiment of the present invention will be described with reference to the figures. Care device 1 assists standing of care receiver M (shown in fig. 2) from a sitting posture to a standing posture and assists sitting from standing posture to a sitting posture. Care device 1 of the present embodiment is to be used, for example, by a care receiver M for whom standing by themself is difficult for assisting the care receiver M to change their bottoms (clothing worn on the lower half of their body), for assisting care receiver M to go to the toilet, and so on. Note that, a standing posture in the present embodiment refers to a state in which at least the bum of care receiver M is separated from a chair such as seat 3, and a state in which the lower body of care receiver M is upright enough such that a caregiver assisting the care receiver M can assist with changing clothing or going to the toilet. In the embodiment, a left-right direction, a front-rear direction, and an up-down direction are as shown in fig. 1.

[0017] As shown in figs. 1 and 2, care device 1 includes base 10, wheels 20, raising and lowering section 30, arm 40, supporting device 50, grip 55, lower limb contacting section 70, control device 80, and input device 90 (fig. 5).

[0018] Base 10 is provided with frame 11, support column 12, footrest 13, and fixed cover 14. Frame 11 is positioned slightly separated from ground surface 2 (floor or ground).

[0019] Support column 12 is fixed to frame 11 and stands upright on an upper front surface of frame 11. Support column 12 is arranged centrally in the left-right direction towards the front of frame 11. Note that, in the present embodiment, care device 1 includes one support column 12, but two or more support columns 12 may be provided.

[0020] Footrest 13 is fixed to an upper rear surface of frame 11. Contact marks 13a for the feet of care receiver M are provided on an upper surface of footrest 13. Contact marks 13a act as a foot positioning guide for care receiver M. As shown in fig. 1, fixed cover 14 is fixed to frame 11 or support column 12 so as to enclose the lower portion of raising and lowering main body 31 of the raising and lowering section 30, which are described later.

[0021] As shown in fig. 1, wheels 20 are arranged at the four corners of frame 11. Wheels 20 include a locking function that restricts rotation. In the present embodiment, wheels 20 are provided to be freely rotating, by may be provided to be driven by a driving device.

[0022] Raising and lowering section 30 is provided with raising and lowering main body 31, oscillation support section 32, and raising and lowering cover 33. As shown in fig. 2, raising and lowering main body 31 is formed elongated in the up-down direction, and is provided on a front surface of support column 12 to be movable linearly in the up-down direction. Raising and lowering main body 31 is guided by a guide (not shown) on the front surface of support column 12, and is driven by raising and lowering driving motor 35 (fig. 4). The lifting and lowering main body 31 is enclosed by the fixed cover 14. Note that, in the present embodiment, because one support column 12 is provided, care device 1 includes a single raising and lowering section 30; however, in a case where two or more support columns 12 are provided, a quantity

of lifting and lowering sections 30 is provided corresponding to the quantity of support columns 12.

[0023] Oscillation support section 32 is provided on an upper end side of raising and lowering main body 31 and includes oscillating shaft center 32a that is parallel to the left-right direction. Specifically, support section 32 is formed to project rearward from an upper end of raising and lowering main body 31. In other words, oscillating shaft center 32a is positioned to the rear of support column 12 and to the rear of raising and lowering main body 31.

[0024] As shown in fig. 1, the raising and lowering cover 33 is fixed to raising and lowering section 30 and encloses raising and lowering section 30. Further, raising and lowering cover 33 encloses support column 12 and fixed cover 14. Raising and lowering section cover 33 overlaps fixed cover 14 even when raising and lowering section 30 is at a raised position.

[0025] Arm 40 is provided such that a base side end oscillates around oscillating shaft center 32a of oscillation support section 32 of raising and lowering section 30. Arm 40 is oscillated by arm driving motor 41 (fig. 4). Arm 40 oscillates to a higher position than oscillation support section 32. In other words, an oscillation range of arm 40 is set between a state in which the tip of arm 40 extends to the rear of oscillation support section 32 (refer to fig. 2), and a state in which the tip of arm 40 is positioned approximately above oscillation support section 32 or the lifting and lowering main body 31 (refer to fig. 3). Arm 40 rotates forward from a state extending to the rear in a case in which care device 1 is performing standing assistance, and rotates rearward so as to extend to the rear in a case in which care device 1 is performing sitting assistance.

[0026] Supporting device 50 is provided on the end of arm 40 and supports the upper body of care receiver M. Supporting device 50 is raised or lowered and oscillates with respect to base 10 by the moving device 57 configured from raising and lowering section 30, raising and lowering driving motor 35, arm 40, and arm driving motor 41. In the present embodiment, supporting device 50 is provided with torso receiving section 51 that contacts the torso of care receiver M, underarm receiving sections 52 that support the underarms of care receiver M, base plate 53, and load detecting device 60. Body receiving section 51 and underarm receiving sections 52 are fixed to base plate 53, and base plate 53 is fixed to arm 40. Supporting device 50 may include only one of body receiving section 51 and underarm receiving sections 52.

[0027] Torso receiving section 51 supports the torso of care receiver M from below. Torso receiving section 51 has a wide surface and is made of a cushion material. Torso receiving section 51 is formed to have an initial shape that matches that of a typical care receiver M, and is flexible to change shape to match the torso of each individual care receiver M. In the present embodiment, torso receiving section 51 contacts care receiver M from the chest to the abdomen.

[0028] Underarm receiving sections 52 are formed to have an arc shape and are provided on the right and left sides of torso receiving section 51 such that the arc opening faces upward. Underarm receiving sections 52 support the underarms of care receiver M from below so as to support the upper body of care receiver M. Further, underarm receiving sections 52 regulates forward and rearward movement of care receiver M by sandwiching both underarm portions of care receiver M from the front and rear.

[0029] Grip 55 is U-shaped, and both ends of the U shape of grip 55 are fixed on a lower surface of torso receiving section 51. The center section of grip 55 is positioned to the front of torso receiving section 51 and is gripped by care receiver M who is being supported by supporting device 50.

[0030] Load detecting device 60 is provided between base plate 53 and torso receiving section 51. As shown in fig. 4, load detecting device 60 of the embodiment is configured from four load sensors: front-side load sensor 60a, rear-side load sensor 60b, right-side load sensor 60c, and left-side load sensor 60d. Front-side load sensor 60a is arranged on base plate 53 at a position substantially central in the front-rear direction and central in the left-right direction. Rear-side load sensor 60b is arranged on a rear section of base plate 53 at a position central in the left-right direction. Right-side load sensor 60c is arranged on a rear section of base plate 53 at a position towards the right edge. Left-side load sensor 60d is arranged on a rear section of base plate 53 at a position towards the left edge. Load detecting device 60 detects a load that supporting device 50 receives from care receiver M using the four load sensors 60a, 60b, 60c, and 60d.

[0031] Lower limb contacting section 70 contacts a front portion (shin or knee) of the lower limbs of care receiver M in a sitting posture, thereby helping to decide the position and posture of the lower body of care receiver M in a sitting posture. In particular, the positions of the legs are decided to a certain extent. Lower limb contacting section 70 is fixed to support column 12 of base 10. Lower limb contacting section 70 is provided with two support members 71 and lower limb contacting main body 72.

[0032] Support members 71 are L-shaped. One end of the L shape of support member 71 is fixed to support column 12, and the other end of the L shape of support member 71 is positioned to the rear of support column 12. Lower limb contacting main body 72 is fixed to the other end of support member 71 and is positioned to the rear of raising and lowering cover 33 and below oscillation support section 32. Lower limb contacting main body 72 is a portion for contacting the front of the lower limbs of care receiver M, has a wide surface, and is formed of a cushion material.

[0033] Input device 90 is an input means via which an operator such as care receiver M or a caregiver inputs a standing operation instruction or a sitting operation in-

struction. As shown in fig. 5, input device 90 is provided with stand button 91 for issuing the standing operation instruction, and sit button 92 for issuing the sitting operation instruction. Input device 90 also includes display section 93 for displaying various items of information. Input device 90 of the embodiment continues outputting the standing operation instruction to control device 80 while the operator is pressing stand button 91 and continues outputting the sitting operation instruction to control device 80 while the operator is pressing sit button 92.

[0034] Control device 80 is fixed to horizontal base 11 of base 10 and stands upright facing upwards from the upper front surface of horizontal base 11. Control device 80 is arranged to the side of support column 12. Control device 80 controls the up-down movement of raising and lowering section 30 and the oscillation of arm 40 so as to perform sitting assistance and standing assistance for a care receiver M.

[0035] As shown in fig. 5, control device 80 is connected to the above load detecting device 60, raising and lowering driving motor 35, arm driving motor 41, and input device 90.

[0036] A standing assistance program for performing standing assistance operation is memorized in advance on control device 80. When the standing operation instruction is executed by the operator, control device 80 executes the standing assistance program so as to control operation of moving device 57, that is, the up-down movement of raising and lowering section 30 and the oscillation of arm 40. Also, a sitting assistance program for performing sitting assistance operation is memorized in advance on control device 80. When the sitting operation instruction is executed by the operator, control device 80 executes the sitting assistance program so as to control operation of moving device 57, that is, the up-down movement of raising and lowering section 30 and the oscillation of arm 40. Further, control device 80 corrects the standing assistance program and the sitting assistance program in accordance with a standing start height and a standing end height.

[0037] Next, the standing operation of the care device 1 configured as described above will be described in accordance with the flowchart in the figure. An operator such as care receiver M or a caregiver pushes stand button 91 of input device 90 to issue a standing operation instruction to care device 1 (S100). When control device 80 receives the standing operation instruction from input device 90 via the input to stand button 91, control device 80 acquires load values from load detecting device 60 (S110), Control device 80 determines whether to start the standing operation based on the acquired load values. Specifically, in S120, control device 80 determines whether a load unbalance is occurring in the front-rear direction in the load that supporting device 50 is receiving from care receiver M, based on the load detection value of front-side load sensor 60a and rear-side load sensor 60b. In the present embodiment, control device 80 calculates a difference value between the load detection value from front-side load sensor 60a and the load detection value from rear-side load sensor 60b and determines that a load unbalance is occurring in the front-rear direction in a case where the difference value is larger than a predetermined threshold. Note that, in the present embodiment, the same threshold is used even when the weight of care receiver M varies. This is based on the fact that, as a result of tests conducted by changing conditions of the weight of care receiver M, it was found that it is possible to determine whether a load balance is good or bad with the same threshold even when the weight of care receiver M varies by evaluating the load balance based on the difference value between the load detection values from the load sensors. Subsequently, similar to S120, in S130, control device 80 determines whether a load unbalance is occurring in the left-right direction in the load that supporting device 50 is receiving from care receiver M, based on a load detection value from right-side load sensor 60c and a load detection value from left-side load sensor 60d. Control device 80 calculates a difference value between the load detection value from right-side load sensor 60c and the load detection value from left-side load sensor 60d and determines that a load unbalance is occurring in the left-right direction in a case where the difference value is larger than a predetermined threshold. The threshold may be the same as or may be different from the threshold used in determining the balance in the front-rear direction. In a case where it is determined in S120 or S130 that a load unbalance is occurring in the front-rear direction or the left-right direction, control device 80 displays a message indicating the occurrence of the load unbalance on display section 93 and ends processing (S140). On the other hand, in a case where it is determined in S120 and S130 that a load unbalance is not occurring in the front-rear direction or the left-right direction, control device 80 controls moving device 57 so as to start the standing operation (S150).

[0038] When supporting device 50 starts moving, control device 80 checks whether there is an input from stand button 91 (S160). If there is no input from stand button 91 in S160, this indicates that the operator has issued a stop instruction for the standing operation, thus control device 80 stops the movement of supporting device 50 (S170). On the other hand, if there is an input from stand button 91 in S160, control device 80 acquires the load values from load detecting device 60 (S180). Control device 80 determines whether to stop the standing operation based on the acquired load values. Specifically, in S190, control device 80 determines whether a load unbalance is occurring in the front-rear direction in the load that supporting device 50 receives from care receiver M, based on a load detection value from front-side load sensor 60a and a load detection value from rear-side load sensor 60b. In the present embodiment, control device 80 calculates a difference value between the load detection value from front-side load sensor 60a and the load detection value from rear-side load sensor 60b and determines that a load unbalance is occurring in the front-

rear direction in a case where the difference value is larger than a predetermined threshold. Further, in S200, control device 80 determines whether a load unbalance is occurring in the left-right direction in the load that supporting device 50 is receiving from care receiver M, based on a load detection value from right-side load sensor 60c and a load detection value from left-side load sensor 60d. In the present embodiment, control device 80 calculates a difference value between the load detection value from right-side load sensor 60c and the load detection value from left-side load sensor 60d and determines that a load unbalance is occurring in the left-right direction in a case where the difference value is larger than a predetermined threshold. Then, in a case in which control device 80 determines that a load unbalance is occurring in the front-rear direction or the left-right direction S190 or S200, even if the standing operation instruction is being input via stand button 91, control device 80 ignores the standing operation instruction, stops the standing operation during the operation, displays a message indicating a stoppage has occurred because of the load unbalance on display section 93, and ends processing (S210).

[0039] On the other hand, in a case in which control device 80 determines that a load unbalance is not occurring in the front-rear direction or the left-right direction in S190 or S200, control device 80 calculates a current position of the supporting device 50 by using encoder positional information of arm driving motor 41 and encoder positional information of raising and lowering driving motor 35 (S220). Then, in S230, control device 80 determines whether the calculated current position has reached an end position of the standing operation. If the current position has not reached the end position of the standing operation, control device 80 continues performing the standing operation and repeats processing from S160 until the current position reaches the end position of the standing operation. If the current position has reached the end position of the standing operation in S230, control device 80 stops the standing operation and ends the standing operation (S170).

[0040] Described above was standing operation of care device 1; sitting operation of care device 1 can be described for a similar flow by simply replacing "standing" with "sitting" in the above descriptions.

[0041] Care device 1 of the embodiment described above includes: base 10; supporting device 50 configured to support care receiver M, supporting device 50 being provided on base 10; moving device 57 configured to perform a standing operation or a sitting operation by moving supporting device 50 with respect to base 10; load detecting device 60 configured to detect a load that supporting device 50 receives from care receiver M, load detecting device 60 being provided on supporting device 50; and control device 80 configured to control moving device 57 Control device 80 stops the standing operation or the sitting operation during the operation based on a load value detected by load detecting device 60. Therefore, care device 1 is capable of stopping the standing operation or the sitting operation during the operation based on a state of the load that supporting device 50 receives from care receiver M. The load that supporting device 50 receives from care receiver M varies depending on a supported state of care receiver M. Hence, for example, in a case where the supported state of care receiver M is not appropriate, it is possible to stop the standing operation or the sitting operation of supporting device 50. In this manner, in a case in which the required of level assistance for care receiver M is relatively low, the care receiver M improves their supported state using their own body so as not to interrupt the standing operation or the sitting operation during the operation, thus achieving a rehabilitation effect. Further, in a case in which the required of level assistance for care receiver M is relatively high, because it can be understood from the stopping of the standing operation or the sitting operation that the supported state of care receiver M is not appropriate, a caregiver assisting the care receiver M can correct the supported state of the care receiver M, and restart the standing operation or the sitting operation with the care receiver M in an appropriately supported state.

[0042] Also, control device 80 stops the standing operation or the sitting operation during the operation when determining that a load unbalance is occurring in the front-rear direction in the load that supporting device 50 receives from care receiver M, based on the load values detected by front-side load sensor 60a and rear-side load sensor 60b of load detecting device 60. Similarly, control device 80 stops the standing operation or the sitting operation during the operation when determining that a load unbalance is occurring in the left-right direction in the load that supporting device 50 receives from care receiver M, based on the load values detected by right-side load sensor 60c and left-side load sensor 60d of load detecting device 60. Thus, with care device 1 it is possible to stop the standing operation or the sitting operation during the operation when a load unbalance occurs in the front-rear direction or the left-right direction in a load that the supporting device receives from the care receiver, thus improving practicability of care device 1.

[0043] In addition, load detecting device 60 is capable of measuring load values at multiple positions of supporting device 50 using load sensors 60a, 60b, 60c, and 60d. Further, in a case in which a difference value between a front-side load value detected by front-side load sensor 60a and a rear-side load value detected by rear-side load sensor 60b exceeds a predetermined threshold, or in a case in which a difference value between a right-side load value detected by right-side load sensor 60c and a left-side load value detected by left-side load sensor 60d exceeds a predetermined value, control device 80 determines that a load unbalance is occurring. In this manner, the load balance is determined based on the difference value between the load values, thereby it is possible to determine whether the load balance is good or bad without resetting the threshold even if the weight of care re-

ceiver M varies.

[0044] Further, care device 1 includes input device 90 configured to receive the standing operation instruction or the sitting operation instruction from an operator. If control device 80 determines to stop the standing operation or the sitting operation during the operation based on the load values detected by load detecting device 60, control device 80 stops the standing operation or the sitting operation even in a case in which the standing operation instruction or the sitting operation instruction is being input to input device 90. In this manner, even when the operator continues inputting the standing operation instruction or the sitting operation instruction, the standing operation or the sitting operation is stopped during the operation when a load unbalance occurs, thus improving the practicability of care device 1.

[0045] Meanwhile, it goes without saying that the invention is not limited to the above-mentioned embodiment and various embodiments may be applied within the technical scope of the invention.

[0046] For example, in the embodiment described above, control device 80 ends processing when the standing operation of moving device 57 is stopped in S210; however, in a case where the standing operation or the sitting operation of moving device 57 is stopped, control device 80 may restart the standing operation or the sitting operation on condition that the operator inputs the standing operation instruction or the sitting operation instruction to input device 90, when control device 80 determines that the standing operation or the sitting operation may be restarted based on the load values detected by load detecting device 60. In this manner, even if the standing operation or the sitting operation has been stopped temporarily, the standing operation or the sitting operation can be restarted when the load unbalance is rectified. Accordingly, because the care receiver M tries to improve their supported state using their own body, a rehabilitation effect is achieved. In addition, because the standing operation or the sitting operation is restarted on condition that the operator inputs the standing operation instruction or the sitting operation instruction to input device 90, it is possible to prevent an operation that is not intended by the operator from being performed. Further, in this case, control device 80 may ignore the standing operation instruction or the sitting operation instruction in a case where the standing operation instruction or the sitting operation instruction is continuously input to input device 90 from before when the standing operation or the sitting operation was stopped. In this manner, it is possible to prevent an operation that is not intended by the operator from being performed.

[0047] In the embodiment described above, the load detecting device (first load detecting device) 60 is provided only on supporting device 50; however, a load detecting device (second load detecting device) may further be provided on footrest 13. In this case, control device 80 may stop the standing operation or the sitting operation during the operation based on load values detected by the first load detecting device and the second load detecting device. In this manner, care device 1 is capable of stopping the standing operation or the sitting operation during the operation based on a state of the load that supporting device 50 receives from care receiver M and a state of the load that footrest 13 receives from care receiver M. For example, in the embodiment described above, the threshold used when determining whether a load unbalance is occurring in S120, S130, S190, and S200, is constant regardless of the weight of care receiver M; however, in a case where it is desirable to change the threshold depending on the weight of care receiver M, it is possible to change a value of the threshold depending on the load value detected by the second load detecting device.

[0048] In the embodiment described above, load detecting device 60 is configured of multiple load sensors; however, the load detecting device may be configured of one load sensor. In addition, control device 80 determines the occurrence of a load unbalance based on the difference value between two load sensors; however, the difference value may be computed from load values from three or more load sensors. Alternatively, the occurrence of a load unbalance may be determined based on the load value of one load sensor. For example, in a case where only rear-side load sensor 60b is provided, and the load value from rear-side load sensor 60b exceeds the predetermined threshold, the control device may determine that a load unbalance is occurring and may stop the standing operation or the sitting operation. In addition, the standing operation or the sitting operation may be stopped based on a load value at a specific position of supporting device 50 without consideration of the load balance. In addition, load detecting device 60 is provided between base plate 53 and torso receiving section 51; however, the load detecting device may be provided on underarm receiving section 52.

[0049] In the embodiment described above, moving device 57 is configured to perform a combination of a raising and lowering operation and an oscillating operation; however, the moving device may be configured to perform only the lifting and lowering operation or only the oscillating operation. Alternatively, the moving device may be configured to perform a combination of the lifting and lowering operation and a front-rear operation or another type of operation. In addition, moving device 57 may be configured of one drive shaft or may be configured of two or more drive shafts.

[0050] In the embodiment described above, supporting device 50 supports the torso and underarm portions of the care receiver M; however, supporting device 50 may support another part of care receiver M. Supporting device 50 need only support a part of the body of care receiver M, but it is preferable that supporting device 50 supports at least a part of the upper body of care receiver M.

[0051] Care device 1 of the above embodiment assists care receiver M such that only their lower body is upright

at the standing operation end position, but care device 1 may assist care receiver M such that their lower body and upper body are upright at the standing operation end position.

[0052] In the embodiment described above, the present invention is described as care device 1; however, the present invention may be, for example, a control method of care device 1.

Reference Signs List

[0053] 1: care device; 2: ground surface; 3: seat; 10: base; 11: frame; 12: support column; 13: footrest; 14: fixed cover; 20: wheel; 30: raising and lowering section; 31: raising and lowering main body; 32: oscillation support section; 33: raising and lowering cover; 35: raising and lowering driving motor; 40: arm; 41: arm driving motor; 50: supporting device; 51: torso receiving section; 52: underarm receiving section; 53: base plate; 55: grip; 57: moving device; 60: load detecting device (first load detecting device); 60a: front-side load sensor; 60b: rear-side load sensor; 60c: right-side load sensor; 60d: left-side load sensor; 70: lower limb contacting section; 71: supporting member; 72: lower limb contacting main body; 80: control device; 90: input device; 91: stand button; 92: sit button; 93: display section

Claims

1. A care device configured to assist standing or sitting of a care receiver, the care device comprising:

   a base;
   a supporting device configured to support the care receiver, the supporting device being provided on the base;
   a moving device configured to perform a standing operation or a sitting operation by moving the supporting device with respect to the base;
   a first load detecting device configured to detect a load that the supporting device receives from the care receiver, the first load detecting device being provided on the supporting device; and
   a control device configured to control the moving device, and stop the standing operation or the sitting operation during the operation based on a load value detected by the first load detection device.

2. The care device according to claim 1, wherein the control device is configured to stop the standing operation or the sitting operation during the operation when determining that a load unbalance in a front-rear direction has occurred in a load that the supporting device is receiving from the care receiver, based on the load value detected by the first load detecting device.

3. The care device according to claim 1 or 2, wherein the control device is configured to stop the standing operation or the sitting operation during the operation when determining that a load unbalance in a left-right direction has occurred in a load which the supporting device is receiving from the care receiver, based on the load value detected by the first load detecting device.

4. The care device according to claim 1 or 2, wherein the control device is configured to stop the standing action or the seating action during the action when determining that a load unbalance in a left-right direction occurs in a load which the supporting device receives from the person in need of assistance, based on the load value detected by the first load detection device.

5. The care device according to any one of claims 1 to 4, further comprising:

   an input device configured to receive a standing operation instruction or a sitting operation instruction from an operator,
   wherein
   the control device is configured to stop the standing operation or the sitting operation even in a case in which the standing operation instruction or the sitting operation instruction has been input to the input device, when the control device has determined to stop the standing operation or the sitting operation during the operation based on the load value detected by the first load detecting device.

6. The care device according to any one of claims 1 to 5, wherein the control device is configured to, in a case in which the standing operation or the sitting operation of the moving device has been stopped, restart the standing operation or the sitting operation on condition that the operator has input the standing operation instruction or the sitting operation instruction to the input device, when the control device has determined that the standing operation or the sitting operation may be restarted based on the load value detected by the first load detection device.

7. The care device according to claim 6, wherein the control device is configured to ignore the standing operation instruction or the sitting operation instruction in a case in which the standing operation instruction or the sitting operation instruction has been continuously input to the input device before the standing operation or the sitting operation was stopped.

8. The care device according to any one of claims 1 to 7, wherein the base is provided with a footrest on which a foot of the care receiver is loaded, the foot-

rest being provided with a second load detection device, and wherein the control device is configured to stop the standing operation or the sitting operation during the operation based on load values detected by the first load detecting device and the second load detecting device.

FIG. 1

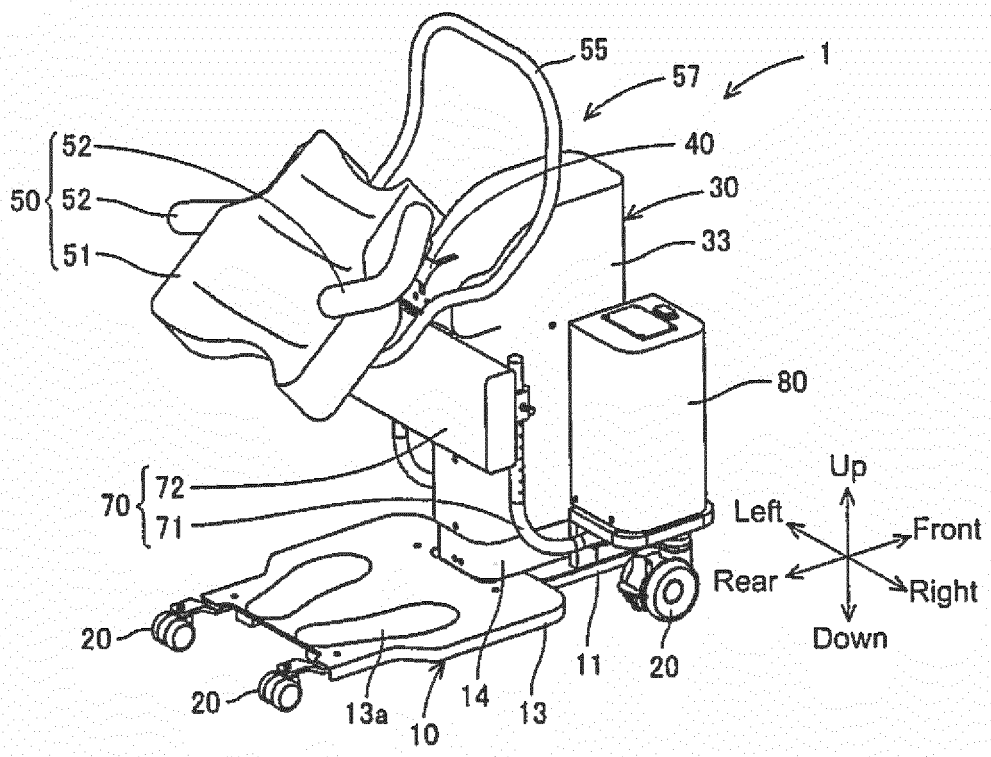

55
57
1
52
50
52
51
40
30
33
80
70
72
71
Up
Left
Front
Rear
Right
Down
20
20
13a
10
14
13
11
20

FIG. 2

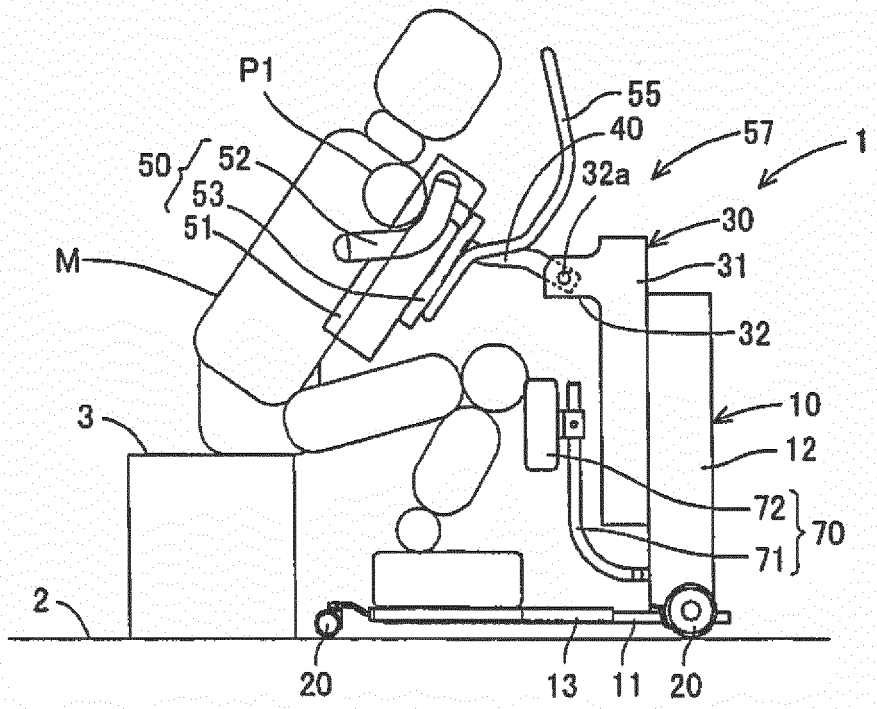
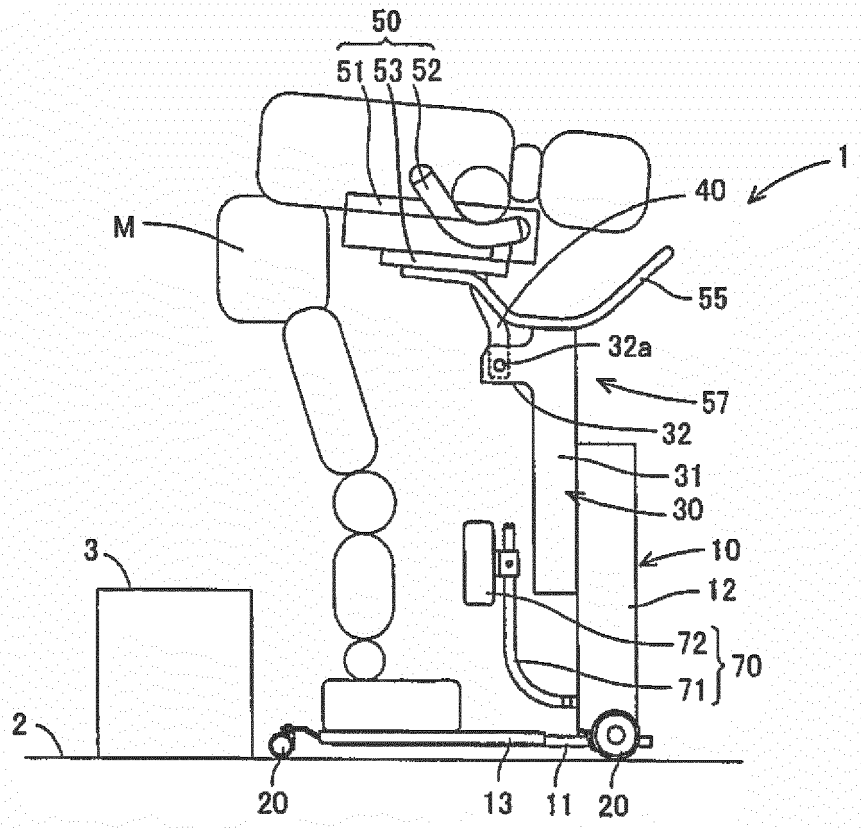

P1
55
40
57
1
50
52
53
51
32a
30
M
31
32
10
3
12
72
70
71
2
20
13
11
20

FIG. 3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40
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32a
57
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3
10
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70
71
2
20
13
11
20

FIG. 4

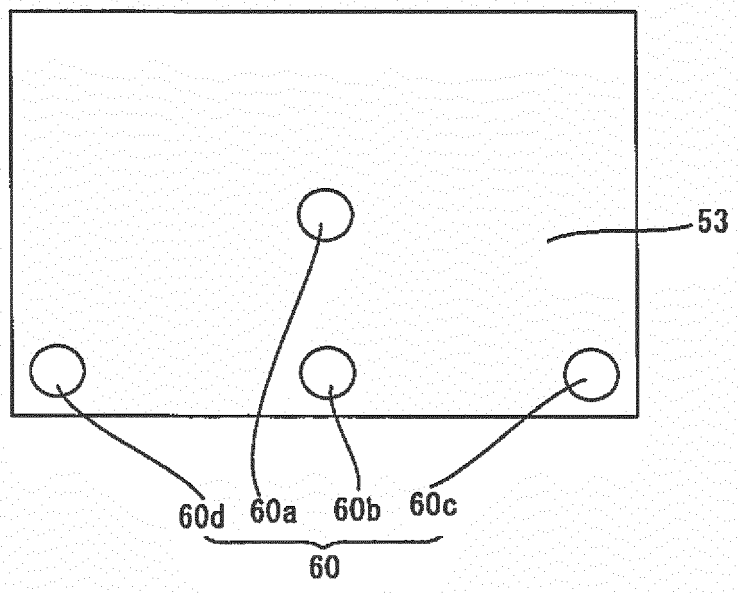

53
60d
60a
60b
60c
60

FIG. 5

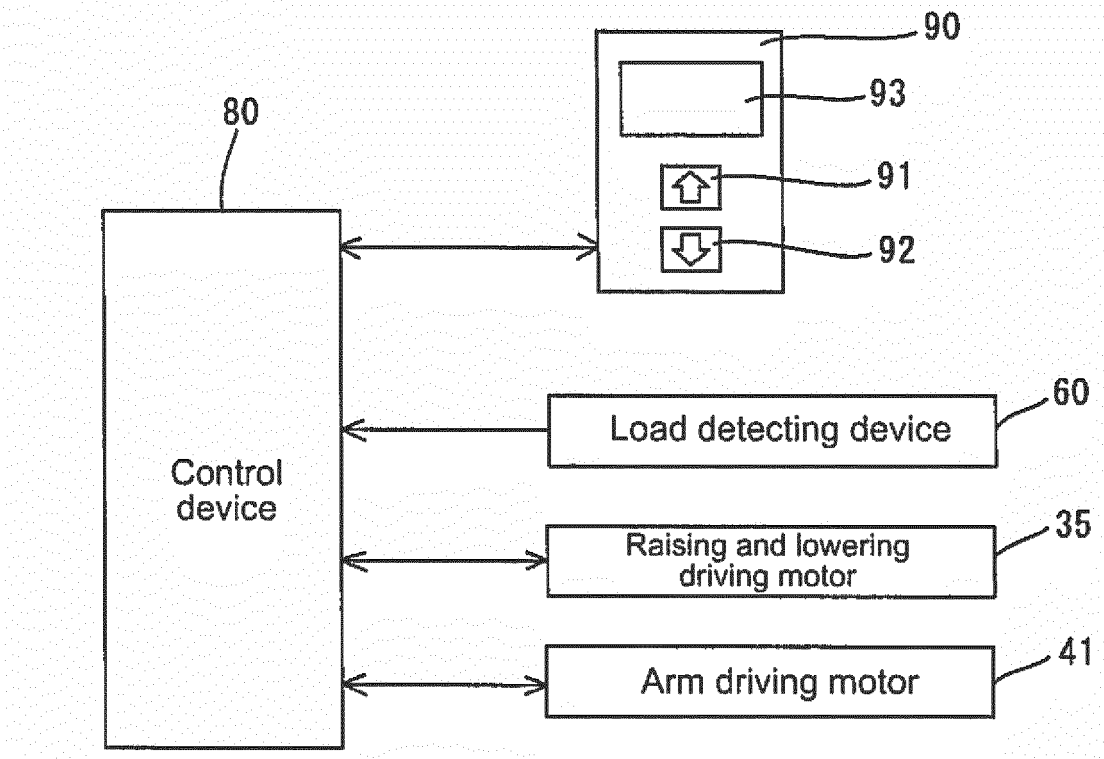
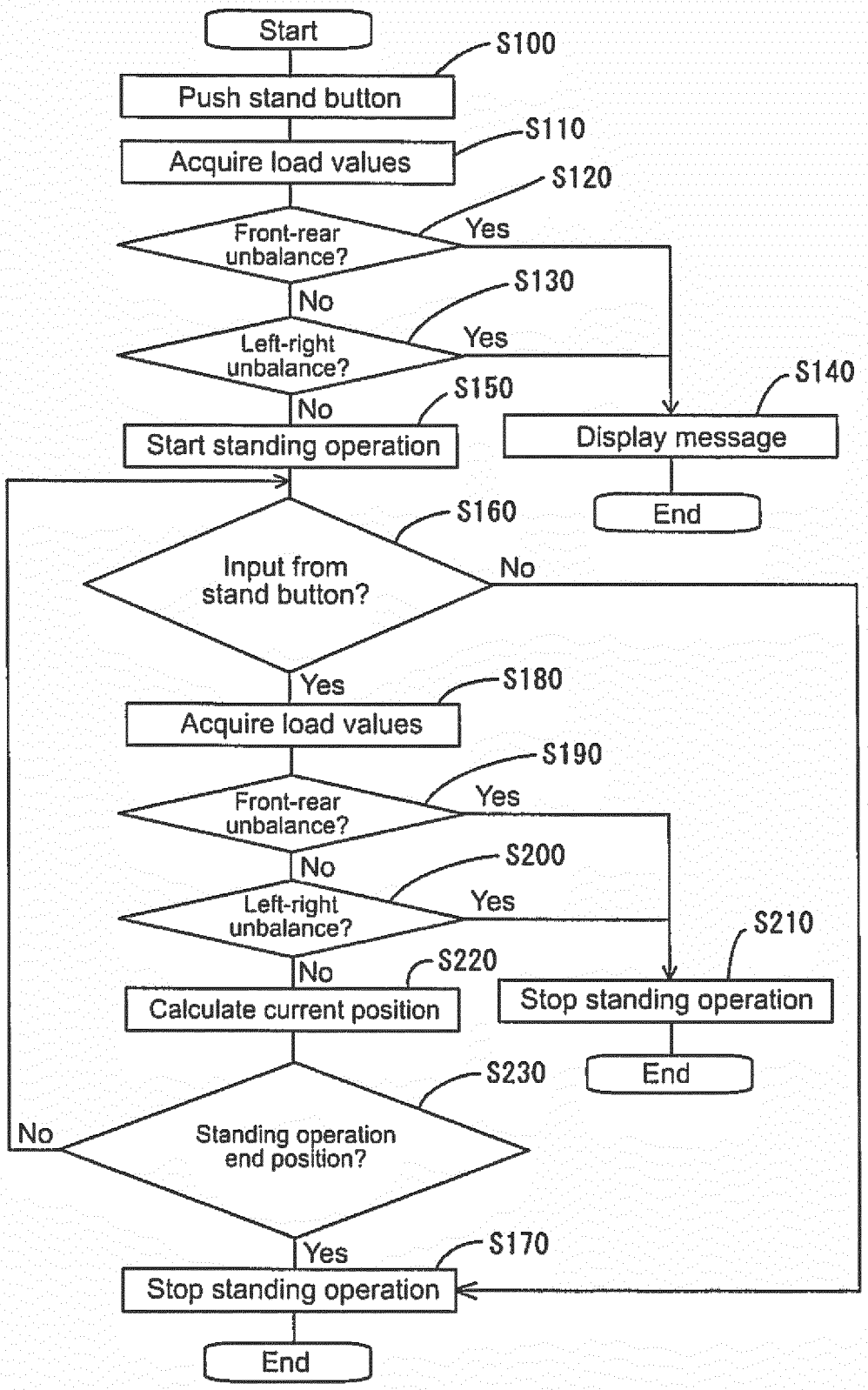

90
93
80
91
92
Load detecting device
60
Control device
Raising and lowering driving motor
35
Arm driving motor
41

FIG. 6


Start
S100
Push stand button
S110
Acquire load values
S120
Front-rear unbalance?
Yes
No
S130
Left-right unbalance?
Yes
No
S150
Start standing operation
S140
Display message
End
S160
Input from stand button?
No
Yes
S180
Acquire load values
S190
Front-rear unbalance?
Yes
No
S200
Left-right unbalance?
Yes
No
S220
Calculate current position
S210
Stop standing operation
End
S230
Standing operation end position?
No
Yes
S170
Stop standing operation
End

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2015/083821

A. CLASSIFICATION OF SUBJECT MATTER
A61G5/00(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)
A61G5/00

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2013-78601 A (Fuji Machine Mfg. Co., Ltd.), 02 May 2013 (02.05.2013), entire text; all drawings (Family: none)	1-8
A	JP 2011-19571 A (Fuji Machine Mfg. Co., Ltd.), 03 February 2011 (03.02.2011), entire text; all drawings (Family: none)	1-8

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

* Special categories of cited documents:
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"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
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"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

Date of the actual completion of the international search	Date of mailing of the international search report
12 February 2016 (12.02.16)	23 February 2016 (23.02.16)
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

- WO 2015145756 A **[0003]**