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(54) **ELECTRIC LIFTING/LOWERING COMMODE**

(57) Disclosed is an electric toilet seat lift, including a toilet seat, a bracket, a lift support configurable to control the toilet seat to be raised and lowered, and a drive configurable to drive the lift support to move, the drive including a linear actuator and an adjuster module, one end of the linear actuator being hinged to the lift support, an opposite end thereof being hinged to the adjuster module, the adjuster module being configurable to drive positional change of an end portion of the linear actuator and including a pivot connector assembly hinged to the end portion of the linear actuator and a pivot pusher assembly configurable to drive the pivot connector assembly to move. The electric toilet seat lift as disclosed realizes change of the seat trajectory through positional adjustment of the end portion of the linear actuator, satisfies requirements of various heights of users for a same toilet, and offers a higher degree of general-purpose utility.

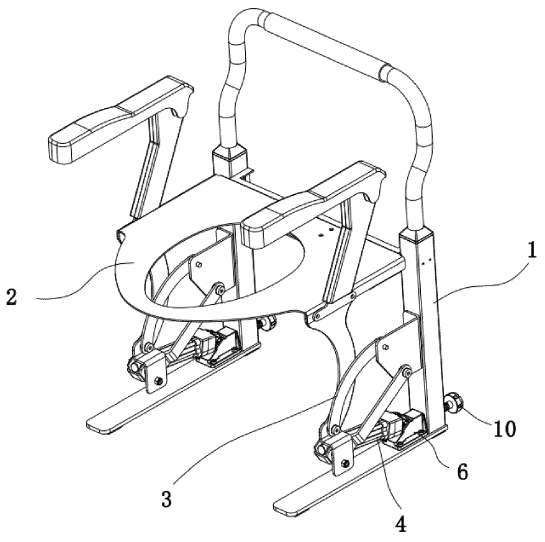

Fig. 1

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Description

FIELD

[0001] The subject matter described herein relates to toilets, and more particularly relates to an electric toilet seat lift.

BACKGROUND

[0002] Conventional toilets would cause much trouble to users with lumbar-vertebra and knee-joint problems, and to those seniors and pregnant women, as during the process of sitting down, their waist and lower-body muscles need to continuously generate force to maintain body balance upon shifting of their body's center of gravity. An existing facility already provides a device that drives the toilet seat to rise and incline via a telescopic drive, which, however, has drawbacks such as a complex structure, a poor stability, an insufficient rising height, and an over large inclination angle; in addition, the existing telescopic drive, whose motion trajectory is unadaptable, cannot satisfy requirements of various heights of users for a same toilet.

SUMMARY

[0003] To overcome the drawbacks of a conventional device that drives the toilet seat to rise and incline via a telescopic drive, such as a complex structure, a poor stability, an insufficient rising height, and an over large inclination angle, as well as incapability of being adapted to various heights of users for a same toilet, the disclosure provides an electric toilet seat lift, which realizes trajectory adaptability of a seat through positional adjustment of an end portion of a linear actuator and thus satisfies requirements of various heights of users for a same toilet, thereby offering a higher degree of general-purpose utility.

[0004] The disclosure adopts a technical solution below:

An electric toilet seat lift comprising: a toilet seat, a bracket, a lift support configurable to control the toilet seat to be raised and lowered, and a drive configurable to drive the lift support to move, the drive comprising a linear actuator and an adjuster module, one end of the linear actuator being hinged to the lift support, an opposite end thereof being hinged to the adjuster module, the adjuster module being configurable to drive positional change of an end portion of the linear actuator and comprising a pivot connector assembly hinged to the end portion of the linear actuator and a pivot pusher assembly configurable to drive the pivot connector assembly to move.

[0005] In the technical solution, the linear actuator moves in a telescopic manner, which drives the lift support to move so that the toilet seat is raised or lowered; during this process, the pivot pusher assembly adjusts the pivot connector assembly to drive positional change of the end portion of the linear actuator, causing change of the movement trajectory when the lift support drives the toilet seat to move; as such, the disclosure satisfies requirements of various users and offers a higher degree of general-purpose utility.

[0006] In some implementations, the pivot connector assembly comprises a pivot connector and a slide base, the slide base being secured on the bracket, a guiding hole being formed on the slide base, the pivot connector being arranged in the guiding hole, a bottom of the pivot connector abutting against the pivot pusher assembly, the pivot pusher assembly driving the pivot connector to move axially along the guiding hole.

[0007] The guiding hole plays a role of guiding movement of the pivot connector; the pivot pusher assembly pushes the pivot connector to move axially in the guiding hole, driving positional change of the second hinging end connected to the pivot connector assembly, thereby realizing change of the movement trajectory of the toilet seat.

[0008] In some implementations, the pivot pusher assembly comprises a first slider and a first adjustment lever configurable to push the first slider to move, and a slide bevel is formed on the first slider, the bottom of the pivot connector being slidingly arranged on the slide bevel.

[0009] The pivot pusher assembly pushes, via the first adjustment lever, the first slider to move to drive the pivot connector to telescope in the guiding hole; the inclination configuration of the slide bevel allows for height change of the abutting position of the bottom of the pivot connector during movement of the first slider, driving change of the axial position of the pivot connector in the guiding hole, which further drives positional change of an end of the linear actuator hinged to the adjuster module, causing change of the acting effect of the linear actuator pushed out, whereby stroke amplification is realized.

[0010] In some implementations, the first adjustment lever is telescopically arranged on the bracket, a front end of the first adjustment lever abutting against the first slider; and a reset spring configurable to provide a force in a direction opposite to that exerted by the adjustment lever is arranged between the first slider and the slide base.

[0011] The telescoping movement of the first adjustment lever on the bracket drives the first slider to move, while setting of the reset spring plays a role of resetting the first slider, so that the first slider is always subjected to two forces in opposite directions respectively exerted by the first adjustment lever and the reset spring, which ensures a balanced stress received by the overall system, whereby movement of the slider is always controlled in a balanced state.

[0012] In some implementations, one end of the first adjustment lever is rotatably arranged on the bracket, and an opposite end thereof is rotatably arranged on the slide base; a handle configurable to drive the first adjustment lever to rotate is provided at the one end of the first adjustment lever; a through hole configurable for the first

adjustment lever to pass through is formed on the first slider; an external thread is formed on the first adjustment lever, and an internal thread fitted with the external thread is formed inside the through hole.

[0013] To operate the electric toilet seat lift, by turning the handle, the first adjustment lever is brought to rotate; the thread-fitting structure between the first slider and the first adjustment lever allows for the rotating first adjustment lever to bring the first slider to move, further driving the pivot connector to telescope in the guiding hole; in addition, threaded engagement between the inner thread and the external thread allows for the slider to hold at any intermediate position of the slide base.

[0014] In some implementations, the bottom of the pivot connector abuts against the slide bevel; or, a guide slideway is formed on the slide bevel of the first slider, the bottom of the pivot connector being slidingly arranged in the guide slideway.

[0015] Abutting between the bottom of the pivot connector and the slide bevel allows for sliding engagement between the bottom of the pivot connector and the slide bevel, which facilitates pushing the slider to move to drive the pivot connector to move; the guide slideway arranged on the slide bevel plays a role of limiting movement of the pivot connector on the slide bevel.

[0016] In some implementations, the pivot connector assembly comprises a rocking member, the rocking member being hinged to the linear actuator, a rotary connection end rotatably connected on the bracket is arranged on the rocking member, and the pivot pusher assembly drives the rocking member to rotate about the rotary connection end.

[0017] By setting of the rocking member, the structure of the pivot connector assembly is simplified, reducing the number of parts needed.

[0018] In some implementations, the pivot pusher assembly comprises a second slider and a second adjustment lever configurable to drive the second slider to move, the second slider being in tangential contact with the rocking member, an arc-shaped convex surface is formed on the second slider, and an arc-shaped concave surface fitted with the arc-shaped convex surface is formed on the rocking member, the arc-shaped convex surface being conformingly fitted with the arc-shaped concave surface.

[0019] Setting of the arc-shaped concave surface and the arc-shaped convex surface realizes tangential contact between the second slider and the rocking member, where the contact between the slider and a contact block is always a surface-to-surface contact, so that the contact block is stressed more uniformly when being pushed by the slider.

[0020] In some implementations, the second adjustment lever is set as a screw rod, a front end of the second adjustment lever abutting against the second slider; a mounting hole configurable for the screw rod to pass through is formed on the bracket, and a nut is secured at an end of the mounting hole proximal to the slider, the screw rod being in threaded connection with the nut.

[0021] By setting the second adjustment lever as a screw rod, during the process of the second adjustment lever pushing the second slider, it is only needed to rotate the screw rod to realize telescopic movement of the second adjustment lever on the bracket, which further pushes the second slider to move forwardly and backwardly; in this way, the operation is simplified, and the self-locking force of the threaded engagement ensures that the adjusted position of the slider is stationary and stable.

[0022] In some implementations, scale marks are set on the screw rod.

[0023] The scale marks are set to show a position to which the pivot connector is moved, which facilitates positional consistency when a plurality of drives work jointly.

[0024] In view of the above, the disclosure offers the following benefits: by adjusting the position of the end portion of the linear actuator, the trajectory of the toilet seat is changed, whereby the movement trajectory of the toilet seat driven by the lift support is changed, which satisfies requirements of various users and offers a higher degree of general-purpose utility; in addition, the disclosure realizes stepless adjustment of the position of the pivot connector; in addition, the other parts are less stressed, so that the service life of those parts is extended; moreover, the disclosure facilitates positional consistency between a plurality of drives working together.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

Fig. 1 is a structural schematic diagram of an electric toilet seat lift according to the disclosure;

Fig. 2 is an exploded structural schematic diagram of a drive in a first implementation;

Fig. 3 is a sectional view of the drive in the first implementation;

Fig. 4 is a structural schematic diagram of the drive in the first implementation;

Fig. 5 is a structural schematic diagram of a drive in a second implementation;

Fig. 6 is a sectional view of the drive in the second implementation;

Fig. 7 is an exploded structural schematic diagram of a drive in a third implementation;

Fig. 8 is a sectional view of the drive in the third implementation;

Fig. 9 is a structural schematic diagram of the drive in the third implementation;

[0026] In the drawings: 1. bracket; 2. toilet seat; 3. lift support; 4. linear actuator; 401. first hinging end; 402. second hinging end; 5. pivot connector; 6. slide base; 601. guiding hole; 602. guide bevel; 7. first slider; 701. slide bevel; 8. rocking member; 9. contact block; 10. first adjustment lever; 11. nut; 12. reset spring; 13. pivot connection block; 14. rotary member; 12. first adjustment lever; 1201. handle; 13. slide base; 14. first slider; 15. second adjustment lever.

DETAILED DESCRIPTION OF EMBODIMENTS

[0027] Hereinafter, the disclosure will be further described in detail through specific implementations with reference to the accompanying drawings.

First Implementation

[0028] Fig. 1 illustrates a first implementation of an electric toilet seat lift, comprising: a toilet seat 2, a lift support 3, a bracket 1, and a drive, where the lift support 3 is configurable to bring the toilet seat 2 to be raised and lowered, one end of the lift support 3 being attached to the toilet seat 2, an opposite end thereof being hinged to the drive; the drive comprises a linear actuator 4 and an adjuster module; the linear drive 4 comprises a first hinging end 401 hinged to the lift support 3 and a second hinging end 402 hinged to the adjuster module; the adjuster module is configurable to adjust a position of the second hinging end 402 and comprises a pivot connector assembly hinged to the second hinging end 402 and a pivot pusher module configurable to push the pivot connector assembly to move, the pivot pusher module being arranged on the bracket 1. The pivot connector assembly comprises a pivot connector 5 and a slide base 6 configurable to limit movement of the pivot connector 5, the slide base 6 being fixed to a bottom of the bracket 1; a guiding hole 601 is formed on the slide base 6, the pivot connector 5 being slidingly arranged in the guiding hole 601, a bottom of the pivot connector 5 abutting against the pivot pusher assembly; the pivot pusher assembly drives the pivot connector 5 to move axially along the guiding hole. The guiding hole plays a role of guiding movement of the pivot connector 5. As the pivot pusher assembly pushes the pivot connector 5 to move axially in the guiding hole, a position of the second hinging end 402 connected to the pivot connector assembly is changed, so that the movement trajectory of the toilet seat 2 is changed to meet requirements of various users; as such, the disclosure offers a higher degree of general-purpose utility.

[0029] As illustrated in Figs. 2, 3, and 4, the pivot pusher assembly comprises a fist slider 7 and a first adjustment lever 10 configurable to push the first slider 7 to move; a slide bevel 701 is arranged on the first slider 7, and the bottom of the pivot connector 5 is slidingly arranged on the slide bevel 701. In this implementation, the bottom of the pivot connector 5 abuts against the slide bevel 701. The first adjustment lever 10 is telescopically arranged on the bracket 1, a front end of the first adjustment lever 10 abutting against the first slider 7; and a reset spring 12 configurable to provide a force in a direction opposite to that exerted by the adjustment lever is arranged between the first slider 7 and the slide base 6. The reset spring 12 plays a role of resetting the first slider 7, so that the first slider 7 is constantly subjected to two opposite forces respectively provided by the first adjustment lever 10 and the reset spring 12, which ensures that the overall system receives a balanced stress, whereby movement of the slider is always controlled in a balanced state. In this implementation, the first adjustment lever 10 is set as a screw rod, an adjustment hole configurable for the screw rod to pass through being formed on the bracket 1; a nut 11 is fixedly arranged on the adjustment hole, the nut 11 being in threaded connection with the screw rod. During operation, since the nut 11 is stationary, it is only needed to turn the screw rod to realize telescopic movement of the first adjustment lever 10 on the bracket 1, whereby the slider is pushed to move. This setting facilitates the screw rod to stop at any position, i.e., facilitating stepless adjustment of the pivot connector 5. In addition, scale marks are further set on the screw rod. The scale marks are configurable to show a position of the pivot connector 5 projecting out of the guiding hole, facilitating positional consistency when a plurality of drives work together.

[0030] To guide movement of the first slider 7, a guiding slide cavity is arranged on the slide base 6, the first slider 7 being arranged in the guiding slide cavity; or, a limiting guide structure is arranged between the first slider 7 and the bracket 1, e.g., a limiting guide recess is arranged at the bottom of the first slider 7, and a limiting guide protrusion is arranged on the bracket 1, the limiting guide recess sleeving outside the limiting guide protrusion.

[0031] In addition, in this implementation, a guide bevel 602 is arranged on the slide base 6, the guiding hole 601 being formed on the guide bevel 602, the guide bevel on the slide base 6 being arranged parallel to the slide bevel 701 on the slider, an axis of the guiding hole being arranged perpendicular to the guide bevel; this prevents the pivot connector 5 from being jammed during the process of telescoping.

[0032] In the first implementation, the linear actuator 4 performs adjustment in such a manner: by screwing the first adjustment lever 10 in and out, the first slider 7 is pushed to move forward or backward in the slide base 6, driving relative displacement between the pivot connector 5 and the first slider 7; since the bottom of the pivot connector 5 is slidingly arranged on the slide bevel 701 of the first slider 7, a length of the pivot connector 5 projecting out of the guiding hole on the slide base 6 changes with movement of the first slider 7, which further changes the position of the second hinging end 402 of the linear

actuator 4, where forward movement of the first slider 7 is implemented by the first adjustment lever 10 acting against a rear end surface of the first slider 7, while backward movement of the first slider 7 is implemented by a continuous backward acting force applied by the reset spring 12 against a front end surface of the first slider 7. During the entire movement process, the first slider 7 is constantly subjected to the forces in opposite directions respectively exerted by the screw rod and the reset spring 12, which ensures that the overall system receives a balanced stress; as such, the first slider 77 always moves in a balanced state.

Second Implementation

[0033] Figs. 5 and 6 illustrate a second implementation, which is substantially identical to the technical solution of the first implementation, except that one end of the first adjustment lever 12 is rotatably arranged on the bracket 1, while an opposite end thereof is rotatably arranged on the slide base 13; one end of the first adjustment lever 12 is provided with a handle 1201 configurable to drive the adjustment lever to rotate; a through hole configurable for the first adjustment lever 12 to pass through is formed on the first slider 14; an external thread is formed on the first adjustment lever 12, and an internal thread fitted with the external thread is formed inside the through hole. To operate the electric toilet seat lift, the handle 1201 is turned to bring the first adjustment lever 12 to rotate; due to the thread-fitting configuration between the first slider 14 and the first adjustment lever 12, the first slider 14 is brought to move as the first adjustment lever 12 rotates, which further drives the pivot connector 5 to telescope inside the guiding hole; in addition, threaded engagement between the internal thread and the external thread allows for the slider to hold at any intermediate position of the slide base 13.

[0034] To further limit movement of the pivot connector 5 relative to the slide bevel, a guide slideway is formed on the slide bevel of the first slider 14, a bottom of the pivot connector 5 being slidingly arranged in the guide slideway.

[0035] In addition, a metallic probe is arranged at a lateral side of the first slider 14, and a notch is arranged at a lateral side of the slide base 13, the metallic probe projecting out of the notch; scale marks are set on the slide base 13 proximal to the notch, so that a user may identify a projected position of the pivot connector 5 from a specific scale mark on the slide base 13 pointed by the metallic probe, thereby ensuring consistency between the positions of of the pivot connectors 5 on the brackets 1 at two sides.

[0036] In the second implementation, the linear actuator 4 performs adjustment in such a manner: by screwing the first adjustment lever 12 in and out, the first slider 14 is driven to move forward or backward; when the first adjustment lever 12 screws the slider out, the slider moves forward relative to the bracket 1, and the pivot connector 5 projects out of the slide base 13; when the slide bevel of the first slider 14 is conformingly fitted with the inner wall of the slide base 13, the slider moves to the utmost front end of the slide base 13. When the first adjustment lever 12 screws the first slider 14 in, the first slider 14 moves backward relative to the bracket 1, and the pivot connector 5 retracts into the guiding hole on the slide base 13; when the rear end surface of the first slider 14 engages the bracket 1, the first slider 14 moves to the utmost rear end of the slide base 13. In addition, the threaded engagement allows for the first slider 14 to hold at any intermediate position of the slide base 13.

Third Implementation

[0037] Figs. 7, 8, and 9 illustrate a third implementation, which is substantially identical to the technical solution of the first implementation, except that a pivot adjustment assembly is provided, comprising: a rocking member 8, the rocking member 8 being hinged to a second hinging end 402 of the linear actuator 4; the pivot pusher assembly drives the rocking member 8 to rotate about the rotatable connection end. A pivot connection block 13 configurable to be hinged to the linear actuator 4 is arranged on the rocking member 8, the pivot connection block 13 being welded on the rocking member 8. In addition, a rotary member 14 is provided between the rocking member 8 and the bracket 1, the rotary member 14 being disposed above the adjustment lever; in this implementation, the rotary member 14 is set as a snap-in nut, the rocking member 8 and the bracket 1 being connected via the snap-in nut. In addition, the rotary member 14 may also be set as a pin or the like.

[0038] In this implementation, the rocking member 8 is sleeved outside the slider, facilitating limitation of slider movement.

[0039] In addition, the pivot pusher assembly comprises a second slider and a second adjustment lever 15 configurable to drive the second slider to move, the second slider being in tangential contact with the rocking member 8. An arc-shaped convex surface is formed on the second slider, an arc-shaped concave surface fitted with the arc-shaped convex surface is formed on the rocking member 8, the arc-shaped convex surface being conformingly fitted with the arc-shaped concave surface. In this implementation, a contact block 9 is arranged between the rocking member 8 and the slider, the contact block 9 being secured on the rocking member 8 and conformingly fitted with the slider, the slider being in tangential contact with the contact block 9, the arc-shaped concave surface being arranged on the contact block 9; the second adjustment lever 15 is set as a screw rod, a front end of the second adjustment lever 15 abutting against the second slider; a mounting hole configurable for the screw rod to pass through is formed on the bracket 1; a nut 11 is secured to an end of the mounting hole proximal to the slider, the screw rod being in threaded connection with the nut 11; scale marks are

set on the screw rod; the scale marks serve to show a position to which the pivot connector 5 is moved, facilitating positional consistency of a plurality of drives working together.

[0040] In the third implementation, the linear actuator 4 performs adjustment in such a manner: by turning the second adjustment lever 15, when the second adjustment lever 15 moves forward, the second slider moves forward to push the rocking member 8 to rotate about the rotary member 14 on the bracket 1, bringing the pivot connection block 13 to move forward, causing positional change of the second hinging end 402 of the linear actuator 4; when the screw rod moves backward, the rocking member 8 pushes the slider to move under the action of gravitational force, bringing the pivot connection block 13 to move backward, further causing positional change of the second hinging end 402 of the linear actuator 4.

[0041] It is noted that, the terms "front," "rear," "left," "right," "upper," and "lower" referred to above indicate the directions in the drawings, while the terms "inner" and "outer" refer to the directions towards or away from the geometrical center of a specific member.

[0042] The implementations described *supra* are only intended for illustrating the disclosure, not for limiting the scope of the disclosure. To those skilled in the art, various modifications and alterations may be made based on the technical solution and the idea described *supra*, while all of such modifications and alterations shall fall within the scope of protection of the appended claims.

Claims

1. An electric toilet seat lift, comprising: a toilet seat, a bracket, a lift support configurable to control the toilet seat to be raised and lowered, and a drive configurable to drive the lift support to move, the drive comprising a linear actuator and an adjuster module, one end of the linear actuator being hinged to the lift support, an opposite end thereof being hinged to the adjuster module, the adjuster module being configurable to drive positional change of an end portion of the linear actuator and comprising a pivot connector assembly hinged to the end portion of the linear actuator and a pivot pusher assembly configurable to change position of the end portion of the linear actuator.

2. The electric toilet seat lift according to claim 1, wherein the pivot connector assembly comprises a pivot connector and a slide base, the slide base being secured on the bracket, a guiding hole being formed on the slide base, the pivot connector being arranged in the guiding hole, a bottom of the pivot connector abutting against the pivot pusher assembly, the pivot pusher assembly driving the pivot connector to move axially along the guiding hole.

3. The electric toilet seat lift according to claim 2, wherein the pivot pusher assembly comprises a first slider and a first adjustment lever configurable to push the first slider to move, and a slide bevel is formed on the first slider, the bottom of the pivot connector being slidingly arranged on the slide bevel.

4. The electric toilet seat lift according to claim 3, wherein the first adjustment lever is telescopically arranged on the bracket, a front end of the first adjustment lever abutting against the first slider; and a reset spring configurable to provide a force in a direction opposite to that exerted by the adjustment lever is arranged between the first slider and the slide base.

5. The electric toilet seat lift according to claim 3, wherein one end of the first adjustment lever is rotatably arranged on the bracket, and an opposite end thereof is rotatably arranged on the slide base; a handle configurable to drive the first adjustment lever to rotate is provided at the one end of the first adjustment lever; a through hole configurable for the first adjustment lever to pass through is formed on the first slider; an external thread is formed on the first adjustment lever, and an internal thread fitted with the external thread is formed inside the through hole.

6. The electric toilet seat lift according to claim 3, 4, or 5, wherein the bottom of the pivot connector abuts against the slide bevel; or, a guide slideway is formed on the slide bevel of the first slider, the bottom of the pivot connector being slidingly arranged in the guide slideway.

7. The electric toilet seat lift according to claim 1, wherein the pivot connector assembly comprises a rocking member, the rocking member being hinged to the linear actuator, a rotary connection end rotatably connected on the bracket is arranged on the rocking member, and the pivot pusher assembly drives the rocking member to rotate about the rotary connection end.

8. The electric toilet seat lift according to claim 7, wherein the pivot pusher assembly comprises a second slider and a second adjustment lever configurable to drive the second slider to move, the second slider being in tangential contact with the rocking member, an arc-shaped convex surface is formed on the second slider, and an arc-shaped concave surface fitted with the arc-shaped convex surface is formed on the rocking member, the arc-shaped convex surface being conformingly fitted with the arc-shaped concave surface.

9. The electric toilet seat lift according to claim 8, wherein the second adjustment lever is set as a screw rod, a front end of the second adjustment lever abutting against the second slider; a mounting hole configurable for the screw rod to pass through is formed on the bracket, and a nut is secured at an end of the mounting hole proximal to the slider, the screw rod being in threaded connection with the nut.

10. The electric toilet seat lift according to claim 9, wherein scale marks are set on the screw rod.

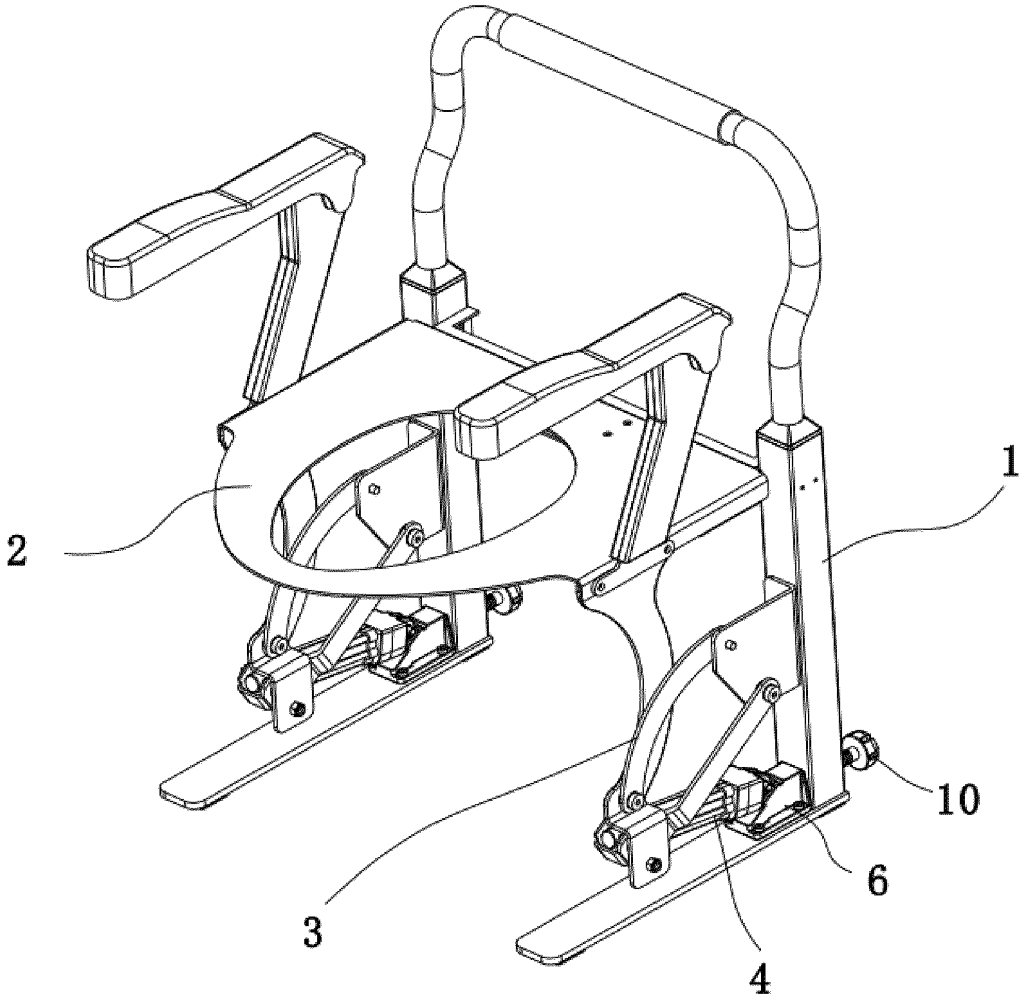

Fig. 1

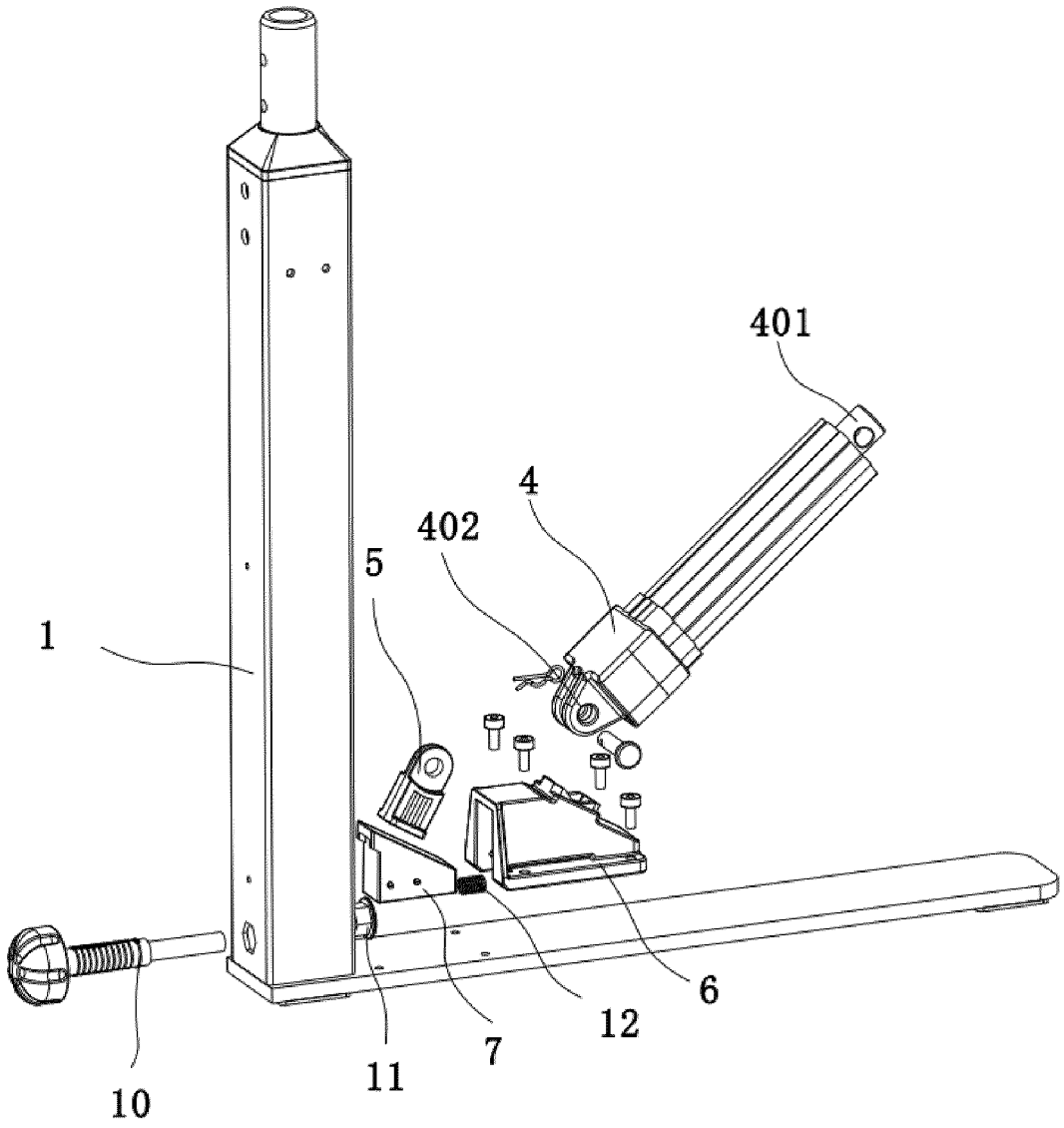

Fig. 2

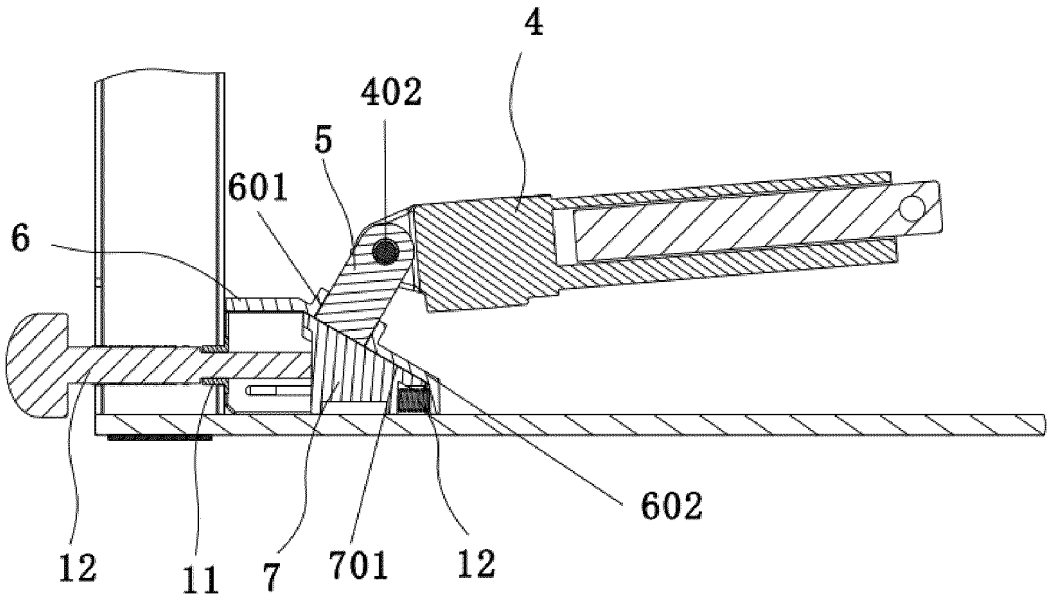

Fig. 3

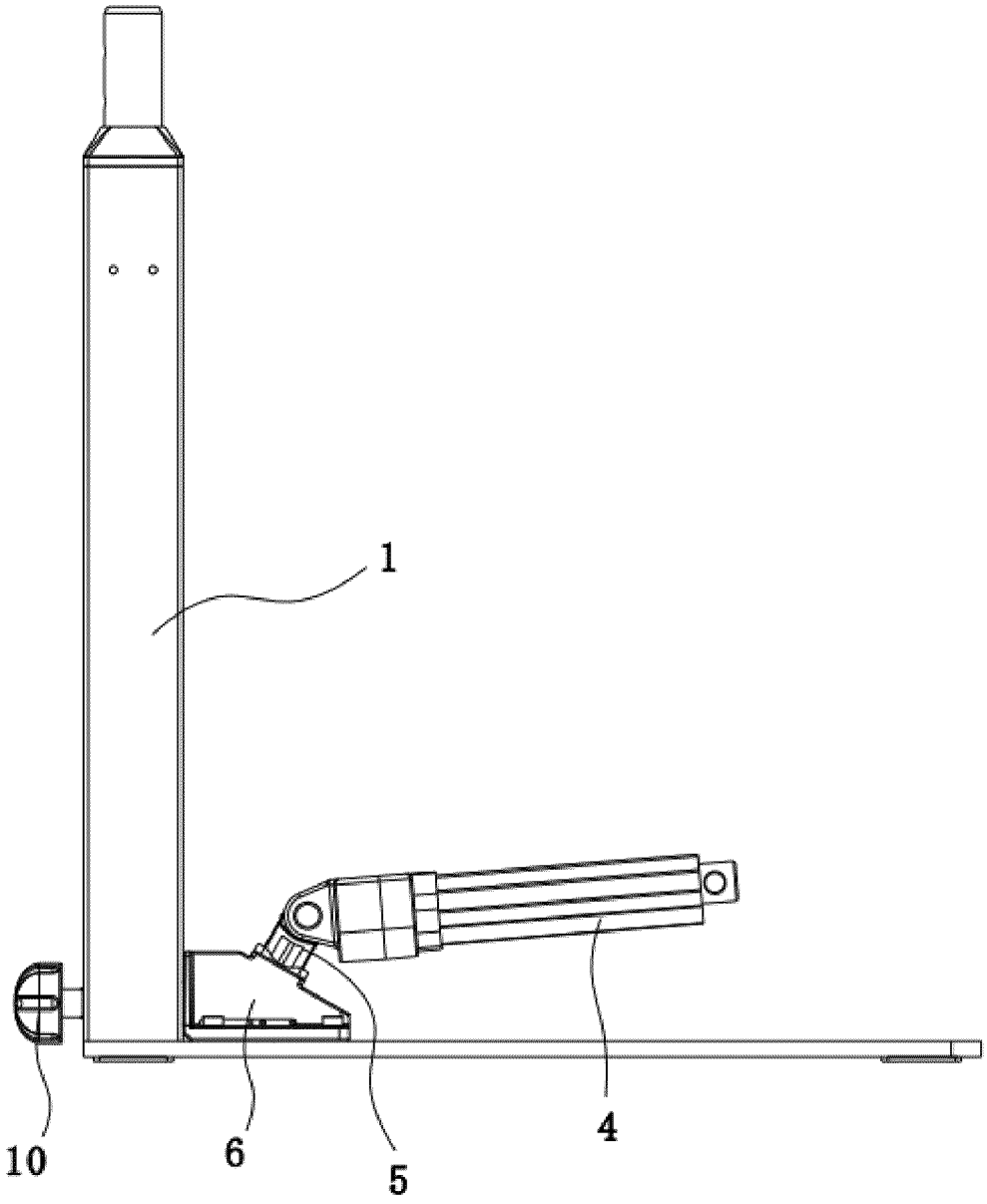

Fig. 4

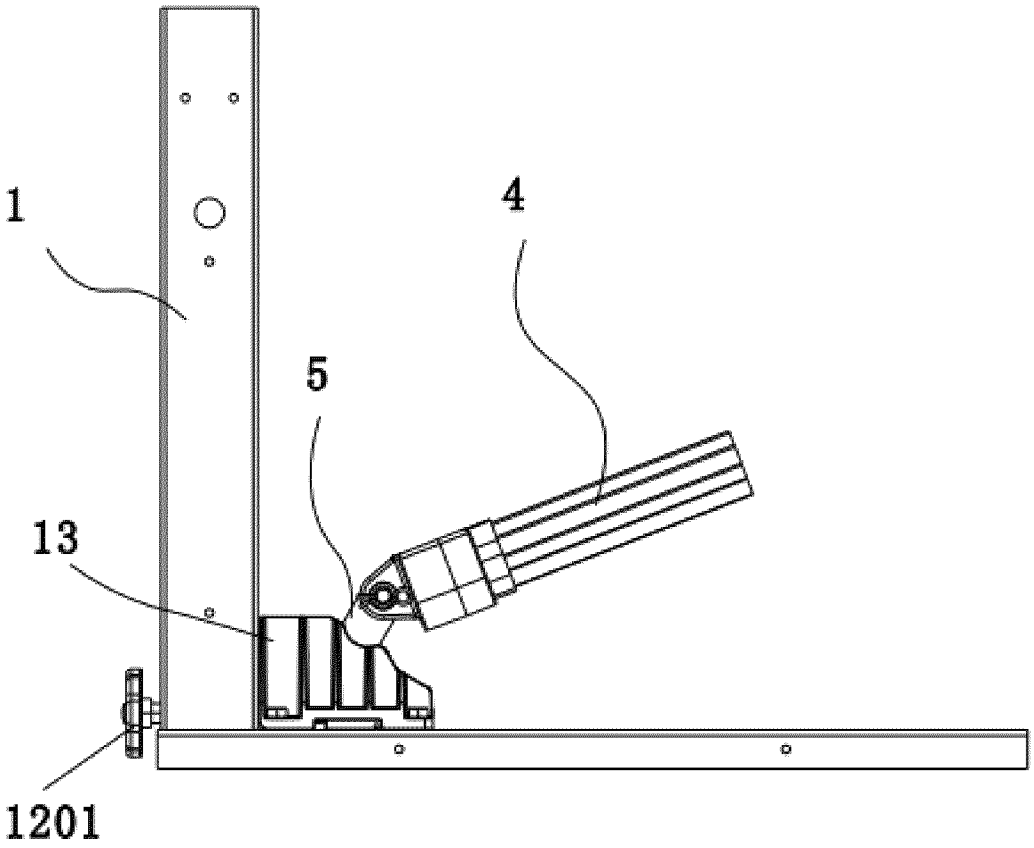

Fig. 5

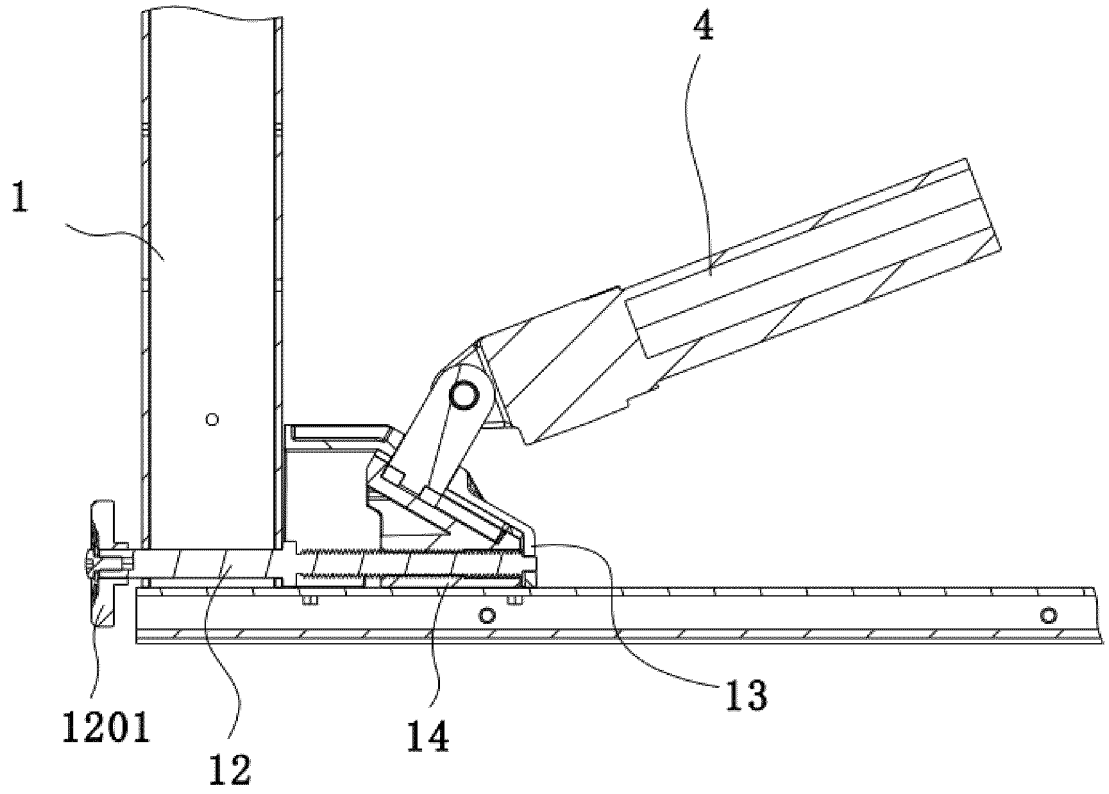

Fig. 6

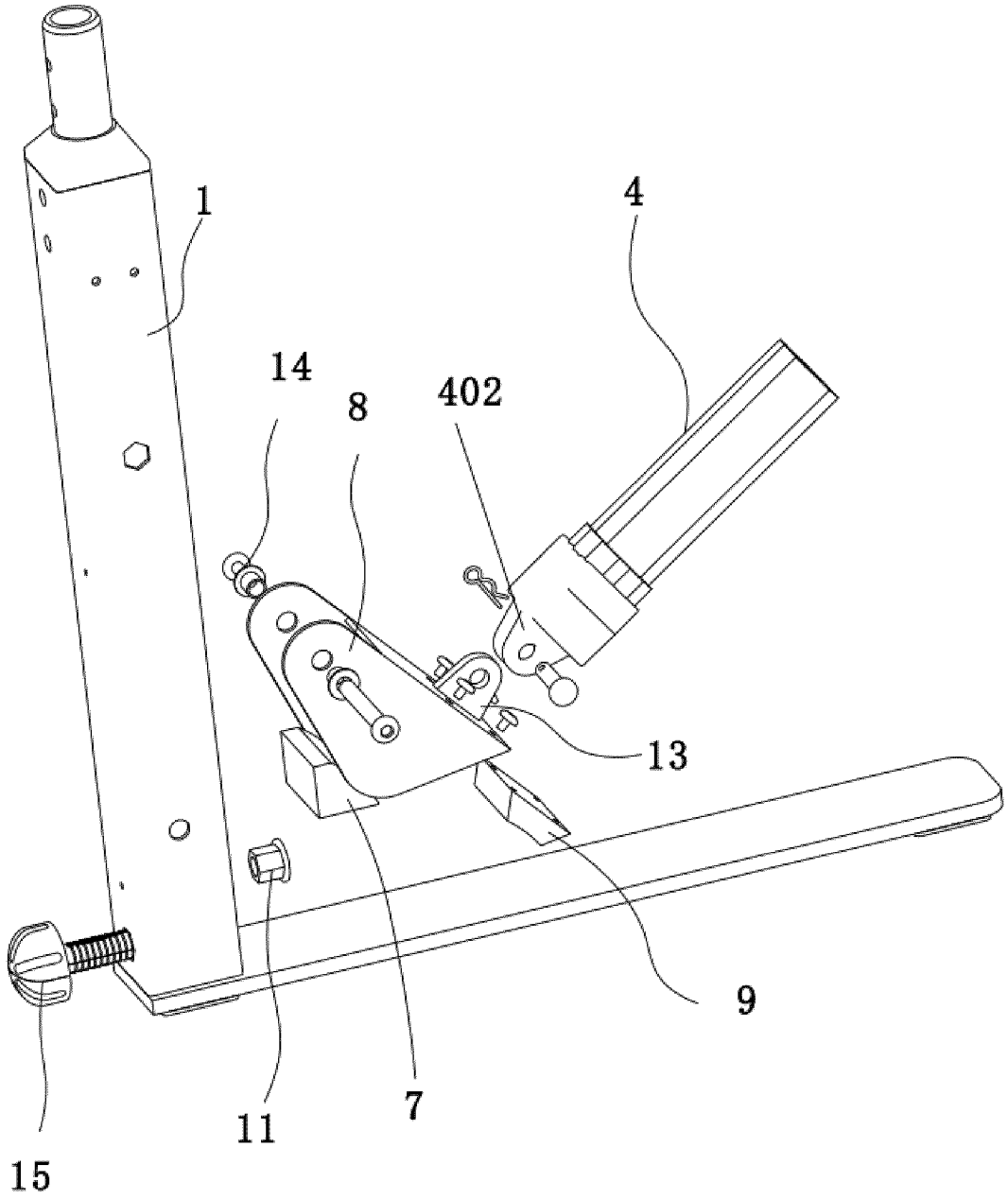

Fig. 7

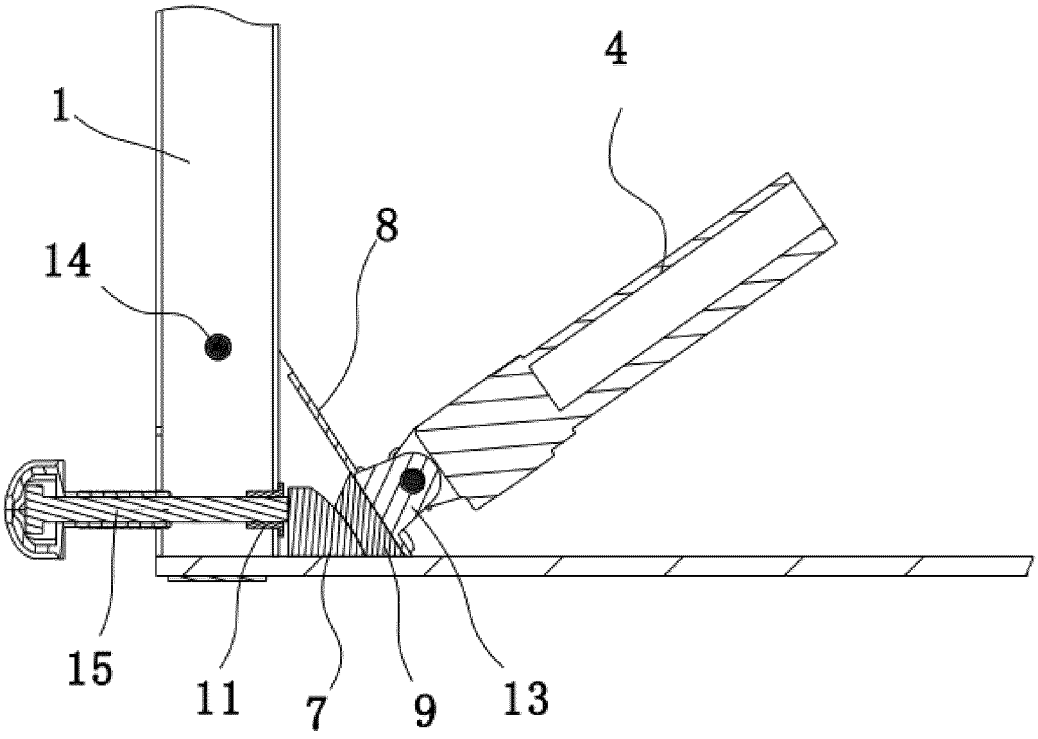

Fig. 8

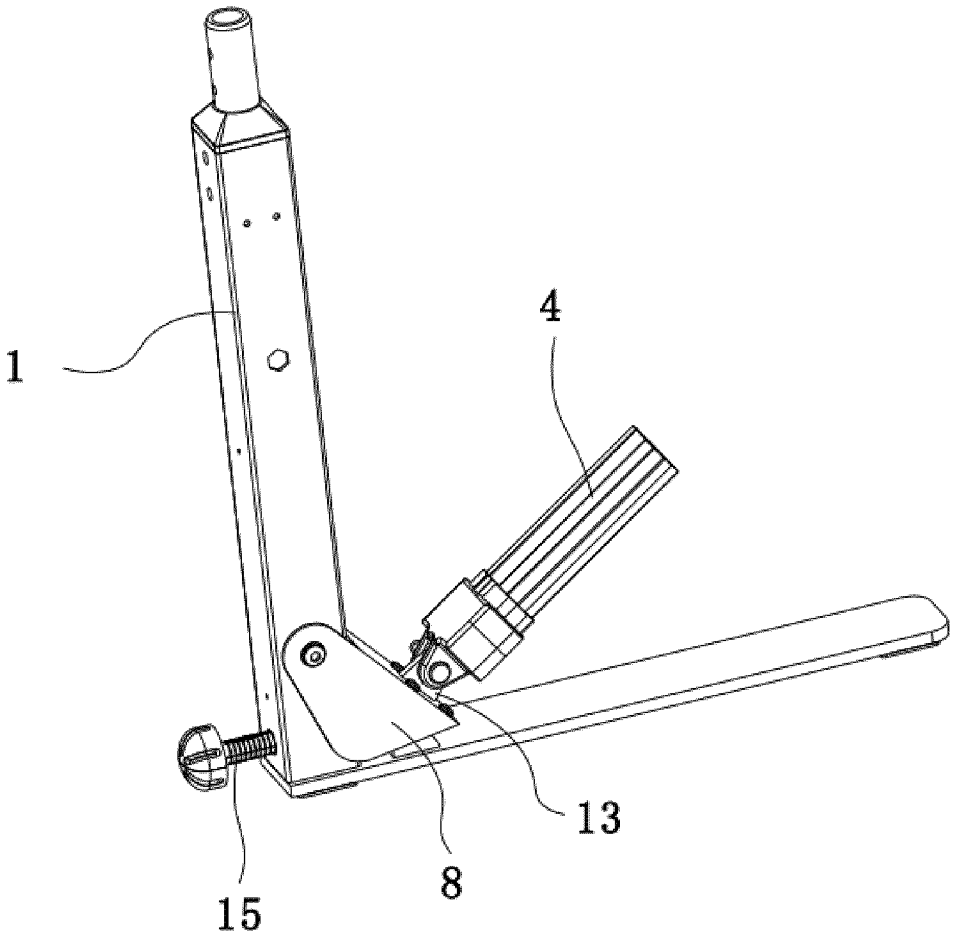

Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/109060

A. CLASSIFICATION OF SUBJECT MATTER

A47K17/02(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)

IPC: A47K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

CNTXT, ENTXTC, VEN, ENTXT: 电动, 杆, 滑块, 马桶, 升降, 支点, 助力, 坐便, 座便, 智能, 升, 降, 倾斜, 抬, 起降, 高度, 角度, 调节, electric, pedestal, adjust, lifting, linear, drive, telescopic, rod, height, lean, incline, intelligent, toilet, sliding, block, support, auxiliary, closestool

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 214073105 U (HUNAN INTERNATIONAL ECONOMICS UNIVERSITY) 31 August 2021 (2021-08-31) description, paragraphs [0005]-[0030], and figures 1-3	1-4, 7, 10
Y	CN 205433544 U (TANG QI et al.) 10 August 2016 (2016-08-10) description, paragraphs [0004]-[0025], and figures 1-2	1-4, 7, 10
PX	CN 218528599 U (ZHEJIANG JIECHANG LINEAR MOTION TECHNOLOGY CO., LTD.) 28 February 2023 (2023-02-28) description, paragraphs [0004]-[0052], and figures 1-9	1-10
A	CN 213696710 U (RUSHAN CHAOXIHU MEDICAL APPARATUS CO., LTD.) 16 July 2021 (2021-07-16) entire document	1-10
A	CN 215227163 U (NINGBO DONGLONG OPTOELECTRONIC SCIENCE & TECHNOLOGY CO., LTD. et al.) 21 December 2021 (2021-12-21) entire document	1-10

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 October 2023	**24 October 2023**

Name and mailing address of the ISA/CN	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2023/109060

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 213696705 U (JIANG DEJUN) 16 July 2021 (2021-07-16) entire document	1-10
A	CN 215305407 U (QUANZHOU NORMAL UNIVERSITY) 28 December 2021 (2021-12-28) entire document	1-10
A	JP 2004254836 A (BUSINESS SUPPORT HIKAWA) 16 September 2004 (2004-09-16) entire document	1-10
A	BR 202018016303 U2 (ALDAIR CARLOS FISTAROL et al.) 03 March 2020 (2020-03-03) entire document	1-10

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/109060

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 214073105 U	31 August 2021	None	
CN 205433544 U	10 August 2016	None	
CN 218528599 U	28 February 2023	None	
CN 213696710 U	16 July 2021	None	
CN 215227163 U	21 December 2021	None	
CN 213696705 U	16 July 2021	None	
CN 215305407 U	28 December 2021	None	
JP 2004254836 A	16 September 2004	JP 4228363 B2	25 February 2009
BR 202018016303 U2	03 March 2020	None	

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