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(54) **HEIGHT-ADJUSTABLE HINGE AND SHOWER ROOM**

(57) A height-adjustable hinge, comprising: a first middle column (12), a second middle column (22), and two bases, wherein a first base (11) in the two bases is detachably connected to the first middle column (12); a second base (21) in the two bases is detachably connected to the second middle column (22); the first middle column (12) and the second middle column (22) are rotatably connected; the first middle column (12) comprises a first curved surface, the second middle column (22) comprises a second curved surface, and the first curved surface and the second curved surface are matched, so that the relative heights of the first base (11) and the second base (21) change along with relative rotation of the first middle column (12) and second middle column (22). The height of a door can be adjusted by means of the hinge in the rotating process of the hinge, and the height-adjustable hinges can form two sets of hinges suitable for left and right doors by means of detachable connection between the middle columns and the bases.

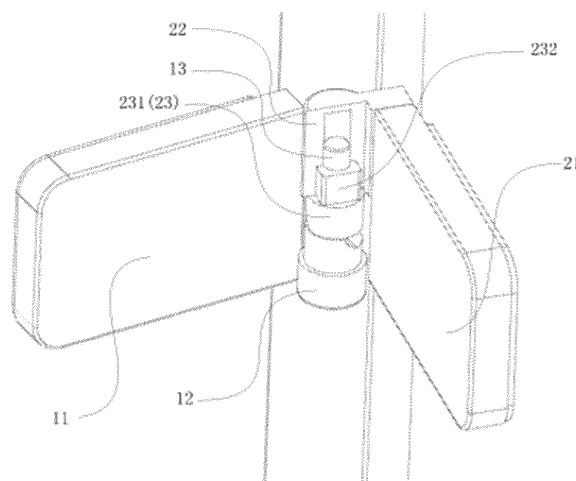


FIG. 10

Description

Technical Field

[0001] This invention relates to the field of bathroom accessories, in particular to a height-adjustable hinge.

Background

[0002] For a shower room with a side-hung door, there is a type of hinge that can adjust the height of the door during opening and closing of the door. The hinge can reduce the height of the door in a door closing state to realize sealing between the door and the floor, and increase the height of the door in a door opening state to avoid friction between a seal of the door and the floor during the door opening process. However, this prior art hinge cannot be used for both the left and right side doors, for example, the hinge used for the left side door cannot be used for the right side door. Therefore, there is a need to manufacture two sets of hinges for the left side door and the right side door respectively.

Summary

[0003] Based on the above-mentioned problem, this invention aims to provide a hinge, which not only can realize height adjustment, but also can be used for both left and right side doors.

[0004] This invention provides a height-adjustable hinge, including: a first middle column, a second middle column and two bases; in which a first base of the two bases is detachably connected to the first middle column; a second base of the two bases is detachably connected to the second middle column; the first middle column and the second middle column are rotatably connected; the first middle column includes a first curved surface, the second middle column includes a second curved surface, and the first curved surface and the second curved surface cooperate so that the relative height of the first base and the second base is changed as the first middle column and second middle column are rotated relative to each other.

[0005] In at least one embodiment, the first base has the same structure as the second base, and the first base and the second base each include a first mounting portion and a second mounting portion that are staggered in a height direction; the first middle column is mounted to the first mounting portion of the first base and the second middle column is mounted to the first mounting portion of the second base, or the first middle column is mounted to the second mounting portion of the first base and the second middle column is mounted to the second mounting portion of the second base.

[0006] In at least one embodiment, the two bases are each provided at a side surface with a first threaded hole and a second threaded hole for mounting the first middle column or the second middle column, the first threaded

hole and the second threaded hole are staggered in a height direction, the first middle column and the second middle column are both mounted to the first threaded holes, or the first middle column and the second middle column are both mounted to the second threaded holes.

[0007] In at least one embodiment, the second curved surface is formed on a lifting block, and the lifting block is mounted to the second middle column.

[0008] In at least one embodiment, the first middle column is provided with a first hole for receiving a mating portion of the lifting block, and the first curved surface is formed at a bottom of the first hole.

[0009] In at least one embodiment, the first middle column is further provided with a second hole for receiving a shaft, and the second middle column is provided with a third hole for receiving a mounting portion of the lifting block.

[0010] In at least one embodiment, a pattern of a cross section of the third hole has at most one axis of symmetry.

[0011] In at least one embodiment, the first curved surface includes a first flat surface, a second flat surface and a first inclined surface connecting the first flat surface and the second flat surface; the second curved surface includes a third flat surface, a fourth flat surface and a second inclined surface connecting the third flat surface and the fourth flat surface.

[0012] In at least one embodiment, the first flat surface, the second flat surface, the third flat surface and the fourth flat surface are parallel to each other.

[0013] This invention further provides a shower room, including the height-adjustable hinge of this invention.

[0014] The height-adjustable hinge provided by this invention can adjust the height of the door in the rotating process of the hinge, and enables the formation of two sets of hinges suitable for both the left and right doors by the detachable connection between the middle columns and the bases.

Brief Description of Drawings

[0015]

FIG. 1 is a schematic structural view of a shower room according to this invention.

FIG. 2 is an exploded view of FIG. 1.

FIG. 3 is a partially enlarged view of part A in FIG. 2.

FIG. 4 is a partially enlarged view of part B in FIG. 2.

FIG. 5 is a structurally exploded view of a base of a hinge according to this invention.

FIG. 6 is a schematic structural view of a first middle column of the hinge according to this invention.

FIG. 7 is a schematic structural view of a lifting block

of the hinge according to this invention.

FIG. 8 is a schematic sectional view showing a state where a first hinge assembly and a second hinge assembly according to this invention have been mounted.

FIG. 9 is a sectional view taken along plane C in FIG. 8.

FIG. 10 is a schematic sectional view showing another state where the first hinge assembly and the second hinge assembly according to this invention have been mounted.

Description of Reference Signs:

[0016]

100- first fixed glass assembly; 200- first movable glass assembly; 300- second movable glass assembly; 400- second fixed glass assembly; 500- wall-fitting profile;

10- first fixed glass; 1- first hinge assembly; 11- base; 111- main body; 112- gasket; 113- washer; 114- rear cover plate; 115- bolt; 116- rear cover trim plate; 117- first threaded hole; 118- second threaded hole; 12- first middle column; 121- first pivoting portion; 122- first connecting portion; 123- first hole; 124- second hole; 125- first flat surface; 126- second flat surface; 127- first inclined surface; 13- shaft;

20- first movable glass; 2- second hinge assembly; 21- base; 22- second middle column; 221- second pivoting portion; 222- second connecting portion; 23- lifting block; 231- mating portion; 232- mounting portion; 233- third flat surface; 234- fourth flat surface; 235- second inclined surface; 236- through hole;

30- second movable glass; 3- third hinge assembly; 31- base; 32- second middle column; 33- lifting block;

40- second fixed glass; 4- fourth hinge assembly; 41- base; 42- first middle column; 43- shaft; 5- decorative cover.

Detailed Description

[0017] As shown in FIGS. 1 and 2, a shower room with a double door is provided, which includes a first fixed glass assembly 100, a first movable glass assembly 200, a second fixed glass assembly 400 and a second movable glass assembly 300. The first fixed glass assembly 100 and the second fixed glass assembly 400 are connected to a wall by a wall-fitting profile 500. The first fixed glass assembly 100 and the first movable glass assembly 200 are rotatably connected by a first hinge assembly 1

and a second hinge assembly 2, and the second fixed glass assembly 400 and the second movable glass assembly 300 are rotatably connected by a third hinge assembly 3 and a fourth hinge assembly 4. The first movable glass assembly 200 and the second movable glass assembly 300 rotate in opposite directions during the door opening or closing process.

[0018] The first fixed glass assembly 100 includes a first fixed glass 10 and a first hinge assembly 1 connected to the first fixed glass 10. The first movable glass assembly 200 includes a first movable glass 20 and a second hinge assembly 2 connected to the first movable glass 20. The second movable glass assembly 300 includes a second movable glass 30 and a third hinge assembly 3 connected to the second movable glass 30. The second fixed glass assembly 400 includes a second fixed glass 40 and a fourth hinge assembly 4 connected to the second fixed glass 40.

[0019] As shown in FIGS. 3, 4 and 7, a shaft 13 of the first hinge assembly 1 can be inserted into a through hole 236 of a lifting block 23 of the second hinge assembly 2 to constitute a hinge. A shaft 43 of the fourth hinge assembly 4 can be inserted into a through hole of a lifting block 33 of the third hinge assembly 3 to constitute another hinge.

[0020] As shown in FIGS. 3, 4 and 5, the first hinge assembly 1 includes a base 11, a first middle column 12 and a shaft 13. The first middle column 12 is connected (fixedly mounted) to a first threaded hole 117 of the base 11, and an exposed portion of the shaft 13 faces the side of the base 11 on which a second threaded hole 118 is situated. The second hinge assembly 2 includes a base 21, a second middle column 22 and a lifting block 23. The second middle column 22 is connected (fixedly mounted) to the first threaded hole 117 of the base 21, and a second curved surface of the lifting block 23 faces the side of the base 21 on which the second threaded hole 118 is situated. The third hinge assembly 3 includes a base 31, a second middle column 32 and a lifting block 33. The second middle column 32 is connected (fixedly mounted) to the second threaded hole 118 of the base 31, and a second curved surface of the lifting block 33 faces the side of the base 31 on which the first threaded hole 117 is situated. The fourth hinge assembly 4 includes a base 41, a first middle column 42 and a shaft 43. The first middle column 42 is connected (fixedly mounted) to the second threaded hole 118 of the base 41, and an exposed portion of the shaft 43 faces the side of the base 41 on which the first threaded hole 117 is situated.

[0021] The base 11, the base 21, the base 31 and the base 41 in the first hinge assembly 1, the second hinge assembly 2, the third hinge assembly 3 and the fourth hinge assembly 4 have the same structure. Description is made below by taking only the base 11 as an example.

[0022] As shown in FIGS. 5 and 9, the base 11 includes a main body 111 and a rear cover plate 114, and the main body 111 and the rear cover plate 114 are located

on the two sides of the first fixed glass 10, respectively. In order to prevent the first fixed glass 10 from bursting under pressure, a gasket 112 is provided between the main body 111 and the first fixed glass 10, and another gasket 112 is provided between the rear cover plate 114 and the first fixed glass 10. In order to prevent the first fixed glass 10 from bursting, washers 113 are provided in holes of the glass. The main body 111 is provided with an annular protrusion inserted into the holes of the gasket 112 and the washer 113 for positioning, and the rear cover plate 114 is provided with an annular protrusion inserted into the hole of the gasket 112 for positioning. The bolt 115 is screwed to the main body 111 through the rear cover plate 114 to fix the base 11 to the first fixed glass 10. The bolt 115 may be covered with a rear cover trim plate 116 mounted to the rear cover plate 114.

[0023] A first threaded hole 117 and a second threaded hole 118 for being connected with the first middle columns 12, 42 or the second middle columns 22, 32 are provided on a side surface of the main body 111. The first threaded hole 117 is located at a first mounting portion and the second threaded hole 118 is located at a second mounting portion. The first threaded hole 117 and the second threaded hole 118 are disposed to be staggered in the height direction of the shower room (the axial direction of the first middle column 12 or the second middle column 22). There can be two first threaded holes 117 and two second threaded holes 118, so that the angle at which the first middle columns 12, 42 or the second middle columns 22, 32 are connected to the main body 111 will not be reversed. The first threaded hole 117 or the second threaded hole 118 may be covered by a decorative cover 5.

The First Middle Column

[0024] The first middle column 12 and the first middle column 42 have the same structure and differ only in the position where they are connected to the base. Description is made below by taking the first middle column 12 as an example.

[0025] As shown in FIG. 6, the first middle column 12 includes a first connecting portion 122 having a cuboidal shape and a first pivoting portion 121 having a cylindrical shape. The first connecting portion 122 is connected to a side wall of the first pivoting portion 121, and they are preferably integrally formed. The first connecting portion 122 is provided with a through hole corresponding to the first threaded hole 117 or the second threaded hole 118. By means of a bolt, the first middle column 12 can pass through the through hole of the first connecting portion 122 in different directions to connect to the bases 11, 41, thereby constituting the first hinge assembly 1 or the fourth hinge assembly 4. Specifically, the bolt passes through the through hole from the right side to connect to the first threaded hole 117 so as to constitute the first hinge assembly 1, and the bolt passes through the through hole from the left side to connect to the second

threaded hole 118 so as to constitute the fourth hinge assembly 4. The bolt mounted to the first connecting portion 122 may be covered with the decorative cover 5.

[0026] The first pivoting portion 121 is provided on one end with a first hole 123 extending in the axial direction of the cylinder. The first hole 123 is a circular hole capable of receiving the lifting block 23, with its bottom configured as a first curved surface. A second hole 124 for receiving the shaft 13 is provided at the center of the first hole 123. One end of the shaft 13 is inserted into the second hole 124, and the other end (i.e., the exposed portion of the shaft 13) protrudes from the first curved surface.

[0027] The first curved surface is annular and includes a first flat surface 125, a second flat surface 126, and a first inclined surface 127 connecting the first flat surface 125 and the second flat surface 126. The first flat surface 125 smoothly transitions to the first inclined surface 127, and the second flat surface 126 smoothly transitions to the first inclined surface 127.

The Second Middle Column

[0028] The second middle column 22 and the second middle column 32 have the same structure and differ only in the position where they are connected to the base. Description is made below by taking the second middle column 22 as an example.

[0029] As shown in FIGS. 3 and 4, the second middle column 22 includes a second connecting portion 222 having a cuboidal shape and a second pivoting portion 221 having a cylindrical shape. The second connecting portion 222 is connected to a side wall of the second pivoting portion 221, and they are preferably integrally formed. The second connecting portion 222 is provided with a through hole corresponding to the first threaded hole 117 or the second threaded hole 118. By means of a bolt, the second middle column 22 can pass through the through hole of the second connecting portion 222 in different directions to connect to the bases 21, 31, thereby constituting the second hinge assembly 2 or the third hinge assembly 3. Specifically, the bolt passes through the through hole from the left side to connect to the first threaded hole 117 so as to constitute the second hinge assembly 2, and the bolt passes through the through hole from the right side to connect to the second threaded hole 118 so as to constitute the third hinge assembly 3. The bolt mounted to the second connecting portion 222 may be covered with the decorative cover 5.

[0030] The second pivoting portion 221 is provided on one end with a third hole extending in the axial direction of the cylinder. The third hole is used for partially receiving the lifting block 23 so as to mount and position the lifting block 23. The pattern forming a section of the third hole is formed by four sides, of which three sides are straight and one side is curved (referring to the lifting block 23 in FIG. 9). The sectional shape of the third hole not only prevents the lifting block 23 from rotating in the third hole, but also allows the lifting block 23 to be inserted into the

third hole only at a unique angle, so that the second curved surface of the lifting block 23 and the first curved surface of the first middle column 12 can be abutted against each other at a unique, determined angle.

The Lifting Block

[0031] The lifting block 23 and the lifting block 33 have the same structure and differ only in being mounted to different second middle columns. Description is made below by taking the lifting block 23 as an example.

[0032] As shown in FIG. 7, the lifting block 23 includes a mounting portion 232 that can be inserted into the third hole and a mating portion 231 that mates with the first hole 123. The mounting portion 232 has a shape matching the third hole so that the mounting portion 232 can enter the third hole and cannot be rotated therein. The mating portion 231 has a substantially cylindrical shape, with one end connected to the mounting portion 232, and the other end formed into a second curved surface that can be abutted against the first curved surface. The lifting block 23 is provided at the center with a through hole 236 through which the shaft 13 can pass.

[0033] The second curved surface is annular and includes a third flat surface 233, a fourth flat surface 234, and a second inclined surface 235 connecting the third flat surface 233 and the fourth flat surface 234. The third flat surface 233 smoothly transitions to the second inclined surface 235, and the fourth flat surface 234 smoothly transitions to the second inclined surface 235. The first flat surface 125, the second flat surface 126, the third flat surface 233 and the fourth flat surface 234 are parallel and have the same area.

[0034] As shown in FIGS. 6-8, in a state where the first fixed glass 10 and the first movable glass 20 are situated in the same plane (i.e., when the door is closed), the first curved surface is abutted against the second curved surface, the first flat surface 125 is abutted against the fourth flat surface 234, the second flat surface 126 is abutted against the third flat surface 233, and the first inclined surface 127 is abutted against the second inclined surface 235.

[0035] As shown in FIGS. 6-8 and 10, during the rotation of the first movable glass 20 (i.e., during door opening), the first inclined surface 127 and the second inclined surface 235 slide relatively, so that the first flat surface 125 and the third flat surface 233 tends to be abutted against each other, the second flat surface 126 and the fourth flat surface 234 are separated, and the first inclined surface 127 and the second inclined surface 235 tends to be separated. Thus, the height of the first movable glass 20 can be increased during the door opening process.

[0036] The door constituted by the second movable glass 30 and the second fixed glass 40 has the same structure, so the height of the second movable glass 20 can also be increased during the door opening process.

[0037] Of course, this invention is not limited to the

above embodiments, and various changes and variations may be made to the above embodiments of this invention by those skilled in the art under the teachings of this invention, without departing from the scope of this invention.

(1) The lifting block 23 can be mounted to the second middle column 22 through the third hole, or can be integrally formed with the second middle column, or otherwise connected thereto.

(2) The shapes of the sections of the third hole and the mounting portion of the lifting block may be other patterns with at most one axis of symmetry, such as a trapezoid and a triangle.

(3) The first curved surface and the second curved surface may have other shapes that can be abutted against each other.

(4) The height-adjustable hinge of this invention is not only used in a shower room with a double door, but also can be used in other occasions requiring waterproof sealing, such as a shower room with a side-hung door or a toilet door.

[0038] The advantages of the height-adjustable hinge of this invention are described below.

[0039] On the premise that the height adjustment function of the hinge can be realized, two sets of hinges can be formed through combination by mounting the first middle column and the second middle column at different positions. The two sets of hinges have opposite opening directions and can be used for left opening-type door and/or right opening-type door, especially for a double door. The hinges mounted in a combined manner not only can enable interchange through a change in the mounting positions of the first middle column and the second middle column, but also are reduced in production cost by using the same parts for mounting.

[0040] It is feasible to connect the hinge assemblies, formed by connecting the bases with the first middle columns or the second middle columns, to glass in advance to form pre-mounted glass assemblies, and then connect the glass assemblies into a shower room. The pre-mounting of glass assemblies makes it easier to mount the shower room, thereby realizing quick mounting.

Claims

1. A height-adjustable hinge, comprising a first middle column, a second middle column and two bases; wherein a first base of the two bases is detachably connected to the first middle column; wherein a second base of the two bases is detachably connected to the second middle column; wherein the first middle column and the second mid-

- dle column are rotatably connected, wherein the first middle column comprises a first curved surface and the second middle column comprises a second curved surface, wherein the first curved surface and the second curved surface cooperate so that the relative height of the first base and the second base is changed as the first middle column and the second middle column are rotated relative to each other.
2. The height-adjustable hinge according to claim 1, wherein the first base has the same structure as the second base, and the first base and the second base each comprise a first mounting portion and a second mounting portion that are staggered in a height direction; wherein the first middle column is mounted to the first mounting portion of the first base and the second middle column is mounted to the first mounting portion of the second base, or wherein the first middle column is mounted to the second mounting portion of the first base and the second middle column is mounted to the second mounting portion of the second base.
3. The height-adjustable hinge according to claim 1, wherein the two bases are each provided at a side surface with a first threaded hole and a second threaded hole for mounting the first middle column or the second middle column, wherein the first threaded hole and the second threaded hole are staggered in a height direction, and wherein the first middle column and the second middle column are both mounted to the first threaded holes, or the first middle column and the second middle column are both mounted to the second threaded holes.
4. The height-adjustable hinge according to any one of claims 1-3, wherein the second curved surface is formed on a lifting block which is mounted to the second middle column.
5. The height-adjustable hinge according to claim 4, wherein the first middle column is provided with a first hole for receiving a mating portion of the lifting block, and the first curved surface is formed at a bottom of the first hole.
6. The height-adjustable hinge according to claim 4, wherein the first middle column is further provided with a second hole for receiving a shaft, and the second middle column is provided with a third hole for receiving a mounting portion of the lifting block.
7. The height-adjustable hinge according to claim 6, wherein a pattern of a cross section of the third hole has at most one axis of symmetry.
8. The height-adjustable hinge according to any one of claims 1-3, wherein the first curved surface comprises a first flat surface, a second flat surface and a first inclined surface connecting the first flat surface and the second flat surface; wherein the second curved surface comprises a third flat surface, a fourth flat surface and a second inclined surface connecting the third flat surface and the fourth flat surface.
9. The height-adjustable hinge according to claim 8, wherein the first flat surface, the second flat surface, the third flat surface and the fourth flat surface are parallel to each other.
10. A shower room, comprising the height-adjustable hinge according to any one of claims 1-9.

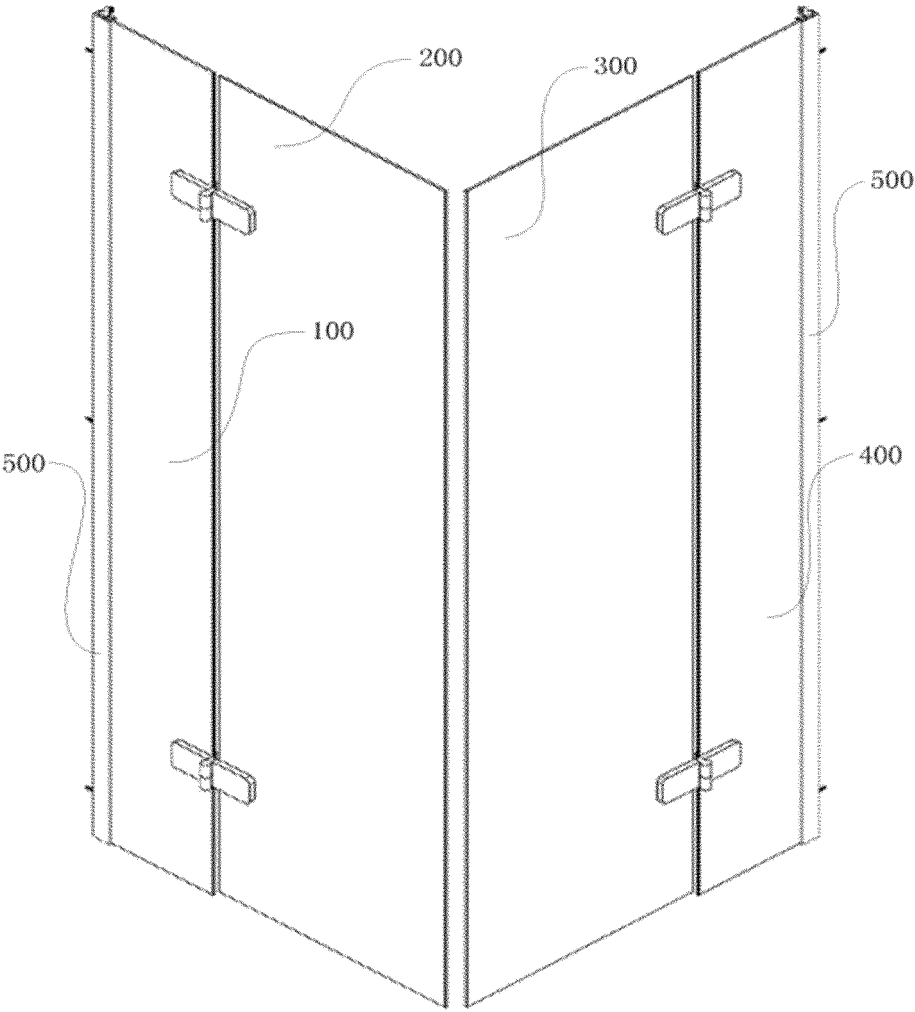


FIG. 1

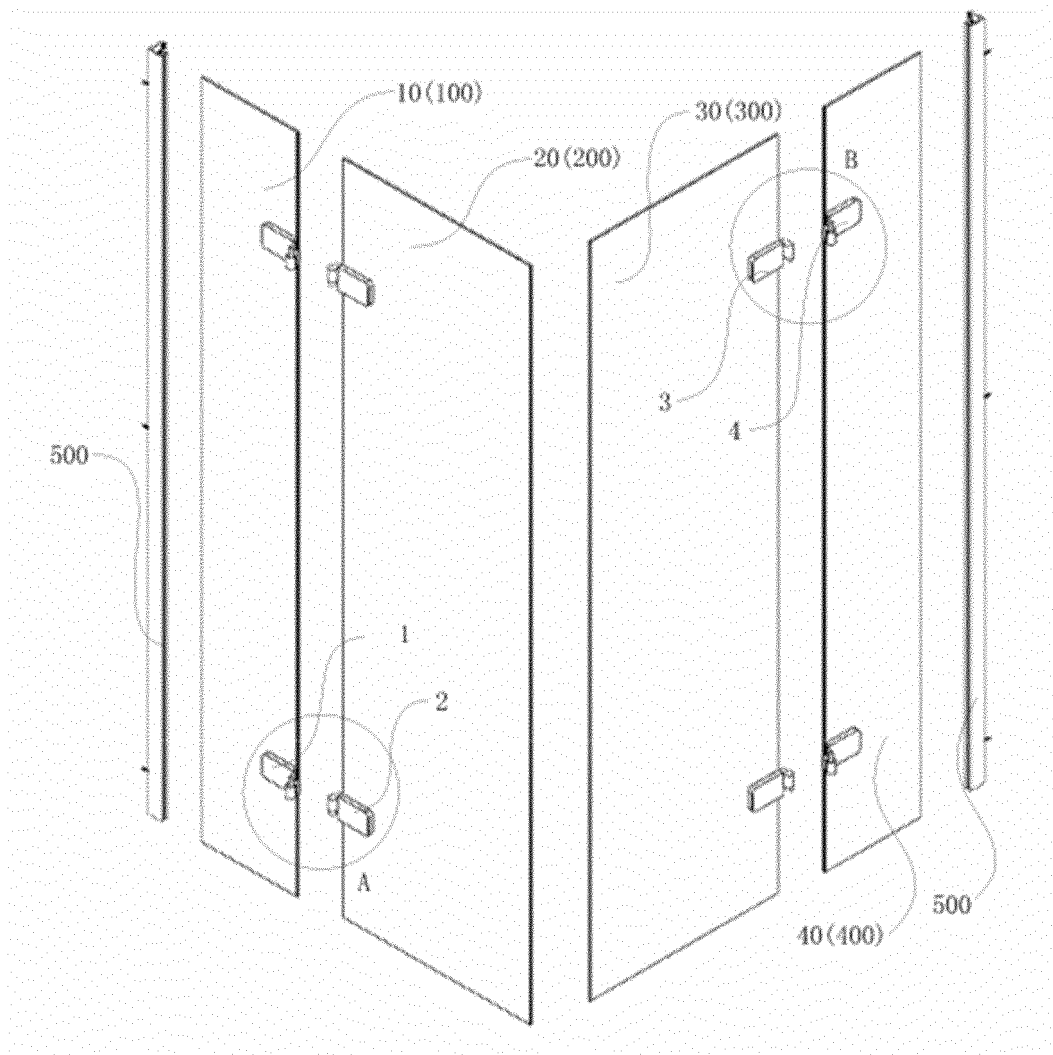


FIG. 2

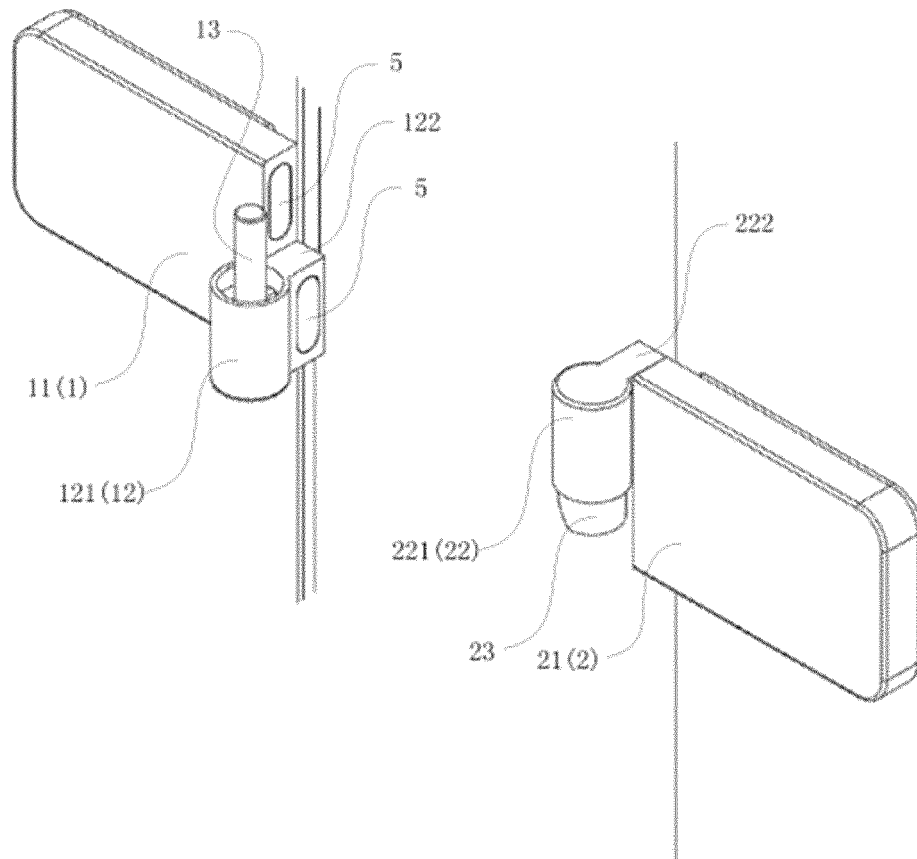


FIG. 3

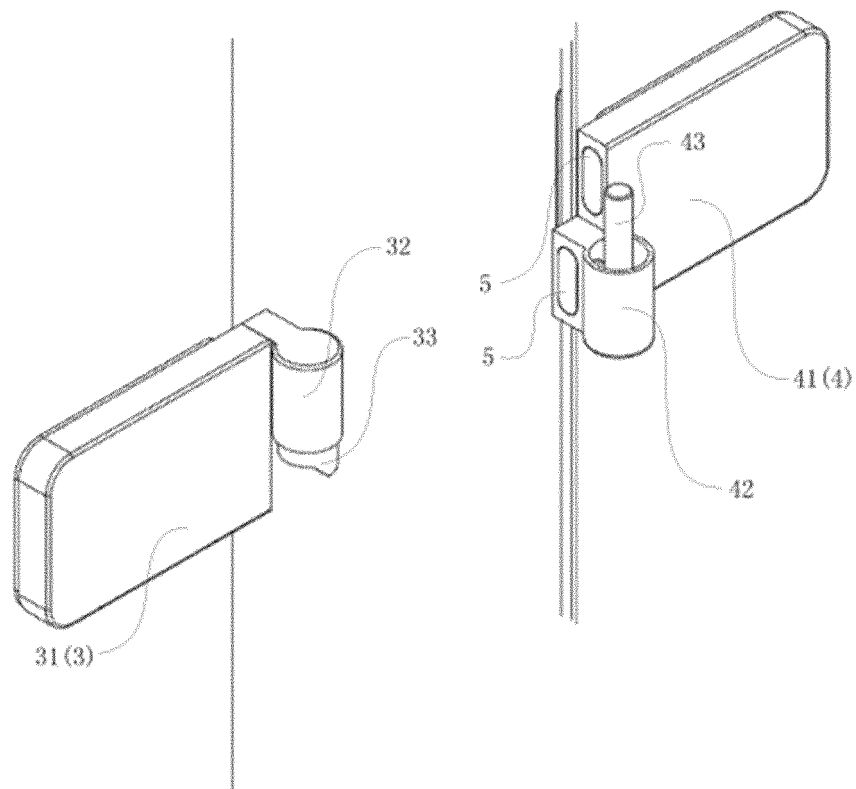


FIG. 4

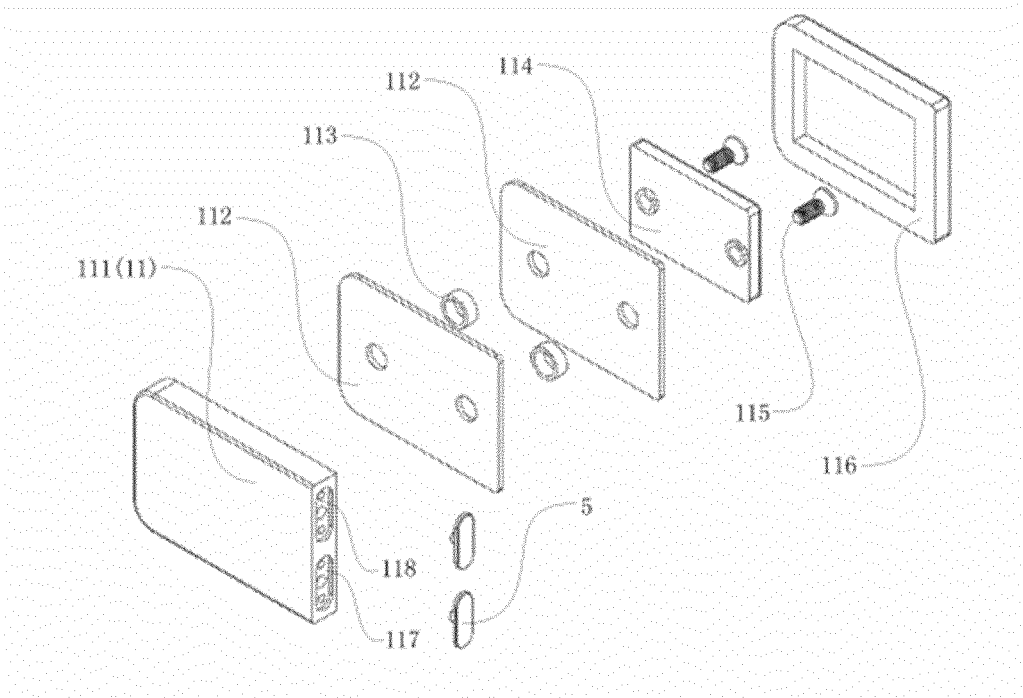


FIG. 5

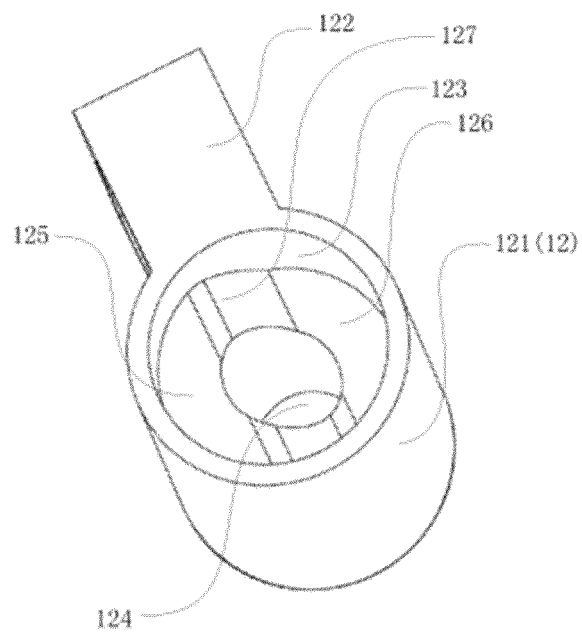


FIG. 6

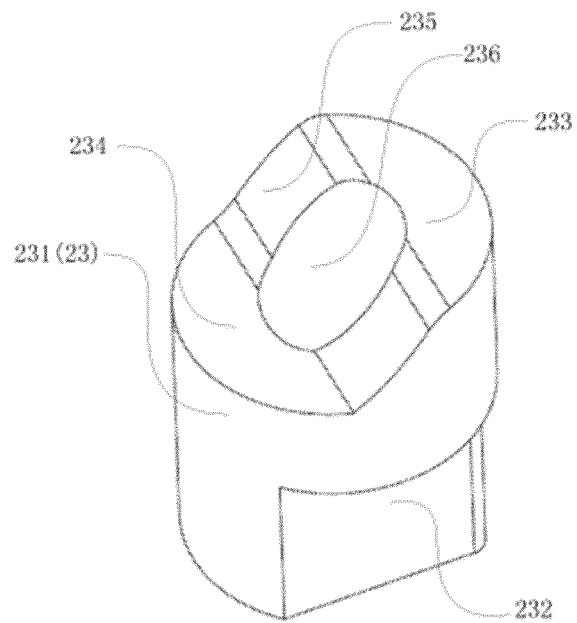


FIG. 7

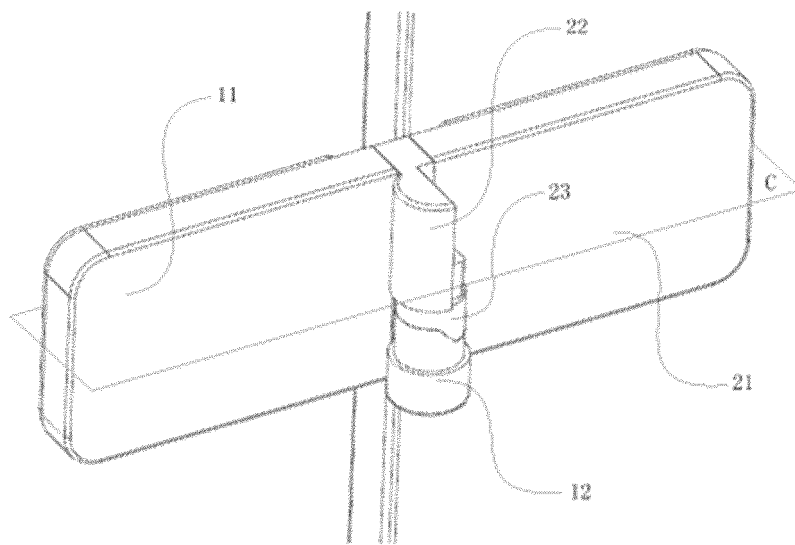


FIG. 8

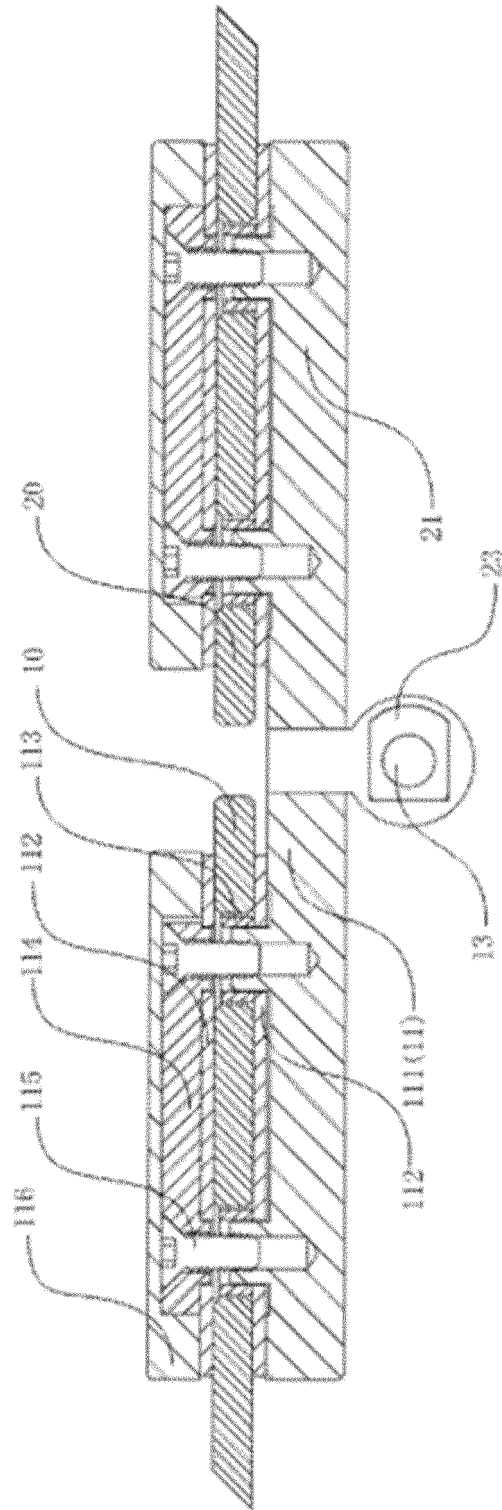


FIG. 9

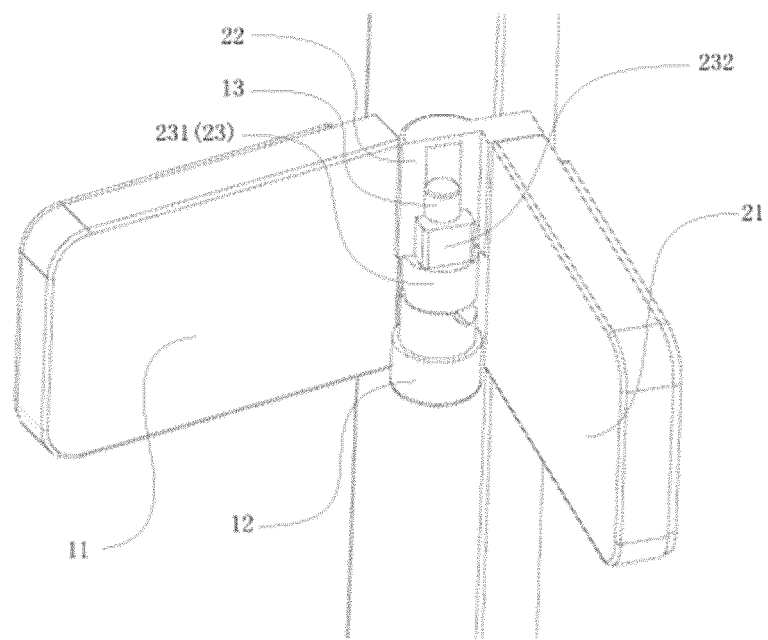


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/084594

A. CLASSIFICATION OF SUBJECT MATTER

E05D 7/02(2006.01)i; E05D 7/10(2006.01)i; E05D 3/02(2006.01)i; E05D 5/02(2006.01)i; E05D 5/14(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)

E05D

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)

CNABS; CNKI; VEN; 铰链, 高度, 拆卸, 曲面, 左右, 转动, 底座, hinge, height, curve, detachable, change, rotate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 2632252 Y (WANG, JIAN) 11 August 2004 (2004-08-11) description, detailed description of the preferred embodiments, and figures 1-4	1-10
A	CN 1170077 A (SHARP KK) 14 January 1998 (1998-01-14) entire document	1-10
A	CN 203879171 U (HEFEI RONGSHIDA SANYO ELECTRIC CO., LTD.) 15 October 2014 (2014-10-15) entire document	1-10
A	CN 103997868 A (SUZHOU LONGWAY ELECTRONIC MACHINERY CO., LTD.) 20 August 2014 (2014-08-20) entire document	1-10
A	CN 1590689 A (LG ELECTRONICS TIANJIN APPLIANCES CO., LTD.) 09 March 2005 (2005-03-09) entire document	1-10

☐ 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

18 October 2018

Date of mailing of the international search report

25 October 2018

Name and mailing address of the ISA/CN

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Facsimile No. (86-10)62019451

Telephone No.

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2018/084594

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