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(54) HANDLE ASSEMBLY AND SHOWER DOOR

(57) A handle assembly and a shower door are provided. The handle assembly (300) includes a handle seat (310); the handle seat (310) includes a through hole (311); the handle seat (310) further includes a plurality of inner side holes (312) and a plurality of first magnets (313) placed in the inner side holes (312); the inner side holes (312) are disposed in a manner of surrounding the through hole (311); the first magnets (313) are columnar; axes of the first magnets (313) are parallel to the inner side holes (312); the first magnets (313) are divided into south poles and the north poles in a radial direction and may rotate about the axes in the inner side holes (312); the handle assembly (300) further includes a waterproof piece (320); the waterproof piece (320) includes baffles (325) and flanges (327) located at edges of the baffles (325); the waterproof piece (320) is placed in the through hole (311); the flanges (327) are engaged with the through hole (311); the flanges (327) include a plurality of outer side holes (326) and a plurality of second magnets (328) placed in the outer side holes (326); the outer side holes (326) are disposed in a manner of surrounding the baffles (325); the second magnets (328) are columnar; axes of the second magnets (328) are parallel to the inner side holes (312); and the second magnets (328) are divided into south poles and the north poles in a radial direction and may rotate about the axes in the outer side holes (326). When the handle assembly is applied to the shower door, the beneficial effects of water proofing, space saving and the like can be brought, and the waterproof piece may be opened and closed in multiple directions.

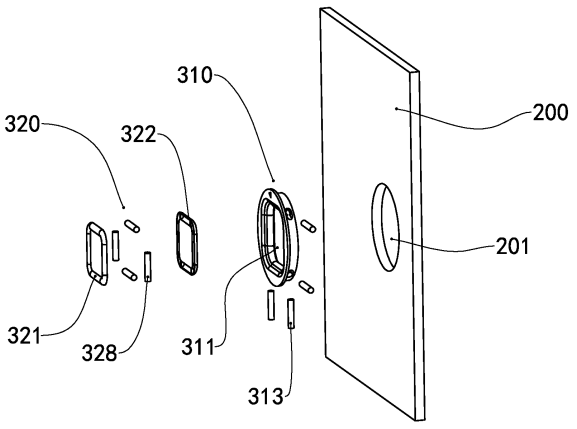

FIG. 2

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Description

Technical Field

[0001] The present invention relates to the field of sanitary appliances, and in particular to a waterproof handle assembly which saves space and can realize multidirectional opening and closing, and a shower door using the handle assembly.

Background Art

[0002] Now when people decorate, they usually arrange a shower room in a bathroom. The shower room usually uses a shower door with glass plates. The shower door mainly includes a sliding door with rails and a hinged door with hinges. The shower door, regardless of being the sliding door or the hinged door, is generally provided with at least two glass plates; the multiple glass plates may all be movable glass plates that may slide or rotate back and forth; and the shower door may also be provided with at least one fixed glass plate and at least one movable glass plate capable of sliding or rotating back and forth. The fixed glass plate is generally referred to as a fixed door, and the movable glass plate is generally referred to as a movable door.

[0003] Generally, a handle is required to be mounted on the movable door, a user applies force to the handle, and the force acts on the movable door through the handle, thereby completing the operation of pushing or pulling the movable door. Existing shower door handles are multiple in types, including a handlebar-shaped handle, a strip-shaped handle, a pull-ring-shaped handle, etc. However, most of these handles need to drill holes in the movable door and then install the handles on the movable door. The handles usually protrude outwards relative to the movable door, thus occupying more space. Especially for sliding doors, the space between the movable door and the fixed door is limited. When the handle protrudes outwards relative to the movable door, the movable door and the fixed door cannot completely be overlapped due to the blocking of the handle, thus reducing the space in an access position and making it inconvenient for users to get in and out.

[0004] One solution of the prior art is to open a larger hole in a movable piece, and when opening and closing the door, the user needs to push the movable door by inserting the hand or finger into the hole. Since the hole is located in the movable door and there is no portion protruding outwards, the movable door may be opened to the maximum to be overlapped with the fixed door. However, this solution has the disadvantage that water will leak from the hole when the shower door is closed during use of the bathroom. A further solution to this problem is that a sleeve is mounted in the large hole and a rotating piece is mounted in the sleeve and hinged in the sleeve through a pin. However, an application of this handle is also limited because a rotating direction of the rotating piece is limited.

Technical Problem

[0005] In order to solve the above problems, the main objective of the present invention is to provide a waterproof handle assembly that saves space and can realize multi-directional opening and closing.

[0006] Another objective of the present invention is to provide a waterproof shower door that saves space and in which the handle assembly can realize multi-directional opening and closing.

Technical Solution

[0007] To achieve the main objectives above, a handle assembly is provided in the present invention, comprising a handle seat including a through hole; the handle seat further includes a plurality of inner side holes and a plurality of first magnets placed in the inner side holes; the inner side holes are disposed in a manner of surrounding the through hole; the first magnets are columnar; axes of the first magnets are parallel to the inner side holes; the first magnets are divided into south poles and north poles in a radial direction and rotatable about the axes in the inner side holes; the handle assembly further includes a waterproof piece; the waterproof piece includes baffles and flanges located at edges of the baffles; the waterproof piece is placed in the through hole; the flanges are engaged with the through hole; the flanges include a plurality of outer side holes and a plurality of second magnets placed in the outer side holes; the outer side holes are disposed in a manner of surrounding the baffles; the second magnets are columnar; axes of the second magnets are parallel to the inner side holes; the second magnets are divided into south poles and north poles in a radial direction and rotatable about the axes in the outer side holes.

[0008] As a further technical solution, holes walls, close to the through hole, of the inner side holes are thinner than hole walls, away from the through hole, of the inner side holes.

[0009] As a further technical solution, the first magnets are cylindrical or rectangular prism-shaped; and the second magnets are cylindrical or rectangular prism-shaped.

[0010] As a further technical solution, the waterproof piece includes a first waterproof sheet and a second waterproof sheet; the first waterproof sheet and the second waterproof sheet both include sheet bodies and grooves located at edges of the sheet bodies; the first waterproof sheet is connected with the second waterproof sheet; the sheet bodies form the baffles; and the grooves form the outer side holes.

[0011] As a further technical solution, the first waterproof sheet is bonded or clamped with the second waterproof sheet.

[0012] As a further technical solution, the grooves are semicircular grooves.

[0013] As a further technical solution, the handle seat further includes an outwards extending flange; and the flange includes a contact surface parallel to the cross section of the through hole.

[0014] As a further technical solution, the handle seat further includes lead-in holes communicated with the inner side holes.

[0015] To realize another objective of the present invention, a shower door is provided in the present invention, including a fixed door and a movable door that may slide or rotate relative to the fixed door; a mounting hole is disposed in the movable door; a handle assembly is fixed in the mounting hole and includes a handle seat; the handle seat includes a through hole; the handle seat further includes a plurality of inner side holes and a plurality of first magnets placed in the inner side holes; the inner side holes are disposed in a manner of surrounding the through hole; the first magnets are columnar; axes of the first magnets are parallel to the inner side holes; the first magnets are divided into south poles and north poles in a radial direction and rotatable about the axes in the inner side holes; the handle assembly further includes a waterproof piece; the waterproof piece includes baffles and flanges located at edges of the baffles; the flanges are placed in the through hole and are engaged with the through hole; the flanges include a plurality of outer side holes and a plurality of second magnets placed in the outer side holes; the outer side holes are disposed in a manner of surrounding the baffles; the second magnets are columnar; axes of the second magnets are parallel to the inner side holes; the second magnets are divided into south poles and the north poles in a radial direction and rotatable about the axes in the outer side holes.

[0016] As a further technical solution, holes walls, close to the through hole, of the inner side holes are thinner than hole walls, away from the through hole, of the inner side holes.

[0017] As a further technical solution, the first magnets are cylindrical or rectangular prism-shaped; and the second magnets are cylindrical or rectangular prism-shaped.

[0018] As a further technical solution, the waterproof piece includes a first waterproof sheet and a second waterproof sheet; the first waterproof sheet and the second waterproof sheet both include sheet bodies and grooves located at edges of the sheet bodies; the first waterproof sheet is connected with the second waterproof sheet; the sheet bodies form the baffles; and the grooves form the outer side holes.

[0019] As a further technical solution, the first waterproof sheet is bonded or clamped with the second waterproof sheet.

[0020] As a further technical solution, the grooves are semicircular grooves.

[0021] As a further technical solution, the handle seat further includes an outwards extending flange; the flange includes a contact surface parallel to the cross section of the through hole; and the contact surface is bonded with the movable door.

[0022] As a further technical solution, the handle seat further includes lead-in holes communicated with the inner side holes.

Beneficial Effects

[0023] The handle assembly provided by the present invention includes a handle seat and a waterproof piece, wherein the handle seat includes a through hole and inner side holes disposed in a manner of surrounding the through hole; first magnets are disposed in the inner side holes; a waterproof piece includes baffles and flanges; the flanges include outer side holes disposed in a manner of surrounding the baffles; second magnets are disposed in the outer side holes; the first magnets and the second magnets are column, are divided into south poles and north poles and may rotate about the axes; the waterproof piece is placed in the through hole; and the flanges are engaged with the through hole. When a door needs to be opened and closed, a user may push the waterproof piece in any direction at any position of the waterproof piece; the waterproof piece will move at one edge according to the position and direction of external force, exposing the inner wall of the through hole for contacting, the user applies force to the inner wall of the through hole so that the movement of the movable door is realized, and at this time, the other edge of the waterproof piece, opposite to the edge that moves, is still attracted due to the action of the magnetic force, thereby ensuring that the waterproof piece is in contact with the handle seat and is not disengaged from the handle seat; and after external force provided by the user disappears, since the first magnets and the second magnets may freely rotate about the axes, the first magnets and the second magnets may be automatically adjusted to attract the opposite poles due to the action of the magnetic force, and the waterproof piece may be automatically attracted into the through hole no matter any edge of the waterproof piece moves or the waterproof piece moves toward any direction, thereby playing a waterproof role.

[0024] Further, in order to ensure magnetic attraction force between the first magnets and the second magnets and avoid the entire waterproof piece from falling out of the through hole when the user exerts a large force on the waterproof piece, the hole walls, close to the through hole, of the inner side holes in the handle seat preferably have smaller thicknesses.

[0025] Further, in order to make the handle assembly easy to assemble, keep the handle assembly enclosed, and prevent dust or dirt from depositing and the first magnets and the second magnets from being corroded, a waterproof piece body may be composed of the first waterproof sheet and the second waterproof sheet, the second magnets may be conveniently placed in the groove of the first waterproof sheet or the second waterproof sheet, and after the first waterproof sheet is connected with the second waterproof sheet, the second magnets

may be enclosed in the outer side holes. In addition, the lead-in holes may be disposed on the outer side of the handle seat, the first magnets are placed into the inner side holes through the lead-in holes, and when the handle seat is mounted in the movable door, the lead-in holes may be enclosed by the movable door.

Brief Description of the Drawings

[0026]

FIG. 1 is a structural view of an embodiment of a shower door of the present invention.

FIG. 2 is a structural exploded view of an embodiment of a handle assembly of the present invention applied to the shower door.

FIG. 3 is a structural view of a handle seat in the embodiment of the handle assembly of the present invention.

FIG. 4 is a structural view of the handle seat in the embodiment of the handle assembly of the present invention from another point of view.

FIG. 5 is a sectional view of the handle seat in the embodiment of the handle assembly of the present invention.

FIG. 6 is a structural view of a first waterproof sheet in the embodiment of the handle assembly of the present invention.

FIG. 7 is a structural view of the first waterproof sheet in the embodiment of the handle assembly of the present invention from another point of view.

FIG. 8 is a sectional view of a waterproof piece in the embodiment of the handle assembly of the present invention.

FIG. 9 is a structural view of a first magnet in the embodiment of the handle assembly of the present invention.

FIG. 10 is a structural view of the embodiment of the handle assembly of the present invention in a first working state.

FIG. 11 is a structural view of the embodiment of the handle assembly of the present invention in a second working state.

FIG. 12 is a structural view of an existing handle assembly applied to the shower door.

FIG. 13 is a structural view of the handle assembly of the present invention applied to the shower door.

[0027] The present invention will be further described in combination with accompanying drawings and embodiments.

Embodiments of the present invention

Embodiment of Shower Door

[0028] As shown in FIG. 1, the shower door of the embodiment is a sliding door, including a fixed door 100 and a movable door 200 reciprocally slidable relative to the fixed door 100; a handle assembly 300 is mounted on the movable door 200; and the handle assembly 300 has a structure of the following handle assembly embodiment.

[0029] In other embodiments of the present invention, the shower door may also be a hinged door, and those skilled in the art may apply the handle assembly 300 to different types of shower doors according to actual application needs.

Embodiment of Handle Assembly

[0030] As shown in FIG. 2, the handle assembly 300 of the embodiment is mounted in a mounting hole 201 of the movable door 200. In the embodiment, the mounting hole 201 has a circular shape to facilitate the drilling process. In other embodiments, the mounting hole 201 may also be rectangular, elliptical or the like as desired.

[0031] The handle assembly 300 includes a handle seat 310 and a waterproof piece 320 placed in the handle seat 310; an outer side of the handle seat 310 has the same shape as the mounting hole 201; and the outer side of the handle seat 310 is engaged with the mounting hole 201 to form an enclosed structure.

[0032] As shown in FIG. 2 to FIG. 5, the handle seat 310 includes a through hole 311, a plurality of inner side holes 312 provided around the through hole 311, and a plurality of first magnets 313 placed in the inner side holes 312; the through hole 311 is disposed in the middle of the handle seat 310; the inner side holes 312 are disposed in the handle seat 310.

[0033] The handle seat 310 further includes lead-in holes 314 that communicates with the inner side holes 312 for placing in the first magnets 313; the handle seat 310 further includes an outwards extending flange 315; the flange 315 includes a contact surface 316 parallel to the cross section of the through hole 311; the contact surface 316 is used for bonding with a side surface of the movable door 200 to fix the handle seat 310 in the movable door 200.

[0034] Semicircular hole walls, close to the through hole 311, of the inner side holes 312 have small thicknesses, for example, the thicknesses of side walls, close to the through hole 311, of the inner side holes 312 are about 0.5 mm; and when the thicknesses of the side walls are the value above, the requirement of magnetic attraction force can be met, and a simple production and machining process can be adopted.

[0035] As shown in FIG. 9, the first magnets 313 are cylindrical and are divided into south poles 317 and north poles 318. In other embodiments, the first magnets 313 may be rectangular prism-shaped as required.

[0036] When the first magnets 313 are placed in the inner side holes 312, axes of the first magnets 313 are parallel to directions of the inner side holes 312, and the first magnets 313 may rotate about the axes in the inner side holes 312.

[0037] As shown in FIG. 2, the waterproof piece 320 consists of a first waterproof sheet 321 and a second waterproof sheet 322; and the first waterproof sheet 321 and the second waterproof sheet 322 have a same structure. As shown in FIG. 6 to FIG. 7, the first waterproof sheet 321 includes a sheet body 323 and a groove 324 located at an edge of the sheet body 323. In the embodiment, the grooves 324 are semicircular. As shown in FIG. 8, the first waterproof sheet 321 and the second waterproof sheet 322 are symmetrically stacked and connected; the sheet bodies 323 form baffles 325; outer side holes 326 are formed in inner sides of the grooves 324; and flanges 327 are formed on outer sides of the grooves 324. In the embodiment, the first waterproof sheet 321 and the second waterproof sheet 322 are glued through an adhesive.

[0038] The waterproof piece 320 further includes second magnets 328 located in the outer side holes 326; the second magnets 328 have the same structure as the first magnets 313; and when the second magnets 328 are placed in the outer side holes 326, axes of the second magnets 328 are parallel to directions of the outer side holes 326, and the second magnets 328 may rotate about the axes in the outer side holes 326.

[0039] The working principle of the handle assembly 300 of the embodiment is as follows: when a door needs to be opened and closed, a user can push the waterproof piece 320 in any direction at any position of the waterproof piece 320; as shown in FIG. 10 and FIG. 11, the waterproof piece 320 will move at one edge according to the position and direction of external force, exposing the inner wall of the through hole 311 for contacting, the user applies force to the inner wall of the through hole 311 so that the movement of the movable door 200 is realized, and at this time, the other edge opposite to the edge that moves is still attracted due to the action of the magnetic force, thereby ensuring that the waterproof piece 320 is in contact with the handle seat 310 and is not disengaged from the handle seat 310; and after the external force provided by the user disappears, since the first magnets 313 and the second magnets 328 may freely rotate about the axes, the first magnets 313 and the second magnets 328 may be automatically adjusted to attract the opposite poles due to the action of the magnetic force, and the waterproof piece 320 may be automatically attracted into the through hole 311 no matter any edge of the waterproof piece 320 moves or the waterproof piece 320 moves toward any direction, thereby playing a waterproof role.

[0040] As shown in FIG. 12, an existing handle assembly 330 is generally fixed to the movable door 210 and protrudes outwards from the movable door 210. With regard to a sliding door, the movable door 210 cannot be completely overlapped with the fixed door 110 due to the blocking of the handle assembly 330, thus reducing a space for an access position. As shown in FIG. 13, except for slightly outwards projected portions of the flange 315, the rest portion of the handle assembly 300 of the embodiment is embedded in the mounting hole 201 of the movable door 200. The handle assembly 300 does not form a projection between the movable door 200 and the fixed door 100, and the movable door 200 and the fixed door 100 may be completely overlapped, thus saving the space.

[0041] It is to be understood that the embodiments above are only preferred embodiments of the present invention and are not intended to limit the present invention. For a person skilled in the art, various variations and changes can be made to the present invention. Any modification, equivalent replacement, improvement, etc. made within the spirit and scope of the present invention are intended to be included within the protection scope of the present invention.

Industrial Applicability

[0042] The shower door of the present invention is suitable for on-site assembly in a customer's bathroom, while the handle assembly of the present invention is mainly applied to the shower door, and is particularly suitable for a sliding door. The shower door includes a fixed door and a movable door, and the handle assembly is mounted in a mounting hole of the movable door. With the products of the present invention, the handle assembly of the shower door may provide the beneficial effects of water proofing and space saving, the handle assembly may be easily assembled and mounted on the movable door, and the waterproof piece may swing in any direction and be attracted on the handle seat by magnetic force.

Claims

1. A handle assembly, comprising a handle seat including a through hole, **characterised in that**:

   the handle seat further comprises a plurality of inner side holes and a plurality of first magnets placed in the inner side holes; the inner side holes are disposed in a manner of surrounding the through hole; the first magnets are columnar; axes of the first magnets are parallel to the inner side holes; the first magnets are divided into south poles and north poles in a radial direction and rotatable about the axes in the inner side holes;

   the handle assembly further comprises a waterproof piece; the waterproof piece comprises baffles and flanges located at edges of the baffles; the waterproof piece is placed in the through hole; the flanges are engaged with the through hole;

   the flanges comprise a plurality of outer side holes and a plurality of second magnets placed in the outer side holes; the outer side holes are disposed in a manner of surrounding the baffles;

the second magnets are columnar; axes of the second magnets are parallel to the inner side holes; the second magnets are divided into south poles and north poles in a radial direction and rotatable about the axes in the outer side holes.

2. The handle assembly according to claim 1, wherein holes walls, close to the through hole, of the inner side holes are thinner than hole walls, away from the through hole, of the inner side holes.

3. The handle assembly according to claim 1 or 2, wherein
the first magnets are cylindrical or rectangular prism-shaped; and the second magnets are cylindrical or rectangular prism-shaped.

4. The handle assembly according to any one of claims 1 to 3, wherein
the waterproof piece comprises a first waterproof sheet and a second waterproof sheet;
the first waterproof sheet and the second waterproof sheet both comprise sheet bodies and grooves located at edges of the sheet bodies;
the first waterproof sheet is connected with the second waterproof sheet; the sheet bodies form the baffles; and the grooves form the outer side holes.

5. The handle assembly according to claim 4, wherein the first waterproof sheet is bonded or clamped with the second waterproof sheet.

6. The handle assembly according to claim 4 or 5, wherein
the grooves are semicircular grooves.

7. The handle assembly according to any one of claims 1 to 6, wherein
the handle seat further comprises an outwards extending flange; and the outwards extending flange comprises a contact surface parallel to the cross section of the through hole.

8. The handle assembly according to any one of claims 1 to 7, wherein
the handle seat further comprises lead-in holes communicated with the inner side holes.

9. A shower door, comprising a fixed door and a movable door slidable or rotatable relative to the fixed door, a mounting hole being disposed in the movable door, a handle assembly being fixed in the mounting hole and including a handle seat, and the handle seat including a through hole, wherein
the handle seat further comprises a plurality of inner side holes and a plurality of first magnets placed in the inner side holes; the inner side holes are disposed in a manner of surrounding the through hole; the first magnets are columnar; axes of the first magnets are parallel to the inner side holes; the first magnets are divided into south poles and north poles in a radial direction and rotatable about the axes in the inner side holes;
the handle assembly further comprises a waterproof piece; the waterproof piece comprises baffles and flanges located at edges of the baffles; the waterproof piece is placed in the through hole; the flanges are engaged with the through hole;
the flanges comprise a plurality of inner side holes and a plurality of second magnets placed in the inner side holes; the outer side holes are disposed in a manner of surrounding the baffles; the second magnets are columnar; axes of the second magnets are parallel to the inner side holes; the second magnets are divided into south poles and the north poles in a radial direction and rotatable about the axes in the outer side holes.

10. The shower door according to claim 9, wherein
holes walls, close to the through hole, of the inner side holes are thinner than hole walls, away from the through hole, of the inner side holes.

11. The shower door according to claim 9 or 10, wherein the first magnets are cylindrical or rectangular prism-shaped; and the second magnets are cylindrical or rectangular prism-shaped.

12. The shower door according to any one of claims 9 to 11, wherein
the waterproof piece comprises a first waterproof sheet and a second waterproof sheet;
the first waterproof sheet and the second waterproof sheet both comprise sheet bodies and grooves located at edges of the sheet bodies;
the first waterproof sheet is connected with the second waterproof sheet; the sheet bodies form the baffles; and the grooves form the outer side holes.

13. The shower door according to claim 12, wherein
the first waterproof sheet is bonded or clamped with the second waterproof sheet.

14. The shower door according to claim 12 or 13, wherein
the grooves are semicircular grooves.

15. The shower door according to any one of claims 9 to 14, wherein
the handle seat further comprises an outwards extending flange; the flange comprises a contact surface parallel to the cross section of the through hole; and the contact surface is bonded with the movable door.

16. The shower door according to any one of claims 9 to 15, wherein
the handle seat further comprises lead-in holes communicated with the inner side holes.

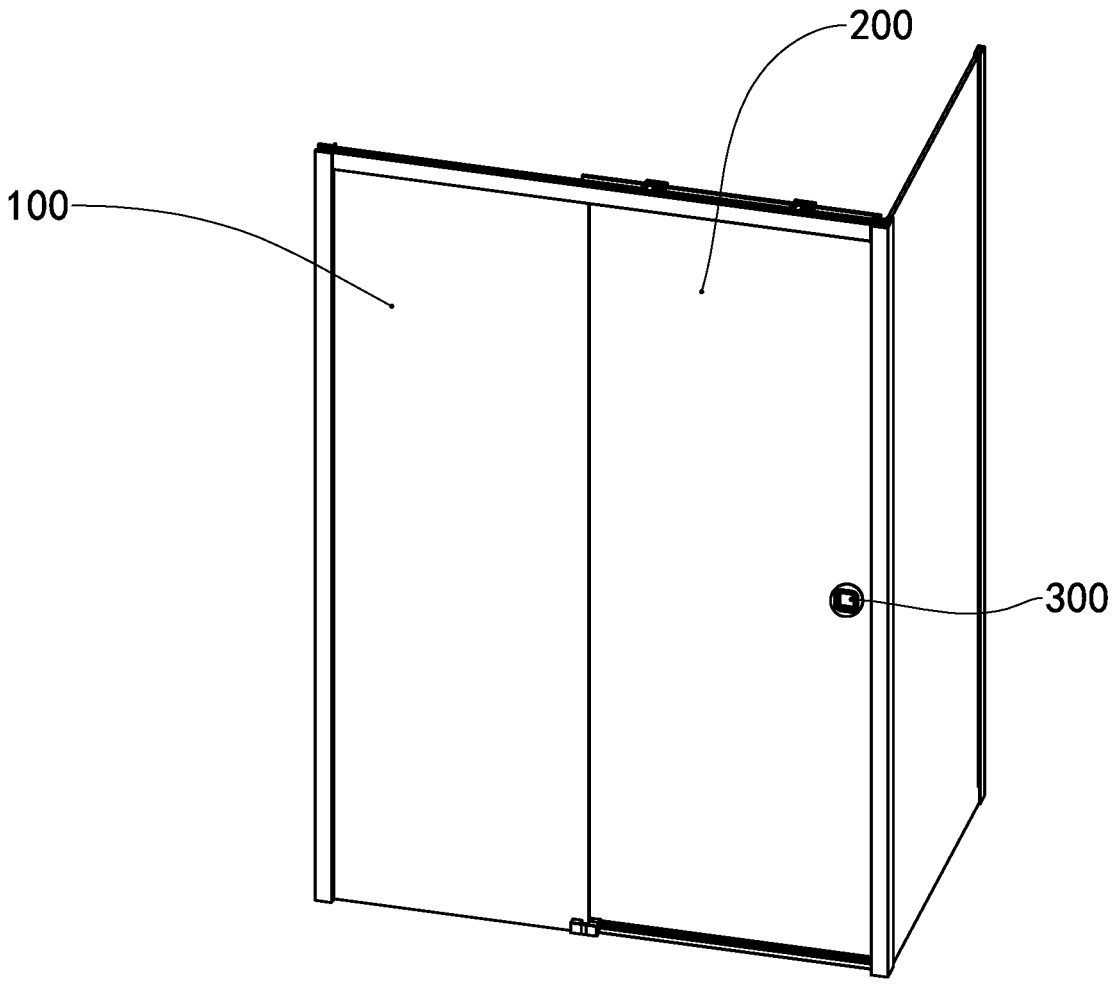

FIG.1

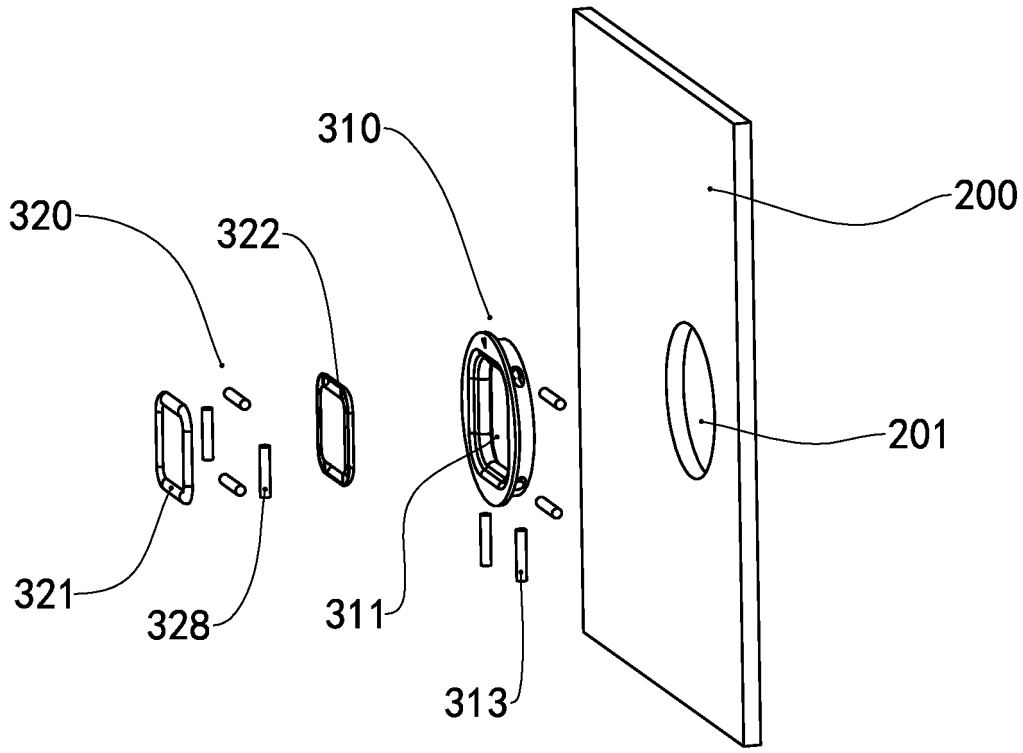

FIG. 2

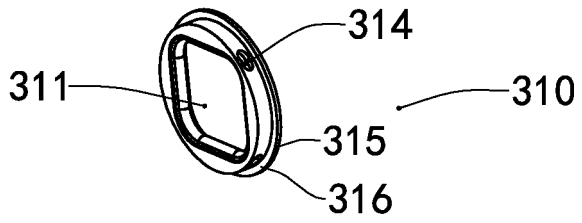

FIG. 3

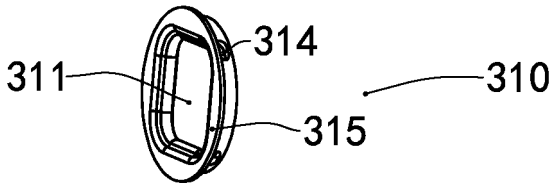

FIG. 4

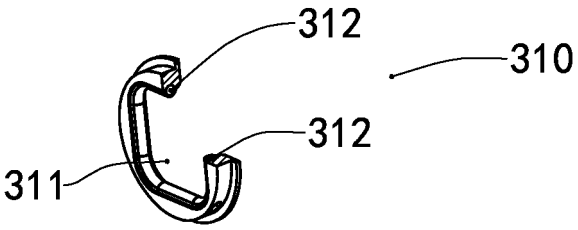

FIG. 5

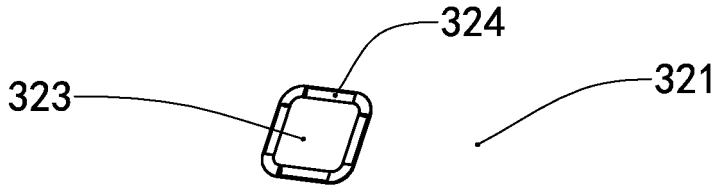

FIG. 6

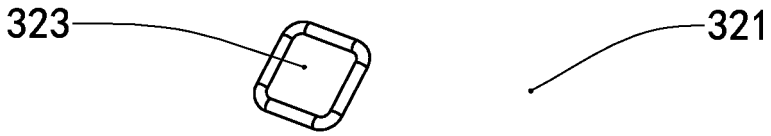

FIG. 7

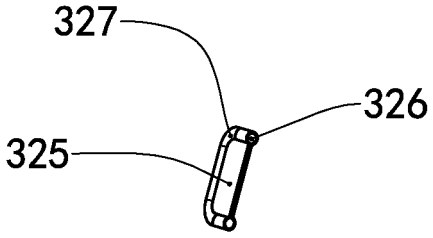

FIG. 8

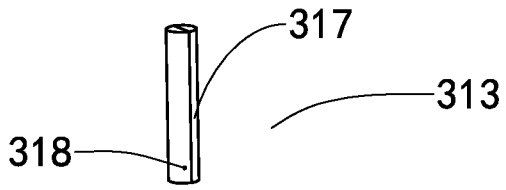

FIG. 9

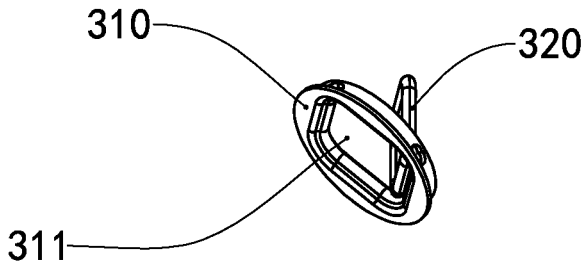

FIG. 10

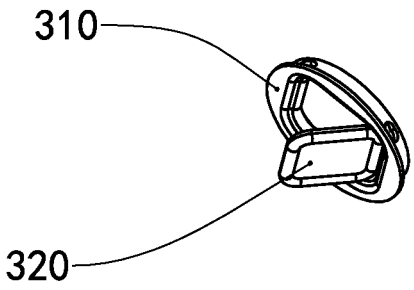

FIG. 11

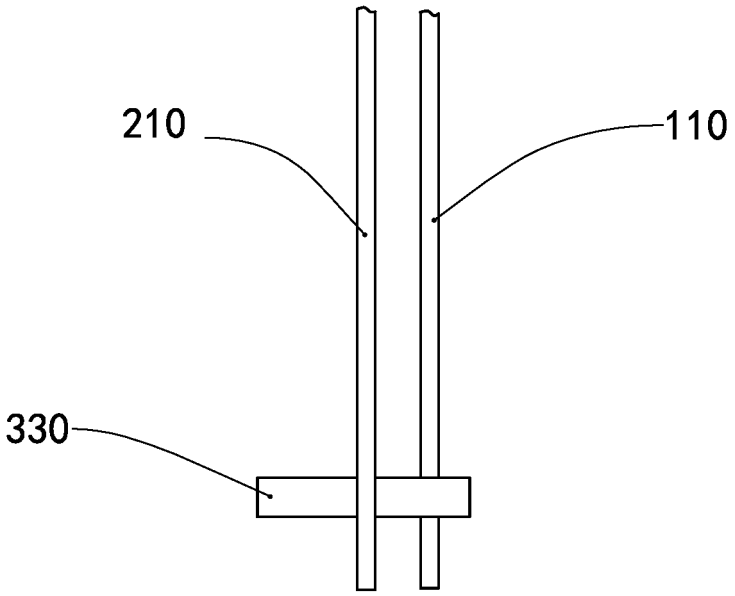

FIG. 12

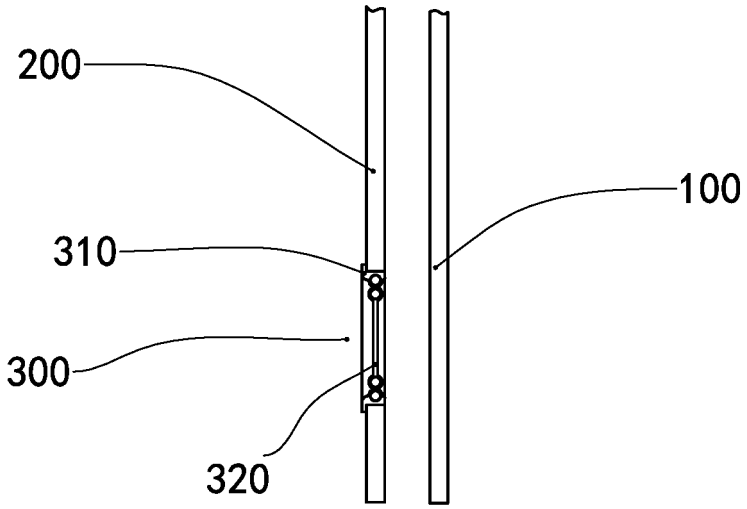

FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/111174

A. CLASSIFICATION OF SUBJECT MATTER

E05B 5/02 (2006.01) i; A47B 95/02 (2006.01) i; E05B 1/00 (2006.01) i; E06B 3/46 (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)

E05B; A47B; E06B; A47H; E05F

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)

CNPAT, WPI, EPODOC, CNKI: 空间, 防水, 方向, 推拉, 合页, 滑动, 门, 拉手, 把手, 磁, 通孔, 暗藏, 内藏, 隐藏, SPACE, WATER, SLIDE, HANDLE, KNOB, TRIGGER, MAGNET, HOLE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	CN 108064318 A (FOSHAN IDEAL SANITARY WARE CO., LTD.) 22 May 2018 (22.05.2018), claims 1-16	1-16
A	CN 203412366 U (QINGDAO AUCMA ULTRA LOW TEMPERATURE FREEZING MACHINES CO., LTD.) 29 January 2014 (29.01.2014), description, specific embodiment, and figures 1-5	1-16
A	US 2007069090 A1 (DRISCOLL, MICHAEL T.) 29 March 2007 (29.03.2007), entire document	1-16
A	JP 2006328872 A (KAKIHARA, YASUHIRO) 07 December 2006 (07.12.2006), entire document	1-16
A	JP H09165944 A (ICHIMURA SEISAKUSHO K.K.) 24 June 1997 (24.06.1997), entire document	1-16
A	CN 204715891 U (XIANGSHAN HUAYANG MACHINERY ACCESSORIES FACTORY) 21 October 2015 (21.10.2015), entire document	1-16

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 July 2018	09 August 2018
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer SHEN, Bin Telephone No. (86-10) 53961048

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/111174

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 108064318 A	22 May 2018	None	
CN 203412366 U	29 January 2014	None	
US 2007069090 A1	29 March 2007	None	
JP 2006328872 A	07 December 2006	None	
JP H09165944 A	24 June 1997	JP 2974052 B2	08 November 1999
CN 204715891 U	21 October 2015	None	

Form PCT/ISA /210 (patent family annex) (July 2009)